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Emerging Milk Exchanges: Human Milk Banking, Sharing and
Technoscience

by

Krista Mary Smith Sigurdson

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Sociology

in the

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by
Krista Sigurdson

DEDICATION AND ACKNOWLEDGEMENTS

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ABSTRACT

Human milk is being exchanged today in ways that are increasingly fraught and contentious. Non-profit milk banks are working hard to keep up with increasing demand from neonatal intensive care units (NICUs) for banked donor milk (BDM); informal exchanges have exploded through the use of Facebook platforms designed for milk sharing and other websites designed for milk selling; and for-profit entities are competing for donated human milk and for hospital-customers of banked donor milk. In this contested space, issues of safety, and the ethical procurement and distribution of human milk are ubiquitous.

This dissertation follows a multi-sited ethnography of non-profit human milk banking, informal milk sharing and the use of human milk in biomedical innovation both in for-profit and academic settings. Drawing on both feminist science and technology studies and situational analysis, I argue that there are two key issues that make contemporary forms of human milk exchange particularly contentious, what I call “the two donor dynamic” and “the problem of commodification”. I argue that the ways value is constructed in the different forms of exchange under consideration negotiate these issues in unique ways that set out moral/ontological understandings about human milk.

Non-profit banking establishes value through logics of surplus, scarcity, safety and care where (for example) donors are cared for and understood as breastfeeding mothers first and donors second and recipients are prioritized according to medical need because of the scarcity of BDM. Informal sharing networks are establishing themselves as forms of biosocial affective economies where a mother’s too much or too little milk can be experienced as breastfeeding problems and informal exchange as a form of relief. I argue that corporate entities and

academic centers developing products from human milk employ promissory understandings of breast milk as that which is both best for a baby and possibly offering biomedical advancement (and sometimes profit).

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Chapter One: Introduction

INTRODUCTION

Breastfeeding and breast milk have occupied considerable attention in American media in recent years. Much content has focused on benefits attributed to breastfeeding, provocative aspects (e.g., extended breastfeeding, breastfeeding in public, or the so-called “breast versus bottle” debates), and social policy issues (e.g., insurance reimbursement for pumps; workplace breastfeeding policies). However, much recent attention to human milk concerns its formal and informal circulations outside of the breastfeeding mother-baby dyad. For example, the media attention followed a controversial effort in 2013 by Medolac, an Oregon-based “human milk nutritionals start-up”, to target African American mothers in Detroit as milk sellers with the promise of economic empowerment.¹ This controversy drew mainstream media attention to human milk circulation in general as evidenced by recent pieces in *Newsweek*,² *The Guardian*,³ and *The New York Times*.⁴

Human milk is exchanged today in a number of ways in the United States. These largely but not exclusively “economic forms” (Zelizer 2011) have considerably overlapping histories, actors, discourses, and contemporary realities. They can be loosely divided into informal sharing/selling, milk banking, and biomedical innovation (or the making of biomedical products out of human milk). Such forms of exchange are not as “new” as they may seem from media reports or from the term “emerging” in the title of this dissertation. Even the commercial use of milk to develop biomedical products for use in neonatal intensive care units (NICUs) by Prolacta (a life sciences company that has received \$46 million in investment from venture capitalists,⁵ has been active in some form since 2000, and gained momentum in 2004, with successful

fundraising.⁶ Moreover, the origin stories of contemporary milk banking and informal sharing go back to the histories of wet nursing and the organization of wet nurse directories in the 19th century (Fildes 1988; Gerstein Pineau 2012; Golden 1996b; Swanson 2014), and the largely undocumented histories of traditional shared breastfeeding practices (Thorley 2009; Thorley 2012).

Statement of the Problem

That said, there does seem to be something “new” occurring worthy of sociological attention. Demand for banked donor milk (BDM) in NICUs has skyrocketed as evidenced by the rapid growth of banks under the auspices of the Human Milk Banking Association of North America (HMBANA). In 2004, HMBANA banks combined distributed 580,768 ounces (HMBANA 2006) while in 2013, they distributed 3.1 million ounces (Sakamoto 2015). The contemporary enthusiasm for banked donor milk (BDM) is attributed to an endorsement by the American Academy of Pediatrics (AAP) (2012) stating that all premature babies should receive appropriately fortified breast milk, preferably a mother's own milk but if not, pasteurized donor milk. This endorsement follows what many neonatologists say they have seen for a long time: that “human milk, not bovine-derived infant formula, is most easily digested and has bioactive factors that assist in gastrointestinal development and provide immunity to infections” (Carroll 2014). In particular, breast milk offers protection against necrotizing enterocolitis (NEC), an often fatal gastrointestinal condition in premature infants (Schanler 2007; Sullivan et al. 2010 cited in Carroll 2014)

Corporate entities like Prolacta and Medolac are capitalizing on this demand by developing a human-milk-based fortifier (Prolacta) and a shelf-stable human milk product

(Medolac) for sale at much higher prices than BDM sold by HMBANA banks.⁷ Prolacta has developed a niche in developing a human milk based fortifier (as opposed to bovine milk based fortifier) and “ready to feed” human milk products that has taken the idea of an “exclusively human milk based diet” to its logical conclusion by eliminating bovine products entirely without eliminating fortification. While Prolacta’s own clinical studies (e.g., Ghandehari et al. 2012; Sullivan et al. 2010) suggest that these products sometimes called “lactoengineered products” (Medo 2013) prevent NEC and hasten a transition off total parenteral nutrition (TPN) (a step towards hospital discharge) in premature infants, other studies debate these claims (Embleton et al. 2013).

While there is the theoretical possibility that these entities could overtake HMBANA banks market share of selling banked donor milk to NICUs, the pressing concern now for HMBANA is the diversion of donor milk away from HMBANA banks⁸ towards Prolacta which makes fortifiers, and Medolac which makes a shelf-stable milk product.⁹ With Medolac paying donors and Prolacta now paying some of its donors (presumably as a way to compete with Medolac for sourced milk), HMBANA banks are feeling considerable pressure in maintaining their supply of BDM as demand increases.

Concerns about competition for sourced milk in milk banking are also exacerbated by the explosion of on-line platforms for informal milk sharing and selling that bypass the formal infrastructures of both hospitals and milk banks. Informal milk exchanges have occurred in the United States in a myriad of documented (Swanson 2009) and undocumented ways and contexts (Thorley 2009; Thorley 2012). Today, however, the ubiquity and popularity of on-line platforms for sharing and selling milk (Perrin et al. 2014), many of which emerged around

2010,¹⁰ are adding new dynamics and patterns that impact all forms of contemporary milk exchange.

One dynamic concerns the safety of milk shared or sold informally. For instance, Health Canada,¹¹ the Food and Drug Administration, (FDA)¹² and HMBANA (in a joint statement with the European Milk Banking Association, EMBA),¹³ all caution against using milk acquired informally because of the risk of pathogen transmission or diversion of milk supply from milk banks. Some cautionary perspectives include references to acquiring milk “over the internet” as an added element of risk (e.g., Landers 2014). Americans have launched and embraced a wide array of on-line informal exchanges of goods and services (sometimes referred to as a “sharing economy”¹⁴) that involve exchanges with “strangers” met on the Internet (e.g., craigslist, taskrabbit, airbnb, freecycle, and the plethora of on-line dating sites). Breast milk sites have now joined them.

Other possible forms of competition or collaboration regarding donation of breast milk lie in other applications for human milk (e.g., stem cell extraction, therapies for cancer, infections or digestive problems, or in the development of functional foods). There is a sense in which the potential uses for breast milk will soon explode alongside a fuller understanding of how such milk functions in infants both healthy and ill. Bruce German, director of the Foods for Health Institute at UC Davis was quoted in *The New York Times* as saying that “We are at the tip of the iceberg for milk”.¹⁵ Two potential applications for breast milk get the most attention. First, HAMLET (Human Alpha-lactalbumin Made Lethal to Tumor) cells found in breast milk have been found to kill different types of cancer cell lines as well as certain bacteria (including antibiotic resistant bacteria – see chapter 6). Second, stem cells have been discovered in breast

milk and research is being conducted to characterize them and discover their function. At this point, such applications are generally seen as complementary to human milk banking and sharing in that they add to the potency of human milk¹⁶ without as yet diverting any sizeable supply. However, that future is an imagined possibility for some stakeholders.¹⁷

The current president of HMBANA, Pauline Sakamoto, and the CEO of Medolac, Elena Medo, have entered the discussion publicly through exchanges in the journal *Breastfeeding Medicine*. This is a unique medical journal that publishes research on breastfeeding for a largely medical audience despite the fact that neither breasts nor breastfeeding constitute a medical specialty.¹⁸ In their first exchange, Medo argued that HMBANA banks cannot keep up with demand for BDM, especially given the need for “lactoengineered” fortifiers made from human milk. Medo (2013:438-41) argues that because of banked donor milk shortages for NICUs, it is time for a radically different approach. She views the prevalence of informal sharing as key indication that women are willing to part with their excess breast milk but want more control of the process than milk banks. Further, she suggests that HMBANA banks have alienated informal sharing mothers by deeming them as engaged in “trafficking.” Instead, she suggests a model where donors can leverage the value of their milk (i.e., be paid) for the benefit of their families and babies if they so choose. She also criticizes a for profit model that does not pay its donors (e.g., Prolacta) as unethical.

Sakamoto, Bar-Yam and Perrin (2014:166-67) responded to Medo’s model through a subsequent letter to the editor of *Breastfeeding Medicine*. They argued that the benefits of lactoengineered products (human milk based fortifiers, currently manufactured by Prolacta) are not as well established as the efficacy of BDM. They assert there is hope for non-profit milk

banking in that milk donation could dramatically increase through remedying the knowledge gap among health care professionals and properly informing potential donors about donation requirements. Sakamoto, Bar-Yam and Perrin (2014) suggest that there are considerable risks to paying donors (e.g., milk adulteration and early weaning). They view Medo's suggestion of payment as Medolac wanting to leverage these mothers' assets for their own profit, rather than wanting to empower mothers to leverage the value of their milk. Lastly, they suggest that paying donors will increase the cost of milk, further dissuading NICUs from using milk. Instead, they suggest, NICUs need to understand the cost savings of using BDM in avoiding NEC and its complications.

Unsurprisingly, Medo (2014:168), who had the last word, took issue with many of these claims. Most interestingly, she painted the stance of Sakamoto, Bar-Yam and Perrin (2014) as one of waiting for "some unidentified group of researchers, health care professionals, milk processing entities, public health professionals, and mothers to make the sweeping changes needed in milk banking practice." She also implied that HBMANA have vested interests in maintaining the status quo. While this is an unkind characterization, it does show a great divide that I found. HMBANA differs from Prolacta regarding the causes of milk shortages. HMBANA places a great deal of value in the "how" of milk banking or that it is done "right" which includes 1) not paying donors, 2) not making a profit from gifted milk and 3) prioritizing recipients with the sickest babies first (see chapters 3 and 4). In sharp contrast, Prolacta placed a great deal of value on the extremely urgent nature of getting the safest and most sophisticated products, given current technoscience, to needy babies immediately, with a happy coincidence of profit making along the way.

I offer this contemporary snapshot of media accounts and journal debates around the proper use of surplus breast milk to set the stage for this dissertation's problem space. There are a number of contentious questions that circulate in the social worlds under investigation. What *is* surplus breast milk? That is, when is breast milk "*extra*" and available for exchange (i.e., not coerced or dangerously incentivized from donors)? What are the proper forms and uses of exchanged breast milk (e.g., pasteurized banked donor milk (BDM), lactoengineered fortifiers, shelf stable banked donor milk, informally shared/sold unpasteurized milk, or breast milk when exchanged through shared breastfeeding or wet nursing)? Last, can/should various economic forms of milk exchange exist simultaneously or are some inherently dangerous or diverting of milk supplies from the most needful infants?

RESEARCH METHODS

This dissertation is a multi-sited ethnography of human milk banking, sharing and the use of human milk in biomedical innovation. It uses situational analysis as a theory/methods package that places the situation as the "ultimate unit of analysis and understanding its elements and their relations as the primary goal" (Clarke 2005:xxii). I have drawn on "basic" grounded theory the inductive development of theory through open coding, the generation of analytic codes and categories, the attention to continuous analysis, and theoretical sampling (Charmaz 2006). But, following Clarke (2005:19), I hope to push grounded theory around the interpretive turn by assuming the multiplicity of knowledges and perspectives; using the situation as my unit of analysis; moving away from representational strategies to complexities, contradictions and heterogeneities; using sensitizing concepts rather than the pursuit of total theory; doing situational analyses through making situational maps, social worlds/arenas maps,

and positional maps; and turning to discourses to expand domains in my research. In what follows I describe how each of these methodological approaches will inform my project.

I follow Clarke's (2005) call for qualitative researchers to situate themselves as immodest witnesses (Haraway 1997), part of a larger trend within qualitative research that asserts knowers – both the researcher and the researched – as embodied and situated. Breastfeeding, as a general area of inquiry, abounds with multiple knowledges and embodied knowers and I consider myself one of them.

Generally, the perspectives represented in public health discourse on breastfeeding are those of researchers who track the health benefits of breastfeeding or seek to understand why certain mothers are (not) breastfeeding. That is, when mothers are attended to in breastfeeding research, it is often to track a health benefit/deficit so as to intervene appropriately. This dissertation operates at the margins of these dominant discourses by attending to forms of breastfeeding or providing breast milk that stretch entrenched conceptions of breastfeeding/not breastfeeding or what it means to “succeed” or “fail” accordingly. Further, given that the human milk exchanges under consideration explicitly involve science, technology, multiple ways of knowing, multiple female bodies and their fluids, this dissertation moves away from an investigation of a singular female body and towards a conception of science, technology, bodies, and knowledges as socially co-constructed (Jasanoff 2006).

Clarke (2005) suggests that to attend to the broader situation of a research project is to add to grounded theory's traditional attention to action and processes, an analysis of “the full situation, including discourses – narrative, visual and historical” (2005:xxxii). This approach is

particularly well suited for this project because the various elements I am pulling together are not intended to form a positivist account of breastfeeding in its entirety. Rather I seek another empirically honest but more post-structural account of a situation, an ethic that Clarke (2005) offers as part of grounded theory's legacy within situational analysis.

Below under the heading "PROJECT DESCRIPTION" I describe the three interrelated social worlds under investigation: milk sharing, milk banking and the use of human milk in biomedical innovation. Within these fields, I have analyzed interview data, field notes, photographs and a variety of collected discursive materials (e.g., brochures, websites, and forms).

Theoretical sampling has been an important tool in this project (Charmaz 2006). That is, focused attention to new data sources that can address theoretically interesting questions has been important because this project is motivated by theoretical questions, rather than the representativeness of the fields under investigation. That is, my research does not presume that my fields are representative of all human milk exchanges within that social world, rather that they are theoretically illuminating. For example, my research on informal sharing offers the development of an affective biosociality of how far some women are willing to go in order to breastfeed or provide breast milk; my research on non-profit milk banking offers some limitations of circulating human milk in a non-profit bioeconomy that have been folded into their economic form; and my research on the use of human milk in biomedical innovation reflects how innovation interacts with lactation research in juggling its entry into a biomedical mode of reproduction.

Following Clarke (2005), my data collection and analysis uses sensitizing concepts, rather than substantive or formal theory. On the other hand, it hopes to avoid, what Clarke (2005:29) calls “analysis lite” where analysis is so specific and cautious that it avoids any relevance whatsoever. The space between over generalization in formal theory and lite analysis exists in: “the possibility of analytic extension of theorizing into other parallel or related situations...through the use of comparisons rather than theoretical formalization and claims of transcendence” (Clarke 2005:29). In future iterations, this dissertation on emerging milk exchanges offers itself up to comparison with or analysis alongside other overlapping social worlds and situations such as reproductive health, women and maternal health, the bioeconomy in its various forms, especially, but not limited to innovation based on human derived products/tissues/fluids.

In addition to using grounded theory modes of coding data, and categorizing codes through memo writing, diagramming and reflection (Charmaz 2006), I have used the three modes of situational analysis offered by Clarke (2005:83) in order to continuously contextualize and “open up” my research findings: situational maps, social worlds/arenas maps and positional maps. Relational analysis with situational maps has been a particularly fruitful tool for my project since this dissertation analyzes diverse parties and fields that are not necessarily in communication with each other but nonetheless have “relationships”. Social worlds/arenas maps themselves have served my project in identifying patterns of “collective commitment” and “salient social worlds” (Clarke 2005:110) in my studied fields. Further, I hope these tools have served to find differences and variations within the different social worlds under analysis. Additionally, positional maps have served my analysis on issues that are particularly divisive

within the area of human milk exchanges and the identification of “the two donor dynamic” and “the commodification problem” (discussed below).

Situational analysis has been particularly adept at integrating the analysis of data that goes beyond interview transcripts and field notes. This project incorporates analysis of visual and textual materials collected from websites and newsletters as well as conferences and in-person interactions.

This dissertation follows in the footsteps of many scholars in STS and elsewhere who have incorporated non-human actors or “actants” explicitly into their analyses (Clarke 2005:60). As Clarke (2005) points out, this strategy can be traced back to Foucault’s (1970) genealogical method in *The Order of Things* and also in the frameworks offered by symbolic interactionists (e.g., Blumer 1969). Actor-network-theory (ANT) offers an explicit theoretical articulation of how this emphasis can be employed that has been profoundly influential on STS (e.g., Latour 1987). Clarke (2005:61) summarizes an ANT approach as:

The analytic task (much simplified) is to follow the leaders, describe what they do (including production of and interaction with the nonhuman), how they (both human and nonhuman) interest potential allies through translations of what they have to offer to meet potential allies’ needs, and then enroll them as allies in the actor-network through a funneling process.

This dissertation, however, incorporates feminist critiques of ANT as extremely provocative and helpful in establishing a way to follow and analyze human milk while attending to the uneven consequences of some agencies over others (Clarke 2005:60). Clarke and Montini (1993) stress, for instance, the importance of attending to the instability and multiplicity of non-human actors as well as implicated actors (such as downstream users of a technology). Similarly, Star (1991) critiqued ANT for offering a managerial or entrepreneurial model of

networks. Instead, she stresses a heterogeneity of multiple memberships/marginality as well as an analysis that questions “who benefits” rather than flattening a network to its various actors, as though they are all equal.

The topic of this dissertation is well suited to an emphasis on non-human actors that emphasizes instability, multiplicity, contestation, invisible users and questions who benefits. The fact that human milk exists at the human/non-human boundary, particularly the female/non-human binary (e.g., Casper 1998) as that produced and emitted by a human to be consumed by another human invites these complications.

DESCRIPTION OF RESEARCH

This dissertation addresses the following questions with regard to case studies in informal milk sharing, milk banking and the use of human milk in biomedical innovation. How and why is milk exchanged in these different social worlds or economic forms? How is value made and contested within and across these forms of exchange? In answering these questions, I describe exchanges in capital (i.e., finances), affects (i.e., emotions), materials (i.e. things and bodies), science (i.e., scientific ways of knowing), epistemologies (i.e., technoscience and “other” ways of knowing), ontologies (i.e., meanings attached to things) and moral understandings (i.e., perceptions and enactments of what is right and wrong) exchanges.

This dissertation reflects a process of *discovering* and following patterns of milk circulation or exchange that became apparent to me while conducting research. As such, there are some research directions that I began, but did not pursue and others that I discovered along the way, and ended up as major foci. This reflects a commitment to following an actant (human milk) and its’ multiple constructions within the exigencies of accessibility and a grounded

theory/situational analysis approach that offers a method for theoretical sampling and theoretical saturation.

Initially, this project explicitly followed a range of human milk exchanges that are marginal in that they differ from what is typically understood as “breastfeeding”. For instance, I worked to recruit transgender men who breastfed, adoptive and/or lesbian mothers who induced lactation, parents who used wet nurses or mothers who acted as wet nurses, parents who use breastfeeding devices and pharmaceuticals to lactate, as well as parents (usually mothers) who sold/donated or used shared/sold milk or banked donor milk. What I discovered was that these phenomena in isolation were extremely difficult to access. However, when these phenomena overlapped with the social worlds of milk sharing, they became increasingly accessible to research. Additionally, I discovered that milk sharing worlds represent *communities* with participants who eagerly wanted to share their stories as well as their milk.

Below, I provide a list of the participants I interviewed and the types of participant observations I conducted that inform this dissertation. Some of the participants and participant organizations consented to being identified while others selected to not be identified through the use of pseudonyms. In cases where it would be impossible to identify one participant (organization) without in effect identifying another who wanted to remain anonymous, I used pseudonyms for both. This list is organized into the three major social worlds or economic forms but it should be noted that there is considerable overlap (or ambiguity) among these worlds and the actors/actants involved. For example, Prolacta, the life sciences company that has long marketed a human milk based fortifier (grouped under biomedical innovation), is also often considered a milk “bank” in that they operate so called “banks” that collect milk and they

are forming partnerships with hospitals so that they can distribute BDM, not just fortifier, hence are now explicitly entering the BDM market. The limitations of my case studies or field sites and interviewee sampling are discussed in the final chapter.

Milk Banking Worlds

Mothers' Milk Bank (MMB)¹⁹

- 6 In-person in-depth interviews (some interviewed multiple times, or interviews lasting multiple conversations) with staff and directorship at MMB taking place between November 2011 to August 2013.
 - o Medical director, director, two donor coordinators, recipient coordinator, lab tech. See interview guides (see appendix B).
- Participant observation at the MMB.
 - o Weekly ethnographic visits from November 2011 to June 2012 and one return ethnographic visit in August 2013. During these visits, I volunteered (primarily packing milk for distribution), spoke with staff and observed operations. Collected materials when available (e.g. donor agreements packages, flyers, etc.).
 - o Attended focus group held with donors, recipients and staff in June 2012 regarding how to improve donor recruitment, branding and MMB website.
 - o Took permitted photographs at the MMB.
 - o Attended a "Miracle Milk" Stroll in support of milk donation May 2014.
 - o Observed the old and new MMB website as well as increased Facebook and social media presence from November 2011 onwards.
- 18 In-person in-depth interviews with MMB donors and recipients from November 2011 to November 2011.
 - o 7 interviews with MMB donors (a small number done over the phone or Skype).
 - o 11 interviews with MMB recipients (2 received BDM in the NICU, 8 received BDM as out-patients, and 1 received milk in both settings). (a small number done over the phone or Skype).
 - o See interview guides (see appendix B).
 - o All donors and recipients were asked to complete a demographic questionnaire (see appendix C).

- 4 In-person in-depth interviews with lactation consultants at a San Francisco Bay Area hospital maternity ward (Northern Hospital, pseudonym) where BDM from the MMB was in the process of being introduced into their NICU and also from which MMB donors had long been recruited.
 - o Toured the facility and observed storage and delivery of milk.
- 1 In-depth phone interview with a lactation consultant at a San Francisco Bay Area hospital that uses Prolacta fortifier and BDM.

Iowa Mothers Milk Bank (Iowa MMB)²⁰

- 3 In-person in-depth interviews with staff and directorship taking place over 3 days in May 2013 during an ethnographic visit.
 - o 1 staff member (responsible for donor and recipient coordination, serology testing and lab work), 1 executive director 1 medical director interviewed.
- Participant observation at the Iowa MMB
 - o Spent 3 days observing staff operations at the MMB including driving to pick up milk, organizing incoming milk donations and processing milk for distribution.
 - o Observed Iowa MMB website and available promotional materials (pamphlets, posters etc.).
 - o Took photos when permitted.
- Interviews and observations at the University of Iowa NICU (the Iowa MMB is within the University of Iowa and supplies this NICU with BDM).
 - o In-person in-depth interviews with NICU staff: 2 neonatologists (Eckhart Ziegler, the past medical director of the MMB of Iowa and Tara Colaizy the current medical director of the MMB) and 1 dietitian.
 - o Participant observation in the NICU (given tour, observed milk delivery to premature babies, informal conversations with staff members).

B.C Women's Provincial Milk Bank²¹

- 1 In-person in-depth interview with the executive director, Frances Jones taking place July 2012.
- Participant observation through a tour of milk bank processing facility.

Human Milk Banking Association of North America (HMBANA)

- Participant observation at the 2012 HMBANA Conference in Las Vegas entitled “Embracing Human Milk in the 21st Century: Practice, research and results.” Listened to talks, toured the promotional booths, etc.
- Collecting and reviewing HMBANA newsletters from 2006 onwards.
- Observing HMBANA website and press releases therein.
- 1 In-person in-depth interview (over a period of 2 days) with Dr. April Fogleman, a Professor of nutrition science who has worked closely with HMBANA banks, especially MMB and is currently on their Board of Directors.
- Multiple interviews with then-past, now-current president of HMBANA Pauline Sakamoto (also director of MMB). (listed above)
- Multiple interviews with then-president of HMBANA Jean Drulis (also executive director of MMB of Iowa). (listed above)
- 1 Interview with Frances Jones, past-president of HMBANA (also director of BC Women’s Provincial Milk Bank). (listed above)

Milk Sharing Worlds

Informal Milk Sharing Participants

- 18 In-depth in-person interviews with recipients of informally shared milk (a small number done over the phone or Skype). Between October 2011 and February 2012.
- 18 In-depth in-person interviews with donors of informally shared milk (a small number done over the phone or Skype). Between October 2011 and February 2012.
- 1 In-depth Interview with a mother whose breast milk was rejected in an informal sharing arrangement.
 - o There is overlap between donors and recipients because 3 participants had been both donors or recipients in the past and are counted in both groups.
 - o Most of these participants bottled their milk for sharing, however 3 of the participants also cross-nursed or used shared breastfeeding in addition to sharing bottled milk.
 - o Many of these participants used lactation devices or induced lactation through pumping or medication.
 - o These participants shared milk through a variety of websites or in-person
- 4 In-depth in-person interviews with milk sharing organizers from Human Milk 4 Human Babies and The Bay Area Breast Milk Cooperative.
- 1 In-depth Skype interview with a milk sharing advocate/blogger.
- Participant observation at the time of interviews in parents’ homes (e.g. having them show me stashes of milk, herbal supplements, breastfeeding logs or other relevant equipment. Photographs taken with permission.

- Participant observation at a “nurse-in” held at Facebook headquarters in Menlo Park, CA protesting Facebook’s removal of breastfeeding images where many milk sharing mothers were in attendance. Photos taken with permission.

Biomedical Innovation Worlds

Prolacta Biosciences

- 3 In-depth in-person interviews with executives at Prolacta Bioscience in Monrovia, LA. Conducted on two visits (November 2012 and January 2013).
- Participant observation through an extensive tour of processing plant.
- Observation of Prolacta’s website and other promotional materials (flyers, posters, Facebook site).

Hakansson Research Group and HAMLET

- 4 In depth in-person interviews with scientists working in the Hakansson Research Group in Buffalo, NY.
- Participant observation through observing scientists working in the lab, on grants, and with animal models.

Bennett Research Group and GHMLRS

- 3 In depth in-person interviews with scientists who work(ed) in the Bennett Research group. These took place over two visits, one (February 2012) to an American University where a research partnership was underway. Others took place in conjunction with the Global Human Milk and Lactation Research Society (GHMLRS) meetings in Trieste Italy (September 2012).
- Participant observation through attending the GHMLRS meetings. Listened to talks, observed promotional booths, etc.

Documentary and Related Scientific Sources

In addition to these social world-specific data sources, I read contextual organizational and scientific documents such as HMBANA newsletters, Prolacta newsletters, milk sharing and lactivist blogs, clinical research papers on the use of BDM and human milk based fortifier, and scientific research papers in the areas of HAMLET, and stem cells in human milk.

SENSITIZING THEORIES and CONCEPTS

This dissertation is in conversation with a number of theories and concepts developed in medical sociology, medical anthropology and STS (science and technology studies). Here, I offer an outline of some of these concepts and traditions that inspired my work and to which my work contributes.

In their work on tissue economies, Waldby and Mitchell (2006) suggest that in today's world of rapidly expanding economies of tissue exchange, we have come to see ourselves as capable of biotechnical fragmentation through the donation of a range of tissues (blood, organs, egg, sperm, etc.). Further, according to Waldby (2002), new circuits of biological exchange are not only commercial and therapeutic, but also relational and social, bearing new forms of fragmentary and/or interrelated personhood. Waldby and Mitchell (2006) developed a theory of "technicity" wherein a tissue's shape in a tissue economy is "described at the intersection of the material qualities of tissues – their location and function in the body, their durability, their immunological specificity – with the kinds of technology available to procure, potentiate, store, and distribute them" (Waldby and Mitchell 2006:32). Participation in such economies means that the value of the human body as outside relations of commerce is discursively replaced. Breast milk in the exchanges analyzed in this dissertation displays both these features of technicity, the material qualities and the technologies available for their exchange.

In his analysis of the "markets in body parts" (a descriptor he uses reluctantly given his deconstruction of each term), Hoeyer (2013) further destabilizes how we might understand tissue economies. He suggests that "technologies using and engaging with 'the human body'

challenge ideas about body boundaries at both an ontological and an epistemological level” with body boundaries as never-given and under constant (re)establishment, biologically and culturally. He sees questions of body boundary-making (e.g., when is something “part of” a “body” and when is it not?) as situated empirical/historical questions. In this way, tissue exchanges in this way, are significant determinants in the “establishment of our understandings of bodies and their relationship to persons” (Hoeyer 2013:vi).

However, tissue exchanges are not the only place we might look to understand how these determinations are made and entrenched. Hoeyer (2013) suggests that markets *themselves* represent “historically specific understandings of exchange” that involve ideas and enactments about what *can* and *cannot* be exchanged. That is, markets, *and circulating ideas about what a market is/should be*, “create special tension in relation to objects moving in and out of the bodily space we identify as persons” (Hoeyer 2013:vi). He offers a way of analyzing tissue exchange that avoids reifying either “the body” or “the market”. This dissertation represents an attempt to explore this ontological/moral tensions of milk moving in and out of the bodily space we identify as lactating women in human milk exchanges.

Further, I take up Hoeyer’s (2013) suggestion of using the term “exchange” instead of “economies” or “markets” in order to be open to the highly nuanced range of meanings, and actions that I observed in human milk exchanges. For example, I observed market-like meanings and actions, but also state-like and gift-like meanings and behaviors. In chapter 5, I use the term “redistribution” to mark how milk sharing meanings and actions operationalize a form of lay-redistribution. However, technically the term “redistribution” is imprecise given that it

implies a call for state-based redistribution of an unjustly apportioned good to a disadvantaged population.

Additionally, using the term “exchange” instead of economies or markets opens up my analysis to forms of valuation that do not presuppose that human milk moves back and forth between commodity and gift states (“a scale which frames value and meaning according to market thinking”) (Hoeyer 2013:20). There is a lengthy sociological and anthropological history of attending to the variety of scales of value things can exist that are not strictly economic (e.g., things “can be sacred or profane; symbols of power, sexuality, or commemoration; or viewed as life-saving resources, means for knowledge production, or causes of infection”) (Hoeyer 2013:20). Furthermore, to “give” has many meanings and functions open to cultural and individual variation (Hoeyer 2013:20). For example, “in his seminal essay *The Gift: The Form and Reason for Exchange in Archaic Societies*, Marcel Mauss argued that gifting is a basic institution involving a threefold obligation: to give, to receive, and to return. Exchange therefore involves more than material redistribution; it revolves around construction of relations” (Hoeyer 2013:20).

Despite this tradition of understanding the gift as that which involves a benefit to givers through *reciprocity and the solidification of relations*, many forms of tissue exchange have entrenched versions of giving that emphasize the lack of return to the giver for ethical and safety reasons. This stems from a strict division employed between gifts and commodities wherein commodifying tissue at the point of procurement risks: 1) infringing on a donor’s dignity; 2) exploiting a donor; 3) masking commodification; or 4) negatively influencing the quality of donations (Hoeyer 2013). Most famously, Titmuss (1971) compared American

(primarily for-profit) to British (non-profit) blood transfusion systems finding a higher contamination rate in for-profit organizations, he explained that donors were motivated by money rather than care for recipients (Hoeyer 2013). Today, “the need for reliable donor information...serves as one of the prime arguments for the current global shift in policies toward ‘gift models’ in blood and tissue procurement” (Hoeyer 2013:17).

Numerous scholars (Almeling 2010; Franklin 2005; Franklin 2006; Gerstein Pineau 2012; Thompson 2005; Thompson 2007; Thompson 2008; Waldby and Mitchell 2006) have undermined a strict distinction between gifts and commodities in contemporary tissue economies. For example, In her ethnography of sperm and egg donation Almeling (2010) found “the market for sex cells [sperm and eggs], incorporates both financial compensation and the language of donation” (Almeling 2010:11) much in the same way that early milk banks paid “donors” and heavily framed milk selling as donation (Gerstein Pineau 2012) (see chapter 2 for further discussion). Almeling (2010) used the sex-specific donations of sperm and egg to analyze how “biological bodies, economic mechanisms and gendered cultural norms interact within the structural context of donation programs to produce variation in the organization of the market, both in terms of how sex cells are valued and in the expectations placed on egg and sperm donors” (10-11). Likewise, she addresses the variation in men and women’s experiences of bodily commodification.

While human milk donation is undoubtedly a gendered phenomena, there is no equivalent male-sexed donation that is subject to the same dynamics of being a form of nutrition for an infant. Historically, blood donation, was compared to milk donation and Swanson (2009) offers an insightful comparison where blood selling was seen in the early 20th

century as done by “men of business” whereas women selling milk were seen as supplementing her family’s income rather than obtaining the basic necessities of life. Although my current analysis does not offer a comparative male bodily donation program, it does evoke gendered cultural norms around motherhood (discussed below) that are not equally applied to fatherhood. The comparable form of exchange that runs through this dissertation is breastfeeding *itself* which as a form of maternal care work anchors many gendered beliefs and ideologies.

This dissertation analyzes breastfeeding and breast milk as gendered phenomena that tell us about contemporary embodiments of motherhood, but these embodiments are not simple, static, or universal. Gender is much more co-constructed than an elision between, motherhood (or women) and breasts, breast milk would suggest. That is, understandings of gender develop and change through social interactions and are not universally tied to breasts, breastfeeding, breast milk or motherhood. A number of donors and recipients that I interviewed did not conform to essentialist versions of gender or sexuality and their stories can be read as shorthands for various embodiments and co-constructions of gender and sexuality.²² Illustrative examples ran through my research and included: a single gay adoptive father who collected informally shared breast milk acquired through a lactation support group for mothers; an informal recipient who had had a double mastectomy following breast cancer, used a gestational surrogate, did not breastfeed (nor induce lactation) and spoke of the upsides of this bodily limitation; two parents in a co-parenting trio who sought out informally donated breast milk after one of them (a female to male transgender man) was unable to breastfeed exclusively despite enormous efforts.

Theories and articulations of biomedicalization (Clarke et al. 2010b; Clarke et al. 2003) are also important theoretical underpinnings for this dissertation. Biomedicalization theory originated in theories of medicalization, with “medicalization” defined as the “processes through which aspects of life previously outside the jurisdiction of medicine come to be construed as medical problems” (Clarke et al. 2003:161). Clarke, Shim, Mamo, Fosket and Fishman (2003) add “bio” to invoke Foucaultian analysis of biopolitics and to signal the intensification of medicalization through the “transformation of the human and non human made possible by such technoscientific innovations as molecular biology, biotechnologies, genomization, transplant medicine and new medical technologies” (162).

Clarke et al (2003) offer five key interactive processes that “both engender biomedicalization and are produced through it.” Although all of the shifts they describe are pertinent to this dissertation, four are particularly salient: 1) the political economic reconstitution of the vast sector of biomedicine; 2) the increasingly technological and scientific nature of biomedicine; 3) the focus on health, risk, and surveillance; and 4) the transformations of bodies and identities.

In this dissertation I use both concepts of “biomedicalization” and “medicalization”, particularly when it comes to milk banking because it is thought by many to be *under-medicalized* and still moving towards increasing medical legitimacy and technoscientific sophistication. Breastfeeding, breast milk and BDM all experience elements of biomedicalization but none in a uniform, all encompassing fashion consistent with Clarke and colleagues (2010a) analysis of countertrends and complications, such as ambivalence, resistance, or countermovements.

First, under the theme of “the political economic reconstitution of biomedicine”, Clarke and colleagues (2003) note both the increasing corporatization and commodification of health care and the increasing devolution/rationalization of services alongside their stratification. Given this observation, it could be argued that milk banking might skip “medicalization” and be directly “biomedicalized” but that is yet to be determined. That is, this dissertation was done just as milk banking is in the process of increasing corporatization (i.e., Prolacta or Medolac are threatening to overtake non-profit milk banks) and the non-profit milk banking sector is growing. If corporate entities overtake non-profit banks, it will have been before non-profit milk banking achieved a high degree of state-based medically-focused financial support²³ or thorough distribution in the United States (Parker et al. 2013). Access to BDM originating in the economic form of non-profit milk banking is uneven and stratified according to bureaucracies, some tacit and some explicit, as well as parents’ willingness/ability to pay. I argue in Chapter 4 that a form of “moral exchange” in non profit milk banking emphasizes the milk bank’s role in proper allocation rather than the milk bank’s role in assuring adequate volume for all potentially deserving babies.

Second, Clarke and colleagues (2003) suggest that “the increasing technoscientific nature of the practices and innovations of biomedicine are, of course, key features of biomedicalization” (173). There are aspects of overt technoscientific expansion and innovation that run through this dissertation (especially Chapter 7). At the same time, chapter 5 on milk sharing reflects the blending of decidedly non-technoscientific “natural” ideals (i.e., milk sharing as avoidance of “artificial” formula pursuant to the goal of “natural” breastfeeding) with technoscientific tools (the use of social media, and email listservs to facilitate milk matches).

Chapters 4 and 5 on non-profit milk banking reflect cautious uptake of new technologies (e.g. social media, and milk analysis technologies) within a commitment to low-tech ways of doing things (e.g., the same pasteurization techniques have been used for decades).

Third, Clarke and colleagues (2003) note the increasing focus on health, risk and surveillance within a shift to biomedicalization including a redefinition of health as that which becomes “an individual goal, a social and moral responsibility and a site for routine biomedical intervention” (171). This shift that involves health as something to be worked towards, no longer taken for granted. alongside another shift Clarke et al. (2003) note is particularly useful for this dissertation. Fourth, biomedicalization involves transformations of bodies and the production of new individual and collective identities, including new genres of technoscientific identities or (“new genres of risk-based, genomics-based, epidemiology-based, and other technoscience-based identities”) (180). They connect this idea to (among others), Rabinow’s (1992) concept of “biosociality” that “underline[s]...the certain formation of new group and individual identities and practices arising out of these new truths” (241-42). These combined shifts (health as moral obligation and the production of new and individual identities) run through the entirety of this dissertation. But, they are most explicitly explored in chapter 5 through the moral imperative that some women feel to breastfeed (as their healthiest choice) and their turn to a collective solution (milk sharing) as a way to succeed in fulfilling its imperatives. In particular, chapter 5 takes up milk sharing as a form of biosociality through the sensitizing concept of “affective economies” (Ahmed 2004) discussed there.

These biosocial identities and practices (usually) involve the practices of mothers and identities of “motherhood”. Motherhood, itself, is subject to gendered, raced and classed

cultural norms discussed in chapter 2. Briefly, Hays (1998:14) argues that today we are within an ideology of “intensive motherhood” whereby good mothers not only put their children’s needs first, but provide labor and emotion-intensive care to protect them from a harsh impersonal market-driven society. However, it has been well argued that this ideal is premised on access to racial and class privilege (Arendell 2000; Mason 2015), rendering beyond the possible for many mothers. As such, it is unsurprising that many of the mothers I interviewed informally sharing milk in the San Francisco Bay Area were from privileged demographics.

The mothers I interviewed who are informally sharing milk have adopted identities of health consciousness and self-surveillance while other less privileged mothers are encouraged to do so through state-funded programs such as WIC (Women Infants and Children). In her study of WIC, Mason (2015:1) uses theories of neoliberalism and biomedicalization to argue that the Women Infants and Children program (WIC) “aims to produce health-conscious, self surveilling subjects....through tactics of habituation, responsabilization and empowerment” and that these strategies increase mothers’ inclination to adopt WIC-approved health norms [i.e., breastfeeding] and practices as their own, and disguises (but does not eliminate) the workings of state power.

Milk banking, I would argue, represents a much more diverse collective of mothers. While MMB donors appear to come from privileged backgrounds, they are racially and ethnically diverse (Gerstein Pineau 2012). Recipients themselves are even more diverse. While many outpatients pay out of pocket and are likely affluent, a great number of outpatients are on MediCal. In-patient babies who have access to BDM are less likely to come from safety net hospitals (Parker et al. 2013) and therefore do represent a degree of affluence. However, BDM

in general, is apportioned first to premature babies, many of whom are African American and/or from low income families (Casper and Moore 2009). This stratification – that many NICU recipients are premature babies who come from low-income African American families – is largely rendered invisible within the milk banking infrastructure. That is, my research took place in milk banks, with donors and (mostly out-patient) recipients. I observed no reference to this underlying stratification. I find it fascinating that milk banking, like other biomedical products and pharmaceuticals can be easily depoliticized in its circulation, even when its reasons for existence may link to issues of social, racial and economic justice.

Human milk exchanges represent technologically mediated forms of care. This care can emphasize scarcity and care *for* the milk itself through its proper handling/purification in a chain of custody (see chapters 3 and 4). It can emphasize care *for* mothers and babies in biosocial affective economies (see chapter 5). And it can this emphasize care for mothers and babies through an *alignment* of biomedical reproduction and the need to produce *enough* BDM and fortifier to avoid BDM shortages or unnecessary deaths given technoscientific advances (see chapter 6). These analyses reflect a tradition in STS and related disciplines to avoid seeing care and technology as mutually exclusive concepts or forms of social life (Boris and Parrenas 2010a; Ducey 2010). As Ducey (2010) points out, caring labor is often depicted as unique in its non-technological character through emphasis solely on its corporal elements. To de-emphasize technologically mediated forms of care, however, is to “offer little resistance to the gendered notion of caring labor as primarily emotional and innate [and to] disguise material shifts in the nature of contemporary sociality” (Ducey 2010:19).

This move to re-vision technology and care together exists within an overall move to attend to the intersection of care and money, or intimacy and money, as exists in many forms of contemporary care work (e.g., sex work, domestic work, etc.) (Boris and Parrenas 2010b). This has been, most famously explored in the work of Hochschild and others (e.g., Ehrenreich and Hochschild 2004; Hochschild 1979; Hochschild 2003). I follow Zelizer (1985; 2011) in her view that markets and social life are inextricably intertwined and that commodification is not inherently detrimental. Zelizer's work has spanned "the emerging market for life insurance, the changing cultural and economic value of children, and the social and legal interpretations of monetary exchanges in intimate relationships. Based on this research, she has formulated a sociological model of markets in which economic, cultural and structural factors interact" (Almeling 2010:7). In particular, I use her concept of "distinct economic forms" (discussed below under the heading "the commodification problem") to conceptualize human milk exchanges as offering simultaneous, interactive, forms of exchange that incorporate value scales that are both market-like, gift-like at other times, and may also exist on other scales.

This dissertation follows the tradition in STS, sometimes called "Ontological Feminist STS" of attending to ontologies (or theories about being and reality) through investigation of the connections between science, technology and the world (Thompson 2005). This theme in STS originates in Actor-Network Theory (see above) (Thompson 2005) but has since developed a decisive feminist emphasis through the work of Donna Haraway, Susan Leigh Star, Adele Clarke, Charis Thompson and many others. Haraway's concept of "situated knowledges" or the view that all knowledge is situated and that "objectivity actually depends on partiality rather than universalism and transcendence, and on embodiment rather than disembodied knowing"

(Thompson 2005:49) is particularly important. That is, this dissertation follows ontologies of human milk in their partiality within specific socio-technical networks and gendered/raced/classed ideologies of motherhood and breastfeeding.

This dissertation deeply engages is Thompson's (2005) concept of "ontological choreography," the dynamic coordination of "technical, scientific, kinship, gender, emotional, legal, political and financial aspects" (9). In human milk exchanges, this also involves moral understandings of what markets can/should be as well as what breastfeeding is/should be (see below on "the commodification problem" and "the two donor dynamic").

In chapter 7 I offer Thompson's (2005) concept of biomedical reproduction as a way into the use of human milk for biomedical innovation. Thompson (2005) traces an overlapping shift from a capitalist mode of production to a "biomedical mode of reproduction" wherein reproduction is put to work in an industrial sense with its own "characteristic systems of exchange and value, notions of the life course, epistemic norms, hegemonic political forms, security and hierarchies and definitions of commodities and personhood" (248). Overall, chapter 7 is a provocation to re-view the other chapters. Human milk, like other tissues (e.g., sperm and eggs) circulates in a range of competing/collaborating socio-technical-economic forms. But there is also a uniqueness to breast milk that is explored here.

OVERVIEW OF THE DISSERTATION

I have found there to be two overarching dynamics permeating the exchanges under investigation and are negotiated therein. I conceptualize these as "the two donor dynamic" and "the commodification problem" in order to mark them as issues that logics of surplus, scarcity, care, and safety are contending with.

The two donor dynamic concerns the centrality of the mother/baby dyad in infant feeding and signifies the fact that when a mother donates breast milk, her baby is also “donating” his/her milk and when a recipient baby receives donated milk, his or her mother is also “receiving” a replacement for her breast milk. One way to think of this is that breastfeeding itself is *always already* an exchange between a mother *and* her baby (see Cassidy 2012). In its most generalizable form, this dynamic concerns how the exchanges under consideration contend and negotiate with breastfeeding and lactation worlds in general.

This dynamic is a unique attribute of breast milk because it is a *food* produced *as-needed* and always already designed for *exchange* through an interaction between a mother and baby. This interaction is variably experienced and understood as natural and pleasurable but also laborious, painful and technologically mediated. The quintessential naturalness or primacy of the mother/baby dyad and the sacredness of breastfeeding as integral to that relationship (Kukla 2005) form part of our understanding of breastfeeding. Like other areas of social life where substitutive care is concerned, human milk exchanges that deviate from breastfeeding are usually deemed of and enacted as lesser versions of the idealized form of care (Kukla 2005).

I found that when breast milk is donated to a milk bank, scientific study, or directly to another mother, its exchange refers back to the mother/baby dyad vis-a-vis *both* the donor and recipient to ensure a moral exchange. Receiving donor milk always already demonstrates failure to fulfill an ideal of motherhood (Wolf 2011) and donating milk is equally interrogated for that possibility. For instance, BDM is generally only sought *after* a mother has “failed” to produce enough breast milk while her baby is in the NICU (Parker et al. 2013), a “failure” that is very

common (Meier et al. 2013). Similarly, BDM is generally only acquired by “out-patients” when maternal milk is unavailable (e.g., for reasons of adoption, surrogacy or insufficient milk). Physicians monitor the veracity of this need for BDM by writing physician’s orders (in NICUs) and prescriptions (for out-patients) that attest to inadequate maternal milk, as required by HMBANA banks. This is one example of how milk exchanges choreograph the risk of disrupting a breastfeeding relationship on the recipient end.

Despite the primacy, naturalness and sacredness attached to breastfeeding, it is also seen in many social contexts and situations as offensive or inappropriate. Variation in this sentiment exists regarding the boundaries of appropriate breastfeeding practice (e.g., different answers exist to the following questions: Is it acceptable to breastfeed without a cover? Is it acceptable to breastfeed in front of male relatives? Is it appropriate to breastfeed past a baby’s certain age? Is it acceptable to breastfeed a baby other than your own?).

Those who work to promote breastfeeding work to challenge boundaries of what is deemed acceptable breastfeeding practice in a perceived “bottle feeding culture” (Hausman, Smith and Lobbok 2012:7) where bottle feeding is the accepted norm. Boundaries placed on acceptable breastfeeding practices may situate the mother/baby relationship as “best” or sacred but with the potential to veer into offense or inappropriateness. These can include an exposed breast while breastfeeding in public (Dowling, Naidoo and Pontin 2012; Saha 2002; Stearns 2011), a child thought to be “too old” for breastfeeding (Stearns 2011), feelings of pleasure during breastfeeding (Umansky 1998) and breastfeeding in front of male friends and relatives. Many women feel that their breastfeeding practices are under constant surveillance from their families and communities (Stearns 2011).

For many, the introduction of another mother and her milk into a breastfeeding relationship is particularly “unnatural”, distressing or inappropriate (Nathoo and Ostry 2010; Shaw 2004; Shaw 2007).²⁴ Reasons for this include transgressing the mother/baby relationship and challenging the primacy of biological kinship or threatening a biological mother’s primary role (Nathoo and Ostry 2010; Shaw 2004; Shaw 2007).²⁵ Further, this transgression may situate breast milk as a suspicious and potentially dangerous female “bodily fluid” (Bramwell 2001) that requires specific practices to legitimate its circulation (Carroll 2014). Underlying this uneasiness is a general aversion to things that transgress bodily boundaries, what Shaw (2004) refers to as a “yuk” factor that can attach to things like “blood, sweat, tears, vomit, phlegm, seminal fluids, and breast milk” (292). Further, to suggest that body fluid be transmitted outside the mother/baby dyad opens up the possibility of disease transmission, particularly HIV/AIDS (Hausman 2011). Further, when breastfeeding transgresses the mother/baby dyad, innuendos regarding going against nature, strange sexual intentions, or abuse can appear (Ladd-Taylor and Umansky 1998). In sum, breast milk, in its circulations becomes a fraught entity.

The commodification problem concerns what is sometimes framed as the “marketization of everything” (Sandel 2012), or the gradual encroachment of market activities, logics, and behaviors into more and more aspects of our intimate lives (Hochschild 2003). For some (e.g., Hochschild 2003), this encroachment is treated with despair and longing for times when some spheres of human activity were protected from the market and its impersonal, non-sentimental logics.

I call this a “problem” here because those involved in human milk exchanges openly grapple with and debate these issues Can/should human milk circulate in a marketplace? How

can milk be morally exchanged as a medical product? Many participants in my research worry about paying donors, about making a profit from milk exchanges, and about the commercial preparation of human milk derived products that may divert a supply of “non-commercial” BDM sold by HMBANA banks.

There have long been concerns about wet nurses and their use in solving infant feeding problems. Historically, such concerns have been about the appropriateness of a mother abdicating her responsibility to breastfeed to a wet nurse, the safety of a wet nursing arrangement (both for the wet nurses’ own baby and for the baby wet nursed) and the fitness of the wet nurse (both as a source of milk and as a potentially difficult presence in a family home). Historically, these concerns have been further overlaid with issues of race, class and nation further explored in chapter 2.

Today some are concerned that wet nursing signifies a transaction between mothers who are not social equals (Shaw 2007) and therefore represents a morally troublesome arena that invites coercion or unjust labor conditions. When human milk exchange goes outside the mother/baby dyad (whether via human milk banking or informal sharing/selling), how that exchange is done, and how it is perceived relates back to our conceptions of market and non-market exchange possibilities. In this case much of our historical reference comes from the history of wet nursing in terms of how it was organized within an economy of infant feeding as well as its historical critiques.

Some thinkers have problematized a two spheres dichotomy between markets and worlds of sentiment (e.g., Callon 1998). Likewise, my analysis in this dissertation moves from a “two spheres” approach to an investigation of “distinct economic forms” in the same sense as

historical accounts have offered (e.g., Fildes 1988; Golden 1996b). Zelizer's work (Hoeyer 2013; Zelizer 2011) re-shifts the focus from the contamination effect of market thinking to a critical examination of *distinctive* economic forms that arise in settings such as households, informal economies, consumption markets, care economies, and gift transactions where lines between paid and unpaid work are blurred.

I view perceptions and enactments/avoidances of market transactions (Zelizer 2011) as forces *in and of themselves*. I avoid asking whether any given exchange or exchange system under investigation *is* a market exchange or a non-market exchange because I see market thinking (or what we think markets are, can be, should be) as forces at play in these situations, rather than a pre-determined ontological set of rules and categories that an exchange may or may not fit in (Zelizer 2011).

It was very common in the practices under consideration, to hold distain for any hint of market enterprise (e.g., HMBANA milk banks are proudly non-profit; milk bank donors are not paid, and milk sharing websites exclude any form of monetary compensation for donors, or any affiliation with commercial interests). Such careful avoidance of marketization of breast milk relates back to distain for viewing the bodies of babies and mothers (their parts, tissues, fluids and labors) as instrumental in the making of commodities, or as commodities themselves in a market-like exchange (Hoeyer 2013).

What is important in the exchanges under consideration (informal sharing, milk banking and donor milk use in biomedical innovation) is the negotiation of this perceived problem (the encroachment of the market into breastfeeding, and breast milk) with the material needs to make milk exchanges happen. This problem is posed and solved in a variety of different ways,

all of which bring with them varieties of moral/ontological choreography and blur market and non-market attributes (Hoeyer 2013), activities and exchanges.

Similarly, I note the blurring of gift and market economies, without imposing a pre-existing classification of “gift” or “commodity” on a given exchange, but rather noticing how these terms operate within a given economic form where value is exchanged in a variety of ways. The distinction between a marketplace and a gift economy is a legacy of Titmuss’ (1971) work on blood banking. Waldby and Mitchel (2006) are critical of this distinction, suggesting that it is no longer tenable given the realities of modern day tissue exchanges. Debates over whether human milk should be exchanged as a gift or as a commodity are part of the terrain within this “commodification problem”. What is clear to me is that this is a blurry dichotomy (between gift and commodity) and that human milk is gift-like and commodity-like in the exchange systems under consideration. My project is not to unpack where and when breast milk a gift or a commodity, as has been ably demonstrated by Gerstein Pineau (2012) with regards to the history of milk banking. Rather, my project concerns following how discourse, and material realities and needs structure milk exchange systems as distinct economic systems and systems of valuation.

BACKGROUND ECONOMIES AND STRATIFIED REPRODUCTION

The phenomena of human milk banking and sharing, as well as the development of biomedical products from human milk are examined here during the current neoliberal era of increasing social, economic and health care inequalities in the U.S. and internationally. Income inequalities between the richest and the poorest Americans is widening, and so is the realization that this skewed distribution of resources severely impacts the social and physical

well-being of a large proportion of the American population (Adler and Stewart 2010). Health disparities researchers are agreed that “socioeconomic deprivation is a key mechanism through which other bases of social disadvantage, particularly those linked to race and ethnicity, result in poorer health status” (Adler and Stewart 2010:6). Many now see race and class as co-determinants of disparities in health (Kawachi, Daniels and Robinson 2005), or emphasize that race and socioeconomic status (SES) are “two related but not interchangeable systems of social ordering that jointly contribute to health risks” (Williams and Sternthal 2010:5).

Highly significant here, the same political economic system that “produces” the “intensive mothering” pursued by the socially and financially advantaged families who are over-represented in this research also produces very high rates of infant mortality and morbidity for those less socially and financially advantaged (Lane 2008). Prematurity (and its corollary, low birth weight) is widely known to be the main cause of infant mortality, surpassing other causes (e.g., birth defects, sudden infant death syndrome, maternal health complications, etc.) (Williams 2013). Babies born to mothers with less education and income are more likely to be born prematurely and to be smaller at birth (Williams and Sternthal 2010:10). Racial and ethnic disparities in premature birth have persisted, with recent numbers suggesting that African American babies are the most likely racial group to be born prematurely (14%) and white babies the least likely to be born prematurely (10.3%). Infant mortality rates, similarly, show that African American babies are “twice as likely to be of low birth weight than white babies and four times as likely to die of prematurity as white babies” (Casper and Moore 2009:61). As Sandra Lane (2008:3) makes vividly clear in her study of infant mortality in Syracuse, New York, “low birth weight, premature birth, and infant death are part of life patterns resulting from

systematic discrimination in all of our social institutions [and] this unequal treatment increases the accumulation of risk over a lifetime, and, in some cases, is passed on to the next generation.” As such, prematurity, infant morbidity and infant death are thus embodiments of the underlying economies of the exchanges described in this dissertation research. Although term birth rates are improving *overall* in the United States, there remain deeply entrenched disparities, such that people of lower socio-economic status and people who are not white (especially African Americans) are more likely to be born prematurely (and to die in infancy). Significantly, that morbidity is manifest in many of the infants in neonatal intensive care units for whom supplemental or replacement breast milk, my focus here, may be prescribed.

Similarly, low breastfeeding rates exist as a direct materialization of inequality in health and socio-economic conditions in the United States. Although breastfeeding rates have improved *overall* in the United States, there remain deeply entrenched disparities according to race/ethnicity, socioeconomic characteristics, and geography (US Department of Health and Human Services 2011:7). Particularly troublesome is the fact that “breastfeeding rates for black infants are about 50 percent lower than those for white infants at birth, age six months, and age 12 months, even when controlling for the family’s income or educational level” (US Department of Health and Human Services 2011:7). Given such disparities, there has been a surge in African American and women of color activist groups focusing their work on situating these disparities within their social and economic contexts as well as increasing breastfeeding rates and decreasing premature births.²⁶ I witnessed this type of engagement at the 2015 California Breastfeeding Coalition annual Breastfeeding summit pre-conference entitled *Addressing Breastfeeding Inequities: One Community at a Time*, where a panel of African

American lactation researchers, consultants and activists addressed breastfeeding in the African American population. They analyzed the social, cultural, and economic reasons why an African American woman might not breastfeed as well as showcasing community based interventions they are employing to increase breastfeeding rates.²⁷

My research was based on gaining access to both mothers involved with milk banking and sharing, and to scientists studying breast milk and/or producing breast-milk based products for for-profit companies. One of the major limitations of my research is that while I easily gained access to mothers involved with milk banking and sharing, I did not gain equal access to mothers of infants in the NICUs who were prescribed breast milk from HMBANA banks or fortifier from Prolacta. Nor did I research factors leading such infants to NICU hospitalizations. There is the danger, therefore, that this dissertation effectively “invisibilizes” the underlying economic conditions that produce both 1) prematurity and a market for breast milk products in the NICU and 2) raced and classed breastfeeding disparities alongside the growing interest in milk sharing among often more privileged parents. Similarly, there is the danger that this dissertation “individualizes” these economic forms and exchanges of breast milk, divorcing them from their broader socio-political contexts.

In fact, the economic forms this dissertation investigates should all be read as phenomena reliant upon the health and social inequalities that are raced, classed and gendered. It is notable that none of these forms is suited to changing the larger economic motors that fuel exchanges in breast milk. In future research, I will consider how the logics uncovered in this dissertation (of surplus, scarcity, care, and safety) themselves risk invisibilizing these more fundamental economic dynamics. They may actually further entrench stratified

reproduction (Colen 1995) in new ways, facilitated by technologies and computer and information technologies.

For example, HMBANA banking is mobilized around the cause of promoting “the health of babies and mothers through the provision of safe pasteurized donor milk and support of breastfeeding” alongside a commitment of “ensuring that all individuals with a medical need for it have access to pasteurized donor human milk” (P. 7) (HMBANA 2013). They are not, however, mobilized around a commitment to reducing prematurity or disparities in premature births. Further, in interviews HMBANA leaders notably see themselves as unsuccessful at improving lactation.

Milk sharing exchanges, as I observed them, were largely undertaken between parents (usually mothers) already ardently committed to breastfeeding usually partnered, white and having high-incomes. At the end of Chapter 5, I emphasize the work undertaken by these parents to exchange milk. I need to stress that this amount of work would be impossible for most mothers, particularly those for whom breastfeeding itself is out of reach given socio-economic conditions. Or, as Kimberly Seals-Allers, an African American breastfeeding advocate put it recently at a conference presentation at the 2015 California Breastfeeding Summit, for many African American poor mothers, breastfeeding is “low on the totem pole” of priorities when dealing with issues of childcare, transportation, and economic and family security.

Prolacta’s technological work in manufacturing a human milk based fortifier as well as Medolac’s foray into breast milk products (both for use in the NICU) should be seen as distinctively biotechnological interventions on the socially and economically produced problem of prematurity. Prolacta has identified a unique product that they argue is *needed* based on

clinical research and can be marketed to premature infants under the studied intervention of a fortified “exclusively human milk diet”. In interview with the CEO, he was clear that most of the babies that use their products are insured through MediCal or equivalent state-based insurance formats for low-income families and that this is how hospitals bill for their products. My interviews in Iowa at the NICU there and a NICU in The San Francisco Bay area similarly suggest that much of HMBANA BDM is billed to MediCal or equivalent state based insurance schemes. Relatedly, Thompson (2013) recently analyzed the way in which stem cell research has been conducted under a “pro-corial” frame that, among other things, incorporates promises of an ethical distribution of innovation particularly to those with less access to healthcare (P. 48). The pro-corial frame has not, however, incorporated an ethic of overall “economic and social justice and the mitigation of disparities in health” (Thompson 2013:48). My current research on human milk adds a case in which disparities in health may actually be fueling innovation. This layering of economies in such situations is impossible to ignore and needs to be foregrounded in this dissertation.²⁸

Overview of Chapters

Chapter 2 offers a historical overview of breastfeeding in the United States as well as contemporary dynamics and issues. It then provides a history of wet nursing, human milk banking and informal sharing. Chapter 3 and 4 follow milk as it flows through a non-profit milk bank in San Jose, California. Here, I argue that the value of BDM is established through overlapping logics of surplus, scarcity, safety and care folding the unpaid donor, the scarcity of milk donations and BDM, and the proper care of donated milk in their sociotechnical network. Chapter 5 offers my ethnography of human milk sharing in the San Francisco Bay Area where I

analyze milk sharing as a form of biosocial exchange and affective economy where over and under supply are addressed through a collective solution. This solution extends a parent's (usually mother's) breastfeeding project through donation or receipt and offers a form of relief to both parties as well as a distinct economic form of transactional care (not strictly a gift economy). Chapter 6 analyzes my findings on the use of human milk in biomedical innovation in the making of a human milk fortifier (Prolacta), the procurement of stem cells from breast milk (Bennett Research Group) and the development of antibiotic treatments from components found in breast milk (HAMLET). This chapter uses the sensitizing concept of "biomedical reproduction" to consider how these economic forms navigate their way towards innovation. Chapter 7 offers my overall conclusions, the limitations of this research and some key directions for future research.

Chapter 2: Breast Milk: Background Histories and Implications

INTRODUCTION: BREASTFEEDING, BREAST MILK AND MOTHERHOOD

In the introduction to this dissertation, I suggest that there are two “problems” or dynamics that run through contemporary human milk exchanges. I called these “the two-donor dynamic” and the “commodification problem”. This chapter offers two overlapping background histories to situate the origins and dynamics of these concepts. First, I briefly review the history of breastfeeding in the United States, culminating in breastfeeding promotion in the neoliberal state. Second, I review the history of human milk exchanges in the United States through wet nursing, milk banking and informal sharing and selling. Together, these histories show how breast milk is tissue with a gendered, classed, and racialized history that interplay with the medicalization of infant feeding, nationalistic discourses and ideologies of motherhood.

Mothering and breastfeeding have long been matters of public concern due to the dependence of infants on breast milk or safe substitutes for their health and survival. Surrounding these life and death realities exist multiple simultaneous circulating historical discourses about breastfeeding. These inform what it may mean to be a “good” mother within specific geopolitical, gendered, raced and classed formations (Hill Collins 1999). The histories of the organization and perception of breastfeeding and human milk exchanges have been organized and perceived in the United States are the foci of this chapter.

Ideologies of motherhood, children and parenting have gone through many iterations (Hays 1998; Zelizer 1985). Feminist constructionism in the social sciences and humanities has generally viewed mothering and motherhood as “dynamic social interactions and relationships, located in a societal context organized by gender and in accord with the prevailing gender belief

system” (Arendell 2000:1194). How providing nourishment as part of mothering is organized and given meaning in given contexts becomes a provocative question (Arendell 2000) that underlies this literature review.

Hays (1998:14) argues that we are today dwelling within an ideology of “intensive motherhood” wherein good mothers not only put their children’s needs first, but also provide the labor and emotion-intensive care to protect them from a harsh and impersonal market-driven society. Lee (2008) summarizes intensive motherhood as child centeredness wherein the mother, commonly deemed exclusively responsible for her child’s development, seeks fulfillment by maximizing the potential of her children with the validation of expert guidance. Blum (2000) uses the term “exclusive motherhood” to add an essentialism attributed to the child-mother bond, particularly following the fears expressed by late 20th century white professional mothers who did not want to be forgotten or replaced by care givers. Wolf (2011) suggests the term “total motherhood” to emphasize the responsibility for protecting children from all imaginable risks. She views contemporary breastfeeding promotion as a enmeshed within a “risk culture committed to total motherhood” (Wolf 2011:113).

However, the ideology of intensive motherhood is premised on access to racial and class privilege (Arendell 2000; Mason 2015) and, a variety of “deviancy discourses” that target those who do not conform (such as “single mothers, welfare mothers, minority mothers, immigrant mothers and lesbian mothers”) (Arendell 2000:1195). Within this paradigm, some ways of mothering are deemed moral (those that are white and middle/upper class), while others are deemed immoral (those that are black and working class) through public health campaigns, advertising campaigns and everyday judgments made about mothers around us (Hill Collins

1999). Many scholars (Scheper-Hughes 1993) insist that when taking diverse women's standpoints and situations into account, mothering is not a universal relationship between a woman and her children (Arendell 2000) and that some individuals or groups may embrace alternative ideals of motherhood (Blum 2000).

At various historical moments, the figure of the breastfeeding woman has been used by religious, medical and lay experts as a metaphor for a harmonious nation, or as a direct imperative for how to achieve a harmonious nation (Kukla 2005). Today breastfeeding promotion comes is done directly by the state (e.g., US Department of Health and Human Services 2011) (see for analyses e.g., Artis 2009; Mason 2015; Wolf 2011) and from health care professionals, lactation professionals, and lay lactation activists ("lactivists").

Today these overlapping perspectives contribute to the view of human milk as "liquid gold" (Fentiman 2010) that is sacralized as part of mothering in contemporary human milk banking (Gerstein Pineau 2012) and in informal exchanges. Ironically, breastfeeding promotion is now fueled by its former underdog status when it was effectively discouraged by the medical establishment in the early-mid 20th century alongside the development and promotion of commercial breast milk substitutes. These fights continue against the corporate power of formula companies and entrenched medical practices that are contrary to breastfeeding.

At the same time, there is today profound concern regarding possible risks of human milk exchanges, specifically the possibility of disease transmission, of infant neglect, and of the misallocation of surplus milk away to less needy babies. Additionally, there is "yuk factor" that permeates human milk circulations, particularly for those new to the phenomenon (Shaw 2004). In sum, this historical overview details the origins of enthusiasm for and panic about

human milk exchanges. This review provides background on the two contemporary binaries that characterize contemporary conditions of possibility in milk exchanges: 1) “informal” versus “formal” exchanges and 2) commercial versus non-commercial exchanges.

BREASTFEEDING IN THE 20TH CENTURY

In what follows, I provide a history of 20th century breastfeeding, with the rise of scientific motherhood alongside the physician expert who provided guidance on the proper use of commercially prepared infant formulas (Apple 1987). I then discuss the “back to the breast” movement that gained a countercultural momentum mid-century through an ideology of “natural motherhood”, at a time when bottle feeding was at its peak (Martucci 2015). Breastfeeding was increasingly promoted in the 1960s and 1970s by the women’s health movement which overlapped with anti-formula activism (Blum 2000). In the last 30 years medical and public health communities have officially gotten on the “back to the breast” bandwagon (US Department of Health and Human Services 2011) but such “endorsements” are ripe with contradictions and complications that originate in the history of breastfeeding as it has interacted with the medical community.

Scientific Motherhood and the Decline of Breastfeeding

In the early 20th century, physician advice rose above that of clergy or family regarding infant feeding or other issues of infant care (Apple 1987). As artificial feeding improved and increasingly safe alternatives to breastfeeding were available, privileged women began to view bottle-feeding as part of enhanced autonomy for their maternal bodies. Apple (1987) argues that by the 1950s, bottle feeding was part of the ideology of scientific motherhood as women

turned away from traditional sources of childrearing advice and towards scientific experts, ceding authority over infant feeding to the growing profession of pediatrics. This, together with growing relationships between formula companies and physicians, established “bottle feeding as ‘normal’ as hospital maternity and postnatal procedures institutionalized this practice” (Martucci 2015:113).

Wolf (2011) has suggested that infant feeding advice played a significant role in the consolidation of pediatrics in the early part of the 20th century. Specifically, these doctors found themselves dependent on a certain number of patient visits in order to maintain a viable private practice. Physicians simultaneously tinkered with infant formulas and argued that regular weight checks were needed to confirm the normal growth of infants (Wolf 2011). Pediatricians began scheduling “well care” as part of prevention programs with all infant feeding decisions being made therein. The American Medical Association (AMA) went so far as to threaten to remove their approval of formula if companies provided instructions directly to mothers, solidifying their role as infant feeding experts. While most women breastfed at the end of the 19th century, by the 1950s, formula feeding was the norm and was recommended as the best form of childhood nutrition that could be measured, controlled, scheduled and kept under the guidance of the pediatrician (Apple 1987). Although the official policy of the American Academy of Pediatrics (AAP) was that breastfeeding was the preferred method of feeding, individual practitioners were influenced by infant formula “detail men” who gave out free samples and free trips, a practice then known ironically as “ethical marketing” (Fentiman 2010). By mid-century, breastfeeding rates fell to 50% of newborn babies and by 1971, only

21% of US infants breastfed at the time of discharge from the hospital and just 6% at 6 months of age (Fentiman 2010).

Infant feeding was medicalized in tandem with the medicalization of childbirth (Apple 1987). While in previous eras births were considered a “woman’s affair” attended by midwives and female relatives, child birth was transformed such that by the 1920s “medical control of birth management – so-called scientific childbirth-was the norm” (Apple 1987:173). Wolf (2011) suggests that obstetricians were framed as entrusted with the health and safety of a distinct entity – the fetus. The medicalization of both infants and mothers is integral to what she calls contemporary “total motherhood” in a risk culture (Wolf 2011). Similarly Lee (2008) connects contemporary “intensive motherhood” with the medicalization of pregnancy and motherhood wherein risk-aversion becomes the job of the mother and the doctor together.

“Back” to the Breast

Historian Jessica Martucci (2015), a historian, has recently examined the “back to the breast” movement had origins in the 1950s in groups such as the La Leche League (LLL), and a bit later in the later feminist women’s health movements and anti-formula activism (Blum 2000). Martucci (2015) argues that the LLL and similar groups emerged in response to “scientific motherhood” and coalesced around a broader understanding of “natural motherhood” that was legitimized by psychological theories that gained traction amongst a counterculture of breastfeeding. This ideology:

...intertwined scientific and cultural arguments that privileged a teleological (and often spiritual) understanding of “nature”[and] relied upon a scientific understanding of nature and motherhood in which interconnected physiological and emotional processes unfolded instinctually in the bodies of mothers and infants along a set pattern. Rooted in the human and natural sciences, natural motherhood emerged in tension with the

century's dominant ideology of scientific motherhood [that] rested upon a disembodied masculine scientific authority and the technological mediation of experts in maternal processes, including hospital birth and bottle feeding (Martucci 2015:111).

Martucci (2015) and Golden (1996b) agree that although early 20th century experts recommended breast milk for babies, "they often saw the distance that bottle-feeding created between a mother and infant as psychologically the safest alternative" (Martucci 2015:115).

In the 1970s, further enthusiasm for breastfeeding was generated in psychological bonding theories as utilized by pediatricians and child rearing experts (Fentiman 2010). Bonding was seen as a critical connection made between mother and infant in the post birth period that had a mystical quality (Fentiman 2010). In the contemporary era, bonding and attachment theory is circulated by most notably the parenting gurus William and Martha Sears. Further, bonding is folded into institutional promotion of breastfeeding. For example, UNICEF's Breast Feeding Initiative seeks to transform hospital based care so that it requires rooming in, in order to facilitate skin-to-skin breastfeeding or other schemes that reject any artificial feeding apparatus like pacifiers since they are detrimental to skin-to-skin contact (Lee 2008).

Perhaps Martucci's (2015) major contribution is her argument that the emergence of the LLL in the 1950s did not represent an "isolated blip" challenging the march toward scientific motherhood. Rather, bolstered by ideas and practices already in existence, she asserts that the LLL grew rapidly in size and influence moving "natural motherhood" forward.

The La Leche League (LLL) was founded in the 1950s by Catholic women committed to "extended, on-demand breastfeeding, natural childbirth, and large families" (Blum and Vandewater 1993:287). This commitment was in sharp contrast to what many women were actually practicing in the 1950s (physician controlled, medicated birthing and rigidly-scheduled

infant-feeding) (Blum and Vandewater 1993). At the time that LLL was founded, only 25% of American women breastfed at birth and many fewer breastfed longer than that (Blum and Vandewater 1993).

The LLL rationale for promoting breastfeeding has changed little over the years, and has always stressed breastfeeding as an embodied, nurturing experience for mother and child within a larger philosophy of mothering (Blum and Vandewater 1993). In more recent editions of their guide book *The Womanly Art of Breastfeeding* (Wiessinger et al. 2010), the LLL has drawn more on medical and scientific authority to promote breastfeeding (Wolf 2011).

Because this philosophy, based on the assumption of a child's intense dependence, stresses child-led weaning and minimal mother/child separation, the LLL has struggled with how to counsel the increasing scores of women who are not full time mothers and seek their assistance with breastfeeding issues related to work (Blum and Vandewater 1993). Blum and Vandewater (1993) found that the choice to work outside the home has rarely been framed as an economic necessity by LLL publications or leaders (Blum and Vandewater 1993).

The LLL is the second largest self-help organization in the U.S. after Alcoholics Anonymous and some credit its longevity with its lack of political analysis, agenda or action orientation (Blum and Vandewater 1993). The fact that the LLL has not advocated for better maternity leave (Hausman 2003), nor better policies for low-income working mothers, demonstrates its privatization of motherhood through helping individual women breastfeed rather than seeking social politics that better serve children's needs (Blum 2000; Blum and Vandewater 1993). This lack of political edge is also reflected also in the white middle class base of the organization.

Hausman (2003) refers to this as the ideological problem of “domesticity” that haunts the LLL wherein male involvement in the paid work force at a “family wage” level quickly generates a traditional gendered division of domestic labor. Despite different perspectives, Hausman (2003) and Blum (2000) agree that the LLL does not address the needs of women who are not white and middle/upper class. In fact, the LLL has developed a rather grating relationship with the women’s health movement (Blum 2000) while it is at the same time a very popular source of information and self-help about mothering and breastfeeding.

The Women’s Health Movement, The Nestle Boycott and The Baby Friendly Hospital Initiative

In the late 20th century two contradictory trends impacted infant feeding practices: women entered the workforce en masse and breastfeeding was once again promoted by the medical establishment (Blum 2000). Woven amongst these trends is the feminist women’s health movement’s role in reviving breastfeeding in the 1970s. Emboldened by second wave feminism and a changing economy, more American mothers with young children have engaged in paid employment since the 1970s (Blum 2000). At the same time, there was a “left wing revival” of breastfeeding prior to breastfeeding’s medical (re)endorsement (Blum 2000). Feminist movements initially stressed reproductive rights but soon began emphasizing women’s health in general (Blum 2000). Often seeing medicine as part of male social control, the movement “formed advocacy networks, women’s clinics and self-help groups” (Blum 2000:43) that offered reciprocal, participatory care emphasizing noninterventionist “natural” healing techniques. Such groups shared the LLL’s emphasis on “natural” breastfeeding and childbirth, but in general, had a much more radical and confrontational approach to

mainstream medicine (Blum 2000). Many women's health groups shared the "back to nature" ethos of counterculture movements of the 1960s and 1970s.

At the same time, women's health groups rallied around the Nestle boycott of the era that reacted to the aggressive marketing of formula in the developing world. With few international barriers, formula companies had begun marketing to the developing world in the early 20th century (Baumslag and Michels 1995). International aid organizations (e.g., UNICEF) handed out free formula along with other food items to malnourished children in their clinics and in communities. Such efforts stamped formula with the endorsement of an international medical community in the eyes of those in the developing world (Baumslag and Michels 1995). Over the years, millions of infants died because of improper formula use in the developing world that follows from poor sanitation and poverty (Baumslag and Michels 1995). Donna Haraway (1999), following a reading of Scheper-Hughes (1993), describes the dynamic as such:

Much of this market depends on very small purchases at any one time....Marketing infant formula to the poor is like marketing drugs –small cheap packages are essential to hooking to customers and developing the mass market. Active organizing emerged against the aggressive, medically inflected marketing of artificial formula to women who could neither afford the product over the long haul nor count on conditions to prepare it hygienically (p. 81).

Formula companies successfully marketed to developing countries through aggressive strategies that have since been the source of their public relations nightmares. These marketing strategies (e.g., billboards on the street and in doctor's waiting rooms, free formula samples, radio advertisements that promoted formula, and formula employees posing as nurses handing out formula) served to undermine women's confidence in breastfeeding (Baumslag and Michels 1995).

From the late 1970s onward, Nestle was specifically targeted amongst formula companies for its aggressive promotion strategies because, while other American owned formula companies tamed their international marketing following American investor pressure, Swiss-owned Nestle was not vulnerable to American pressure. In fact, in the late 1970s, Nestle was the most profitable food company on the planet. When a boycott was initiated in 1977, it felt no pressure to change, only to ramp up their public relations budget (Baumslag and Michels 1995). The Nestle boycott was emboldened by the counterculture movements of the era and the boycott strengthened breastfeeding's anti-capitalist interpretation: "The feminist health movement, the 'hippies', and the Nestle Boycott together added a subversive, anticapitalist interpretation to 'natural mothering' (Blum 2000:44). The Nestle boycott rallied students and religious groups alike to take action against the marketing of formula in the developing world.

With growing membership from church groups, particularly those with missions in the developing world, the anti-formula coalition called INFACT (Infant Formula Action Coalition) succeeded in initiating a US congressional hearing in 1978 (Baumslag and Michels 1995). This dramatic hearing enhanced the credibility of INFACT and mobilized institutions towards finding a solution to the over-marketing of formula in the developing world. Nestle agreed that they would abide by whatever code WHO/UNICEF put together on the issue. However, when WHO (1981) created an "International Code of Marketing of Breast-milk Substitutes", companies, including Nestle did not always comply (Baumslag and Michels 1995). The code was not signed in 1981 by the United States, although it was overwhelmingly approved by other nations. The voluntary standard, eventually signed in 1994 under President Bill Clinton, is not international law. Instead, each nation is free to adapt the code within its own legal framework. Numerous

publications purport to show that the code is not enforced and many loopholes have been discovered by the formula industry.²⁹ The Nestle boycott, therefore, has never fully ended.

Many hospitals worldwide today are equipped with free formula samples or other “freebies” (diaper bags etc.) for new mothers to take home. Often, the formula company has paid the hospital for the “licensing” to give-away (Baumslag and Michels 1995). Further, many hospitals do not have policies conducive to establishing breastfeeding (e.g., newborns are kept in nurseries rather than “rooming in” with mothers, and staff do not uniformly promote breastfeeding). In reaction, UNICEF/WHO developed the Baby Friendly Hospital Initiative in 1991 whereby hospitals that do not accept donations from formula companies encourage mothers and babies to room in, and related breastfeeding policies can be accredited as “Baby Friendly”. Currently, 152 countries including the U.S.³⁰ have implemented the Baby Friendly initiative but only 14.14% of American births occur in Baby Friendly facilities.³¹

Although the LLL remained silent on the Nestle boycott and only overlapped minimally with the feminist segments of the women’s health movement, it is widely credited in journalistic accounts for the resurgence in breastfeeding in the 1970s (Blum 2000).³² Medical associations were eventually influenced by these countercultural forces, and in 1978 the American Academy of Pediatrics finally changed their official position to state that breast milk is superior to formula (Blum 2000). Despite such endorsements, breastfeeding today dwells in complex and contradictory situations characterized by uneven medical and public health promotion, variable medical indifference and a complex network of socio-cultural factors that can, in practice, make breastfeeding impossible and/or undesirable, prohibitively costly and even socially penalized.

BREASTFEEDING TODAY

Since World War II, the LLL helped to normalize breastfeeding by framing it within a paradigm of good, natural, bonded mothering that did not need the medical establishment to assist mothers with infant feeding. The feminist women's health movement and the Nestle boycott further mobilized breastfeeding promotion through both anti-medicalization and anti-corporate messages. These largely separate but also interwoven trajectories alongside increased official medical endorsements have made breastfeeding an increasingly acceptable and desirable cultural practice since the late 20th century.

Additionally, since the 1980s, scientific studies of breastfeeding have documented the benefits of breastfeeding, giving "breast is best" discourse biomedical legitimacy (Wolf 2011). For example, epidemiological research on breastfeeding benefits include decreased gastrointestinal distress in infants, to fewer ear infections, decrease in likelihood of obesity, and a higher IQ later in life (Wolf 2011). Despite such supports, breastfeeding is an uneven practice full of contradictions. While official medical organizations recommend breastfeeding and lactation consulting is now a well-established quasi-medical profession, it is often argued that in concrete practices, medical institutions, hospitals and physicians are not supportive of breastfeeding.³³ My research documents this in that I have observed that some breastfeeding mothers are quite suspicious of medical guidance on infant feeding and cautious about adopting hospital practices unquestioningly.

Additionally, although breastfeeding rates have increased, there exist troubling disparities in breastfeeding along race and class lines. More privileged women often choose breastfeeding, and less privileged choose formula feeding (Blum 2000). These disparities have

long been identified and targeted by public health engendering extensive breastfeeding promotion efforts.

The Medicalization and Commercialization of Breastfeeding Support

Hausman (2003) points out the vexed contemporary relationship between actual breastfeeding support mechanisms and medical policies. On the one hand, women are encouraged to breastfeed by physicians after birth in hospitals. On the other hand, infants are routinely monitored for weight gain at well baby checks and mothers are assessed for sufficient milk. As Hausman (2003) puts it, it is problematic and can be contradictory for breastfeeding advocates to rely on medical authority since it is often medical authority that causes a woman to doubt her breastfeeding abilities and switch to bottle feeding. Hausman further suggests that individual physicians are often misinformed about breastfeeding and provide inadequate breastfeeding support. In practice, post-partum nurses are often responsible for helping a woman establish breastfeeding. But with women spending less and less time in the hospital, those who need further non-family breastfeeding support need to independently obtain access to lactation consultants, breastfeeding classes, breastfeeding support groups, and/or specialty breastfeeding stores.

The field of breastfeeding support is quasi-medical³⁴, commercial, voluntary, and activist – there are classes, stores, support groups and consultants affiliated with hospitals, non-profits and commercial spaces. The increasing commercialization of breastfeeding support is evident in the proliferation of specialized nursing clothing, and the elaboration of pumps, storage products, etc. Such products typically market breastfeeding as practiced by attractive, economically comfortable and cosmopolitan women. For example, the owner of a Manhattan

boutique promotes breastfeeding clothes in saying: “Are you going to nurse in something that looks like a stretched-out athletic sock, or do you want to wear a completely blinged-out HOTmilk or Marlies Dekkers nursing bra that looks just like what Lady Gaga wears?...Nursing is normal. And normal means that you can be really gorgeous.”³⁵

In terms of stated medical support for breastfeeding, the American Academy of Pediatrics (AAP) has gradually strengthened its recommendations since its initial statement in 1982 that breastfeeding is preferable but formula is an acceptable alternative (Blum 2000). AAP guidelines from 2005 urged medical professionals to “protect, promote, and support breastfeeding in their individual practices, hospitals, medical schools and communities” and provide guidelines for how to do so (Gartner et al. 2005:496). Recently (American Academy of Pediatrics Section on Breastfeeding 2012), the AAP recommended for the first time the use of banked human milk and the fortification of pumped breast milk for many infants with very low birth weights - a recommendation that has had a major impact on the demand for human milk products (Fentiman 2010). But despite this shift towards breastfeeding with its cultural and biomedical legitimacy, breastfeeding is not the norm in the US with low rates increasingly understood as problematic, especially in public health discourse (US Department of Health and Human Services 2011).

Breastfeeding rates and disparities today

Today, when breastfeeding is raised in public health research, it is usually within an attempt to explain or remediate low breastfeeding rates, either in general or in a particular racial or socioeconomic sector. The concern that is expressed around low breastfeeding rates is

grounded in the claims made about the health promoting benefits of breastfeeding and the risks of formula feeding (Artis 2009; Wolf 2007). Generally, most women initiate breastfeeding after childbirth, but as time progresses, fewer and fewer babies are still breastfeeding (US Department of Health and Human Services 2011). Of babies born in 2007, “75 percent of mothers initiated breastfeeding, 43 percent were breastfeeding at six months, and 22 percent were breastfeeding at 12 months” (US Department of Health and Human Services 2011). This stands in sharp contrast to the recommendations of the AAP to breastfeed exclusively for 6 months and to continue breastfeeding for at least 12 months (Gartner et al. 2005), and the breastfeeding targets set by Healthy People 2010 (US Department of Health and Human Services 2011).

Most troubling within public health discourse are the disparities found in breastfeeding practices by race and socioeconomic status (US Department of Health and Human Services 2011). Breastfeeding rates for black infants “are about 50 percent lower than those for white infants at birth, age six months, and age 12 months, even when controlling for family’s income or educational level” (US Department of Health and Human Services 2011:7). Further, high breastfeeding rates are associated with higher income, and geographical location within an urban area (US Department of Health and Human Services 2011). There is a growing understanding within public health discourse that these numbers reflect the fact that mothers who return to work early after having a baby are less likely to initiate or continue to breastfeed (US Department of Health and Human Services 2011) and are more likely to be low income and/or black.

A range of overlapping reasons is offered for why many American women don't breastfeed at all or for very long in public health literature (US Department of Health and Human Services 2011). Writing here about "obstacles" to breastfeeding gives the faulty impression that all mothers would breastfeed if they only they could when, in fact, there is a growing discourse from mothers who freely and happily chose to formula feed, whether their choices are constrained or not.³⁶ Here I delineate the 6 barriers to breastfeeding as described by the American Surgeon General (US Department of Health and Human Services 2011) in a recent "Call to Action to Support Breastfeeding".

First, although many women know that "breast is best", they do not know exactly why and do not have breastfeeding role models who can educate them about what to expect from breastfeeding. Second, bottle-feeding is the social norm in American Society such that to breastfeed is to work against a "bottle feeding culture" (as often described by breastfeeding advocates). Third, women are often embarrassed or uncomfortable breastfeeding in front of family and friends or in public creating an additional barrier to breastfeeding. Fourth, many women cite lactation problems (e.g., sore nipples, engorged breasts, mastitis, leaking milk, pain and failure to latch on by the infant) to explain why they stopped breastfeeding. Relatedly, many women may lack confidence in their ability to breastfeed or to provide a sufficient amount of milk for their infants even when these beliefs are usually unfounded or could be overcome (US Department of Health and Human Services 2011).

Fifth, mothers who return to work typically find that returning to work is a significant barrier to breastfeeding (US Department of Health and Human Services 2011). This is especially the case for the many women who face inflexibility in their work and a lack of private space or

time for expressing milk or breastfeeding, not to mention nearby affordable childcare.

Workplace obstacles are likely the most significant obstacle to breastfeeding today in that most US employers offer only brief maternity leaves, much shorter than in other developed nations (Fentiman 2010). There is a clear class divide in that women with lower status jobs are more likely to return to work after 12 weeks (the minimum legal requirement) while women with higher status jobs are more likely to be able to take longer maternity leaves and breaks in order to pump while at work (Blum 2000; Fentiman 2010). Pumping is most often part of a breastfeeding practice for breastfeeding mothers who work outside the home.³⁷ Pumps in various forms have existed for over a century, since wet nursing declined and breast milk banks began buying, selling, or donating human milk (Blum 2000). But it is only since the 1990s that breast pumps have been frequently found outside the hospital – in mothers' homes or in their workplaces.³⁸

Sixth, hospital policies and clinical practices can be detrimental to breastfeeding. For example, breastfeeding support is given a low priority, and mothers and infants are subject to routines inappropriate to breastfeeding (especially separating a mother and a baby or routinely supplementing a newborn) (US Department of Health and Human Services 2011). Shim's recent work on cultural health capital (Shim 2010) may shed light on the relationship between social status and health care interactions in mediating breastfeeding outcomes. For instance, a mother with higher cultural health capital might convince a hospital to adopt breastfeeding friendly practices in her case (e.g. access to an electric pump or lactation consultation), while another mother with less capital might not have the same influence on her health care setting.

A BRIEF HISTORY OF WET NURSING IN AMERICA

As the historical record makes clear, whatever the precise reasons for its longevity, wet nursing outlived its critics (Golden 1996b:14)

Wet-nursing in America is generally chronicled starting with the 18th century and ending with its rapid decline in the early 20th century. Historians of wet nursing (Fildes 1988; Golden 1996b) have shown that in order to understand the “dangers” of wet nursing, we must examine the historical contexts of its practice. The *social organization* of infant feeding that included wet nursing was in fact responsible for high infant mortality over the course of the 17th, 18th and early 19th centuries. Mothers were often separated from babies; too few wet nurses were responsible for too many babies; and unsafe feeding alternatives were often introduced with dire consequences. Further, infant feeding and wet nursing were deeply stratified according to race, class and nationality, and discourses of “good motherhood” and breastfeeding reflected these trends.

Wet Nursing in Post-Revolutionary America into the 19th century

Throughout the 19th century there developed new conceptualizations of bourgeois work and home wherein ideally “wives and mothers remained outside the paid labor force” and new ideals variably called “the cult of domesticity” or “moral motherhood” (Golden 1996b:41) formed the hegemonic cultural conception of motherhood of the growing white urban middle class. Motherhood, therein, was “remade as a vocation imbued with social meaning, yet seemingly removed from the social nexus of the marketplace” (Golden 1996b:42). As such, the new urban middle class expected wet nurses to work as domestics or “hired help” within their homes. However, their presence was also viewed as “dangerous” for threatening the sanctity of

the nursery space with a cash economy and potentially introducing disease into the home (Golden 1996b:42). These “dangers” caused mothers, and later doctors, to make every effort to ensure that the wet nurses were healthy.

Extant statistics suggest that it was the urban lower classes who suffered disproportionate rates of infant mortality during the 19th century due to concentrated population and contaminated water and food sources (Golden 1996b). The high rates of infant mortality among the urban lower class led to increased availability of wet nurses whose own babies had died.

The line between needing and wanting a wet nurse blurred further in this period for bourgeois white women, and this was reflected in “popular literature increasingly defining middle and upper class women as frail” and unsuited to nursing (Golden 1996b:45). Medical advice also started to echo this view that “middle and upper class women were weak vessels who could not fulfill their biological duties” of child birth and breastfeeding (Golden 1996b:53). Pediatric textbooks endorsed the need for medical guidance in child rearing and the hiring of a wet nurse (Golden 1996b). Before the civil war, physicians began outlining medical protocols for hiring wet nurses that set the stage for their increasing role in scrutinizing wet nurses into the end of the 19th century (Golden 1996b). Given the fear of transmitting venereal disease through nursing, wet nurses were weeded out if there were any indications of venereal infection. However, given that a full medical examination of a wet nurse would “violate codes of morality and modesty” and physicians approached the female body with reluctance, such examinations were commonly conducted on the wet nurses’ own baby (Golden 1996b).

There developed a two tiered wet nursing system where: “the offspring of the well-to-do were suckled in their homes [by live-in wet nurses]; the offspring of wet nurses were placed with other women” (Golden 1996b:58) who often went unpaid but nonetheless cared for and nursed the infant. Over the course of the 19th century, the gulf between the middle class mothers and their wet nurse employees widened “as increasing numbers of privately employed wet nurses came from the ranks of institutionalized single mothers” (Golden 1996b:63).

Golden (1996b) describes the extensive wet nurse marketplace that existed in the mid-to-late 19th century wherein three trends were apparent and provided new avenues for hiring wet nurses: the commercialization of domestic service, the institutionalization of unwed mothers, and the medicalization of childbirth and infant welfare programs. Older informal systems of finding wet nursing persisted but were largely relegated to working-class families seeking wet nurses. For the well-to-do, the wet nurse marketplace became rationalized and employers (or physicians acting on their behalf) sought out formal arrangements for finding a wet nurse (Golden 1996b).

As the 19th century progressed, wet nursing became more medicalized: physicians were heavily involved in the hiring of wet nurses; wet nurses increasingly were not seen as domestic servants but as providing an “adjunct to maternal feeding” and wet nurses were evaluated by a blend of medical and moral standards (Golden 1996b:129). The growth of medical science and of medical specialties (specifically pediatrics) shaped this medicalization as well (Golden 1996b). Coinciding with the “growing social value of children” wherein the young went from being “valueless to being priceless” (Zelizer 1985) pediatrics began to consolidate at the end of the 19th century. Both pediatrics and public health concerned themselves with infant feeding at a

time when infant mortality was “discovered” by reformers launching efforts to improve the lives of infants (Golden 1996b).

One major concern of physicians and reformers was problems in the milk supply wherein illness were acquired through cow’s milk either because of contamination or adulteration: “when babies drank from their bottles (which may have also harbored bacteria due to improper cleaning), they risked their lives” (Golden 1996b:132). Before pasteurization laws in the 20th century, there existed a patchwork of available pasteurized milk either through purchasing from certified dairies or supplied to the poor through milk stations (Golden 1996b).

Yet even when made safe for consumption, most doctors agreed that cow’s milk was not good food for babies (Golden 1996b) and breastfeeding was strongly encouraged (Apple 1987). Near the end of the 19th century physicians and chemists developed proprietary food mixtures and a set of formulas for modifying food mixtures and soon “American manufacturers entered what would prove a lucrative business” with the first known advertisement stating “no more wet nurses”...“a clear indication of what the manufacturer viewed as the food’s rival” (Golden 1996b:134). By the turn of the 20th century, mothers increasingly engaged in “scientific infant feeding” or “scientific motherhood” under the guidance of doctors, giving pediatricians the legitimacy for their specialty practice and authority within the world of infant feeding decisions (Apple and Golden 1997). Despite the recommendations of physicians to breast feed, increasingly women were not doing so (Golden 1996b).

The Decline of Wet Nursing in the late 19th century/early 20th century

In the 20th century, scientific motherhood linked the home and the marketplace: mothers became responsible based on “the belief that science and technology could be applied by women to the rearing of children just as they were being applied [by men] in the factory and large organizations” (Golden 1996b:157). With extremely high infant mortality rates (1 in 5 babies dying in 1900 before their first birthday), and falling birthrates among the middle and upper classes, “scientific motherhood was often a struggle against death” (Golden 1996b:158). Many who hired wet nurses in this era, did so after failing with use of artificial feeding: “they were forced to reconcile their desire to be a scientific mother with their need to rely on an arrangement that, by its very nature, seemed to defy all that was meant by science” (Golden 1996b:158). Although absent from the accounts of physicians and advice books, there existed lasting bonds between wet nurses, their employers and the infants under their care as well as feelings of jealousy and immense gratitude towards wet nurses from their employers (Golden 1996b:172).

Wet nursing at the turn of the 20th century was rarely defended and was in rapid decline in a situation where bottle feeding worked well enough in many instances and was cheaper and without the household management problems posed by the presence of a wet nurse (Golden 1996b). However, artificial feeding was not uniformly promoted by the medical community at this point despite the fact that infant food manufacturers were releasing a plethora of advertisements to convince both doctors and mothers of its merits (Swanson 2014). Physicians became hard-pressed to find wet nurses given declining institutional sources due to employment opportunities for women and new pressures to keep unwed mothers united with their own babies (Golden 1996b).

While it is generally thought that the practice of wet nursing dropped off entirely in the 20th century, this is not entirely true (Fildes 1988). In the US, professional wet nurses were employed until at least the 1930s in cities and into the mid-20th century in the rural south (Fildes 1988). In the southern states, the tradition of African slaves wet nursing white infants lingered with American medical textbooks from as late as 1947 stated that the milk of a “Negro” woman was invariably secreted in greater quantity than that of a white woman (Fildes 1988:250).

In the early 20th century, American wet nurses were employed in hospitals, in children’s aid societies, in foundling hospitals and in private homes. At the time, the term “wet nurse” was used both for women who nursed infants at their breast and those who hand or manually expressed their breast milk to be given to an infant (Fildes 1988). As the history of milk banking attests, wet nurses gradually stopped nursing babies directly and increasingly bottled their milk for sale. American families in the early 20th c. could find paid wet nurses through agencies, directories, and the recommendations of their physicians.

A HISTORY OF AMERICAN MILK BANKING

Support for milk banking has existed, particularly for high-risk infants, for over 100 years (Jones 2003). American milk banking emerged from early 20th century wet nurse directories that connected private employers with wet nurses (Gerstein Pineau 2012; Swanson 2014). As wet nurse directories declined, milk “stations” or “bureaus” began collecting, pasteurizing and distributing bottled breast milk (Gerstein Pineau 2012; Swanson 2014). Milk stations paid milk sellers for their milk (either by week, month, or by the ounce). However, this type of opportunity was short lived and only existed as an option for around 60 years (from 1910-1970)

with milk banks moving toward a donor model (Golden 1996b). Today's milk banks do not provide financial compensation for mothers except for, in some cases, they supply free pumps or storage bags (Jones 2003). Since their initial emergence in the early years of the 20th century, human milk banks have waxed and waned due to concerns with safety and the popularity of formula (Jones 2003).

Excellent recent social histories of milk banking from a payment model (wet nurse directories and early milk stations) to a donor model (contemporary milk banks) have been produced by Kara Swanson (2009) and Marissa Gerstein Pineau (2012). They compliment Janet Golden's (1996b) history of wet nursing that ends with the development of milk stations and the move towards milk "banks". Although the historical record is messy and there are overlaps between the two models, I use the terms milk "stations" and milk "banks" to differentiate different social organizations of infant feeding. "Stations" used a payment model and were started by physicians, while "banks" transitioned towards a donor model and were started by lay women (Swanson 2009). Some historical accounts use milk "bank" continuously to refer to both types of organization (Golden 1996b; Jones 2003).

The "discovery" of prematurity: wet nurse directories and the transition to bottled milk

In their late 19th century situation of rapid decline, wet nurses occupied few niches in American society, largely "suckling foundlings in institutions or working for well-to-do families" (Golden 1996b:179). A new opportunity arose at the turn of the 20th century for women to suckle premature babies in *hospitals*, and later to express their milk to be bottled for use in homes or hospitals. Golden (1996b) refers to this transition as the initial "commodification" of

human milk (Golden 1996b). Slowly, the value of milk shifted from assessments of “the personal characteristics of wet nurses – their health, morals, willingness to obey authority, emotional ties to their own children” to its therapeutic value for those who received it (Golden 1996b:179).

This transition was launched when early 20th century physicians and reformers “discovered” and began tackling the problem of prematurity alongside that of infant mortality (Golden 1996b). While reformers took on public health preventative measures such as the provision of prenatal care, physicians started creating new protocols for the treatment of premature infants in an era where prematurity was common and akin to a death sentence. While there was growing interest in and debate about the proper care of premature babies, physicians agreed that human milk was an indispensable treatment. In the early 20th century, physicians arranged ways for wet nurses to breastfeed premature babies: they arranged for wet nurses to live in hospitals or sent premature babies to infant asylums where wet nurses lived (Fildes 1988; Golden 1996b).

Wet nurses in this era, however, were hard to come by and because of the urgency attached to acquiring milk for babies, premature or otherwise, wet nurse bureaus and agencies were established by a handful of highly motivated physicians (Golden 1996b). The organization of wet nurse directories in this era was contrary to the overall trend of “American women...abandoning breastfeeding in droves” in favor of bottle feeding (Golden 1996b:18). Some physicians found this trend very disturbing but others hastened to make artificial feeding safer and more scientific. While most mothers were breastfeeding at the turn of the 20th

century, by mid-century, babies were regularly bottle fed under medical supervision (Apple 1987).

The ideology of “scientific motherhood” the view that infant feeding should not be left up to mothers, but conducted under the scientific guidance of a physician appeared with developments in artificial feeding and the consolidation of pediatrics as a legitimate professional specialty (Apple 1987): “These artificial feeding options not only supported maternal preferences to avoid breastfeeding but also offered doctors much more scope to prescribe precise feeding regimens” (Golden 1996b:19). Apple (Apple 1987) describes scientific motherhood as existing within an era where scientific knowledge increasingly held a privileged status where “science became practically synonymous with progress and reform” (p. 17).

Most famously, physician, Dr. Fritz Bradley Talbot organized the Boston Wet Nurse Directory in 1910 after an exhausting search to find a wet nurse for a patient (Golden 1996b). This directory was simply an office maintaining a list of lactating women looking for employment and charging a small fee to employers. It worked to “maximize both the easy availability and the quality of nurses for his patients” (Swanson 2014:21). To accomplish this, Talbot “focused on disciplining the wet nurse, applying the progressive values of expertise and efficiency to reform wet nursing in the same spirit that other pediatricians tackled the reform of the cow’s milk supply chain and the formulation of artificial foods. If he must rely on these so-called “slatternly women,” he would remake them into more ideal milk-producing units” (Swanson 2014:21).

Wet nurses in the directory were housed next to an infant asylum where they would nurse foundlings until a permanent position in a private home arose (Golden 1996b). In these

settings, their diet, dress and behavior could be monitored and disciplined (Swanson 2014:21). Wet nurses were required to keep their own babies³⁹ and were relatively well paid (Golden 1996b). After they finished their paid position, former wet nurses were helped to find shelter and employment, often finding themselves with savings and able to escape extreme poverty (Golden 1996b). As with wet nursing in previous eras, the introduction of poor women and now also their infants into the nurseries and homes of rich families led to discord (Golden 1996b; Swanson 2014), and posed supervision problems for physicians (Swanson 2014).

The Boston Wet Nurse Directory lasted until 1925 largely as a private philanthropy financed anonymously by Dr. Talbot (Gerstein Pineau 2012; Golden 1996b). In the end, “the medical and social controls exercised by the Directory were mere scaffolding erected to support a crumbling [wet nursing] structure” and the Directory could not overcome the competition from bottled breast milk (Golden 1996b:189) or artificial formula. The Directory closed its doors once it could no longer bear the sizeable expense of ensuring the housing and social welfare of the nurses themselves (Golden 1996b). However, it reopened immediately in a new location in a doctor’s office building as “The Mothers Milk Directory,” “dispensing with unmarried resident wet nurses altogether and transitioning to collecting [bottled] milk from married sellers in their homes” (Gerstein Pineau 2012:49).

The Era of Mothers’ Milk “Stations”

In fact, collecting bottled milk at the Boston Wet Nurse Directory” had been happening throughout its existence (Gerstein Pineau 2012; Golden 1996b; Swanson 2014). Dr. Talbot had incorporated both wet nurses who directly nursed babies and those who expressed milk into bottles into the Wet Nurse Directory with a premium charged for bottled milk over the services

of a wet nurse (Golden 1996b; Swanson 2014). This blend of direct nursing and bottling milk existed throughout the early 20th century in various contexts where wet nurses were employed (hospitals, children's aids societies, foundling hospitals and private homes) (Fildes 1988).

Golden (1996b:192), as I noted, characterizes the historical trend toward bottling milk as "commodification." In contrast, Swanson (2014:16) saw this as "turning to healthy human bodies as a source of human therapeutics [wherein] efforts succeeded in making the human body accessible and bankable," mirroring parallel efforts in blood collection and the development of blood banking. Swanson (2014:17) suggests that disembodied milk from its suppliers allowed it to be "standardized, anonymized, and control[led] in ways that producing women could never be." As such, "doctors could replace intimate personal exchanges—putting a baby to a breast—with transactions between strangers who might never see or know each other. As a result of the efforts of Talbot and other pediatricians, human milk became the first body product to be institutionally organized in disembodied form" (Swanson 2014:17). Golden (Golden 1996b) suggests that the transition in Boston from the Wet Nurse Directory to the Directory for Mothers' Milk demonstrates the evolution of wet nursing to milk banking: "the home in which wet nurses once lived became a milk laboratory, and the goal of the organization moved from helping needy young women to assisting medically needy infants" (Golden 1996b:199).

Dr. Talbot and his physician contemporaries found that "breast milk in bottles offered better control than feeding by suckling" (Gerstein Pineau 2012; Golden 1996b; Swanson 2014). For instance, expressed or pumped milk could be measured and analyzed for fat, protein and carbohydrate concentration was more easily integrated into a system of hospital milk

laboratories where artificial food was prepared (Swanson 2014). This shift was also welcome by physicians because it posed fewer managerial difficulties than hospital-based wet nurses (similar “problems of character and control” to those of wet nurses employed in private homes) (Golden 1996b:190). Wet nurses⁴⁰ would “produce milk for premature babies by manual expression or by using a pump” (Golden 1996b:190) most often at the milk station itself (Swanson 2014). Babies were then fed with specially designed feeding devices or droppers, lessening the risk of disease transmission (Golden 1996b). Wet nurses who expressed milk in a hospital setting wore uniforms and stayed under the watchful eye of the hospital staff (Golden 1996b). Swanson (2014) describes this enforcement of “strict hygienic procedures” such as nipple washing/scrubbing under the surveillance of a matron.

Wet nurses continued to be evaluated based on their racial and/or national characteristics with some groups viewed as producing “inferior” milk (Golden 1996b). The refusal to hire African-American wet nurses for white babies endured in the North though some argued against this (Golden 1996b). Lines drawn on racial or national lines show that lingering beliefs that characteristics of a wet nurse (even when milk was bottled) transferred to her nursling (Golden 1996b). At the same time, the language became more tempered and “the ongoing process of commodification slowly transformed human milk from a substance produced by women to a therapy dispensed by doctors” (Golden 1996b:192).

Dr. Talbot’s model spread such that by 1929, at least 20 US cities had a mothers’ milk “station” or “bureau” where mothers milk was bought and sold (Swanson 2014) typically to replace hospital wet nursing programs (Golden 1996b). This shift transformed “wet nursing as a service to breast milk as a unique and valuable market commodity” (Swanson 2014:35).

Further, whereas wet nurses were usually “found at the bottom rungs of society – women without husbands to support them or their babies”, women who bottled their milk for sale often “had a stable place to live” and were drawn from the working poor Talbot described as “healthy married mothers” (Swanson 2014:36). Golden (1996b) suggests that:

...doctors viewed milk providers as they did hospital-based wet nurses...merely as recipients of aid, to be regarded with suspicion. In medical narratives, they characterized the women’s earnings not as compensation for providing a necessary substance but as a form of benevolence provided by the hospital (P. 79, my emphasis).

Regardless of how their payment was framed, milk sellers could make a sizeable difference to their family income.

There were accounts from physicians of sellers exploiting the system by adding water or cow’s milk to their bottled milk, leading some banks to require donors to donate only on-site (Golden 1996b). Golden (1996b) found evidence that many women gave their milk to milk banks and rejected payment. For some, this was likely a form of gratitude for having been treated without charge in a hospital.⁴¹ Milk banks carefully selected and managed their milk sellers, with physicians eliminating any with contagious disease. Women’s own physicians examined them to ensure that they had enough milk for their own baby and more. Nurses visited each potential milk seller and “excluded any woman judged “dirty”” with approved candidates trained in hygiene and milk collection (Golden 1996b:198).

Swanson (2014:38) suggests that “as a body product, human milk [within milk stations] was a commodity traded within a constrained market designed to promote the ends of the doctors who had succeeded in organizing its supply and controlled its distribution.” Milk stations were organized and run by health professionals but also middle-and upper-class

women were often involved in supporting the projects through women's clubs or the Junior League (Swanson 2014). Further, while wet nursing was a service offered at market price, bottled milk was not sold at the highest possible profit. Rather, bureaus sought to decrease their prices through the help of hospitals that would provide space and refrigeration (Swanson 2014). Also, physicians would vary their prices for bottled milk in order to "achieve their professional ends of treating all needy patients", much in the same way that physicians themselves would treat some patients for free and treat others on a sliding scale (Swanson 2014). It was sometimes hoped that families paying top price for milk would in-effect "subsidize" those who paid less (Swanson 2014), a dynamic still at play in my observations at the Mothers' Milk Bank in San Jose.

Golden (1996a) attributes the commodification of milk in this era to the development of organized, professional milk stations that allowed for the disembodiment, pooling, and pasteurization of the milk thus purifying milk from its producers' characteristics (see also Gerstein Pineau 2012). "Ultimately, they would achieve both aims – tight control over milk sellers and the "purification" of their milk – through the creation of the modern milk bank" (Golden 1996b:193).

Early milk banks ("stations") provided breast milk to "premature infants, term newborns whose mother's milk was insufficient at the time, surgical cases and ill children" (Jones 2003:315). The same type of infants use banked breast milk today, however the severity of their illnesses is far greater today given life-prolonging advancements in newborn health care (Jones 2003). In 1934 the birth of the Dionne quintuplets in rural Ontario, Canada caused many milk stations and individuals to rush forward with offers of milk (Golden 1996b; Jones 2003).

This raised the profile of breast milk and milk stations but also the broader question of whether such “vital fluid” fit in a commercial transaction (Golden 1996b:200). In the 1940s, comparisons were drawn between blood and milk banking to argue that, just as blood was donated to save fighting men in WWII, American mothers should give milk to babies, rather than sell it. But, this analogy has its limitations given that most infants can be fed artificially with success whereas there is no substitute for blood (Golden 1996b).

Despite lingering criticisms, milk stations persisted throughout World War II, with approximately 24 in existence in the U.S. in 1944, but then declining rapidly in the postwar era to 7 in 1955 (Swanson 2014). In the postwar era job opportunities arose for women, artificial feeding became prevalent and the demand for breast milk decreased (Jones 2003).

Breastfeeding rates in the second half of the 20th century dropped to an all-time low with physicians no longer decrying this trend but almost universally accepting artificial feeding as “part of a modern medical practice that included a hospitalized, medicalized birth” (Swanson 2014:161). Physicians were no longer interested in managing human milk as an infant food source “either in disembodied or maternal form” (Swanson 2014:160). This is significant for this dissertation and questions regarding the circulations and exchanges of milk today.

Transitioning from Stations to Banks

In the face of medical indifference, breast milk stations closed their doors in the post WWII era and charitable women’s organizations opened milk banks moving toward a new model: “a feminized, lay-led institution that emphasized peer-to-peer maternal gifting, taking the blood bank as a model but adapting it in new ways” (Swanson 2014:161). The first milk bank of this model to open was the Evanston Premature Babies’ Milk Bank that chose to call

itself a “bank” rather than a “station” and accepted donated milk rather than sold milk (Swanson 2014). Post war banks transitioned to a donor model both calling themselves “banks” and by recruiting milk from a different type of mother.

Despite parallels between blood banks and milk banks in the early twentieth century, two important differences may have slowed the rhetorical transition from milk “stations” to “banks”. First, blood sellers were seen as very differently from milk sellers:

...while the professional blood donor was [seen as] an intrepid man of business engaged in a somewhat risky and uncomfortable job, the milk seller was [seen as] a vulnerable woman recovering from childbirth, and facing another mouth to feed. She was thus a “deserving mother” who was herself an object of “charity”, helped by her participation in this public improvement project (Swanson 2014:163).

Second, the term “bank” was adopted by blood banks because of an accounting method where patients re-paid their use of body products in kind. But this metaphor did not apply to milk collection and distribution. That is, “the friends and family of a baby needing breast milk were almost certainly unable to donate breast milk themselves” (Swanson 2014:163).

The force behind post WWII milk banks was middle class lay-women who increasingly emphasized “human kindness” as a motivation for donors even though they were paid (Swanson 2014). Women who ran milk banks tended to be from higher socioeconomic classes with the “social capital and leisure time to devote to institution building” and they often kept banks going with volunteer laywomen and a few paid nurses (Swanson 2014:169). The class composition of donors began to shift as those who ran milk banks might also be recruited as donors. The hospital became the “nexus of modern medical care”, no longer a charitable institution where the poor women sought care but a site where nearly all women delivered their babies: “When milk banks recruited hospitalized postpartum women...they were now

reaching women...who could afford to be full-time mothers and housewives” (Swanson 2014:169). Milk suppliers began to encompass “both the social elite and the more humble women who might be glad of some extra cash, linked by maternal status rather than socioeconomic status” (Swanson 2014:170). Milk banks in this era exhibited a trend towards purchasing milk from middle class mothers, sometimes advertised as “college grads” “helping put papa through graduate school” (Golden 1996b:204).

The power hierarchy shifted at this point. Previously, at physician-run milk banks, a male doctor and his nursing staff would have kept sellers under a suspicious eye while they expressed on site, in this era, sellers could express at home and volunteers visited homes to collect milk and “provided some check that donors [sellers] met middle-class standards of cleanliness” (Swanson 2014:171).

In 1955 the Evanston Premature Babies’ Milk Bank proudly announced that they would be the only bank that did not pay its suppliers (Swanson 2014). The bank was founded by a middle-class mother, Jeanne Feagans, who sought breast milk for her own premature baby by networking with other mothers who had just delivered who shared the same pediatrician: “Armed with a stock of rented electric breast pumps, she contacted these women and asked if they would be willing to pump extra for her child” (Swanson 2014:159). Mrs. Feagans’ milk bank attracted public attention wherein her “unusual milk route” of travelling house to house to pick up milk for the milk bank after dropping her kids off at school or camp was documented. Swanson (2014) draws a parallel between these lay-women who acted as “altruistic volunteers” and the milk donors. Both were mothers first and secondarily “caring for their community and other women’s children as an extension of their primary roles as mothers and homemakers”

while being supported financially by a male breadwinner (Swanson 2014:175). In the postwar era, the Evanston Premature Babies' Milk Bank was an anomaly in its non-payment of donors but its emphasis on maternal kindness as a motivation for mothers providing milk and volunteers at the milk bank was common (Swanson 2014).

From Milk Banks to Proto-Informal Networks and Kitchen Milk Banks

Over the next few decades, with lack of demand from physicians for banked milk, most milk banks closed in the 1960s and 1970s (Swanson 2014). Swanson (2014) situates the lack of demand within an era of declining breastfeeding rates where bottle feeding fit better into the expectations of a middle class household that emphasized "housewifery and sexualized motherhood, involving interior decoration, cleanliness, and feminine self care and presentation that required increased time spent on housework, grooming and consumerism" not nursing (Swanson 2014:175).

However, the exchange of human milk continued in less formal ways through some remaining traditional milk banks and the development of ad hoc networks and amateur "kitchen milk banks" (Swanson 2014) fueled by counter-discourses that stressed "natural" childbirth and nursing. "Milk bankers" (a term that remains to this day) wanted to follow the model of the Red Cross who argued that blood should be a public resource and believed that milk should be a gift not a commodity Swanson (2014) suggests that this belief related to a perceived dichotomy between that which is "natural" versus that which is "commercial":

In this developing understanding, cow's milk-based infant foods, and even milk bottled under the medicalized conditions of the traditional milk stations and formal milk banks, were "commercial" and thus bad, while breastfeeding and breast milk gifted from mother to mother without formal institutions were "natural" and therefore good (Swanson 2014:178).

These were, of course, minority views held by those who breastfed when few American mothers did. Swanson (2014) relates these views to the development of the La Leche League (LLL) in 1956, a laywomen's organization that provided support for breastfeeding mothers and encouraged breastfeeding as a "womanly art" integral to mothering.

The networks created by the LLL proved to be a source of milk for those who could not access the few remaining milk banks that often only served premature but not full term babies (Swanson 2014). Ad hoc practices of linking mothers with excess milk with those who needed milk were not new, but were given new life through the LLL, with some mothers storing milk in their freezers for distribution to a particular baby in need. Media reports of these exchanges portrayed women as sharing their enthusiasm for breastfeeding through helping out a baby in an emergency, with milk flowing as a gift, without any payment changing hands. Milk banks that remained continued to pay for milk but rates for payment were the same from the 1930s and, as such, women were largely motivated by "maternal kindness more than money" (Swanson 2014:182). In the 1960s and 1970s controversy arose over milk banks charging recipients for milk in a context where many publicized ad hoc milk circulations were a result of parents circumventing traditional milk banks because they could not afford to buy milk (Swanson 2014).

Milk exchanges could circumvent the formal channels of banks through informal mother to mother gift exchanges, demedicalizing breast milk in a way not possible for blood circulation (Swanson 2014). In the 1970s, while blood banks became more businesslike "transitioning from paid and replacement donors to uncompensated donors and relying on insurance reimbursement...milk banks reinforced their noncommercial quality of their body product, not

just as a matter of production but also in its dispersal” (Swanson 2014:184). While some older banks continued to pay donors, over 20 new banks between 1973 and 1982 followed the unpaid donor model pioneered in Evanston (Swanson 2014). Swanson (2014) suggests that this new model was motivated by several key factors: “a peer-to-peer ethos that rendered it unthinkable to offer payment to donors; the lack of resources of the new banks, who had trouble making ends meet even with unpaid donors; and a new emphasis on keeping banks noncommercial” (Swanson 2014:184-5).

In the 1970s and 1980s, breastfeeding itself and the claim that breast milk is natural and should be noncommercial took on new political significance in the context of both feminist critiques of patriarchy and the women’s health movement. Whereas the minority discourse of the LLL (that assumed a sex-differentiated household with a stay-at-home mother focused on her children) had sustained milk banks in the 1950s and 60s, a radicalized view of breastfeeding as natural within a critique of patriarchy incorporated “liberated women who wanted to breastfeed and work outside the home” (Swanson 2014:186).

In this context, breastfeeding was to “challenge the corporate infant formula manufacturers and the medical industrial complex” particularly while activists were organizing the Nestle boycott (Swanson 2014:186). The women’s health movement came out of New Left politics, emphasized lay practice and was suspicious of both the military-industrial complex (Swanson 2014) and the medical industrial complex (Clarke and Olesen 1999). As such, milk banking “was rethought as an anticapitalist institution of women’s power in which an intimate act was extended to strangers to save them from reliance on the cold, impersonal world of the market representative by artificial feeding choices” (Swanson 2014:187).

This led to new banks in the 1960s and 1970s becoming what more traditional milk banks would call “kitchen milk banks” where women collected milk in their own homes for dispersal to other babies (Swanson 2014). With no regulation on milk banking, kitchen milk banks were free to collect and store milk however they wanted without any commercial transaction and without any medical involvement (Swanson 2014). It is estimated that there were around 30 milk banks in the U.S. in the early 1980s, most of them kitchen milk banks, and another 27 in Canada (Jones 2003; Swanson 2014:186).

From Kitchen Milk Banks to Donor Milk Banking

Kitchen milk banks went largely unnoticed by medical authorities to the extent that, despite their ubiquity, the American Academy of Pediatrics announced in 1980 that milk banks stopped operating after WWII (Swanson 2014).⁴² Shortly thereafter, however, the administrators of hospital-based milk banks and the medical profession took notice and successfully campaigned against kitchen milk banks and their “excessive domestication of this body product” (Swanson 2014:188). Non-kitchen hospital-based milk banks wanted to “reposition bottled milk and milk banks within medical control” and therefore framed the informal distribution of milk through milk kitchens as unregulated and unscreened and therefore a source of possible infection. (Swanson 2014:186). Hospital based milk banks sought to recreate themselves in the image of blood banks by putting themselves under medical control and, eventually, getting rid of the paid donor, just as blood banks had done. This helped to remove the disliked “commercial” attribute from milk banking (Swanson 2014).

A segment of the medical community also showed renewed interest in using bottled human milk for premature babies by convening a workshop called *Human Milk in Premature*

Infant Feeding in 1975 of the federal Office of Maternal and Child Health to “consider the benefits and risks of feeding human milk to premature infants” (Swanson 2014:189). The committee agreed that feeding banked human milk to premature infants was safe, but concern was expressed about the lack of uniform composition of human milk. It made a series of recommendations regarding screening, storage and processing, none of which were bound by law or formal regulation (Swanson 2014).

Instead, in 1985, lay women representatives from about two thirds of the American and Canadian milk banks that existed at the time⁴³ met in Washington, D.C. to found the Human Milk Banking Association of North America (HMBANA), modeled in the image of the American Association of Blood Banks (Swanson 2014). The primary goal of HMBANA was to create a set of regulations that the federal government had failed to create and to regulate themselves to make milk safe (Swanson 2014). The first regulations were published in 1990 and subsequent revisions have emerged and been made available to the public (Swanson 2014).

HMBANA hoped to move banked milk back into the medical mainstream, “a goal that would both stabilize demand and help with cash-flow problems” (Swanson 2014:191). From the beginning, to gain medical acceptance and insurance coverage for banked milk. From my observations, these goals are still the focus today, 30 years later. Their initial regulations focused on safety and standardization in “screening, bacterial counts and processing” and referenced blood bank guidelines hoping to mimic milk as a similar body product (Swanson 2014:192). HMBANA sought to remake their product as “*donor breast milk*”, using this term in their first guidelines that advocated for uncompensated milk donation (Swanson 2014).

The HIV Crisis in Milk Banking

In the 1980s and 1990s “just as the world of blood banking was convulsed by the AIDS epidemic, AIDS caused a cataclysm in the much smaller world of milk banking” (Swanson 2014:193). Physicians were reluctant to write prescriptions for banked donor milk, viewing the risk of HIV transmission as greater than the possible benefit of providing human milk (Swanson 2014). The Canadian world of milk banking was particularly affected with the Canadian Pediatric Association putting out an advisory against milk banking in 1995 (Jones 2003), a lasting blow against milk banking that Canadian milk banks are still recovering from.⁴⁴ Milk banks lacked the finances to screen milk for HIV or to eliminate the virus through heat treatment (usually the kitchen milk banks) and by 1990 over half of American milk banks were closed (Swanson 2014). With the first discovered transmission of AIDS through a blood transfusion and the discovery of HIV in human milk in the late 1980s, strengthened a rejection of paid milk sellers (Swanson 2014) reinforcing HMBANA’s model of uncompensated “donor breast milk.”

Contemporary HMBANA Banks: Growth and Competition

Swanson (2014:194) points out that milk banking discourse cautioning against the risks of paid donation have served to institutionalize a lack of control over the donation process for milk banks. Whereas milk *stations* required paid mothers to donate on site and submit to extensive inspection, and early milk banks that continued to pay donors conducted home visits, unpaid donors to milk *banks* since the 1990s ship their milk to banks, precluding even loose surveillance (Swanson 2014).

HMBANA's embrace of the unpaid donor and use of the "banking" metaphor has dramatically increased medical acceptance. There were 13 HMBANA banks in 2013 (Swanson 2014:195) and 18 in 2015 with another 10 banks in development.⁴⁵ HMBANA banks are all non-profits and treat milk as form of "civic property" that "should be distributed to the neediest first" (Swanson 2014:195). As such, current HMBANA guidelines provide a priority listing that is used to make allocation decisions, especially in times of milk shortages (HMBANA 2013).

HMBANA banks have been facing increasing demand, particularly since official endorsements for milk banking emerged from the US Surgeon General (US Department of Health and Human Services 2011) and the American Association of Pediatrics (2012). The AAP stated in no uncertain terms that premature babies in the NICU should receive banked donor milk when a mother's own milk is unavailable:

The potent benefits of human milk are such that all preterm infants should receive human milk. Mother's own milk, fresh or frozen, should be the primary diet, and it should be fortified appropriately for the infant born weighing less than 1.5 kg. If mother's own milk is unavailable despite significant lactation support, pasteurized donor milk should be used" (American Academy of Pediatrics Section on Breastfeeding 2012:E381).

HMBANA banks have experienced strains on their milk supply because of these unequivocal endorsements. There is currently debate over whether they have been able to work together to meet NICU orders or whether they have experienced shortages that have impacted NICU's abilities to provide banked donor milk.⁴⁶

HMBANA banks sell milk to both hospital NICUs and to patients in the community. The average price for milk from a HMBANA bank is \$4.50/oz., expensive given that term infants consume about 30 oz./day (Fentiman 2010). Current surveys suggest that banked donor milk

(BDM) is currently available in around 42% of American NICUs (Parker et al. 2013) and made available to premature babies therein. It is also sold to community patients who have a prescription. Some of these patients have insurance coverage (in the case of MMB this was primarily Medical patients whose babies showed a medical need for breast milk through formula intolerance) while others pay out of pocket, cultivating a reputation for serving the wealthy, class.⁴⁷

Swanson (2014:194) argues that HMBANA's milk donation for social good model has opened up milk banking to an emerging competing model of a "for profit business that takes advantage of the gift/commodity dichotomy and the public acceptance of body banks to maximize shareholder profits." For example, Prolacta, a for profit company that produces a human milk based fortifier and standardized human milk products for use in the NICUs leverages the social acceptance of the unpaid donor to obtain human milk and then modifies sells it. Interestingly, Prolacta is similar to earlier for-profit blood banks but, unlike them, does not pay donors.⁴⁸ While the National Organ Transplant Act prohibits payment for organ donation, there are no laws that prohibit payment for milk (Swanson 2014).⁴⁹ American understanding of unpaid donation as the best and safest way to get body parts and products, supports Prolacta's for-profit format.

Prolacta has been able to leverage the AAP's endorsement of a fortified human milk diet for premature babies by marketing an exclusively human milk diet. That is, Prolacta's business was built on developing a new milk product: breast milk based fortifier that can be added to breast milk as well as "ready to feed" human milk products that are tailored to the nutritional needs of premature babies. Fortifiers are needed for premature babies because they can only

consume a small amount of liquid but need increased caloric and nutritional intake (Sullivan et al. 2010).

Mapping the History of Milk Donation

Gerstein Pineau (Gerstein Pineau 2012) provides a detailed historical account of the transition from the use of milk sellers to milk donors in milk banking and how “class-based cultural conceptions of motherhood...interact with available technologies in different time periods to determine the extent to which breast milk is commodified or giftified” (Gerstein Pineau 2012:7). She suggests that while milk in the contemporary era is perceived as a gift given by donors without remuneration, for the recipient it is still a commodity bought and sold through a milk bank (Gerstein Pineau 2012). In other words, banked breast milk is neither strictly commodity nor gift, “but is perceived differently at different points along the commodity chain” (Gerstein Pineau 2012:9). She argues that

...early milk banks combined commodity and gift exchange at the point of production, because payment to sellers was also a form of charity for destitute women. Today, breast milk is given and exchanged as both a gift and a commodity, but at different points along the commodity chain: It is a gift at the point of production, and a commodity at the point of distribution and consumption. Only in mid-[20th] century was breast milk commodified at each part of the chain, and then only briefly (Gerstein Pineau 2012:10).

Gerstein Pineau argues that in order for today’s donor-based system to exist, three things needed to be in place: first, technological advances (specifically portable breast pumps) alongside employment opportunities for women that allow some mothers to return to work shortly after birth with a private or other space where they may pump; second, breast milk needed to be sacralized (Zelizer 1985) with the mother-infant relationship embedded in the milk such that its moral value is primary and its market exchange is rendered questionable;

third, a cultural conception of intensive motherhood with breastfeeding as central to a mother's devotion (Gerstein Pineau 2012). As she puts it:

Expanding employment opportunities for women meant that the middle class donors who were pumping at work so they could engage in intensive motherhood while separated from their infants did not need to sell their milk as a form of employment; instead, they could afford to give it away. Intensive motherhood also motivated donation in a more direct manner, because donation is an extension of the selfless maternal giving inherent to this conception. Today, middle-class donors' high level of employment and relatively high incomes, combined with intensive motherhood, motivate their gift-giving and make it possible for the banks to rely on unpaid donors rather than sellers. Meanwhile, advances in breast pump technologies make it easier than ever to physically disentangle the milk from the producer, increasing the supply of milk and further sustaining the donor model of milk banking (Gerstein Pineau 2012:20).

Interestingly, Gerstein Pineau (2012:20) suggests that milk is not fetishized in these exchanges. Rather the sacralization of breast milk embeds it within the mother-infant relationship. Further, she argues that although intensive motherhood is embedded in the milk, donors expressed heterogeneous reasons for donating (weight loss and other abstract emotional benefits) that are not necessarily altruistic and often "conflict with their actions" (Gerstein Pineau 2012:24).

"INFORMAL" MILK CIRCULATIONS

Contemporary discourse on milk banking tends to divide "formal" milk banking from the "informal" or "casual" exchanges of wet nursing, cross-nursing, and bottled milk sharing and selling (Sakamoto 2015). As we have seen, however, the history of milk banking in the United States originated in the history of wet nursing and overlapped with "kitchen milk banks." Thus, the contemporary distinction between "formal" and "informal" exchanges of milk is historically situated. In practice, today, there is variation in how "informal" circulations of milk are described. Some combine all selling and sharing outside formal channels of milk banks "casual"

(Sakamoto 2015) while others⁵⁰ deem “casual” inaccurate and prefer to use “informed” sharing to circulations not involving compensation to the donor. Similarly, some earlier feminist work (e.g., Fildes 1988) use the term “wet nursing” to describe any nursing of a baby other than the mother’s own, while others (e.g., Krantz and Kupper 1981) use the term “cross-nursing” to separate unpaid shared breastfeeding from the negative connotations associated with wet nursing. The term “cross-nursing” has caught on more widely and is now used alongside “shared breastfeeding” to described unpaid small-scale arrangements (Shaw 2007).

Cross-nursing

Significantly, milk circulations outside milk banking networks, especially unpaid shared breastfeeding within kinship or friendship contexts, have long and largely undocumented histories in the United States (Thorley 2012). For instance, a number of my participants who donated or received milk recounted family stories of cross-nursing done by their mothers, grandmothers, or family friends. Sometimes these stories were of immigrant relatives before or after arriving in the United States and were framed within a common cultural practice. Often these stories came up outside of the participant’s formal narratives of donating or receiving milk. In fact some told me that it was only my study that made them think about these stories. But they were nonetheless used as a means of situating their milk exchanges as “normal” and within a cultural tradition. Thorley (2008; 2012) suggests that such stories are largely undocumented because women have been covert about the practice even though they were and are ubiquitous in a global context for reasons of emergency or convenience, especially in situations of maternal death. Although familial instances of cross nursing came up in my

interviews, many knew very few details about the stories, probably owing to the fact that they were not often discussed even among women.

Some commentators (Fildes 1988; Krantz and Kupper 1981) suggested in the 1980s that cross-nursing had become increasingly popular among breastfeeding middle class mothers in response to the increasing popularity of breastfeeding. Despite these views, there has been very little scholarly or media attention to cross nursing until very recently. Instead, scholarly attention was devoted to the history of wet nursing and infant feeding (Apple 1987; Fildes 1988; Golden 1996b). Accounts of cross nursing that do exist throughout the 1980s and 1990s tend to be from the worlds of milk banking cautioning about the dangers of informal circulations of milk e.g., (Arnold 1994), not formal studies or accounts from those who exchanged milk or shared breastfeeding informally.

Rhonda Shaw (2004), an Australian pioneered a scholarly interest in contemporary informal circulations. She conducted a small study of women who cross-nursed their friends' babies. She suggests that wet-nursing, adoptive nursing, and cross-nursing all radically challenge the idea that breastfeeding is work that is not (and should not be) shared. Further, she theorizes that women who cross-nurse extend the boundaries of social maternity beyond the unitary interpretations of genetic/gestational motherhood through the sharing of bodily fluids. Shaw (2004) suggests that these practices – and their deemed “inappropriateness” – indicate a disruption of “the coherence with which maternity is currently constructed by white, Western individualism” (Shaw 2004:288). At the same time, Shaw suggests that cross-nursing also represents an “over investment in mothering, as well as reinforcing protocols of care already extant in welfare state pastoralism, which, in effect, serve to extend patriarchal control

rather than challenge it” (288). That is, cross-nursing, as often practiced to avoid formula, can be seen as extending a normative discourse of “breast is best”, rather than challenging societal expectations of motherhood (Shaw 2007).

Beyond these dual meanings of cross-nursing (radical in its challenge of the biological constraints of motherhood and conservative in its adherence to “breast is best” discourse), commentators suggest that women who cross-nurse invest in their permeable identities as mothers through alternative social relationships based on trust, reciprocity, mutual empowerment, and generosity (Shaw 2004). One reason cross-nursing is not necessarily an acceptable “gift” and may generate negative public attitudes is because of the possible transmission of infections such as HIV/AIDS, hepatitis, etc. (Shaw 2007). The LLL, for instance, actively discourages informal sharing of milk for fear of milk contamination or disruption to the bonding process, recommending instead that women utilized a registered milk bank with carefully screened milk (Thorley 2008).

Fear of disrupting the bond between mother and infant was also cited by Shaw’s (2007) informants as factoring in their decisions whether to cross-nurse. There also exists disgust associated with women putting a baby to her breast when the infant is not her own (Thorley 2008) and an association between this practice and child abuse (Shaw 2007; Umansky 1998). It is likely that such reactions are related to cultural conflation of the sexual and erotic breast with the functional and lactating breast (Young 1998).⁵¹ Boyer (2010) discusses how breast milk has become an ontological substance that has been both vilified and fetishized.

Contemporary Wet Nursing

While the practice of cross nursing has often been referred to as “between social equals”, wet nursing is often cited as involving an unequal, and possibly unjust, social relationship (Thorley 2008). Despite the negative connotations attached to contemporary wet nursing, two prominent on-line avenues exist to find a wet nurse. In Beverly Hills, California, one employment agency, Certified Household Staffing matches wet nurses with mothers seeking milk, earning wet nurses \$1000/month (Fentiman 2010).⁵² Wet nurse services began to be offered in 2003 when the manager, Robert Feinstock, found women with breast implants were having trouble nursing and added wet nursing to the list of household help offered by his staffing service.⁵³ Another on-line venue available is onlythebreast.com, a craigslist style website where mothers can buy and sell bottled breast milk or wet-nursing services.

Additionally, there are accounts of women including wet nursing within paid child care arrangements, either intentionally including wet nursing in the arrangement or coming to do it due to circumstances. Some have suggested that there has been a resurgence of wet-nursing in our era of “breast is best”.⁵⁴ But, as with cross nursing, this may merely be due to increased reporting and sensationalism.

Bottled Milk Sharing

As we saw earlier, there is a history of kitchen milk banks in the 1960s and 1970s that collected and distributed bottled milk “informally” outside of any formal milk bank regulatory scheme, despite the fact that they were called milk “banks” (Swanson 2014). In this same period there were media accounts of women using their social networks to collect milk for particular babies in need – a phenomenon that continues today sometimes facilitated by online

milk sharing groups,⁵⁵ although the kitchen milk banks have ceased to exist. These kitchen milk banks were emboldened by the women's health movement and the perception that infant feeding could be "taken back" into the natural abilities of women's bodies from the clutches of infant formula companies and milk banks perceived to be "corporate" (Swanson 2014). While such kitchens disappeared, there has been a recent explosion in the sharing of bottled milk between friends, and acquaintances often made possible by websites that have been designed to connect parents seeking milk with women who have an oversupply. I suggest that, like the kitchen milk banks of an earlier era, contemporary informal sharing arrangements exist as a way for those who want milk but cannot access milk from a milk bank or prefer free unpasteurized milk directly from a donor.

Today, such transactions are facilitated by a combination of Internet platforms and face-to-face relationships or referrals. Most recently, Internet platforms using Facebook, particularly Human Milk 4 Human Babies (HM4HB), have been especially prolific in matching donors and recipients. But there are a variety of platforms and listservs, some expressly designed for sharing milk (e.g., milkshare), but also parenting, birthing, breastfeeding and neighborhood listservs, have been used to great success (Fentiman 2010). The Food and Drug Administration⁵⁶ Health Canada,⁵⁷ and the Center for Disease Control caution against informal milk sharing because of the risk of the transmission of HIV, tuberculosis and other pathogens. The LLL, once a source for making informal milk sharing arrangements in the era of milk kitchens (Swanson 2014), now has an official policy that leaders are not to initiate or facilitate milk sharing, wet nursing or cross nursing.⁵⁸ Nonetheless, mothers engaged in and organizing milk sharing assert the value of sharing milk and defend their capacities to screen each other through developing

guideline-like principles (Walker and Armstrong 2012) or philosophies that emphasize empowerment and a mother's autonomy to make an informed choice.⁵⁹

Some lactating women sell bottled milk through informal channels, most notably through a website called onlythebreast.com. Some media reports are sympathetic to these transactions, showing how they increase access to milk for those who cannot afford milk banks and offer a form of income for new mothers who “mean well”.⁶⁰ Other media reports stress the strangeness, “creepy-ness” or illicit nature of these transactions by showcasing men with breastmilk fetishes who purchase milk sometimes under a false pretense of seeking milk for a baby.⁶¹ Although there are no federal or state laws that makes the selling of breastmilk illegal (Fentiman 2010), many media reports and milk banking discourse in general often refer to the marketplace for buying and selling breast milk a “black market.”⁶² A recent microbiology study (Keim et al. 2013) tested the informally sold milk for pathogens and found that milk was often contaminated. This has led many of those who advocate informal *sharing* to stress that sharing exchanges are much safer and have not been sampled through these tests that only included anonymous commercial transactions.⁶³

MAKING BREASTS FEED

There are a number of social and embodied situations wherein a new mother who wants to breastfeed finds her body uncooperative and may use milk sharing or milk banking as part of her or a hospital's “breastfeeding project” (Avishai 2007). Here I briefly walk through a number of situations where breasts are uncooperative. These situations are beyond the scope of this dissertation but merit brief description. Significantly, I am not addressing all the social

barriers that stand in the way of many American women breastfeeding nor the many contexts or reasons women may chose not to breastfeed (either happily or reluctantly).

First, “as a result of premature delivery, maternal illness and physical separation from their infants, it is not uncommon for NICU mothers [with premature infants] to experience a delay in breast milk production or difficulty in providing sufficient volumes”(Carroll 2014:466). Lactation and medical researchers now stress the importance of providing breast milk to premature babies and research now stresses the importance of breast milk in these contexts (American Academy of Pediatrics Section on Breastfeeding 2012) putting such mothers under pressure to produce breast milk.

Second, some mothers who did not go through a pregnancy (e.g., use surrogates, adopt babies or are lesbian co-mothers) induce lactation (Wittig and Spatz 2008) through a combination of pumping, breastfeeding (sometimes through a supplemental nursing system – SnS) and hormone treatment.⁶⁴ Many women in this situation take Domperidone (“Motilium” trade name), a galactagogue that has not been US FDA approved, but has been approved over 20 years ago by Health Canada.

Third, physiological reasons for low milk supply exist and are sometimes categorized according to stage of breast glandular development or activation: preglandular, glandular and postglandular (Cassar-Uhl 2014). These causes can exist individually or can interact causing “lactation catastrophes” for mothers trying to breastfeed (Cassar-Uhl 2014). “Postglandular” encompasses most causes for lactation problems (e.g. extended separation of mother and baby that delays suckling and a mother’s lactation response, a poor latch such that the baby cannot properly transfer milk at the breast or the introduction of scheduled feeds that limit the

amount of time a baby spends at the breast (Cassar-Uhl 2014). “Preglandular” refers to hormonal issues that interfere with a mother’s release of prolactin that is stimulated by a baby’s suckling (e.g., an endocrine disorder such as polycystic ovarian syndrome or postpartum thyroiditis). Glandular causes for low milk supply refer to a lack of milk making tissue in the breast, either because of breast surgery (as a result of cancer, or breast augmentation/reduction surgery) or because of insufficient glandular tissue (IGT), a little understood or recognized condition (Cassar-Uhl 2014).

Lastly, while breastfeeding after breast cancer is possible, some surgeries can eliminate or reduce the chances of lactation (Gorman et al. 2009; Huggins 2010). All breast surgeries, including breast augmentation and reduction surgeries, increases the likelihood of insufficient lactation when a woman tries to breastfeed (Bondurant et al. 2000).

RECENT SUBSTANTIVE LITERATURE ON HUMAN MILK EXCHANGES

In the last 5 years, there has been a steady increase in academic interest in human milk exchanges. A small number of theoretical analyses of milk exchanges exist in the literature. Boyer (2010) surveyed the various travels of breast milk that she attributes to its “mobility” generated through lactation technologies, (e.g., pumps, bottles and refrigeration). She suggests that today breast milk travels as a mobile biosubstance drawing together gift-exchanges and commodity exchanges. Fentiman (2010) surveyed “emerging markets” in human milk and infant formula within a general “marketing of breastfeeding” framework and offers useful legal and market analyses. Hassan (2010) provides an analysis of Prolacta’s marketing wherein she argues that “breast milk, as a commodity, is...metaphorically reshaped and masked to represent the wonders of technological innovation and progress, while the lactating body and

relationships between bodies increasingly vanish” (211).⁶⁵ Shaw (2010) outlines various ethical perspectives on the gift-exchange of breast milk. She theorizes how various ethical perspectives understand *breastfeeding* as gift-exchange and what this implies about the gift exchange in milk banking. She summarizes liberal, utilitarian, and communitarian ethical perspectives, ending with analyses of how these perspectives would view the commodification of breast milk. More recently, Cassidy (2014) offers an overview of human milk exchanges and suggests that maternal generosity and notions of trust mediate the value of breast milk today. Most pertinent to this dissertation, she argues that built into various forms of breast milk exchange lay notion of the mother-child dyad exchange of breastfeeding as a “true” gift where rarefied and pure altruism exists. That is, she asserts this exists outside modes of reciprocity associated with gifting since Mauss (1954).

Milk sharing has also captured the attention of social science researchers through both qualitative research and advocacy literatures. Many of these investigations are imbued with a sense of describing something misunderstood, entirely unknown or unfairly vilified. Cassidy and El-Tom (2010) offer two auto-ethnographic examples of unpaid milk-sharing, one in Ireland and one in the Sudan, “illustrating the larger implications of the ‘gift’ of milk activating a series of expectations and obligations that anthropologists since Bronislaw Malinowski have analyzed in terms of structures of social cohesion” (110). In the Sudanese example, an unpaid wet nurse breastfed a baby when the mother was incapacitated following a traumatic birth, illustrative of a common occurrence among the Berti people of northern Darfur, Sudan. The two infants were thereby transformed into “milk brothers”, “a detailed and culturally prescribed relationship akin to blood ties in Islamic societies” (111). In the Irish example an infant was born

prematurely in a setting that did not routinely provide BDM, and the parents took matters into their own hands and developed an arrangement with the only available milk bank in Ireland. Here, “the community milk bank represents a kind of invisible community based on a unique and invaluable form of giving” (118).

Thorley (2012) gathered accounts of shared breastfeeding or breast milk from women of diverse nationalities and cultures who resided in 8 different countries at the time of their milk sharing experience. In many cases, these accounts relayed a family history of sharing breastfeeding, as was the case with one participant who shared breastfeeding in India while living in a traditional Islamic family compound where she shared breastfeeding with her co-wife and other friend, as was typical in her situation. In some cases, women reported sharing milk as a result of maternal illness, often cancer treatment. In one instance Thorley (2012) discovered that a Dutch mother had started a milk sharing database in 2005 that screened mothers before adding them to this informal database. She further found while many mothers gave consent for co-feeding, many arrangements were based on a tacit agreement and were only discussed after a situation arose. Further, she found that many mothers were careful about who they told about their shared breastfeeding or breast milk, sometimes finding their husbands were unsupportive.

Cassidy (2012) provides a description of the emergence of the two major on-line milk sharing networks (Human Milk 4 Human Babies and Eats on Feets) and how, in their growth, they have interacted with the worlds of milk banking, their critics and their supporters. She suggests that “the continuing battle for legitimacy that the international donor milk banking community continues to fight has contributed to the spread and advocacy of a non-medically

controlled human milk banking exchange system [informal milk sharing networks],” (Cassidy 2012:226). She views mother-to-mother human milk exchanges as globalized thanks to the use of new digital technology and, despite a variety of participant identities, as increasingly framed within global lactivist rhetoric.

Karleen Gribble has emerged as a vocal advocate for and researcher of informal milk sharing. With Bernice Hausman (Gribble and Hausman 2012), she contextualized the pathogenic (e.g., viral and bacterial), and chemical (e.g., medication) “risks” of informal sharing in general and compared them to risks of other forms of infant feeding, including breastfeeding and formula feeding. For example, they point out that although HIV and HTLV (Human T-Cell Leukemia Viruses) can be transmitted by breastfeeding, they are not transmitted easily and require repeated exposure. Further, most mothers in resource-rich settings are tested for HIV and HTLV during their pregnancies and will be aware of their status upon lactation. They further argue that infant formula can also be contaminated with pathogens (e.g., a wide range of bacterial species). They suggest that “historical and cultural reasons underlie the distaste for the sharing of human milk that is reflected in this condemnation of milk sharing. Instead of proscribing peer-to-peer milk sharing, health authorities should provide parents with guidance on how to manage and minimize the risks of sharing human milk” (280).

Gribble (2013) examined the interaction between milk banking and informal sharing by surveying mothers who engaged in milk sharing about their perceptions of or experiences with milk banks. She found that some informal donors could not donate to a milk bank because there were no local milk banks⁶⁶ or they did not qualify. Other donors did not donate to a milk bank because they found the process too difficult or had a philosophical objection to milk

banking or a philosophical affinity for peer-to-peer sharing. More recently, Gribble's (2014b) survey of informal donors found that many donated because they wanted to help someone, often as an empathetic response to another mother with insufficient milk. Further, many did not want to waste milk that they expressed in order to maintain supply while some expressed explicitly for donation. She found the motivations to be the same as those that have previously been reported by women who donated to a milk bank. Gribble (2014a) also reported on the recipients of shared milk, finding that many had difficulty finding health workers who could help them with breastfeeding and that many had tried to increase their supply or seek milk from friends before seeking informally shared milk on-line.

Palmquist (2014) surveyed American women who share milk for their demographic information, reproductive and lactation histories, and levels of social and health care support for breastfeeding. She found that respondents were primarily white, middle-class, well educated and employed women and had higher than average household income, education, breastfeeding exclusivity and duration. Lactation differences between donors and recipients were associated with structural and biocultural factors (i.e., donors reported higher income, education and breastfeeding support as well as rates of full term birth). To measure the prevalence of on-line milk sharing Perrin, Goodell, Allen and Fogleman (2014) conducted an observational study of 3 months of on-line milk sharing at HM4HB and EOF. Based on their observations, they conclude that milk sharing networks are active and the reasons for participations were often described as "lactation problems" or "child health problems" and that many donors were offering large quantities of milk (often more than 100 ounces).

Most medical and public health commentary is cautious (e.g., Geraghty, Heier and Rasmussen 2011; Vogel 2011) or overtly critical (e.g., Landers 2014) of informal milk sharing or selling. In a mild tone, Geraghty, Heier and Rasmussen (2011) review the risks of milk sharing or selling and stress that these practices are unregulated, raising unknown public health implications. In a more strongly worded article “Warn Mothers Against Buying, Donating Breast Milk Via Internet,” Landers (2014) stresses the “remarkable risks” associated with “casual milk sharing” and suggest that pediatricians temper their advocacy for breast milk/breastfeeding by advising parents against casual milk sharing. A small number of studies have been done on informal sharing or selling in an attempt to characterize the potential risks involved. Two microbial studies (Cohen, Xiong and Sakamoto 2010; Keim et al. 2013) were done on potential risks of informal exchanges and the related necessity of milk bank screening and pasteurization. Cohen, Xiong, and Sakamoto (2010) retrospectively reviewed the Mothers Milk Bank’s experience with donor serological testing over 6 years in order to estimate the prevalence of positive results among potential donors. They found that “out of 1091 potential donors, 3.3% were positive on screening serology, including 6 syphilis, 17 hepatitis B, 3 hepatitis C, 6 HTLV and 4 HIV” (Cohen, Xiong and Sakamoto 2010). Keim, Hogan, McNamara, Gudimetla, Dillon, Kwiek and Geraghty (2013) sampled milk purchased on the Internet informally in order to document the “potential for human milk shared via the internet to cause infectious disease” (e1227). They found that milk purchased on the Internet exhibited high bacterial growth and contamination with pathogenic bacteria. Both studies have been controversial among those who support sharing, but particularly Keim and colleagues (2013) for conflating “sharing” and “selling.”⁶⁷ One study (Geraghty et al. 2013) examined the condition of milk explicitly “sold”

(not shared) on line and found that most of the sampled shipments arrived above the recommended frozen temperature, and much of it above the recommended refrigerator temperature, contributing to possible bacterial growth. Further, this study found that many shipments arrived damaged or suggesting improper collection and storage conditions.

At the same time, there is a growing strand of literature that attempts to recognize or legitimize informal milk sharing as a (potentially) safe and sensible practice. Some (e.g., Martino and Spatz 2014), is geared at providers and what they should know about the practices in which patients may be engaging. Martino and Spatz (2014) recommend providing families engaging in milk sharing with “information on health history and laboratory screening as well as safe-milk handling practices” (369). From an “insiders” perspective, Walker and Armstrong (2012), outline recommendations for how to engage in milk sharing safely through following “the four pillars of safe breast milk sharing” (informed choice, donor screening, safe handling and home pasteurization. Shell Walker, the first author, was one of the founders of Eats on Feets, one of the major milk sharing Facebook pages.

Some literature (e.g., Akre, Gribble and Minchin 2011) provides theoretical and public health arguments for why these practices should be supported but are often dismissed out of hand. Akre, Gribble and Minchin (2011), for instance, point out that international feeding recommendations endorse milk sharing⁶⁸ and, as such, the choice to seek peer-to-peer donor milk should be understood as a healthful practice.

Milk banking has a history of “insider accounts” (e.g., Jones 2003; Tully, Jones and Tully 2001). Recently, Bar-Yam (2010) reviewed how and why she started the Mothers Milk Bank of the North East (MMBNE) and summarizes contemporary ethical problems facing milk banking.

She discusses the allocation of scarce milk reserves, the relationship between milk banking and the International Code of Marketing Breast milk Substitutes and the significance of a possible divide wherein non-profit milk banks do not pay donors while for-profit milk banks do.

More recently, milk banking has been studied by social scientists who are relative “outsiders” to milk banking. However, these studies are often done in collaboration or cooperation with milk banking or NICU “insiders”. Carroll and Herrmann (2012) surveyed American NICU clinicians about their knowledge and opinions of PDHM (they use the term PDHM or “pasteurized donor human milk”). They surveyed clinicians during the first weeks that PDHM was introduced into the NICU and then again 6 months later. They found that after 6 months clinicians were more inclined to recommend PDHM. Clinicians who came to embrace PDHM were initially suspicious of its safety, and later replaced these concerns with concerns about the cost of PDHM and the potential for decreased postnatal growth. In a later paper (Carroll 2013), the same authors analyzed feeding logs in a NICU to estimate the cost of BDM per infant. They estimated that BDM costs \$7 to \$590 per infant, depending on a mother’s willingness or ability to provide her own breast milk. This last finding follows a lineage that tracks the relative cost of NEC (necrotizing enterocolitis) when compared with the cost of providing BDM and/or human milk based fortifiers as preventative therapies (e.g., Ganapathy, Hay and Kim 2012). In an effort to estimate the prevalence of BDM use in American NICUs, Parker, Berrero-Castillero, Corwin, Kavanagh, Belfort and Wang (2013) surveyed NICUS, finding that only 42% of level 3 NICUs⁶⁹ reported use and that larger level 3 NICUs and those in the West and Midwest were more likely to use BDM while safety-net hospitals were less likely.

Bartle (2010) describes competing discourses of breast milk in the NICU using interviews with NICU mothers. On the one hand, mothers show distress when not making enough milk. On the other hand, they are often made to feel as though their milk itself is inadequate through the additional use of bovine-based fortifiers or suggestions that the milk could be replaced by cow formula designed for premature babies. Surrounding this, she describes discourses in the NICU that support viewing breast milk as a potentially dangerous bodily fluid that requires special handling and processing. More recently, Carroll (2014) conducted an ethnographic study of NICUs and milk banks to uncover how donor milk is endorsed as a safe and legitimate feeding option therein. She uses Latour's (2004) "new critique" approach of adding to reality rather than debunking it. She suggests that the material labor of the human milk bank provides a form of material transformation for the milk that can transform it from a risky biosubstance to a product with biovalue deemed safe for use in the NICU. Further, she argues that the reproductive labor of the milk bank donors who self-regulate and comply with milk bank donor requirements create safety before the milk arrives at the milk bank. Lastly, she shows that medical protocols, like prescriptions and informed consent, add to the medical legitimacy and safety of BDM in the NICU.

Gerstein Pineau (2012) conducted a historical study of milk banking that included qualitative interviews with donors and recipient parents at the MMB in San Jose, California. She found that all donors and recipient parents she interviewed, regardless of class status, were influenced by conceptions of "intensive motherhood" (Hays 1998), or the view that good mothers not only put their children's needs first, but provide labor and emotion-intensive care to protect them from a harsh impersonal market-driven society. She found that recipient

parents of higher income assumed donors were also middle class, sharing their values and lifestyle choices. Conversely, lower income parent recipients did not assume this about donors. Further Gerstein Pineau found that while some of the donors she interviewed viewed their milk as un-exchangeable for money, others she interviewed perceived their milk as exchangeable for other tangible or intangible benefits. Some middle class donors expressed an interest in being paid for their milk even though they gave milk away. Gerstein Pineau found that recipient parents who were middle and upper class generally did not think that donors should be paid, instead viewing the milk as a symbol of good parenting. Lower income parents, however did think donors should be compensated, perhaps because they did not associate donation with good parenting assigning the same symbolic value to the milk.

To my knowledge, there have been no empirical investigations of the use of human milk in biomedical innovation (e.g., the use of human milk to make fortifiers or other biomedical products that use (e.g.) stem cells or HAMLET) in the social sciences. Further, there have been no empirical investigations that have analyzed the social worlds of milk banking, informal sharing and biomedical innovation simultaneously.

CONCLUSION

These histories of breastfeeding, wet nursing, and milk banking as well as snapshots of contemporary informal exchanges serve to contextualize my research on contemporary human milk banking, sharing and technoscience. These contextual elements reflect the fact that the economic forms under analysis as well as the embodiments they include are not static and will continue to change over time. I have also provided a literature review of recent substantive literature on human milk exchanges to show that, although there is a growing research on

human milk exchanges, this current project is unique in its scope and orientation. The next two chapters launch an analysis of contemporary non-profit human milk banking attending, in particular, to logics of surplus, scarcity, safety and care and how they have generate value in banked donor milk (BDM).

Chapter 3 - The Right Milk at the Right Price: Recruitment and Screening at a Human Milk Bank

INTRODUCTION

Human Milk Banking Association of North America (HMBANA) banks differ from Prolacta in their relationship with increasing demand for banked donor milk (BDM) and potential milk shortages. HMBANA banks, particularly the Mothers' Milk Bank (MMB) in San Jose where I conducted an ethnography, emphasize a logic of "how" milk banking is done wherein donors are not paid, banks do not make a profit, and the sickest babies are prioritized as recipients of BDM. This moral/ontological construction of BDM and milk banking does not necessarily assure that adequate *volumes* are processed but that mothers and their milk have been appropriately cared for along a chain of custody (Thompson 2005) and that the neediest babies are served first. Prolacta (as we will see in chapter 5), conversely, employs a logic of urgency for producing the safest and most technoscientifically sophisticated products and there may be a happy coincidence with profit making along the way. Both HMBANA and Prolacta employ logics that contend with the two donor dynamic and the problem of commodification although in very different ways that produce different types of value.

This chapter and the next follow milk as it flows through a non-profit milk bank. I argue that HMBANA non-profit milk banking offers an economic form wherein the value of BDM is established through logics of surplus, scarcity, care and safety. These chapters follow the ways milk banks have choreographed a type of growth using these logics that allows them to maintain the medical/moral legitimacy of their economic form while just keeping up with rising demand from Neonatal Intensive Care Units. In this chapter and the next I pay particular

attention to the ways in which the economic form of non-profit milk banking seems antithetical to outright growth in HMBANA banking. In fact, I find there to be an underlying ontology of *scarcity* that is folded into HMBANA's socio-technical-economic form in a variety of ways. In the current chapter, this argument hinges on logics of surplus milk and care via the centrality of the unpaid screened donor from whom donated milk must be gifted surplus milk, thus effectively setting limits on how much milk they can collect. Here I demonstrate how banks such as the Mothers Milk Bank (MMB)⁷⁰ are making strides in attracting more milk donations, particularly through a newly improved Internet presence and social media engagement that is serving to market the donation experience and develop community.

Data Sources

This chapter and the next analyze data collected between 2011 and 2013 on non-profit human milk banking. I conducted 6 in-person in-depth interviews (some interviewed multiple times) with staff and directorship at the MMB in San Jose, California. I made weekly ethnographic visits to the MMB from November 2011 to June 2012 and one return ethnographic visit in August 2013. During these visits I volunteered (primarily packing milk for distribution), spoke with staff and observed operations. When permitted, I collected materials (e.g., donor agreement packages, flyers, etc.) and took photographs. I also attended a focus group held with donors, recipients and staff in June 2012 regarding how to improve donor recruitment, branding and the MMB website. I attended a "Miracle Milk" stroll affiliated with the MMB in support of milk donation in May 2014. I observed the old and new MMB website as well as increased Facebook and social media presence from November 2011 onwards.

I conducted 18 in-person in depth interviews with MMB donors and recipients from November 2011-November 2013. Seven of these interviews were done with donors and 11 were done with recipients. Most recipients interviewed received milk as out-patients (8), some in the NICU (2) and one participant in both settings. All interviewees were asked to complete a demographic survey (see Appendix c) and demographic summary is provided in Appendix A. The limitations of this sample are addressed in Chapter 6 “Conclusions.”

I travelled to the Iowa Mothers Milk Bank (Iowa MMB), a HMBANA bank part of the University of Iowa Children’s Hospital in Iowa City, Iowa. There I conducted 3 in-person in-depth interviews with staff and directorship taking place over 3 days. Additionally, I conducted participant observation there by shadowing staff and observing operations. I observed the Iowa MMB website and available promotional materials and took photos when permitted. Because this bank was affiliated with a hospital, this allowed a greater degree of access to the hospital’s NICU during my visit. I conducted interviews at the University of Iowa NICU (In-person in-depth interviews with NICU staff - 2 neonatologists (Eckhart Ziegler, the past medical director of the MMB of Iowa and Tara Colaizy the current medical director of the MMB) and 1 dietitian. Additionally, I conducted participant observation in the NICU in that I was given a tour, observed milk delivery to premature babies, and had informal conversations with staff members.

I also conducted research on HMBANA by attending their 2012 Conference in Las Vegas entitled “Embracing Human Milk in the 21st Century: Practice, research and results.” There I listened to talks, toured the promotional booths, and spoke to attendees. I also collected and reviewed HMBANA newsletters from 2006 onwards, observing HMBANA website and press

releases, and conducted one in-person in-depth interview (over a period of 2 days) with Dr. April Fogleman, a Professor of nutrition science who has worked closely with HMBANA banks, especially MMB and is currently on their Board of Directors. At the MMB I interviewed then-past, now-current president of HMBANA Pauline Sakamoto (also director of MMB). At the Iowa MMB I interviewed then-president of HMBANA Jean Drulis (also executive director of MMB of Iowa). (listed above). Additionally, I travelled to Vancouver, Canada where I interviewed Frances Jones, past-president of HMBANA (also director of BC Women's Provincial Milk Bank).

I also conducted 4 in-person in-depth interviews with lactation consultants at a San Francisco Bay Area hospital maternity ward (Northern Hospital, pseudonym) where BDM from the MMB was in the process of being introduced into their NICU and also from which MMB donors had long been recruited. I toured their facility and observed storage and delivery of milk. I also conducted 1 in-depth phone interview with a lactation consultant at a San Francisco Bay Area hospital that uses Prolacta fortifier and BDM.

Mapping the History of Milk Donation at The Mothers' Milk Bank

Gerstein Pineau (2012) offers a history of the MMB where my ethnographic work was centered as a case study for milk banking today. Before discussing my own work, I offer her historical work as useful background. The MMB opened in 1974 and is the oldest and largest HMBANA bank in operation today. The bank's origin story lies, much like other milk banks, in a desperate plea for milk from pediatrician seeking milk for a patient. Using funds from the March of Dimes, Maria Teresa (Terry) Asquith, then a transplant technician at a tissue bank at Santa Clara Valley Medical Center and Cynthia Cummings, M.D. set up the "mothers milk unit" then "Mothers' Milk Bank" in 1974 and 1980 respectively. Unlike some other banks in existence

at the time (e.g. the San Francisco Milk Bank), the MMB never paid its donors for fear of adulteration, instead compensating them with “praise” and “involvement with other donors” Gerstein Pineau (2012) suggests that more factors were at play in sustaining the lack of compensation for donors, in particular “class-based conceptions of intensive motherhood” and “trends in women’s employment, medical practices and beliefs, and advances in technology” (Gerstein Pineau 2012:108).

In its early years the MMB relied heavily on donor volunteerism but also saw itself as benefiting donors through an “open door” policy wherein mothers and their children were physically present at the bank and could socialize among themselves and with milk bank staff (Gerstein Pineau 2012). Volunteerism was so strong in this period that a formal Volunteer Auxiliary of the Mothers’ Milk Bank was formed to raise funds. Gerstein Pineau (2012:110) suggests that this arrangement of volunteerism and community building was made possible by the fact that most donors of the time were unemployed stay-at-home mothers who had the time to “drop off milk volunteer and socialize.” Gerstein Pineau (2012) found that the MMB reinforced a notion of intensive motherhood by thanking mothers for “giving of themselves”, tying their donation to their identity as good mothers.

Medical support for the MMB, just like milk banking in general, was inconsistent and often came in the form of “maverick” neonatologists who sought milk over the banks first few decades (Gerstein Pineau 2012).⁷¹ In the end, medical support for the MMB and other banks probably resulted from “the growing preference for breastfeeding in this era” particularly in linkages with natural childbirth movement and pressures from pregnant patients (Gerstein

Pineau 2012:114). Further, there existed increased medical interest in feeding donor human milk to premature infants, despite lack of evidence (Gerstein Pineau 2012).

By the early 1980s there was increased medical acceptance of milk banking and the MMB but the HIV crisis reversed this upward trend (Gerstein Pineau 2012). Reports of HIV transmission in breastfeeding led to declining donations and requests for milk (Gerstein Pineau 2012). The MMB temporarily closed and subsequently began pasteurizing all of their processed milk (Gerstein Pineau 2012). The MMB was one of the few milk banks to stay open throughout the HIV crisis with their supply and demand dropping to their lowest levels in the early 1990s (Gerstein Pineau 2012). By 1990, all HMBANA banks began routine screening of donors for HIV and no cases infection among recipients has ever occurred (Gerstein Pineau 2012).⁷²

In the early decades of the MMB, the establishment of Neonatal Intensive Care Units (NICUs) and technologies that increasingly helped keep premature babies alive added to an increasing market (with higher survival rates) for banked donor milk (Gerstein Pineau 2012). At the same time “the diminutiveness and vulnerability of premature recipients...became a powerful symbol of the bank’s work that helped the bank recruit donors and raise funds” (Gerstein Pineau 2012:119).

Since 1995, the MMB has experienced rapid growth (detailed below). During the last couple of decades, the MMB has changed the type of donors it attracts and the type of relationships it has with them (Gerstein Pineau 2012). Active donor involvement in the bank’s operation has decreased, a board of directors runs the bank and the Volunteer Auxiliary no longer exists. Gerstein Pineau (2012) suggests that the decrease in donor involvement is because of an increase in employment rates among donors. Increased employment did not,

however decrease the amount of donations that the bank received. On the contrary, it is likely that increased employment was a factor in rising milk donations because employed mothers pump while separated from their infants and can amass large quantities of unneeded milk (Gerstein Pineau 2012:122).

Gerstein Pineau (2012) suggests that the MMB has recruited and continues to recruit donors using a conception of intensive motherhood wherein mothers are expected to be altruistic and inherently giving. Simultaneously, the MMB promises donors not to make a profit off of banked milk (by only charging a processing fee, not charging for the milk itself) (Gerstein Pineau 2012). She also suggests that by selling banked milk to a proportion of healthy babies the MMB and other HMBANA banks are espousing a view of intensive motherhood wherein every dimension of a child's life is optimized by parents (usually mothers).

Gerstein Pineau (2012) argues that the increasing medical support for breastfeeding among healthy and premature babies, improved technological advances in pumps, rising surrogacy and IVF pregnancies, improved care for premature babies and increasing internet awareness have helped the MMB grow in recent years. At the same time, the MMB has ceased using volunteers to pick up milk and is now employing staff to pick up local milk and using FedEx extensively to pick up and deliver milk across many states, expanding their network of potential donors and recipients (Gerstein Pineau 2012).

Growth in Milk Banking

American non-profit milk banks have experienced tremendous growth over the last five years as evidenced by the amount of milk they distribute. For example, the MMB, (the largest of all non-profit milk banks) distributed just under 100,000 oz. of milk in 2000 (Cohen 2012)

then over 570,000 oz. in 2013 (Sakamoto 2015). On my final ethnographic visit to the MMB in August 2013, numerous staff members proudly, but wearily, told me about how the previous month was their highest processing month ever, with 60,000 oz. of BDM processed. Growth at the MMB was attributed to a combination of increasing demand for BDM (from hospital NICUs and out-patients)⁷³ and the MMB's improved ability to recruit milk donors.⁷⁴ Recently the American Academy of Pediatrics (2012) strongly endorsed milk banking as did the Surgeon General (US Department of Health and Human Services 2011). Both statements have contributed to greater interest from NICUs in BDM. Despite this, a recent study suggests that only 1/3 of NICUs use BDM and have quite varied degrees of use (Parker et al. 2013).

Back in 2006, the Human Milk Banking Association of North America (HMBANA) (2006) dispelled rumors that their member banks were experiencing milk shortages and that orders for milk from NICUs were not being met. Nonetheless, rumors of unmet hospital orders persist.⁷⁵ I found that at MMB, unmet requests for BDM were not from hospitals but from out-patients who fell at the end of the HMBANA (2011; 2013) priority listing. I found that after filling hospital orders, if the MMB could not meet the requests of all out-patients, their staff asked the out-patients to delay their requests or reduce the amount ordered at that given time.⁷⁶ I witnessed only one event where the MMB was not able to meet a hospital request and, in order to maintain a good relationship with that hospital, they collaborated with another HMBANA milk bank to ensure that the hospital order was filled.⁷⁷

What was vividly clear from my fieldwork was that the MMB was often limited by the amount of donated milk they were able to obtain in their ability to meet the combined requests from hospital NICUs and out-patients. Ron Cohen, the MMB Medical Director told me:

So more people are getting on the [milk banking] bandwagon. Demand is going up. I just don't churn [BDM] out of a machine. I need human beings to make the milk. So that's a big tension in our business. We do need to work on that [increasing milk donations] so that's another thing that we do. We run around trying to create depots, create awareness, have milk drives like people have blood drives, recruit more hospitals who are using the milk to actually help us recruit donors to get the milk. And having government support for that would be fantastic.⁷⁸

In fact, Pauline Sakamoto, the Director of the MMB, suggested that their growth in amount processed was a direct reflection of their ability to attract more milk donors, implying that they have always had unmet demand from out-patients whose orders are lowest priority.⁷⁹

HMBANA banks overall are growing rapidly in terms of the number of milk banks and the amount of BDM processed by HMBANA banks. In 2011, at the outset of my fieldwork, there were 10 operational milk banks and 6 developing HMBANA milk banks (HMBANA 2011).⁸⁰ Currently, there are 19 operational and 5 developing HMBANA milk banks.⁸¹ In 2004 HMBANA milk banks distributed 580,768 ounces (HMBANA 2006), in 2011 they distributed over 2.18 million ounces⁸² and in 2013 over 3.1 million ounces (Sakamoto 2015). Even with such dramatic overall growth, some banks have a hard time staying afloat and not all have experienced the same rate of growth.⁸³ Further, there is often concern that too many people (usually women) are interested in opening milk banks without knowing the difficulty of the undertaking nor whether the actual community at hand needs a milk bank or has the donor pool to provide for it.⁸⁴

This chapter is divided into three major sections. Under "Donor Recruitment", I argue that the MMB and other HMBANA banks fold safety and scarcity into their economic form by constructing milk donors as *first* breastfeeding mothers and *second* as donors. This creates a moral exchange that permeates assessments of how much milk is "out there", new recruitment

strategies that are taking up social media, affiliations with lactation communities and framings of milk as an altruistic gift. Under “Donor Screening” I emphasize the care with which staff must handle milk donations, the cautious opening up of donor exclusion criteria, and the reliance on serological testing to screen donors as ways that scarcity and medical legitimacy are folded into non-profit milk banking. Under “The Experience of Donation” I discuss the ways in which donors to the MMB saw themselves as having lucky or gifted bodies capable of making surplus milk, echoing themes of scarcity that have already been explored but now in bodily form.

DONOR RECRUITMENT

The MMB and other HMBANA banks construct donors as *first* breastfeeding mothers and *second* surplus milk donors (specifically *not* sellers). As such, the MMB and other HMBANA banks construct a notion of “surplus milk” that will not interfere with a donating mother’s breastfeeding of her own infant and will be sourced from trustworthy donors who are not overly incentivized to donate. The donor herself is constructed as donating her surplus milk and her surplus labor (not labor that would otherwise nourish her own child and not labor that could support her or her family financially). This moral exchange folds an ontology of scarcity into non-profit milk banking wherein medical/moral limits on milk collection are imposed throughout and generate value in the economic form of non-profit milk banking.

In this section on donor recruitment, I follow this notion of surplus milk through my observations of recruitment and marketing at the MMB. I found that in order to keep up with rising demand, the MMB has choreographed a way to grow donations through on-line marketing, community building, and engagements with lactation communities.

Assessing and constructing surplus milk

HMBANA milk banks have experienced an enormous increase in demand for BDM milk and have embarked in a very public scramble to recruit donors to keep up. Some HMBANA milk banks are more successful in keeping up while others experience frequent shortages. HMBANA leadership often sees milk shortages as exacerbated by new demands for donated human milk stemming from two sources – first from informal sharing and selling avenues and second, from Prolacta, the for profit entity that makes a human milk based fortifier. This issue is examined in more detail in chapter 5. For now, what is important to note here is that these players (Prolacta and informal sharers and sellers) are evoked in the struggle to recruit donors as sources that exacerbate scarcity in milk banking.

In only one instance did I observe an attempt to quantify the amount of surplus milk “out there” that HMBANA milk banks have not been able to procure or through donor recruitment. At the 2012 HMBANA meetings, one presentation challenged the predominant view among “milk bankers”⁸⁵ that so called “casual sharing”⁸⁶ is depleting the amount of milk available to HMBANA milk banks. The speaker, Erin Hamilton-Spence, President of the Board of Directors of the Mothers’ Milk Bank of North Texas, challenged the assumption that casual sharing and milk banking (for and non-profit) were in a zero sum situation. She provided estimates for how much extra milk is actually “out there” and could be donated to HMBANA milk banks versus how much they actually collect. She calculated that together HMBANA milk banks and Prolacta collect 2.2% of milk that is out there⁸⁷ and that there are billions of ounces “unaccounted for”.

Regardless of the debate over whether Prolacta and informal sharing/selling are actually diverting donor milk away from HMBANA milk banks, what many in milk banking agree upon is that HMBANA marketing efforts have historically been uncoordinated and are not always successful in reaching donors. In interview, Pauline Sakamoto, the Executive director of the MMB contrasted what HMBANA milk banks have done with what Prolacta has been able to do in terms of attracting donors. She conceded, “We [HMBANA] have screwed up marketing”.⁸⁸⁸⁹ In my interviews with Ms. Sakamoto, she frequently referred to the process of recruiting donors through print or web advertising, word of mouth, or social media as “marketing”. It was an interesting slippage of market-speak into an avowedly non-market sphere (non-profit milk banking where donors are not paid). I take the use of “marketing” here to suggest first, that milk banks are engaging more with contemporary marketing tools (social media, internet branding and advertising) and as such, see themselves as engaging in “marketing”. Second, I take the use of “marketing” to indicate that using these tools, milk banks are marketing a donor-identity that is facilitated by on-line tools, particularly Facebook, and can connect donors with each other as well as to the wider breastfeeding advocacy community. Last, I take “marketing” to suggest that the MMB, like other milk banks fold donor recruitment within their overall project of building legitimacy. That is, what a donor is at the MMB is part of how their economic form produces something of value.

During my fieldwork, the MMB engaged in a rebranding campaign that involved conducting a focus group with donors and recipients to ask about out their experiences at the bank and how the MMB could better reach and support donors. Many donors at the focus group were critical of the MMB for its “archaic” website, overly wordy donor instructions,

general disorganization and sparse community building efforts for donors.⁹⁰ One donor's story was particularly vivid. Rachel told the group about playing incessant phone tag with the MMB staff when she tried to ask questions about medication use as well as her frustrating experience with dropping off the milk:

Donating was not easy. I assumed it would be easy, that there would be no speed bumps. But, it took a while to even get a response from the milk bank when I phoned. I had to buy bags and the pump, but I had assumed these would be somewhat covered. Getting back to me was slow, e.g. when I had questions about pumping...I wanted to drop the milk off myself because I just couldn't imagine it going off in a cooler. But when I arrived, there was a hassle of parking (I wasn't told where to park, everything looked like staff only). I was knocking on the door for 1 hour and no one answered. I was calling and calling and no one answered the phones – I could hear the phone ringing on the inside of the trailer. I had told the milk bank that I would be there at that time, and I guess everyone was in a meeting. I wonder if there could be a drive up option – so that I wouldn't have to park to drop off the milk. I paid for the milk bags, but I thought they would be paid for. I got to the milk bank and it sucked that no one was there. I wanted it to be easy.⁹¹

Ultimately, the MMB struggles to have the resources to make donating milk a seamless process and stories like this were not surprising to me or the staff of the MMB.

Rachel was a donor who sought face-to-face community through her donor experience and wanted to come and see people who cared appropriately for her milk. As analyzed by Gerstein Pineau (2012), in the past face-to-face engagement such as this was more common at the MMB when all donors transported their milk to the bank and in-so-doing found an in-person breastfeeding and parenting community at the MMB. Today, however, most donors transport their milk to the MMB via FedEx, or drop their milk off at a depot.⁹² Therefore, it is unsurprising that the physical doors of the MMB were unprepared for Rachel's arrival. Within the last couple of years, the MMB has been working toward filling this need for community engagement through social media use and the promotion therein of the donation experience.

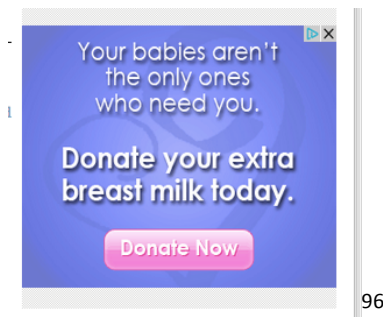
There are often photos of mothers and babies next to coolers full of milk for donation posted on the MMB Facebook wall with captions like “Jane loved watching her mama Rachel pack up milk this morning to share with other babies. Thank you for your generosity, Rachel, we are so grateful”⁹³. Also, the MMB has been increasingly organizing in-person events such as nurse-ins, milk drives and other milk banking promotion events in different geographical locations, none of which necessitate a donor’s physical presence at the MMB at the time of donation to feel involved or engaged but create opportunities to meet other donors, recipients and “milk bankers”.⁹⁴

The struggle to reach donors is entrenched in HMBANA identity and I observed this issue being frequently raised at the 2012 HMBANA meetings. Early in my ethnography, the director of the MMB often lamented HMBANA’s and MMB’s limited marketing budgets and savvy, which prevented them from reaching enough donors. Many HMBANA banks, for example, have often been in the position of responding to (rather than being able to avoid) empty freezers through media releases in local newspapers, or (more recently) through social media outlets such as Facebook. Lisa, A Donor Coordinator at the MMB described this traditional pattern of working with local media in a haphazard way that invited bursts of donor interest followed by recurring milk shortages:

We don’t have much of a marketing budget. We don’t have someone who does marketing specifically. We have pamphlets that we’ll send to NICU’s and to WIC clinics. And we’ll call and ask [if they need more]. Um, but marketing has definitely been an ongoing challenge. We’ve recently had a major shortage of milk, so it’s sort of like feast or famine at the Milk Bank. Sometimes because we don’t have an ongoing marketing campaign, so we don’t have a constant supply of milk. So I think that it tends to dry up some around this time of year. It’s not uncommon, and um, we were really low back at the beginning of November. And Pauline was able to connect with a local news station in San Jose. I think SF Gate did a story. There was one of the news channels did a story. There were multiple stories, news stories about the shortage of milk. And, on the one

hand, it's great because the call volume increased and there was this sort of flurry of calls about donating, but it's not sustainable. Yeah, there was all this PR done which is great. But it dies quickly, especially if there's not an ongoing effort. So I saw that as the donor coordinator you are overwhelmed, you just get this crazy amount of calls to keep up with. Then, you know, in a week it's gonna die down because it's a news story, and it's gonna be sort of old news. So... we haven't found a way to kind of keep a steady flow of donors coming in.⁹⁵

The MMB, in an attempt to bolster a more coordinated and steady message to the public, launched a re-branding/marketing strategy that used on-line tools such as Google ads, Facebook, and Twitter and a new website with new branding (e.g. logo, name, etc.) at the time of my ethnography. Alongside these tools, MMB community events were integrated into their marketing strategy in an attempt to raise awareness about the milk bank and increase milk donations. I found that through their marketing strategies, the MMB recruits donors through a notion of "surplus milk", operationalizing the premise that the donor mother's baby should be breastfed first. Beyond that, some mothers can produce more milk for donation. In this way, the practice of breastfeeding is integrated within milk donation in the sense that breastfeeding is an integral part of the donor identity as constructed by MMB. Many Google ads, for example, now pop up with the line "Your babies aren't the only ones who need you. Donate your extra breast milk today."



MMB's rebranding efforts are paying off in that their website and online presence is greatly improved with a robust social media presence on Facebook, Twitter, Instagram, Pinterest, etc. At the same time, they still struggle with getting enough milk donations to keep up with increasing demand, as was vividly evidenced in a MMB Facebook post from June 2014:

Attention: Our freezers are dangerously low and we need your help to get back up and meet the demands of our babies in need. Last week a premature baby boy was put into his grandmothers care because mom was unable to provide what was required. The grandmother keeps calling to place her order for more milk and we sadly have to tell her we cannot fulfill the request. It's absolutely heartbreaking when we have to do that. If you have extra milk to donate please let us know. If you can pass this along to your social circles, we'd greatly appreciate that too.⁹⁷

By posting requests like this one on their Facebook page and asking followers (donors, recipients, breastfeeding enthusiasts and advocates) to "pass this along" to social circles (i.e., share the post on social media), the MMB is using social media to recruit donors. As we see next, this recruitment strategy is part of the creation of community where those interested in and participating in milk banking simultaneously become part of a community and engage in recruitment/marketing/rebranding.

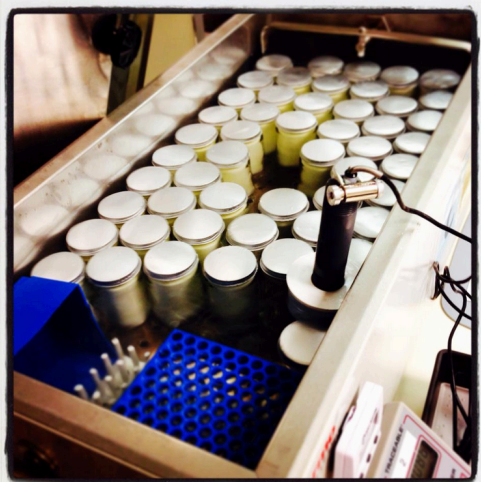
Throughout this transition to a re-branded, on-line savvy MMB, I observed how the MMB used Facebook to create a robust on-line community of donors and recipients without violating their HIPAA privacy standards that requires them to maintain donor and recipient confidentiality. Their current use of Facebook is allowing them to play catch-up with informal milk sharing participants that have long been able to foster community on line through listervs, emails and websites and vigorously on Facebook since at least 2010.⁹⁸ Thus, Facebook has afforded new opportunities for MMB donors and recipients to opt-in to make their identities

known as recipients or donors on Facebook. This opens up the community-building potential of milk banks tremendously, a feature of donation highly valued by many but not all donors.

As in informal sharing networks (discussed in Chapter 5), the MMB on-line community is seamlessly integrated with on-line lactation communities and related areas of concern to breastfeeding women. The articles linked to on MMB's Facebook page concern a range of milk banking or breastfeeding topics, (e.g., breastfeeding rates; breastfeeding promotion efforts; when/how to wean; milk bank processing information; announcements of new milk banks opening; baby wearing⁹⁹ and breastfeeding problems and tips; how much BDM does a premature infant require, etc.). As such, the MMB situates itself within both discourses of lactation and milk banking, moving seamlessly between them. This, effectively, builds a community of nursing mothers around MMB that is now mobilized as those who "own" or are stakeholders in breastfeeding, breast milk, and BDM. This community can now be called upon/encouraged/supported to donate milk, as can be seen in this MMB Facebook post from May 19, 2014 which reads "our pasteurizing machine hard at work on this cloudy Monday! Keep that milk a comin' mamas!"



Our pasteurizing machine hard at work on this cloudy Monday! Keep that milk a comin' mamas! ☺☺☺ #mothersmilkbank #mmb



Like · Comment · Share

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MMB quickly developed an online marketing savvy and presence thanks to a hired media consultant alongside a semi-volunteer, semi-employed former milk donor who manages their social media presence. These efforts have increased donations but the MMB still struggles on occasion to meet the rapidly growing demand from hospital NICUs.¹⁰¹

Despite the MMB's push for more donor interest, a flurry of inquiries from potential donors can overwhelm the daily operations of the bootstrapped MMB. When I returned to the milk bank in August, 2013, and spoke to the donor coordinators, they were overwhelmed with the high volume of donor inquiries. This resonated with the executive director's earlier description of her day-to-day working life and the life of the MMB in general: simultaneously looking towards the future and working/hoping for growth, but also somewhat unprepared for the day-to-day of flurries of incoming donations and growing demand. The MMB is the largest-producing milk bank and runs a very tight ship with staff and volunteers run off their feet all

day. As donations have increased, they have become increasingly busy, but lack the needed staff, space, and materials to keep up.¹⁰²

Given that the MMB is committed to keeping one foot in the door of lactation promotion, it is unsurprising that the MMB has fostered an on-line presence that integrates the promotion of milk banking and lactation in general.¹⁰³ Though this might seem an obvious fit, I argue that this affiliation exists within a moral exchange that constructs donors as *first* breast feeders and *second* surplus milk donors (*not sellers*). This construction is important because it maintains the legitimacy of milk banking as not competing with or undermining breastfeeding.

HMBANA milk banks, like milk banks around the world¹⁰⁴, are at pains to show that their model does not interfere with lactation. The concern is often raised that a donor might donate milk at the expense of feeding breast milk to her own child, or that a mother-recipient of breast milk may be dissuaded from breastfeeding through the receipt of breast milk (inviting comparison to the formula industry). In fact, the proprietary nature of breast milk and breastfeeding (that a mother's own baby should be fed her milk first) is something that milk banks take very seriously. It is often suggested that non-profit milk banking actually promotes lactation. For instance, Ron Cohen, the medical director of the MMB spoke of the effect of BDM on a mother who is not producing sufficient milk supply in the NICU. He suggested in his presentation at the 2012 HMBANA conference that the availability of BDM in this context has the effect of motivating a discouraged mother to keep trying to produce because she sees the work that other mothers have gone to in order to provide important breast milk.

Additionally, HMBANA banking is integrated within lactation communities. For instance, HMBANA includes lactation promotion as part of their mandate (HMBANA 2013), their

meetings often include speakers on a variety of lactation issues, and Pauline Sakamoto, the current HMBANA president is very well respected in the broader lactation community.

However, I observed that this relationship is not always seamlessly integrated and a milk bank may maintain two distinct public personas – a lactation promotion persona and a milk banking promotion persona. For example, the MMB coordinates with the WIC (Women’s Infants and Children) Program and other insurers in renting out breast pumps and the bank itself housed adjacent to a WIC office.¹⁰⁵ However, the MMB’s pump rental program is not directly affiliated with their donation program (donors are not supplied with rental breast pumps and the women who rent pumps are not usually donors). Instead, the pump rental program is a revenue source for the MMB and affiliates them with the lactation promotion efforts of WIC and other insurers without capitalizing on that affiliation for donations. Given the ethic against pressuring donors (discussed further below), it is unsurprising that these two personae – lactation promotion and milk banking promotion – sometimes need to be maintained as distinctive commitments.

Thus the relationship between lactation promotion and milk banking can be a precarious to manage, requiring ongoing negotiation as milk banking grows and develops. For instance, the 2011 “Call to Action to Support Breastfeeding” by the US Surgeon General included among it’s recommendations to support and encourage the growth of milk banking and the use of BDM milk in NICUs (US Department of Health and Human Services 2011). Pauline Sakamoto, the Director of the MMB, is probably the best-known figure in HMBANA and was pictured in a HMBANA newsletter alongside the Surgeon General when this announcement was made. While this endorsement clearly suggests that milk banking is a robustly supported part of

growing lactation efforts in the United States, the Director was quick to point out to me that this endorsement came with no financial support.¹⁰⁶

This dynamic is typical of milk banking in the US in that many HMBANA banks have ties to (or direct support from) state-based infrastructures (e.g. the Mothers Milk Bank of Iowa is part of the University of Iowa, a state school), but these relationships vary widely and are not part of any systematic form of *federal* support for milk banking. This dynamic is also echoed in the Food and Drug Administration's (FDA) ambivalence around regulating human milk banking, preferring to leave them alone as a self-regulated industry sometimes falling under state-based tissue banking regulation and always under state-based public health regulations.¹⁰⁷

Significantly, the MMB Director told me that although she sees increasing lactation (in the community and in the NICU) as one of the primary goals of milk banks, they have largely failed at this. I further asked her if she saw high prematurity rates themselves as a problem that milk banks can address, given that high prematurity rates creates need for BDM. She told me that milk banks are concerned and aware of high prematurity rates and they don't *want* to have these fragile babies as customers. However, she told me that they can't and don't do much about this underlying issue other than speak about it as a problem. I take this to mean that milk banks often see themselves as most affiliated with lactation as an underlying problem they need to address (though unsuccessfully) but high prematurity rates themselves are such an overwhelming and systemic problem that milk banks themselves are ill equipped to address.¹⁰⁸

Donor milk is a gift, milk banking is a service...with a product

HMBANA milk banks construct human milk donations as a gift based on a three part rationale that anticipates what might happen if donors were paid. I argue in chapters 5 and 6

that the non-payment of donors has been taken up in informal milk sharing (chapter 5) and for-profit milk banking (chapter 6), even though it is not mandated by law (Fentiman 2010) and has not always been the historical norm (Gerstein Pineau 2012). Here, I analyze how HMBANA banks frame non-payment.

First, it is thought that paying donors could incentivize donation and donors might stop providing breast milk to their own babies in order to donate. Here is an excerpt of my conversation with the Director of the Mothers Milk Bank of Iowa on why milk banks hesitate to put any pressure on donors:

[I would tell a donor] “We want you to give what you have extra and not feel any pressure. We don’t want you feeling our pressure of needing to keep up with the demand.” We don’t anyway want any donor to feel that. Because it is a gift. It’s a beautiful gift...But then we also don’t want to take away from their stash for their own baby because their supply...could change...I just don’t ever want to hear a mom say “I’m so happy I donated but I ended up having to switch to formula because I couldn’t keep up.”¹⁰⁹

Similarly, I heard from many “milk bankers”, donors and recipients that one of the reasons why donors are not compensated for milk donation is to avoid encouraging them to stop breast feeding their own child. This absence of pressure is at the core of HMBANA philosophy – that mothers are donating for purely altruistic reasons without compensation, financial or otherwise, beyond positive feelings about donation.

Second, it is feared that incentivizing donation might lead donors to adulterate their milk donations (e.g., with cow’s milk, water or other substances) or hide characteristics that would prevent them from donating (particularly legal or illegal drug use and HIV positive status). Ron Cohen, the MMB Medical Director summarized this perspective in a promotional video for the MMB:

Yes human milk has all sorts of great things in it. But you need to do it in a way that is safe and secure. One of the things that HMBANA milk banks like ours do is that we don't *buy* milk. We don't want there to be any economic incentive to someone to provide donate milk that perhaps they shouldn't. Our moms have to be tested and the milk has to be pasteurized.¹¹⁰

At this time HMBANA banks do not test donor milk for adulteration, citing that this would be too expensive an undertaking and would drive the cost of milk up. I frequently heard that because milk banks do not pay donors, there is no incentive to donate and so there is no concern about adulteration, making the technology needed unnecessary.¹¹¹

Last, it is thought that HMBANA milk banks cannot afford to pay donors and that by receiving milk as a donation, they keep their costs low.¹¹² Additionally, the MMB staff members also told me that the MMB keeps its costs low by selling milk to private community members (a subset of "out-patients"), a phenomenon that will be discussed in chapter 3. Together, these anticipatory moral rationales/fears construct milk donors as giving *donors*, not needy (and irresponsible) sellers who might support themselves by selling breast milk.

HMBANA milk banks define themselves as non-profit providers of a service.¹¹³ Similarly, the California Health and Safety code defines milk banks as providing a service.¹¹⁴ Just as there is an ethic against paying donors, there is an ethic against HMBANA milk banks making a profit from donations. In this excerpt from my interview with Jean Drulis, the director of the Iowa MMB, and past president of HMBANA, she connected these strands together and hinged them on the anticipatory safety logic/fear that prevents paying donors:

Krista: This is back to the HMBANA issue, why are HMBANA milk banks nonprofit as opposed to for profit?

Drulis: We don't want to make a profit off of somebody else. We want to keep the cost as low as we can even though it's out of reach for full feeds for most families. It's what

we stand for. If it was some other type of product but we're not paying moms for milk, why should we make a profit off of them?

Krista: So do you think that the fact that you're nonprofit is related to the fact that you can't or you don't pay the women for their milk?

Drulis: No. We wouldn't anyway. It opens up the door for possible adulteration and I suppose it could even, you can't imagine a mom taking some milk from her baby in order to get some grocery money or something. Not saying that would happen but it certainly could be a possibility.¹¹⁵

At present, none of the HMBANA milk banks pay their milk donors, nor do they heavily incentivize donation (e.g., through in-kind gifts or high pressure tactics). Further, milk banks are required to operate as not-for-profit entities in order to belong to HMBANA. However, HMBANA milk banks do sell a product to hospitals and individuals in the community – screened and pasteurized banked human milk – at a cost of \$3-\$5 per ounce depending on the milk bank.

On one hand, the omnipresent anti-profit-making ethos in milk banking limits the growth of human milk banks. As non-profit, grass roots operations with little government financial support, they struggle to attain the kind of long-term financial stability that could allow growth. When a recent needs assessment survey was conducted of HMBANA milk bank directors, Spence and Fogleman (2013) found that HMBANA milk bank directors listed “finances” as their biggest challenge, that 57% of HMBANA milk banks saw themselves as understaffed and 75% of milk banks believed they needed more government support (Spence and Fogleman 2013). Many in HMBANA lament the fractured network of donor human milk banks and uneven distribution of donor human milk in the United States (e.g., Hamilton Spence 2012). In general, I observed that HMBANA milk banks tend to operate cooperatively with other milk banks, rather than competitively as might be expected if they were seeking to maximize profit.

Like the definitional issue of struggling to get milk donations in the door, HMBANA milk banks define themselves as bootstrap, scrappy, no-frills, non-profits struggling to keep their doors open and serve the community.¹¹⁶ As such, many in HMBANA question the practices of Prolacta, a for-profit company that sells a human milk based fortifier made with donated human milk. This dynamic will be further explored in Chapter 5.

DONOR SCREENING

Here, I describe the donor screening process at the MMB, emphasizing three observations: first, milk donations are constructed as gifts that must be managed by the staff with care. This is particularly apparent when it comes to bereaved donors (mothers whose babies have died) and whose gifts are treated particularly sensitively at the MMB. Second, HMBANA has recently specified and narrowed their donor exclusion criteria, hoping to open up the doors to donors previously excluded for – what are now seen as – unnecessary reasons. Third, the MMB situates serological testing as both *necessary* and *sufficient* to exclude potential donors who have transmissible diseases. These three observations show the way scarcity is folded into non-profit milk banking and negotiated with: in the first instance by providing care to bereaved donors even and *especially* when her milk is rejected, in the second instance by cautiously opening up new avenues for donation and in the third instance by justifying serological testing through scientific studies. Together, these flows extend a notion of moral exchange where scarcity and safety are folded into this economic form.

Donor Coordinators and Care for the Bereaved Donor

During my ethnography, I spent time with 3 and interviewed 2 of the Donor Coordinators at the MMB who walked me through the screening process described below. No coordinator would spend time “recruiting” or convincing donors to donate more milk. Rather, they spent the majority of their time simply managing inquiries and the screening and collection processes. I take this absence of active “recruitment” as an extension of the ethic against putting pressure on donors. As a gift, milk donations carry moral and ontological weight and coordinating the receipt or rejection of that gift is very carefully negotiated at the MMB. This was nowhere more apparent in my fieldwork than in the management of bereaved donors (donors whose babies have died).

Bereaved mothers babies died in utero, were still-born, or died after birth. Many women in this situation continue to lactate, or have lactated and collected pumped milk, despite having no baby, or a baby too sick, to breastfeed or consume much breast milk. Many of the bereaved mothers who donate their milk gave birth to a premature and/or sick baby, pumped after their birth not knowing whether the baby would survive and were left with stockpiles of pumped milk.¹¹⁷ Such donors require a higher degree of sensitivity and than other possible donors, as was echoed throughout my ethnography at MMB.

One of the donor coordinators, Lisa¹¹⁸, had been working on a set of HMBANA guidelines for accepting donations from bereaved mothers. Lisa stressed to me in our interview that this toolkit responds to the problem that NICU nurses do not know how to address lactation with bereaved mothers, that they often assume that a woman will want to cease lactation as soon as possible. However, they rarely give proper guidance in how to do so,

leaving bereaved mothers surprised to be lactating and unable to address their own physical or emotional discomfort around the experience. The toolkit suggests that lactation should be directly addressed by NICU nurses to bereaved mothers and that milk donation should be offered as a possible source of relief. What is interesting here is how milk donation is not “recruited” from bereaving mothers, but rather offered as an optional form of care for the bereaving mothers themselves. In fact, Lisa had found in her research that bereaved mothers found some relief in donating milk after losing a baby.¹¹⁹

From my observations at the MMB and of the toolkit, it was clear that bereaved mothers are treated with extra care by donor coordinators.¹²⁰ That is, the very act of accepting their breast milk is enacted as a form of care for those bereaved mothers and any mis-steps along the way can have the opposite effect. I heard time and time again from workers at the milk bank that they try not to turn down milk from a bereaved mother, given her fragile state. Lisa went so far as to speculate whether it would be so wrong to accept a bereaved mothers milk even though she did not pass screening and then (without her knowledge) use her “rejected” milk for research rather than for babies in the NICU.¹²¹ Another donor coordinator, Tina, told me that this terrain is negotiated by letting the bereaved mother know early on in the screening process that if she chooses, she can skip screening and have her milk donated to research instead of for use in babies in the NICU or the community.¹²² Lisa, a Donor Coordinator, told me that the MMB will accept any amount of milk from a bereaved donor, while they usually have a minimum donation of 100 oz. from other mothers.¹²³ If a bereaved donor does not go through screening, the MMB will not process and dispense her milk, but will

set it aside for research. That is, a bereaved mothers' milk can be picked up immediately, no matter the amount, and regardless of screening protocol, a practice that is not the norm.

The classification of "bereaved donor" was one that followed a donor's identity through the milk banking process at MMB, ideally ensuring that whenever she was contacted, she was engaged with extreme care. I observed donor files kept adjacent to the pasteurization room were labeled "BD" for "bereaved donor", a practice designed to insert extra sensitivity during calls to that donor if her milk was found to be contaminated or if any follow up communication was needed.¹²⁴

When Things Go Wrong

Of course, despite careful protocols, things go wrong. I spoke to one bereaved donor, Nicole¹²⁵ who was given the option of her milk being used for research following a false positive serological result for HTLV, a human retrovirus known to cause certain types of cancer.¹²⁶ What the MMB intended to employ as a form of care for this mother (offering to use her milk for research instead of wasting her milk) was instead experienced with frustration and confusion by the donor. Nicole was unable to get any information on what kind of research the milk was to be used for: "I said 'So if you're not going to use this milk for a baby but for research, could I at least find out what would be the outcome of the research. Could you give me the courtesy?'...I was going to give it to them in any case even if it was for research....But my point was like 'Just tell me what your researching about!'¹²⁷. Given my observations at the MMB, this account was not surprising. It was difficult for me to obtain information on what kinds of research the MMB provided milk for and I did not observe any additional consent forms that

specified a given study other than a generic form wherein a box is ticked allowing the milk to be used for “research”. Researchers, in turn, are required to fill out paper work for MMB that stipulates they are not funded by formula companies and that their research is geared toward the improvement and promotion of milk banking. However, what research project a particular donor’s milk is going to, is unknown to that donor and, it seemed, unknown to the MMB at the time of donation.¹²⁸

Increasing Donations by Changing Exclusion Criteria

In 2013, HMBANA updated its “Guidelines for the Establishment and Operation of a Donor Human Milk Bank” from its 2011 version. Here, I provide a narrative of how recent changes have opened up milk banks to more donors, based on increasing specification for excluded medication use.

HMBANA standards stipulate that potential donors are first verbally screened before further information is collected from pediatricians, physicians and blood tests. Phone screening, as I observed it at the MMB, tends to weed out potential donors for reasons that are the least anticipated by those who phone to inquire, particularly their medication use, time spent in Europe (especially the UK) and minimum donation volume requirements.¹²⁹ The 2011 HMBANA standards stipulated that, except for a very short list of medications, donors were excluded for “daily use of over-the-counter medications or systemic prescriptions not permitted for donor milk” (HMBANA 2011). The new 2013 HMBANA standards maintain the same restrictions but specify a much longer list of daily medications that are allowable.

This is an important opening up of HMBANA screening standards because I had earlier observed many donors being excluded for using medications generally deemed safe for

breastfeeding, particularly antidepressants. Potential milk bank donors rejected for reasons they do not agree with (e.g. Patricia, who was rejected for Zoloft use) often turned to informal sharing networks, a tendency that milk banks are hoping to contain by further specifying and narrowing their exclusion criteria, as they did with the inclusion of more allowable medications.¹³⁰ I also interviewed one Donor Coordinator at the MMB who admitted to having referred these rejected donors to “casual sharing” networks, an act inconsistent with HMBANA’s stance against casual sharing.¹³¹ It is specifically by allowing more medication use within their official standards that HMBANA milk banks are seeing an increase in their donor pool.

HMBANA Milk banks like the MMB accept milk from mothers who use certain medications temporarily by asking that they wait a specified period of time after taking the medication before pumping for the milk bank. The 2011 guidelines indicated that “the use of other medications on a temporary basis may be acceptable if the appropriate deferral period is followed,” with an accompanying extremely short list of acceptable temporary medications that would not require a deferral period. At the MMB and the Iowa Mothers Milk Bank (and likely all HMBANA milk banks) they consult Thomas Hale’s “go-to” book on medication use and breastfeeding to determine what the deferral period should be for a certain medication. The calculation is based on multiplying the half-life of a medication as specified in Thomas Hale’s book by 5.¹³² The recent 2013 HMBANA guidelines include a much more lengthy list of *acceptable* medications that do not require a deferral period (including Colace and Zoloft which previously excluded many potential donors) and specifications within the text itself as to what medications are acceptable with their deferral periods. The dramatic lowering of restrictions of

these standards will help milk banks increase their pool of donors and subsequently grow as an industry.

The 2011 HMBANA guidelines had stipulated that potential donors should be excluded for use of illegal drugs. However, they did not specify whether this was exclusion based on use over the donors' *lifetime*, or simply at the time of donation. These guidelines also did not specify which medications are illegal, leaving ambiguity with regard to marijuana use. In contrast, the new 2013 guidelines stipulate that donors are excluded following the use of illegal drugs *within the past 12 months* and any current use of marijuana (medical or casual) use is unacceptable. From what I observed, (before the 2013 HMBANA guidelines came out) MMB interpreted *any* history of illegal drug use as reason for disqualification, except in the case of marijuana. For example, I learned about one potential donor who admitted to having used marijuana 5 years prior to pregnancy who was therefore rejected. This potential donor was very upset, particularly because she had been through the entire screening process only for this drug use to come up down the line (most likely because when she was asked about illegal drug use, she didn't think of marijuana as "illegal" in the same sense as heroin or other IV drugs). The form used by donor coordinators for the phone screening merely indicates: "IV Drugs: Y/N" so marijuana use can be easily missed in an initial screening.

Yet, a donor coordinator, discussed change in the interpretation of marijuana use. In her words, because marijuana is "ambiguously illegal" an opening up over marijuana use has occurred at the MMB in their donor screening. She stated that donors are now required to abstain from marijuana use 12 days before pumping for donation, treating it more like a temporary medication rather than an illegal drug.¹³³

As with temporary medications, screening for marijuana use at the MMB in donors was a matter of *trusting* that donors will abstain from use for a specified period of time. What is unique about marijuana is that, in addition, mention of marijuana requires an additional assessment— is this woman an addict? Might she be using or addicted to (other) illegal drugs? To answer these questions, the donors’ willingness to proceed with the screening process and the willingness of her physician to sign a form that stipulates she is “in good health and would be an appropriate donor to the milk bank” are used. Given that HMBANA milk banks do not test donated milk itself for drug content, adulteration or whether it matches the said donor (costly, highly technologically sophisticated undertakings),¹³⁴ building trust and credibility have made milk banks financially sustainable.

Confirming Surplus

As part of the screening process, a donor must provide two letters attesting to her health and that of her baby: one from her physician and a second from her baby’s. Some MMBCA donors with whom I spoke told me that their physicians and pediatricians were unfamiliar with the process of approving donors and/or were slow to respond to these requests. Milk banking is not well integrated into pediatric or general medical practice such that these forms often represent the first occasion when a medical practitioner has ever heard of human milk banking.¹³⁵ One donor went so far as to tell me that her health care providers were reluctant to fill out the forms because they didn’t see the point of donating milk and were unsupportive of the effort it would take the mother to donate. Many pediatricians and physicians are unfamiliar with milk banking and have erroneous assumptions, particularly concerning where the milk goes and why.¹³⁶

HMBANA's requirement of a letter from the donor baby's pediatrician is a reminder of the "two donor dynamic" (discussed in the introduction) and its contours. Not only is the mother-donor required to prove her status as a healthy and responsible donor, but the baby-donor is also required to do so. The form requires that the pediatrician attest the baby is being nursed, is healthy and would not suffer if his/her mother donated her excess breast milk. I see this requirement as part of milk banking's legitimation project – an attempt to assure that the mother/baby donor baby is sufficiently breastfed and the donated milk is truly excess.

Necessary and Sufficient – Serological Testing and Medical Legitimation

Once the MMB has finished screening a mother over the phone and she has been approved by her health care provider and the baby's pediatrician, screening blood tests are given for HIV 0, 1 and 2, HTLV 1 and 2, Hepatitis C, Hepatitis B, and Syphilis within the 6 months prior to becoming a donor. Some milk banks do these serological tests themselves, while others send potential donors requisitions to visit a contracted laboratory (as does the MMB). Nicole, the same bereaved donor who was unable to get information about the type of research her milk might be used for, was contacted by the milk bank after testing positive for HTLV. Nicole told me about how these results were communicated to her by the milk bank:

When the results came back, one of the nurses there called me and she's like 'Your HTLV results are fine now. They initially came out positive but they're negative' I'm like *what* are you talking about? You are speaking in Greek. I have no idea what you're telling me. She's like 'Well HTLV is testing that screens for cancer.' I totally freaked out. I'm like '*What?*' So she's like "Yeah but it's fine now. It's ok. It's negative'. I freaked out because she totally didn't explain the process. Then I talked to her a couple more times and said 'Well, I still don't understand what you're telling me.'¹³⁷

Nicole ended up speaking to the director of the milk bank who reassured her that her test was a false positive and that the HTLV test is for a specific type of cancer. This particular incident was

very difficult for Nicole. Her baby had died suddenly of SIDS and she had no explanation for her baby's death. The lack of sensitivity with which her positive HTLV test was handled indicates, as discussed earlier, the care with which rejecting milk donors must be managed, particularly bereaved donors.

Recently, the MMB published their rates of donor rejection following serological testing. Cohen, Xiong and Sakamoto (2010:F118) found a 3.3% rate of contamination: "Of 1091 potential donors, 3.3% were positive on screening serology, including 6 syphilis, 17 hepatitis B, 3 hepatitis C, 6 HTLV and 4 HIV." Cohen and colleagues (2010) use these findings toward legitimizing human milk banking as a safe and *necessary* enterprise. They declare the safety of milk banking by noting the ability to screen out infected donors at a rate similar to blood banking, thus marking their process as just as safe as blood banking. Leaders in HMBANA, including the director of MMB, project that milk banking is headed in the direction of blood banking and is currently where blood banking was almost 20 years ago. I take it to mean that milk banks are in the process of building their medical legitimacy and ubiquity but that more remains to be done. Currently, those in milk banking assert the necessity and sufficiency of milk banking by contrasting these screening results with to the phenomenon of peer-to-peer milk sharing. Theoretically such sharing has the same level of infected donors, but without standardized screening mechanisms. These two aspects of this research paper – that BDM is safe and that the screening process is *necessary* to make it safe – are key to the medical legitimization of milk banking as both a necessary and safe process.

Medical legitimacy building in milk banking is not usually the result of a coordinated HMBANA effort. The research published by Cohen and colleagues (2010) was unique in that

HMBANA milk banks do not often publish their statistics, nor do they even have a history of sharing their research as an association, thereby limiting their medical legitimation. The disorganized nature of HMBANA statistics sharing was obvious to me as an observer at the HMBANA 2012 meetings.¹³⁸ During Erin Hamilton-Spence's presentation, she joked about the lack of communication and statistics sharing between milk banks, repeatedly saying "we just don't know" but "we are working on it" while seeking reassurance from the audience of milk bankers that they are indeed "working on it". Similarly, my observations at the MMB suggested that statistics were not routinely or robustly kept, or, when they were, they did not appear to be well organized. For example, at the time of research, donor files were hand written at the MMB, and when a donor was rejected early on during the screening process, her record may vanish entirely. Recently, HMBANA milk banks are making efforts to standardize the collection, organization, and sharing of statistics among member banks by requiring them to provide statistics to a designated HMBANA member on a quarterly basis for internal tracking purposes (HMBANA 2011).¹³⁹

THE EXPERIENCE OF DONATION: GIFTED CIRCUMSTANCES, GIFTED BODIES

As we can see from above, HMBANA banks fold scarcity into their economic form reluctantly or ambiguously making reproduction productive in an industrial sense (Thompson 2005).¹⁴⁰ Here, I discuss how MMB donors experience their ability to produce surplus breast milk for non-profit milk banking. Given this chapter's theme of scarcity, I focus on my finding that many MMB donors framed their oversupply as an outcome of lucky gifted-ness in that their ability to donate milk was often juxtaposed with the awareness that not all mothers are

able to breastfeed or even produce breast milk and they felt a responsibility to deal with this gift appropriately.

Most of the donors I interviewed felt both gifted, lucky or privileged, and a sense of accompanying *responsibility* for using, rather than wasting, this gift. That is, their ability to make surplus milk was often experienced *relationally* as an embodied ability vis-a-vis mothers who could not make enough milk. This framing of surplus milk production as a form of giftedness is related to both the conception of “intensive motherhood” (Hays 1998) and the sacralization of breast milk, as noted by Gerstein Pineau (2012). That is, mothers can have expectations on themselves to breastfeed as part of an ideology of intensive motherhood with breast milk becoming a sacred substance imbued with the effort of intensive motherhood. In this context, breast milk is what some mothers have and other mother’s lack. Donors have an empathetic understanding of what it means to lack this important substance given the expectations put on mothers to breastfeed.¹⁴¹

Breastfeeding was understood by donors as something to be “worked on” and just like health-itself, it can no longer be taken for granted (Clarke et al. 2003). As discussed in Chapter 5, breastfeeding exists in a contradictory discursive space of both effort and ease, with breastfeeding advocates and detractors emphasizing both aspects of the practice. My interviews suggested that there is increasing awareness about this situation. The MMB donors I interviewed found themselves in the position of being super-breastfeeders, with surplus breast milk, or surplus health, to give away. They were acutely aware of the work *and* bodily/social luck of successfully breastfeeding and so experienced their surplus as a social and embodied gift they needed to handle responsibly.

Similar to many of the donors to informal sharing networks discussed in chapter 5, all of the MMB donors I interviewed found themselves in a position to donate as a matter of circumstance, however some continued pumping in order to maintain a donation practice. Like many informal donors discussed in chapter 5, many MMB donors developed a relationship with a pump akin to breastfeeding another baby whereby their bodies maintained surplus milk production accordingly. For some, this was viewed as a bonus with ancillary benefits (e.g., in never having to worry about maintaining supply for their own babies, or weight loss). But for others, this was experienced as a nuisance or an addiction where attachment to the pump could not be escaped. Similar to informal donors, most of the MMB donors I interviewed began pumping in order to address a problem with breastfeeding (e.g., a forceful let-down,¹⁴² painful engorgement,¹⁴³ or a foremilk hind-milk imbalance,¹⁴⁴ painful blistered or torn nipples¹⁴⁵), or to increase supply sometimes in order to return to work.¹⁴⁶

What was unique about some of my interviews with MMB donors was their view, sometimes described as learned, that their oversupply was a gift that they needed to manage responsibly. Lydia, a MMB donor was told directly by a lactation consultant that her oversupply was a gift that could be donated to a milk bank:

I decided to [donate] pretty quickly...because I told [the lactation consultant] how much extra I was producing. I'm producing about 10 ounces a day beyond what I need. And she just responded like I had this gift that was incredible and I had to use it to help people. And then I thought "Oh okay." I think it was probably right about immediately that I decided I would do it. And initially I just thought "Okay I'll just do it for a little while because I don't want..." You know things are a little bit crazy in your life when you have a new baby and so I didn't want to put too much on my plate. So I went and I bought like a box of milk bags, like 25 milk bags I think it was, and I'm like "I'm just going to fill these and then I'll have this set of milk and then I'll donate just this. And then I'll stop." And then it just kept going after that.¹⁴⁷

One MMB donor, Rachel referred to her philosophy on milk donation as “paying it forward.”¹⁴⁸

When I asked her to explain this, she told me that she felt blessed:

So I just felt so blessed that we were able to [donate milk], and that I was able to be pregnant and have a healthy pregnancy that rendered a healthy, happy baby. I just wanted to do whatever I could to help anybody else. Because I knew when I was in the space of considering IVF, any sort of help from anybody with encouragement would have been so comforting. And so I don't know what it's like to be a recipient of donor milk but I imagine that there's a part of it that feels grateful that somebody else was able to put time aside to help you. So I don't know, that's where it comes for us...I was afraid the whole time [during my pregnancy]. And I thought after she came out and she was healthy, I was so lucky. My body did everything that it was supposed to do. I did everything I was supposed to do. It rendered this healthy child and I can't imagine how tough it would be to go through that pregnancy, have a baby and then it be unhealthy or complicated. How do you deal with that? I think donating milk is the smallest thing you can do to even help somebody in that position. Like there is so much more to worry about during something like that, that this would be such a small way to ease it a little bit.¹⁴⁹

Similarly, Molly, another MMB donor spoke of visualizing NICU babies who are getting her milk and the relief that her milk could provide for their parents. She spoke of feeling fortunate to have two healthy full term children with no health problems or supply issues: “I think to be anything short of that situation I think would be so stressful”.¹⁵⁰

Some donors felt humbled or guilty about their embodied gift. Amanda, a MMB donor and lactation consultant, was reluctant to speak openly to her friends and family about being an over-producer, particularly in her line of work where she helped women increase production. This was a common feeling among some informal donors. She told me that she was often in the position of reminding clients that she struggles with other things related to feeding or parenting, even if she is particularly “good” at production:

But I can't lie when patients ask like “I suppose breastfeeding was easy for you,” or whatever. And I'm like “Yes, however my kids were horrible bottle feeders. There are aspects of parenting that are hard for me but feeding was not one of them. I got that

down. But there are other things that I'm insecure about." So I definitely that knee jerk reaction to kind of be like "Yeah that's good for me, but here's other things that I'm not good at, like don't put me up on the cross I'm not anything special, I'm just another mom doing what I can and this is what I'm good at."¹⁵¹

Lydia, another MMB donor, also had trouble speaking openly about having an over supply, particularly with a coworker/friend who had struggled significantly with an insufficient supply.

Lydia framed her donation as a way of feeling more open about her oversupply:

I felt kind of guilty because she had to work so hard. She was very passionate about breastfeeding...then she ended up having these major supply issues. And that must be really hard for women...who legitimately have a supply issue. Because if you read about "Oh breastfeeding problems" they always *really* say "Nobody really has a supply issue. Or that's very rare. You're producing enough milk, you're just not trying hard enough." [That] is sort of the message that they give you. And so I just felt really bad for her. But I felt better about that issue when I was able to tell her that I did donate. Because I felt like maybe that would make her feel like I was, I don't know, it was kind of making up for the fact that I had this blessing, I guess...I just felt like I had sort of made amends in that regard.

For Lydia, donation was a way of making sense of her oversupply given others who cannot produce enough.

Not Commerce But Not Charity: Donation as Turning Something Bad Into Something Good.

All the donors I interviewed were open to or ambivalent about the concept of donors being paid but none wanted to be paid themselves.¹⁵² All were able to donate without expectation of financial remuneration because of their financial position. All of the MMB donors I interviewed had a family income over \$75,000/year and had college degrees or higher education (see Appendix A "Participants Summary"). Further, all but one worked outside of the home and had some degree of professional or family autonomy that allowed them the space and freedom to pump at work or at home. None brought up the fear of over-incentivizing donation and therefore inviting dangerous donation practices. Despite the fact that none of the

donors I spoke to were interested in being paid, only one thought paying for milk donation was morally wrong. Similar to those in informal sharing networks, for many MMB donors, donating was a means of turning a bad experience (over production or other early breastfeeding problems) into a good one or a means of dealing with a surplus that they had accumulated anyway and financial compensation was seen as unnecessary.

Although all spoke of feeling good from donating, none framed this as a “purely” altruistic gift with no benefits to donors or as a huge sacrifice. For example, Rupi, a MMB donor, felt that her happiness from donating was related to not being paid:

I don't think I should be paid. But if somebody was in financial need, maybe they could use that extra money. So I can't speak for them. But I feel better this way. I feel better not in my situation not being paid. Because it gives me some amount of happiness even though it's something I'm not doing anything special to get it but the fact that I'm not being paid makes me feel like I can enjoy the reward better. But if I'm paid it becomes more of a chore.¹⁵³

Rupi found ancillary benefits in keeping up her supply:

And then it's a two way thing too. So I try to pump a little bit extra so I can donate and in doing so I also make sure my supply doesn't come down or sometimes I continue to pump because I don't want my supply to drop. And in doing so, I have extra milk to donate so it's a two way thing. I think it's beneficial to me in multiple ways.¹⁵⁴

Like other donors Rupi's happiness with donation was not only related to feeling like she was helping someone else through her milk but also the good feeling (for some, relief) that her surplus milk was not being wasted. In her case, she donated her frozen milk and kept freshly pumped milk for her own child own consumption which she saw as saving the best product.

Molly, another MMB donor, went as far as to tell me that the boost she got from donating milk helped her offset postpartum depression which she had felt with her previous child.¹⁵⁵

Amanda, a MMB donor, told me that she did not see her act of pumping as an extra amount of work since she would be doing it anyway as part of her routine while away from her baby. In fact, she spoke of donating as making her life easier:

I mean in a lot of ways it made my life simpler. If I hadn't donated that milk I would have had to get an extra freezer in my garage so there would have been that cost plus the power to run it plus kind of the logistics on that end. And we were almost there and we had to take the ice machine out of the freezer so there was a little bit more room because there was so much milk. So logistically it became easier. So time when the freezer got too full then I would just ringy-ding and they would come take the milk away and then I'd have room again.¹⁵⁶

Amanda, another MMB donor was also able to diffuse conflict with her husband over the freezer filling up by calling the milk bank for a pick up. Lydia, a MMB donor, told me donation actually turned out to be easier than the alternative to painfully reduce her supply:

Well it turned out to be a lot easier than I thought it was going to be because honestly it was kind of easier to keep pumping than it was to try to take measures to reduce the milk supply. Because that's kind of a complicated and painful process to reduce it. It was just easier for me to just go ahead and keep doing it.¹⁵⁷

The scenario of turning something bad (or neutral) into something good was experienced acutely by Nicole whose baby had a serious adverse reaction to fenugreek in her milk which she had been taking to increase her supply. Nicole stopped taking fenugreek and pumped for another 2 months, donating the surplus milk to the milk bank.¹⁵⁸

CONCLUSION

This chapter has followed milk through recruitment, screening and donation, focusing on logics of surplus, scarcity, care and safety as they are folded into the economic form of non-profit milk banking. This chapter emphasized logics of surplus and care, while the following chapter that follows milk through processing and distribution emphasizes logics of scarcity and

safety. However, these elements are impossible to untangle. For instance, the notion of “surplus” itself is one of scarcity that suggests that milk cannot be procured as aggressively as possible. Analysis in both chapters suggests that growth in non-profit milk banking requires careful moral and ontological choreography in negotiating how these logics negotiate with the two donor dynamic and the commodification problem. It remains to be seen how non-profit banking will survive the growth in for profit milk procurement and banking models (e.g., Prolacta and Medolac).

Chapter 4 – Purification and Stratifications: The Processing and Distribution of Banked Donor Milk in a Human Milk Bank

INTRODUCTION

In this chapter I analyze processing, testing and distribution at the Mothers' Milk Bank (MMB) as core activities through which banked donor milk (BDM) is produced as a value-added, medically legitimate product via the construction of safety and scarcity in milk banking. As in the previous chapter, at play here are two dynamics involved in milk exchanges outlined in the introduction: "the two donor dynamic" and "the commodification problem." As with the previous chapter, these issues are negotiated through logics of surplus, scarcity, care and safety. In this chapter safety and scarcity are emphasized though all permeate these ethnographic analyses and showcase the ways value is generated in non-profit milk banking.

Here, we see these tensions negotiated in a series of moral exchanges where value is produced in milk banking through constructing BDM as *both* safe and scarce. By "moral exchange" here I mean that the circulation of human milk is often constructed by way of a series of engagements with human milk where a great deal of care and attention is paid to negotiating "the two donor dynamic" and "the commodification problem" as moral and ontological tensions. As emphasized throughout this chapter, the safety and scarcity of BDM are key components in producing medical legitimacy for milk banking and interact with the two tensions listed above in the construction of moral exchanges. I first analyze the processing and testing of human milk and second, the distribution of banked donor milk (BDM), noting temporality of milk banking looming large as a concrete reality that also determines the possibilities for human milk.

The same data sources described in chapter three are used in this chapter and the analysis, likewise, centers on the MMB in San Jose, California. Here, however, I follow milk through the next phases of processing and distribution. Although they overlap, the first section on processing emphasizes the construction of safety and the second section on distribution emphasizes medical legitimacy.

TRANSFORMATION THROUGH PROCESSING: PURIFICATION AND THE MAKING OF SAFETY

Processing is a key moment where the medical legitimacy of BDM is attempted to be produced via the elimination of pathogens to create a safe product. However, I should emphasize that many other elements go into the construction of safety of BDM (Carroll 2014) that are not addressed here. Carroll (2014) conducted an ethnographic study of neonatal intensive care units (NICUs) and milk banks to uncover how donor milk is endorsed as a safe and legitimate feeding option therein. She suggests that the material labor of the human milk bank provides a form of material transformation for the milk that can transform it from a risky biosubstance to a product with biovalue deemed safe for use in the NICU. My focus here on processing as transformation and distribution through stratifications is similar. However, my analysis emphasizes elements of temporality, scarcity, and moral/ontological choreographies within precarious medical legitimation.

In processing, value is added through a series of moral exchanges where 1) the cost of BDM is framed as a processing fee; 2) human milk is purified of its “ick” factor, 3) everyday safety research (not clinical research) frames processing; 4) processing exists in a frenzied bootstrapped non-profit environment; 5) donors themselves are studied in the making of safety; 6) procedures are established in the event of a recall; 7) safety is balanced with supply; 8)

HMBANA guidelines are recalibrated; and 9) technoscience is applied in a limited and strategic fashion within a context of minimal external oversight.

Locating the cost: The processing fee as moral exchange

Further justifying my analysis of processing and testing as activities that add value to BDM, many actors in milk banking describe the fees required from hospitals or individuals for BDM as a “processing fee” rather than a charge for the milk itself.¹⁵⁹ This ontological choreography (Thompson 2005) distances milk banks from any notion that the milk itself is being paid for and might profit donors or milk banks. That is, locating the costs of BDM in processing emphasizes both that donors are not paid and that milk banks belonging to HMBANA (Human Milk Banking Association of North America) themselves are non-profit.¹⁶⁰ Further, the California Health and Safety Code that regulates California milk banks as tissue banks affirms this ontology by defining the activities of non-profit milk banks as rendering a *service*, not selling human milk. This regulation formalizes situating the charge for BDM as a processing cost.

Like other “tissue economies” (Waldby and Mitchell 2006), HMBANA milk banks blends gift and market economies (Gerstein Pineau 2012; Swanson 2014). On the one hand donors are unpaid and HMBANA milk banks are non-profits. But, on the other hand, BDM is sold to hospitals and community members. Ardent anti-market/profit/commercialization thinking runs through milk banking discourse and state law by locating the cost of BDM in the processing fee. This, effectively, names and brackets off the potential safety and moral problems that paying donors or making profit off human milk might cause (see Sandel 2012 for moral problems associated with commercialization).

The boundary where screening ends (the focus of the previous chapter) and processing begins is, in practice, somewhat arbitrary given that they are both moments in the transformation of milk as it enters and leaves a milk bank. Regardless, it is significant that the MMB and other HMBANA milk banks refer to their charge for BDM as a “processing fee”. Hence, for the purposes of this chapter, I focus analytically on processing as a key situation of transformation or purification (Latour 1993) as value-adding practices that construct safety and scarcity in milk banking, aiding in building medical legitimacy of BDM.

Presumed Strangeness not Safety

Given the history of milk banking and the virtual disappearance of most milk banks after the blood banking scandals of the 1980s (see Chapter 2), MMB Medical Director Dr. Ron Cohen told me that one of the biggest challenges for milk banks has been to insist on the safety of their product, both through strengthening their safety practices and through publicizing them. As he noted, concerns over the safety of BDM consistently overlap with perceptions of the strangeness of introducing another mothers’ breast milk into a mother/infant dyad. In many milk banking circles, this overlapping area (the perceived lack of safety and the perceived “strangeness” of donor milk) is referred to as the “yuk” or “ick” factor (Shaw 2004) and Dr. Cohen sees this as a major hurdle in convincing the world that milk banking is safe. He told me that many of those who confront the use of BDM in their practices (e.g., neonatologists, patients, nurses, etc.) view its use with some disgust. He told me that nurses would say to him (as they are administering BDM) “oh, I would never do that” and he has heard neonatologists say, “it just doesn’t feel right”. He reported that this was the major initial obstacle at the MMB,

but still haunts BDM. Today, Dr. Cohen told me, it is addressed as a matter of convincing people that screening and pasteurization works.¹⁶¹

I observed Dr. Cohen directly engage this “yuk factor” in his 2012 presentation at the HMBANA conference in Las Vegas. He showed the slide below to represent one of the 3 major obstacles he saw to the increased use of BDM: the “ick” factor. This includes four fears (of infection, contamination, damage from pasteurization and inadequate nutrition).



Dr. Cohen, like others in milk banking, used the above imagery to suggest that while we are used to the idea of milking cows, the idea of women pumping for donation strikes many as strange or gross.

Katherine Carroll (2014), and others (Shaw 2004) have written about the “ick factor” in milk banking and sharing. I raise it here to situate processing as a strategy which neutralizes this “ick factor” through both the killing of pathogens and through making BDM anonymous as it emerges from a milk bank, essentially free of traces of the donor. One donor coordinator, for example, commented to me that she saw much of the processing as part of a process of sanitizing the milk from the disgust associated with women’s bodies and breastfeeding.¹⁶²

In the previous chapter, we saw how the MMB used social media to create community around among donors and recipients, allowing donors and recipients to reveal their identities

and develop relationships. By showcasing donor profiles, these social media activities reinforce the material reality that BDM originates in another lactating mother, usually with a baby of her own. The “two donor dynamic” is thus a *productive* tension with milk exchanges alternating between both poles of masking and revealing donor identities and bodies. Social media reinforces the notion that BDM comes from another mother with another baby, while processing and testing strips her identity from the milk and purifies it of the “yuk” factor associated with breastfeeding and breast milk exchange.

Everyday Safety Research not Clinical Use Research

Human milk banks are part of an overall network of actors (neonatologists, researchers, lactation consultants, patient advocates and lactation advocates) working to construct BDM as a medically legitimate product. By this I mean that these actors work together to make BDM a safe, needed and efficacious medical product, both materially and discursively.

Given that the MMB is the largest producing member of the Human Milk Banking Association of North America (HMBANA), I assumed that I would find there a hub of research and development on the use of human milk in neonatal intensive care units (NICU) or in the larger community. That is, as you would expect to find clinical research on the use of their products in a pharmaceutical company, I assumed the MMB would be conducting research on the use of BDM. Similarly, I further assumed that this type of research would be affiliated with or sponsored by their umbrella organization, HMBANA.

Instead, I discovered that the research conducted by the MMB is largely *safety* or quality control related and is undertaken alongside their everyday donation, processing and distribution flows. On many occasions, the MMB director referred to the every day work at the

MMB as “research” in the sense that they are *always* monitoring and evaluating their practices.

Dr. Ron Cohen, the MMB medical director, echoed this saying:

We [the MMB] do have a small budget for research because we do need to do things like quality assurance research. We have to look at what we’re doing and we do!¹⁶³

Additionally, the MMB partners with other research projects by supplying milk that cannot be dispensed for human consumption, usually because the donor has not passed or completed the screening process. As Dr. Cohen put it “The biggest thing we do is collaborate with people who have the money but don’t have access to the milk”.¹⁶⁴ Given that this milk is not fit for human consumption, it is used in compositional research on the properties of breast milk, not clinical research.¹⁶⁵



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Moreover, HMBANA itself does not house or sponsor research. In fact, when I asked the MMB director about HMBANA-funded research, she laughed and pointed out that HMBANA has no budget for that.¹⁶⁷ However, HMBANA is increasingly fostering collaborative milk bank research by requiring its member banks to submit their statistics. However, these shared figures are not published nor made readily available to the public and are largely production oriented (volume of donations, volume of processed milk) rather than oriented towards finding

and marketing the best use of BDM, as you would expect in the pharmaceutical industry (Dumit 2012).

This is not to say that the MMB and HMBANA are uninterested in research related to the use of BDM. Instead, HMBANA milk banks focus their research efforts on maintaining the quality and safety of the BDM they distribute while milk bank affiliates (e.g., neonatology, nutrition and lactation researchers) focus on research on the efficacy and need for BDM. The issues of clinical efficacy and need for BDM are addressed in chapter 6, where I discuss overlaps among the worlds of informal sharing, milk banking and biomedical innovation.¹⁶⁸

The Frenzy of Transformation: Processing and Testing at MMB

The level of daily activity at the MMB was quite frenzied during my period of ethnographic observation. My observations suggest that BDM, in its processing, is constructed as a scarce product requiring a fast-paced, stripped-down, minimal infrastructure. Lab, executive, administrative, managerial and packing staff as well as volunteers always seemed to be working at full tilt, finding time to talk to me only during lunch breaks or while rushing to simultaneously get work done. In general, I tried to stay out of the way by either sitting back and observing or helping out where I could, often volunteering to pack pasteurized milk in coolers for distribution, a task that required little training and was sometimes done by unpaid volunteers. The frenzied pace was evidenced by one staff member (Richard, a lab technician) who had a reputation for *running* around the milk bank in an effort to get as much work done as possible. But he caused many near-miss collisions in their narrow trailer hallway that often overflowed with unpacked boxes of supplies and empty coolers.

Other staff members told me about working long days with few or short breaks, as well as coming in on weekends, outside of their regular scheduled hours. The MMB's work is time sensitive. With no significant donor milk reserves, at the time of my ethnographic observations, donor milk was coming into the milk bank and leaving pasteurized within a matter of 2-4 days. That is, I never observed the MMB attain a significant stockpile of unpasteurized milk for processing or pasteurized milk for distribution. Rather, milk made its way through the facility very quickly and efficiently. Richard's racing around MMB was not a personality quirk but rather emblematic of the race to process milk as efficiently as possible with limited resources.

Additionally, HMBANA (2013) guidelines stipulate that donor human milk needs to be used within 1 year of the date pumped, making the possibility of developing a significant stockpile of unpasteurized or pasteurized milk somewhat unrealistic. Milk banks operate on an unpredictable volume of needed input (screened milk donations) and an unpredictable demand for their output (varying standing and one-time orders from hospitals and individuals for BDM). Therefore, they have no way of determining exactly how much donor milk they will have available to process nor how much pasteurized milk will be requested, at any given time. Therefore, to avoid wasting donor milk or their resources, and to ensure a revenue stream, they operate at a fast pace, leaving no significant reserves of unpasteurized or pasteurized donor milk. Due to an increase in both demand and donated milk over the course of my field work, the MMB went from processing 10-12 batches a day to 15-16 with no notable staff increase. I discuss below how the unpredictable and time-sensitive nature of this process impacts how their recipient priority list is operationalized and adds to the dynamics of BDM as a scarce product that is unequally distributed to those who are affluent.

The MMB is housed in a small portable trailer divided into small rooms or areas: a lab (where the pooling, sampling, pasteurization and dispensing and logging takes place), a dirty room (the area where the coolers and equipment are washed), an office (where the donor coordinator and recipient coordinator sit), and a storage area where supplies are kept (this area also doubled as an additional office used by a rotation of staff). The trailer itself is located within the Santa Clara Valley Medical Center complex in San Jose, California. The county of Santa Clara effectively donates the use of the trailer to the milk bank by renting it to them for \$1 per year.¹⁶⁹ As the staff and executive director admit, the trailer is too small and not well suited to their purposes. From a cosmetic perspective, the trailer is certainly not flashy (one of the staff members referred to it repeatedly as “dilapidated”). From a functional perspective, the staff seemed to be constantly running into each other, dodging boxes and coolers, and lacking sufficient space to do their work.

In addition, the MMB occupies two offices in a nearby portable trailer for the executive director and administrative staff. After a number of failed starts, the MMB will soon move to a new larger location, also within the Santa Clara Valley Medical Center Complex. They are now “growing up” and paying “real” rent.¹⁷⁰ Their new location will be almost 3 times larger than the trailer but still not big enough given the volume of their production.¹⁷¹

Processing as Moral Exchange: Studying Purification, Studying Donors

Next I describe processing as I observed it with some comparative reference to the Iowa MMB and Prolacta where I also visited and conducted observations. At the beginning of my fieldwork, the MMBs had a staff of 12: two donor coordinators, one Spanish speaking donor coordinator, one recipient coordinator, one lab director, four lab technicians, an office

manager, and two administrative/packing staff. The staff came from a variety of backgrounds. The administrative staff came from lactation or medical administration backgrounds. Some lab staff came from health-related occupations like emergency medicine technology and pathology. Others were currently enrolled in science undergraduate training.¹⁷² At one point, the lab manager had a PhD in microbiology, but this staff member left his position half way through my fieldwork. What was clear from talking to the staff members was that many of them fell into milk banking, finding it either through volunteerism or happenstance. The executive director of the MMB conveyed to me that there is no training that prepares a person to work in milk banking; rather it trains its employees on the job.¹⁷³ This dynamic was reflected in my observations at the Iowa Mothers Milk Bank where staff came from a variety of backgrounds, none of which, strictly speaking, trained them to work in milk banking.

I found that in the course of monitoring processing procedures at MMB, the donors themselves were studied, evaluated and sometimes eliminated from participation. Frozen donor milk from screened and approved donors arrives in coolers at the MMB in bags or other suitable containers used for collection such as mason jars or zip lock bags. It is then unpacked into a large walk in freezer and logged in via a paper notebook with each donor assigned a donor number. MMB is the largest producing milk bank of any of the HMBANA milk banks (Sakamoto 2015) and every day, it thaws, pools and pasteurizes milk as well as sends pre-pasteurization and post-pasteurization samples out for bacteriological testing.



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Other HMBANA milk banks that are smaller scale do not pasteurize every day, as was the case at the Iowa MMB where they pasteurize many batches every other day. A batch refers to one round of bottles pasteurized using the holder-pasteurization method in a shaker bath where water is heated to 37 degrees for 8 minutes then cooled promptly before freezing. This is the method used by all HMBANA milk banks as opposed to Prolacta where milk is pooled into one large vat that is then pasteurized.¹⁷⁵

In order to begin the pasteurization process, donor milk is thawed and pooled into batches. Every morning, the first lab technician to arrive was responsible for thawing milk for pooling by laying it out on baking sheets and stacking them on a rack as you might see in a bakery. Deciding how to pool milk took into account three factors: 1) the predicted contamination level of each donation (because a donation with a predicted high contamination level might be pasteurized separately and not pooled risking the whole batch); 2) how much milk was in each donation (helping to establish which and how many donations to combine) and 3) the date marked on the donation bags as the date pumped (because the oldest milk will

set the pooled milk's expiry date and because the staff checks the dates against the dates the donor attests to have taken temporarily disqualified medications).



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The predicted contamination level of a donation was based on whether a donor's previous donations were found to be contaminated in their pre-pasteurization bacterial testing and/or whether the contamination levels they had were "heat treated out" (a term used by staff at the MMB) by pasteurization.

Although not a HMBANA requirement, the MMB tests its milk for bacterial load pre-pasteurization using this test to monitor the pumping and collection habits of its donors. This technique was part of their approach to "continual screening through processing"¹⁷⁷. When a donor's pre-pasteurization test comes back with a high bacterial load (the MMB director cited a load above 100,000 colony forming units, CFUs) the donor's file was marked with a red asterisk and she was contacted. The donor was then re-educated on pumping and handling and asked to replace her kit (the removable parts that come with a pump). Her subsequent donations became increasingly suspect and would be pasteurized separately rather than pooled with another donation. The MMB executive director described this to me:

The pre-pasteurization [test] is we take samples of each individual donors raw, frozen and then we take a sample of the pool raw and then we take the pasteurized sample. In

the standards of practice, minimum standards are that you test for the end product so you just do the post-pasteurization test. Why do we do pre-past? It's because for us, it's such large volumes of milk that have to pass through if we find a donor that's really high in bacillus and we know it's not going to heat out, we want to know that so when her next amount of milk comes in, we will process her separately from everybody else. So from this kind of technique, we'll know who to pan out in a corner here and do her alone. So it keeps the batches cleaner. The other thing is it's a teaching opportunity for us to call the mom up and say, "Your milk is wonderful but it's dirty. So could you please change your kit?" So it's a teachable moment as well for that.¹⁷⁸

At the MMB, every time a donor's milk is found by lab staff to be significantly contaminated in the pre-pasteurization test, her file is marked with a red asterisk. After three asterisks, that donor's milk is no longer accepted. Pre-pasteurization tests are used, then, to monitor the donors themselves via their pumping and handling practices and subsequently decide how to treat the milk itself (whether to pool it and, with continued contamination, whether to accept milk from that donor at all). As is stated in the quotation above, this is not a requirement of HMBANA but rather an efficiency measure given the large scale of the MMB's production and the costs associated with wasting milk (should it be found to be contaminated post-pasteurization). The donor herself is enrolled in and evaluated by the technologies utilized by the milk bank (here, the pre-pasteurization testing and the pooling decisions).

At other milk banks, e.g. the Iowa MMB, pre-pasteurization testing is not used which can result in contamination with unknown origins and suspicion cast over a larger number of donors. For this reason, the Iowa MMB generally does not re-contact it's donors when pooled pasteurized milk is found to be contaminated, since the origin of the contamination is more uncertain unless a pasteurized batch happens to be a large donation from a single donor.¹⁷⁹ Here, the way the donor is enrolled and the degree to which her trustworthiness is scrutinized

depends on the scale of the milk bank. The larger the milk bank, the more thoroughly she and her practices are scrutinized. The smaller scale, the less thoroughly.

Prolacta, the for-profit entity that runs a larger scale operation that processes human milk into a fortifier (discussed in Chapter 6) uses their proprietary technology to investigate donor practices to a much greater extent. As the CEO Scott Elster pointed out to me, the problem with human milk collection is that it is done offsite by the donor. That is, unlike blood where the donor is monitored at the blood bank during collection and a staff technician performs the extraction and handling, human milk is pumped and stored off site.¹⁸⁰ With human milk donation, then, there is no way to know that the donation is actually human milk or that the milk actually came from the screened donor. To remedy this situation, Prolacta invented and holds intellectual property on a number of tests that are conducted on the milk itself, rather than the donor. These proprietary tests screen for adulteration and drug content as well as test for a DNA match between the milk and the screened donor.¹⁸¹ Further, Prolacta, has its donors monitor their freezers with Prolacta's own thermometers that are checked by a Prolacta staff member.¹⁸²

As is the case with the MMB's low-tech "asterisk method" of monitoring donors, the high-tech tools used by Prolacta orchestrate the donation of milk as a moral exchange, weeding out the wrong kinds of donors and their untrustworthy practices. Milk donation for MMB and Prolacta require a high degree of honesty and willingness to follow directions. Prolacta's technologies and, to a lesser extent, the MMB's ensure that these traits are maintained. When I asked the MMB director what she thought of Prolacta's technologies such as DNA matching and monitoring for adulteration, she told me that their donors wouldn't do something like this and

that the types of adulteration they are testing for are probably the wrong ones.

¹⁸³Undoubtedly, this goes back to the idea that the donors, because they are not compensated, have no reason to donate but for their desire to give. The equivocation of the quality of a mother's milk donation and her moral valuation and can be felt by a donor herself. I spoke to one donor who was contacted by MMB staff after her milk was found to be contaminated. She found this experience off putting when the MMB staff member told her abruptly "there's something wrong with your milk" sending the donor into a panic about her own breast milk and breastfeeding practices. In such moments, the MMB staff is trained to be sensitive to the donors and reassure them that their milk is perfectly good for their own baby but that in the course of pumping and storage, contamination has occurred and the MMB cannot distribute their milk to premature babies who require extremely "clean" milk.¹⁸⁴ The MMB director told me how she works to train her staff to be extremely kind to donors, but that sometimes a direct message like this one, is not handled with the type of care required.

Once the milk is pooled into a batch, it is poured into glass dispensing bottles and then sampled again for pre-pasteurization bacterial testing. Records of which donations were pooled together were taken by hand and then subsequently entered into a computer by lab staff. The MMB staff stressed the importance of record keeping in case a BDM recall were necessary. At the time of my fieldwork, BDM had only been recalled once at the MMB, an episode that turned out to be a false alarm.¹⁸⁵ The director often said to me anecdotally that the MMB has never had any "adverse outcomes", a line that I heard repeated over and over in various contexts, reinforcing their practices as safe and trustworthy.

There was a great deal of hand written record keeping at the MMB: e.g. donor files, recipient files, lab records, batch records and billing records were all kept in paper format. Computer systems were employed into a software program¹⁸⁶ where batch information was stored and labels printed. Much like other computer systems employed at the MMB, the lactech was used as a back up of paper records that were the primary form of record keeping.

Recognizing Safety as a Social Construction: Balancing Safety with Supply

The bottles were then placed into a shaker bath pasteurizer that utilized the holder pasteurization method. With this method, milk is brought to a temperature of 62.5 degrees C for 30 min then cooled and frozen.¹⁸⁷ Both the 2011 and 2013 HMBANA standards stipulate that “any bacteriological growth is unacceptable for heat processed milk” (HMBANA 2013:23). With each batch at the MMB, a random sample bottle is chosen for bacteriological testing post-pasteurization. At the time of my fieldwork, the MMB had recently implemented changes to their testing procedures, resulting in a higher than normal contamination rate amongst their pasteurized milk.¹⁸⁸ The MMB went from doing their testing in-house to outsourcing their testing to a public lab facility. Up to that point, the MMB’s in-house testing was unique among HMBANA milk banks in that all other HMBANA milk banks outsourced this aspect of production. The director told me that they made this change in order to incorporate a third neutral party in their lab work and to become consistent across the HMBANA milk banks (although outsourcing itself was not a HMBANA requirement) (HMBANA 2011).

I was conducting weekly ethnographic visits to the MMB at the time of this procedural change and witnessed the upheaval that it caused across the staff. This change in testing procedure resulted in a dramatic increase in contamination results, and a great deal of

speculation amongst lab workers over what or who was causing this contamination. As a result, the MMB was forced to dispose of a large quantity of contaminated milk at a time when their supplies were low, further raising the stakes of this change and the suspicion that it cast across the staff. The MMB made efforts to decrease their contamination level by reviewing handling and processing procedures with staff members. But, what eventually returned their contamination rate back to previous levels was a recalibration of the testing itself.¹⁸⁹ It was interesting to watch how quickly the MMB staff went from objectivist understandings of contamination (i.e. questioning each others' handling practices) to more relativist understandings of contamination (i.e. understanding that when the calibration of the metric is changed, the contamination rate changes too). In this sense, the MMB staff were well aware that "contamination" could be differentially defined and that they needed to find a way to balance the need for a 0 contamination level with the need for a regular supply of outgoing BDM.

Recalibrating HMBANA Guidelines

Neither the MMB's initial use of in-house bacteriological testing nor their seemingly flexible "contamination metric" were violations of HMBANA standards. At the time, the 2011 standards were open about whether testing be done in house, or by an outside lab as well as what dilution level ought to be used.¹⁹⁰ Since then, the revised HMBANA (HMBANA 2013) guidelines outline two options for how testing can be done, specifying two methods with specific contamination metrics.¹⁹¹ HMBANA has been working hard to increase their medical legitimacy through increasing the robustness of its safety standards. As has been conveyed to me time and time again, one of milk banking's major hurdles to growth is attaining the

confidence of neonatologists that using donor human milk is safe. For this reason, HMBANA publishes its guidelines on line for anyone to access for a fee. Also, HMBANA milk banks routinely make mention of their safety standards in their donor recruitment efforts or other publicity materials.¹⁹²

Another area where standards were missing before the 2013 version of the HMBANA guidelines concerned whether a contaminated batch had to be immediately destroyed or whether it could be retested and then used again. Before the 2013 guidelines, different milk banks approached this issue differently.¹⁹³ Currently, the 2013 standards stipulate a sample found to be contaminated under a certain level can be retested. In a further test, if a no growth is found, that batch can be used.¹⁹⁴ What are clear from the development of more robust standards is that milk banking is an area in development and that their development is largely internally driven. That is, these guidelines are not established or enforced by any external state agency (except in California and Maryland where milk banks are licensed as tissue banks).¹⁹⁵ The 2013 guidelines, for example, were the outcome of an advisory sub-committee's recommendation in consultation with the HMBANA directorship.¹⁹⁶ The benefit to this structure is that HMBANA can increase the technoscientific robustness of its guidelines as needed to increase its medical legitimacy but without the burden of external oversight that could add to their production costs.¹⁹⁷

Keeping Costs Down and Supply Flowing: Minimal Technoscience and Minimal External Oversight

One example of the internal nature of milk banking guidelines and how they serve to keep costs low and the supply of BDM flowing is the contentious issue of analyzer use on BDM

and its subsequent nutritional labeling. Human milk analyzers are devices that can establish the nutritional content of donor human milk; particularly it's calorie, fat and protein content. Analyzers can be used to standardize the nutritional content of dispensed donor human milk and to label the bottles accordingly, though this is not a HMBANA requirement (HMBANA 2013:23). Currently most milk banks do not use analyzers because of the cost associated with the equipment and the controversy over whether donor human milk should have a standard nutritional content.¹⁹⁸

It was suggested to me by Scott Elster, the executive director of Prolacta, that if the FDA regulated HMBANA milk banks, one of the major areas of change would be the labeling of BDM.¹⁹⁹ On this issue, and others, HMBANA milk banks benefit from being free to decide how much scientific sophistication and standardization to employ in order to gain medical legitimacy, without tipping over into FDA regulation and potentially increasing their costs and limiting their output of BDM. As was conveyed to me by the director of the MMB, HMBANA milk banks wanted FDA regulation when they took part in a milk banking information gathering session in 2010.²⁰⁰ But, more recently, HMBANA milk banks have appreciated that they can operate without FDA regulation given the added cost burden regulation could bring.²⁰¹

Once milk was pasteurized and cooled at the MMB, it was stored in freezers and marked with "Waiting" or "Ready" labels to indicate whether the batch has passed bacteriological testing, or whether results are pending. Milk that passed testing and marked as "Ready" was then labeled with a batch number using the lac-tech logging system which would allow the milk to be traced back to the batch number, and subsequently, the donations that composed the batch.



At the MMB, pasteurized milk that did not pass bacteriological testing was disposed of and treated as a biohazard.

TRANSFORMATION THROUGH DISTRIBUTION: SCARCITY AND THE CONTOURS OF ACCESS

I now walk through the distribution of BDM in the way it reveals the contours of BDM's scarcity and how this maps on to the medical legitimacy, or lack thereof, of BDM. I argue that the formal HMBANA priority listing for the distribution of BDM does not *singularly* determine who gets BDM. Rather, it interacts with the temporality of milk banking (fast paced and with no reserve of BDM available), the uneven acceptance of BDM at American hospitals, health insurance requirements, and a given individual's willingness/ability to pay in the material distribution of BDM. Access problems will be further addressed in chapter 6 (where the multiple markets in human milk are discussed in their interaction). Here, I analyze how the contours of BDM's scarcity are revealed in the operationalization of the HMBANA priority listing at MMB. Throughout this section we can see some of the contours for how BDM has not been thoroughly accepted and integrated as a medical product. Although it goes beyond the scope of the analysis provided here, there are also ways in which HMBANA's priority listing also extends a logic of surplus wherein BDM is surplus milk not meant to get in the way of a recipient

mother/baby's breastfeeding. That is, the priority listing effectively signifies that BDM is a limited product and needs to be carefully allocated according to where legitimate needs for it are occurring. In interview with the MMB director, she made clear that a mother who is inconvenienced by breastfeeding (e.g. who wants to go on vacation) does not have a legitimate need for BDM.

Negotiating Scarcity and Priority: The Recipient Coordinator

At the MMB, the recipient coordinator, Susan²⁰³, managed the orders for pasteurized donor human milk from hospitals and individuals (referred to as "outpatients"). Susan had an extremely kind and likeable demeanor making her very well suited for her job, dealing with stressed out parents and hospital bureaucracies. She was trained in medical administration and worked extremely hard for the milk bank. Susan's role was to take orders for milk, and coordinate with the lab and packing staff in assembling and shipping those orders. When milk was not available for a given order, Susan was responsible for dealing with that shortage. She could either reduce the amount of the requested order, coordinate with another milk bank to get milk to that recipient, or, when absolutely necessary, turn a recipient away.²⁰⁴

During my fieldwork at the MMB, there were often 10 or 11 orders for milk that needed to be filled in any given day, keeping the lab and packing staff rushing to meet them all by the days end. The packing staff often joked that no matter how many orders came in, they would always finish their packing duties by 4pm, suggesting that they worked extremely hard to meet whatever demand came in the door. Orders for milk came all day from either hospitals or individuals and the MMB asked that they give at least 24 hours notice though that was not always possible. At the time of my fieldwork, the milk bank was dispensing approximately 60%

of their milk to outpatients and 40% of their milk to hospitals.²⁰⁵ Not all HMBANA milk banks supply BDM to outpatients to the extent that the MMB do.²⁰⁶ In fact, the MMB has a reputation for supplying outpatients as a way to keep the cost of their BDM low (in that milk is quickly being sent out the door, with no reserves “waiting” to be sold/distributed).²⁰⁷ The MMB director has since suggested to me that these ratios (60% outpatients, 40% inpatients) have reversed with more and more hospitals ordering milk.²⁰⁸

Constructing Medical Need and Scarcity through HMBANA’s Priority Listing

It is important to situate the MMB’s milk distribution practices within HMBANA’s “Suggested Priority for Dispensing Donor Human Milk” (HMBANA 2013:52). HMBANA milk banks to dispense their limited supply of BDM use this priority listing. In effect, this listing gives top priority to hospital orders (wherein milk is bound for premature infants) over orders for individual non-hospitalized babies with a medical need for BDM. Once these two kinds of orders have been filled, priority is given to other medical needs (e.g. children with metabolic disorders who respond well to consuming BDM or individuals with cancer for whom BDM may offer a therapeutic effect). Infants without any specific medical condition (e.g. infants who are adopted, are born of a surrogate mother, or whose mother does not produce enough breast milk) are given last priority. Notably, HMBANA milk banks also have the option to sell milk for use in research once the needs of premature and non-hospitalized sick babies have been met or unusable milk can be sold for use in research at any point.²⁰⁹



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Stratifying Bureaucracies and the Invisibility of Uneven Access

This HMBANA priority listing is an attempt to fairly distribute a limited resource and, as I observed it, the MMB dutifully followed this priority listing. However, I observed two other factors on top of this official priority listing that interacted with it alongside the temporality of milk banking. First, whether a given hospital orders human milk and how it administers it determines whether a hospitalized infant will receive donor human milk. Currently, estimates suggest (Parker et al. 2013) that around 45% of NICUs order donor human milk and there is no standard protocol for the administration of donor human milk. Second, outside of the hospital, the ability to pay and/or insurance status of an infant's parents also determines whether a given community based infant will receive donor human milk.

Drawing on interviews with neonatologists who work with milk banks, this first layer is explored with regard to the question of why less than 50% of NICUs order donor human milk, or why, in this regard, donor human milk is under-medicalized. This second layer is explored with reference to my observations of how the MMB dispensed milk to out patients, taking into account their insurance status and/or ability to pay.

Location as stratification

Unlike some HMBANA milk banks (e.g. the Iowa MMB) that are affiliated with hospitals, The MMB is a stand-alone non-profit milk bank. As such, the MMB sells milk to two distinct types of buyers: hospital NICUs and individuals. When it comes to hospitals, the unofficial factor that also determines access to donor milk is whether a given hospital happens to order milk and how it distributes it. That is, many fragile premature babies who are classified at the top of HMBANA's priority listing are at hospital NICUs where milk is not ordered or where their circumstance does not trigger an internal policy or decision to administer the milk. When it comes to individual purchasers, the stratification that is layered on top of the HMBANA priority schedule concerns an individual purchaser's insurance status and/or an individual's ability/willingness to pay for BDM.

When hospital NICUs purchase milk from the MMB it is to keep a stocked amount on hand or to administer the milk to a specific infant.²¹¹ In either case, the MMB does not collect information (e.g. for billing or prioritization of orders) on the specific infants that are being given the milk in-hospital. Rather, how the milk is administered depends on internal hospital protocols and there is a great deal of variation regarding how hospitals administer pasteurized donor human milk with no "standardized recommendations for criteria for [donor milk] use (Parker et al. 2013). I observed this in my interviews with lactation consultants from two different hospitals with donor milk programs in the San Francisco bay area. One of the lactation consultants reported a more conservative administration program that prioritized babies under 28 weeks gestation, while the other reported a more expansive policy where all babies under 35 weeks gestation receiving either a mothers' own milk or donor human milk.

HMBANA milk banks have been growing fast in recent years in terms of the amount of milk they are producing and distributing and the number of milk banks that have opened or are in development. For example, both of the Iowa MMB and the MMB experienced about a 40% increase in their production in just the last 2 years.²¹² In 2013 HMBANA milk banks overall distributed over 3.1 million ounces following a steady increase over the last decade (Sakamoto 2015). Although increasingly hospital NICUs are ordering BDM (Parker et al. 2013), there are still many NICUs that go without donor human milk, and, therefore many infants at the top of the HMBANA priority listing (premature infants) that do not access donor human milk. Recently, Parker et al (2013) conducted a survey of level 3 NICUs and found that only 42% of responding NICUs used donor human milk. The authors found that “larger NICUs and those in the West and Midwest were more likely to use DM, while safety-net hospitals were less likely to use DM [and that] lack of knowledge by medical directors of accessibility, safety, and parental receptiveness may be barriers to DM use” (Parker et al. 2013:381). Geography and insurance status reveal themselves as further stratifications that can determine whether a hospitalized infant can access donor human milk at his or her hospital.²¹³ At the time of writing, the MMB sells milk to 103 hospitals in 13 states²¹⁴ a number up from early field-work where 7 hospitals was reported.²¹⁵

Many of those in milk banking are quick to point out that there is an enormous unmet need for donor human milk among premature babies in NICUs and many leaders in milk banking (e.g. the director and medical director of the MMB) dedicate considerable efforts to promoting the use of donor human milk as a medical necessity in hospitals. This medical need, in it’s narrowest form is presented in terms of the prevention of necrotizing enterocolitis, a

possibly lethal infection in premature babies that can result in the surgical removal of a large portion of a baby's intestines. Some neonatologists think that using a mother's own milk or donor human milk is preventative against NEC because it is easier to tolerate in the undeveloped gut of a premature infant and it contains the right immunological components to fight off disease (Carroll 2014). Extensive debate exists over what exact nutrition is best for premature infants and/or is preventative against NEC, which is where Prolacta comes in as a supplier of an exclusively human milk based form of nutrition for premature babies. These issues will be further addressed in chapter 6.²¹⁶



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At the same time, leaders in milk banking acknowledge that growth in milk banking has and will not be easy given that they can scarcely keep up with current demand²¹⁸ and their milk banks are struggling to stay afloat financially.²¹⁹ At the 2012 HMBANA meetings Erin Hamilton Spence, the medical director of the Texas MMB estimated that in order to supply 50% breast milk to all the premature NICU babies in Canada and the US, HMBANA milk banks would need to supply 8 million ounces. She said, "We are only a quarter of the way there".²²⁰

Hospitals as gatekeepers to the medical legitimacy of BDM

Parker's (2013) survey reports on a number of perceptions held by NICU directors that may indicate why certain hospitals might not purchase donor human milk. Among them were cost (either of the milk itself or of the administrative burden it would take to order/handle milk), lack of availability of donor human milk (i.e. milk banks are not able to meet NICU demands), lack of safety of donor human milk or reluctance on the part of parents to accept donor human milk. My interviews with neonatologists who work in milk banking echoed these perceptions and included three additional but related rationales. Neonatologists also raised the "yuk" factor – that is that using donor human milk can seem strange or gross to hospital staff (including neonatologists) and parents alike. Neonatologists also raised the prospect of pressure from formula companies, particularly that pre-fortified formula is given to hospitals by formula companies whereas human milk fortifier (what is added to human milk or donor human milk) must be purchased by hospitals. Neonatologists also raised the lack of solid evidence that donor human milk is best for and how to use it. This last issue will be raised in chapter 6.

What is clear from this picture is that BDM does not fit perfectly as a consumable medical commodity. This is apparent when it comes to the issue of cost. Unlike medications that are usually billed to a patient's insurance company, the cost of BDM is usually absorbed by the hospital itself and rolled into the cost of the bed.²²¹ For this reason then, a hospital itself needs to value the use of BDM in order to take on the cost. In my interview with neonatologist Dr. Eckhart Ziegler, the pioneering expert in neonatal nutrition and one of the founders of the Mothers Milk Bank of Iowa, I asked him why more hospitals do not order BDM. He, like others I

have spoken with referred to a handful of reasons, high among them: cost.²²² Dr. Ziegler, pessimistically, framed a hospital's unwillingness to use donor milk as related to the fact that the decision makers – US hospitals – do not benefit from preventative medicine:

*...The hospitals right now make money on everything they do and the longer the baby stays in the hospital, the more money a hospital makes. The hospital has no incentive to shorten the hospital stay...In neonatology there are similar mechanisms are at work. The hospital gets no reward or pay for donor milk. The reward is not there. *We have less necrotizing enterocolitis but nobody has ever claimed that having less necrotizing enterocolitis benefits the hospital. It lowers overall costs but who benefits from that? It's not the hospital. Maybe the insurance companies benefit from it. Society as a whole benefits from it no question. But the immediate parties involved don't benefit. The surgeons, they like to have NEC because they like to operate. Things are stacked against preventive efforts and that's really unfortunate.**²²³

A great deal of research is now being conducted on the cost/benefit to hospitals of utilizing BDM for these reasons, as was evidenced in my observations of the Global Human Milk and Lactation Research Society (GHMLRS) Meetings in 2012.²²⁴

However, stressing the cost of BDM to hospitals is misleading, according to many in the field. Dr. Tara Colaizy the medical director of the Iowa MMB, a practicing neonatologist and donor milk researcher, pointed out to me how small that cost is in comparison to the other costs involved in a baby's NICU stay:

*So a small baby, you're going to spend \$15 a day maximum to feed donor breast milk...maybe \$45 when they're really big. We give Surfactant which is a respiratory medication, it's \$700 a dose and we don't even think about it!...So for a baby to get donor breast milk is between \$1000 and \$2000 for the hospital stay typically. Really it's chump change. These are million dollars bills to our healthcare system to take care of these babies....As donor milk gets put into hospitals, that's the stumbling block is the \$4 an ounce [to the hospital administrators].*²²⁵

BDM acts as a preventative form of care that costs hospitals financially and debate exists over how best to use it as a form of NEC prevention, as will be discussed in chapter 5. Some have

pointed out to me that hospitals can benefit from NEC financially through increasing surgeries and lengths of stay such that there is a further dis-incentive from hospital administrators ordering donor human milk. Recently, all Kaiser hospitals have launched a BDM program and standardized protocol such that all babies²²⁶ will get BDM. It was suggested to me that this change indicates Kaiser's unique insurance position as both the insurer and care provider where they are incentivized to fund prevention efforts. It remains to be seen how changes in the administration of healthcare with the Affordable Care Act will change the incentive structure for establishing BDM programs.

Insurance Status and Ability to Pay as Stratifications

At the time of my fieldwork, MediCal was the only form of insurance accepted at the MMB for individuals who acquired milk directly from the milk bank. The MMB had previously experimented with accepting other forms of insurance but found that the administrative time spent on collecting from and negotiating with insurance companies was often unsuccessful and overly taxing on the limited resources of the bank.²²⁷ As is a HMBANA requirement and a tissue bank licensing requirement, all orders for BDM, whether paid for by MediCal or an individual, required a prescription that included the diagnosis (e.g. adoption, breast reduction, insufficient milk, failure to thrive on formula, etc.) the amount to be given per day, and how long to supply the individual with BDM.²²⁸ However, in order for the MMB to guarantee reimbursement from MediCal for a given request for BDM, the donor coordinator made sure that included with the diagnosis was indication that the infant was intolerant to formula. That is, in order to get MediCal reimbursement for BDM, an infant must have tried and failed to thrive on a number of commercially prepared formulas. No such requirement existed for private payers and, for this

reason, the donor coordinator referred to BDM as more of a “choice thing” for private payers and a “medical need” for MediCal patients.²²⁹ As the MMB donor coordinator put it:

So, basically what [people who buy BDM] need is the prescription. That’s the fundamental thing that they need. Obviously if they’re private they need the money to pay for it, and MediCal they need to have a *medical* reason for having the milk. So those are the basic things, but other than that as long as we have the milk...and of course hospitals are obviously different. The majority of the hospitals we have we keep a regular stock on hand, just for any babies that are in the NICU that might need it, so theirs is slightly different. But yeah, that prescription is the main thing. The ability to pay somehow, either through MediCal or through private, is the other thing, but then as long as we have milk we’re happy to ship it to everybody.²³⁰

One of the MMB recipients I interviewed was a MediCal recipient whose baby had been born premature, received donor milk in the hospital and upon being discharged from the hospital was told to “experiment” on her infant with different formulas in order to secure MediCal coverage for the BDM.²³¹

Private payers could access breast milk from the milk bank for a variety of non-medical reasons including adoption, maternal death or insufficient milk (for unknown reasons or following breast reduction surgery).²³² The majority of the MMB recipients that I interviewed fell into this category. BDM costs \$3/oz. at the MMB which adds up to \$1000 per week for some babies, an expense outside of the limits to most parents²³³. The donor coordinator, Susan, reported to me that she took many phone calls inquiring into the cost and availability of BDM only for possible recipient parents to balk at this cost. She also told me that the MMB is able to accept a varying number of charitable cases from inquiries that Susan takes to the director for approval. Susan told me about the sheer volume of cards and photographs they get requesting to be accepted as charitable case. When the MMB fundraises in the community it is to support these charitable cases.²³⁴

Timing as stratification

I have described the way the hospital itself (whether it orders milk and how it dispenses it) and insurance status/ability to pay impact whether a particular baby can access BDM. Interacting with these unofficial layers is the timing of a given order, impacting whether a given baby will access BDM.

The donor coordinator told me about how “by hook or by crook” they will do their best to fill all the orders that come in. She described how in times of plenty, the MMB does not need to rely on their prioritization scheme because they have enough milk to fill all orders. At other times, she negotiates with private payers to cut back their orders (e.g. instead of ordering for a whole month, only order for a week at a time) and as a last result, some private payers might go on a waiting list (as was experienced by one of the recipients I interviewed). Given that hospital orders are always filled first, it is very unusual for hospital orders to be impacted by a shortage. However, during my fieldwork, at the time of the change in contamination protocol, the MMB had to quarantine a large amount of processed milk while it was re-tested and, as such, could not send out 15 orders that had been promised that day.²³⁵ In times of extreme shortage, the MMB has referred their orders to other milk banks so as to not lose that client:

Krista: So can you just tell me a little bit, for my tape, what happened yesterday with the shortage?

Susan: So yesterday, because of the testing results that came back - we actually had milk, for the bacteria testing the milk had been sent off to the lab, but a lot of it had come back with low levels of contamination, so then that milk can't be classed as Ready to Go Out. So that has to be put in quarantine, we're not disposing of the milk because we're hoping that it will be usable. But that goes into quarantine, so that left us very short of milk that was ready processed and ready to go out, already tested. So although we had about 15 orders that we were preparing to send out. So suddenly they say we only have X amount of milk. So I just sort of looked at what I had, and who needed it, and we concentrate on doing the hospitals first. So any hospitals that could be done, we

did. And Pauline also mentioned that she would call around all the other milk banks and see whether anybody else has a surplus of milk. And Colorado didn't, I can't remember where else she called but none of the others did. But Texas had about 6,000 oz. that they had spare. So they said they were happy to pick up any customers of ours that weren't in California, because of the licensing laws. So they took on Oregon, two in Hawaii, and where was the other one...I can't remember, somewhere else. So they took on any out of state orders, so that was good, that removed four for us. And I was able to chat with a couple of parents who were happy to wait another two days, in the hope that our supplies would pick up. And then the others we pretty much shared out what was available among the remaining people. And now we'll have to make up their orders next week. But people got *something*, or some, by hook or by crook, managed to get something to them...²³⁶

Given the unpredictable and time-sensitive nature of orders for milk and the reality that the MMB does not keep a reserve of BDM, timing becomes a significant stratifying determinant in the dynamics of scarcity and access to BDM. How the recipient priority listing is operationalized depends on what hospitals are ordering milk and what outpatient is ordering milk and when.

CONCLUSION

This chapter continued an analysis of non-profit milk banking as an economic form that incorporates logics of surplus, scarcity, care and safety in its work of moving milk from donors to recipients. This chapter walked through processing and distribution at a MMB emphasizing logics of scarcity and safety that are operationalized therein. We saw here, as in the last chapter, the ways in which non profit banks prioritize care for milk along a chain of custody through a series of moral exchanges that may be antithetical to outright growth in milk banking.

In the next chapter I analyze informal milk sharing exchanges as biosocial exchanges (where an individual problem of over or under production is addressed through a collective solution) that involve an affective economy where emotions come to being through

interactions and exchanges that often exist through a form of transactional care that exemplifies a distinct economic form, rather than a “pure” gift economy.

Chapter 5 – Health Optimization and the Redistribution of Productive Motherhood: Milk Sharing as Biosocial Exchange and Affective Economy

INTRODUCTION

This chapter analyzes contemporary milk sharing communities and practices, informal means of redistributing breast milk which utilize social media as a means of organization, alongside more quotidian forms of sociality such as mom’s groups, listervs, personal referrals, etc. Milk sharing exchanges create venues for mothers to redistribute a trait seen by participants to be unfairly unevenly held: the ability to (exclusively) breastfeed or produce milk. That is, through informal human milk sharing, parents (primarily mothers) form biosocial communities, relationships and identities around a *relational* and *embodied* experience. These biosocial communities are oriented toward the optimization of infants’ health through group management of over, under, or absent production of breast milk. I use Ahmed’s (Ahmed 2004) concept of “affective economies” as a sensitizing concept to characterize the prominent role of *emotions* in milk sharing. Emotions in milk sharing shape (and are shaped by) collective embodied practices, the collective generation of affective value, new individual subjectivities and new social worlds.

Outline of Chapter

I begin this chapter with an overview of the milk sharing phenomena and the data sources used in this chapter. I then offer a précis of theories of biosociality as sensitizing concepts accompanied by other theoretical interventions, as drawn upon in this chapter. First, I view biosocial communities as “affective economies” (Ahmed 2004) where emotions about motherhood and infant feeding are at play. Second, I stress how this form of biosociality is

narrowly situated among those who are likely to go to great lengths in order to breastfeed (which is perceived as natural and normal). As such, this grouping reflects a particular racial and class demographic at this historical moment, discussed later in the chapter. Lastly, I recommend the metaphor of “exchange” (rather than market or gift economy) to describe milk sharing biosociality. Further, I then suggest that milk sharing, from both donor and recipient perspectives, exists within breastfeeding “projects” and represent a reconfiguration of breastfeeding problems congruent with their collective solutions. I show how, for many recipients and donors, milk sharing came about because of breastfeeding problems and was experienced as a form of affective relief to these problems. For receiver mothers, milk sharing restores maternal duty and satisfied a need to have “done everything”. For donors, milk sharing allowed the satisfaction of not wasting hard-earned milk by putting it to good use.

In the final major section, I follow varied patterns of biosocial exchange and how they reveal situations where participants are forming communities of care through the disavowal of profit and commercialization. Paradoxically, however, this is achieved through making primary the *individual* responsibility of parents (usually mothers) alongside often transactional and entrepreneurial exchanges.

Overview of Phenomenon

Breast milk is exchanged in a number of ways both commercially and non-commercially in a number of ways. Commercially, wet-nursing services and/or expressed breast milk can be purchased through websites such as onlythebreast.com and certifiedhouseholdstaffing.com or other babysitting arrangements that wrap breastfeeding into childcare provision. Non-commercially, breast milk is “shared” through a variety of “milk matches”²³⁷ (Cassidy 2012) that

come about through heterogeneous interactions. Sometimes these matches involve cross-nursing (the direct nursing of a baby by another mother) or babysitting swaps. More common is the expression and provision of breast milk to be frozen for later use either through a bottle or SnS system.²³⁸ Milk matches can be made between friends, coworkers and/or members of a mom's group. Alternatively they can be made through referral by a health care provider who connects under and over-producers (particularly midwives and lactation consultants but also obstetricians and pediatricians). Today, matches are increasingly made through on-line means such as listservs oriented toward parenting (e.g., The Bay Area Home Birth Collective listserv, The Bernal Heights Parents' Network, The Golden Gate Mothers Group or the Berkeley Parents' Network), or websites and social networking sites explicitly established for sharing breast milk (e.g., Milk Share, Eats on Feets, Human Milk 4 Human Babies (HM4HB), and the Bay Area Breast Milk Cooperative (BABMC)). Milk sharing websites are exploding through their uptake of Facebook as a ready-made social networking platform that facilitates new types of sociality based on online interaction, in this case, milk sharing.

The largest on-line milk sharing network is The Human Milk 4 Human Babies Global Network (HM4HB) that uses Facebook to run 106 community pages with the most community pages in The United States (51) and Canada (16). Additional community pages are also very active in Africa (1), the Americas (5), Asia (12), Australia and Oceania (9), and Europe (12).²³⁹ HM4HB began when one of the founders, Emma Kwasnika, then in Montreal, Canada, successfully used her own personal Facebook site to match those seeing breast milk with those in need. Ms. Kwasnika collaborated with a midwife in Arizona, Shell Walker to launch the network and organize the administration of its multiple pages. After a falling out between the

two founders, Ms. Kwasnika changed the name to HM4HB and Ms. Walker kept the name Eats on Feets and operated a parallel Facebook network. The nature of the split is discussed below under the section called “informed sharing”.²⁴⁰ Such on-line milk sharing networks that use Facebook (e.g., HM4HB, EOF and BABMC) are eclipsing earlier on-line tools for milk sharing such as Milk Share that uses a listserv format rather than the tools of social media, and requires recipients to pay a one time \$20 fee.

Sample and Data Sources

Between October 13, 2011 and February 22, 2013, I conducted 38 interviews with 42 people who participated in or helped organize milk sharing exchanges. Four of those interviewed were organizers of milk sharing websites: two The Bay Area Breast Milk Cooperative (Ajira Darch and Beth Rago) and two were from Human Milk 4 Human Babies (Emma Kwasnika, the founder who calls herself an “organizer”; and Tamara Morales, the administrator of the Northern California HM4HB Facebook site). Additionally I interviewed a high profile blogger and milk sharing/banking activist, Jodeine Chase. Of those interviewed who shared breast milk informally, I interviewed 18 recipients and 18 donors with some overlap between the two groups because 3 were both donors and recipients at different times in their breastfeeding trajectories.

Participants made matches through a combination of in-person relationships (friendships, coworkers or moms groups), parenting listservs (e.g., The Golden Gate Mothers’ Group, The Berkeley Parents Network, The Bay Area Home Birth Collective and The Bernal Heights Parents Group), and through websites or Facebook sites set up for milk sharing. I found considerable overlap among these ways of making matches given that many recipients would

access donated milk through friendships, references, and on-line matches. As time went on, more of my participants were using milk sharing websites. Participants who shared milk before such websites were available lamented this absence.

Most of those interviewed shared milk by expressing and freezing it rather than through cross-nursing practices. However, three participated in cross-nursing exchanges in addition to exchanges that involved expressing and freezing milk. At the outset of this research, my intention was to include participants who induced lactation for reasons of adoption or same sex parenting. However, in the process of conducting interviews I discovered the cohesion of milk sharing communities and practices and followed this phenomena in particular. However, I did conduct interviews with one mother who induced lactation following adoption and another co-mother who induced lactation after her partner gave birth.

Despite efforts to recruit mothers *and* fathers, most of my interviews were with mothers; three were with couples when participants indicated this was an important part of their story. I collected demographic information on those who exchanged milk (see appendix C for demographic questionnaire and appendix A for a summary of my sample with selected demographic information).

All participants lived in the San Francisco Bay Area, except for two of the milk sharing organizers/activists (Emma Kwasnika now in Vancouver, Canada, and Jodeine Chase in Edmonton, Canada). For the most part semi-structured in-depth interviews took place in participants' homes or workplaces and infrequently over the phone and by Skype (see Appendix B for semi-structure interview guide). When appropriate, participants showed me their stashes of milk, breastfeeding equipment (e.g. pumps, supplemental nursing systems and/or records of

on-line interactions with donors or recipients. Additionally, milk sharing websites, particularly HM4HB and Bay Area Breast Milk Cooperative were followed and activity therein observed to inform my analysis.

Biosocial Exchanges

This chapter engages Rabinow's (1992) concept of biosociality and its theoretical relatives as sensitizing concepts but simultaneously raises some challenges to a sweeping framing therein. The concept of biosociality initially emerged following early mapping of the human genome in an attempt to grasp its implications for biopolitical practices and discourses based on the "new genetics". Biosociality was first identified in groups formed around particular allele variants, whereby groups have "medical specialists, laboratories, narratives and traditions...to help them experience, share, intervene and 'understand' their fate" (Rabinow 1992:244). Such "biosocial communities" generate new kinds of active biomedical citizenship whereby people pioneer new informed ethics of the self, requiring active political engagement with normative judgments about the uses and ends of life itself (Rose and Novas 2005).

However, biological citizenship is not only collectivizing, but individualizing in its development of contemporary "regimes of the self" where a "prudent yet enterprising individual actively shape[s] his or her life course through acts of choice" and using techniques for the management of everyday life in relation to expertise (Rose and Novas 2005:458). Rapp (Rapp 1999), in her description of American women who must choose whether to undergo amniocentesis, illustrates how such a "regime of the self" can make pregnant women into "moral pioneers" who are in a position to use or refuse technologies.

In this chapter, I use “biosociality” in this chapter to highlight exchanges, communities, relationships and identities originating in an individual “health problem”²⁴¹ yet using an explicitly *collective* solution. Practitioners envision the redistribution of an important trait seen to be unevenly held: the ability to (exclusively) breastfeed or produce milk. That is, through human milk sharing, parents (primarily mothers) form biosocial communities, relationships and identities around a *relational* and *embodied* experience though individually they may have quite divergent physiological experiences (over, under, or non production of breast milk). These new biosocial communities are oriented toward the health optimization of infants through the shared project of breastfeeding, as discussed below.

I see these the biosocial exchanges and communities as examples of affective economies (Ahmed 2004) where feelings, sentiments and emotions about good motherhood and infant feeding develop new resonances. Affect in such exchanges are not solitary but are generated through participation and alignment with a collective of some kind (Ahmed 2004). Ahmed (2004) asserts that “affective economies need to be seen as social and material, as well as psychic...[whereby] the accumulation of affective value shapes the surfaces of bodies and worlds” (121). Some mothers feel very motivated to breastfeed given how breastfeeding is often seen as key component of good and healthful mothering. This framing exists within larger social contexts that place immense pressure on mothers to provide the best for their children, and makes breastfeeding a central component of that which is “best” (Wolf 2011). As such, breast milk – in its absence or abundance – becomes symbolic of this key maternal duty and its failure or success. In the discussion of milk sharing below, we see an affective economy of *relief* generated. Many recipients feel failure, guilt and despair about not being able to breastfeed.

Donated milk helps restore to restore sense of “doing everything” they possibly can to feed their baby breast milk. We also see how some donors came to have extra milk as a matter of circumstance or nuisance, but cannot bear to waste such precious milk and find considerable relief in finding a good home for it.

The importance of “doing everything” possible to provide the healthiest form of nutrition echoes Clarke, Shim, Mamo, Fosket and Fishman’s (2003) observations about a contemporary transition from an era of medicalization to biomedicalization. They note the increasing focus on health, risk and surveillance alongside a redefinition of health as that which becomes “an individual goal, a social and moral responsibility and a site for routine biomedical intervention” (171). As such, health is something to be worked toward and is no longer taken for granted. In many ways, milk sharing as biosocial affective economy illustrates the increasing focus on child health as a moral responsibility of the mother. However, in this particular instance, the sub-culture of milk sharing mothers have exhausted or rejected conventional medical advice²⁴² (e.g., “consult a lactation consultant”, “use banked donor milk”, or “use formula”) and turn to mothers with excess supply.

Many mothers and parents do not breastfeed or provide breast milk by choice or circumstance. In this chapter, I frame informal milk exchanges as extensions of efforts to breastfeed or provide breast milk. As such, this analysis reflects practices and perspectives largely located in specific social strata (addressed further below under “Breastfeeding Projects”). What is significant to highlight here is that this distinctive form of biosociality or affective economy only exists within particularly raced and classed social strata, those willing and able to go to great lengths to breastfeed/get breast milk and/or provide surplus breast milk

to a “good” home. Here, doing what is perceived to be “normal” or “natural” requires a great deal of time and energy work that not all parents would or could consider undertaking given their economic and familial circumstances. The term “redistribution” then is limited in practice to those who can and do go to these lengths to breast feed or provide breast milk and is not a form of redistribution across economic or other lines of privilege. However, I continue to use the term “redistribution” because it accurately reflects how participants themselves view their exchanges – as redistributing an ability that is unevenly and unfairly distributed.

I also want to highlight at the outset that the over and under-supply experienced by the donors and recipients I interviewed was in stark contrast to the way breastfeeding is commonly described - as natural and normal, a perfect symbiosis of supply and demand between a mother and her baby. Not only does the baby’s suckling regulate a mother’s supply, the baby’s changing nutritional and immunological needs are met with breast milk that itself changes composition over time. Instead, many participants experienced the sheer volume of work it took to achieve a semblance of this normal, natural or “easy” practice as a job in itself, on top of parenting a newborn.

I use the term “exchange” throughout this dissertation’s a way of moving outside market metaphors and beyond questioning whether milk here exists in a gift or commodity state. The term “exchange” reflects a “long tradition in anthropology for describing the gift-commodity distinction as a false dichotomy” (Hoeyer 2013:19). Further, I hope to follow Hoeyer (2013) in his attempt to move outside questions of commodification or the reverse (giftification) and instead acknowledge “how the gift/market debate manifests a society trying to establish such foundational categories and borders” (p. 19). As such, concluding the chapter

is a section titled “Not What We Do: The Rationales for Non-Payment.” Here I discuss how those involved in informal milk exchanges explain why milk donors are unpaid. Implicitly, participants here are demarcating their practices from both the historical practices of paid wet nursing (exploitative or unsafe) and contemporary practices of informal milk selling (not necessary and allowing unfair distribution).

One might assume that because I am addressing milk *sharing* where donors are not financially compensated, we would find traits generally associated with gifts or gift economies, described by Appadurai (1986) as follows:

Gifts, and the spirit of reciprocity, sociability, and spontaneity in which they are typically exchanged, usually are starkly opposed to the profit-oriented, self-centered, and calculated spirit that fires the circulation of commodities. Further, where gifts link things to persons and embed the flow of things in the flow of social relations, commodities are held to represent the drive – largely free of moral or cultural constraints – of goods for one another, a drive mediated by money and not by sociality. (P. 11)

Instead, I find that the patterns observed in milk sharing are a blend of these types of relations. Under the heading “Transactional care” below, I paint a picture of donor/recipient relationships as often fleeting, friendly (but not friend-making), and temporary. Further, I trace how recipients often strategically and with calculation work to seek out the “gift” of milk. This distinct economic form echoes Almeling’s (2010) suggestion that “just the use of gift language evokes a sense of sociability, a sense of connection between donor and recipient that is more durable and lasting than would be expected given the monetary exchange” (p. 12). I suggest that the overall framing of milk as a gift from the donor to the recipient as “how this is done itself underpins the sense of sociability and connection.

This chapter also explores non-monetary systems or scales of value relevant in exchange systems. Milk, like other circulated tissue and body parts operates “also on a variety of other

scales and can be sacred or profane; symbols of power, sexuality, or commemoration; or viewed as life-saving resources, means for knowledge production, or causes of infection” (Hoeyer 2013:20). Specifically, I follow accounts of milk sharing from both donor and recipient perspectives, tracing two distinctive scales of value (from failure to relief and from nuisance or possible waste to relief) that underpin many milk exchanges.

BREASTFEEDING PROJECTS: FROM INDIVIDUAL TO SOCIAL

The efforts of donors to collect and stored their own surplus milk and of recipients to gather donated milk demonstrate shared commitments to breastfeeding as a healthful practice often an assumed part of “natural” motherhood. In this case, breastfeeding mothers (or parents providing breast milk) are extending the sociality of breastfeeding practices beyond the nuclear family. Such sharing practices are often the result of ardent commitments to breastfeed (Palmquist and Doehler 2014), commonly articulated among individuals who are white, upper middle-upper class, and well educated (Avishai 2007). As such, the “redistribution” of milk that I examine in this chapter is narrowly situated within particular social strata. That said, Palmquist and Doehler (2014) found in their survey of milk sharing participants that there were notable differences between donors and recipients though these differences still situated both groups largely within middle/upper class, usually white strata. While there are undoubtedly contemporary circulations of shared milk among immigrant communities, and internationally, among grandmothers, sisters and community members, my research was unsuccessful in directly capturing these phenomena beyond references made to such traditions by interviewees. It may be that on-line means of sharing milk are cross cutting extant traditions, but my data do not address this.

This chapter also documents the influence of neoliberal configurations of motherhood particularly the way intensive motherhood manifests intense gendered cultural expectations of mothering (e.g., Mason 2015; Palmquist and Doehler 2014). Breastfeeding is often framed as a quintessential example where invisible labor and self-discipline are requisite to comply with dominant mothering standards. My research on milk sharing can be provocatively juxtaposed against Mason's (2015) ethnographic study of Women Infant and Children (WIC) programs to reveal how these cultural expectations have racial and class differences. Mason (2015) found WIC to be a state program working to transform low income mothers (often of color) into "good mothers" who are encouraged to breastfeed within a paradigm of neoliberalism and biomedicalization. According to Mason (2015) WIC "redeems" low income mothers through making them better capitalist (e.g., self-reliant, productive) subjects and through the development of biomedical risk management through self surveillance and a developed "health habitus" (Mason 2015). While the "health habitus" of mothers that Mason (2015) observed were overtly cultivated by a state infrastructure, the participants I observed already displayed such a health habitus. This health habitus of self-reliance, health optimization and biomedical risk management, however, does not necessarily mean going along with official state-based recommendations. Echoing some of the recent work done on parents who do not vaccinate their children (Reich 2014), my participants fed their infants in ways that official state bodies advised *against* (informal milk sharing) and did so relatively free from state sanctions.

My participants enacted breastfeeding as a "project" much like Avishai (2007) noticed in her interviews with breastfeeding mothers who framed the lactating body as a "carefully managed site and breastfeeding as a project – a task to be researched, planned, implemented

and assessed, with reliance on expert knowledge, professional advice, and consumption”, My interest here is in following what happens when that “project” “fails” or takes unexpected turns by way of under or over-production.

From Breast is Best to Breast is Normal

Donors and recipients often framed breastfeeding as both *best* (healthiest or most conducive to bonding) and *normal*, often blurring the two meanings while emphasizing *normality over superiority*. This is consistent with a trend in breastfeeding promotion away from discourse that has situated formula as less healthful (sometimes “risky”) and necessary only in a limited number of circumstances toward stressing the normality of breastfeeding.²⁴³ For example, Patricia, a donor, self-titled “lactivist” and former administrator for HM4HB, corrected me that it’s not “breast is best”, it’s “breast is normal”. Like many participants, she saw the benefits of breastfeeding as going beyond health benefits to also include psychosocial benefits associated with bonding. She hoped her recipient would also experience this through her own efforts to breastfeed:

You know, I just I feel like breastfeeding is normal. It’s not breast is best, it’s breast is *normal*. It’s not my breastfed child is 3 IQ points smarter, it’s that a formula fed child is 3 IQ points dumber. I feel like nursing is about more than nutrition and anyone who I was going to donate to I would hope that they would be using a supplemental nursing system (SnS) and not just a bottle...²⁴⁴

Some participants framed the normality of breastfeeding in contrast to the “strangeness” or “artificiality” of formula. Samantha, a recipient, saw breast milk as intended for human consumption and cow’s milk (often the basis of commercially prepared formula) as intended for cow consumption. Samantha actively interested in nutrition and healthy food for

her family, compared breast milk to whole foods (to be encouraged) and formula to processed food (to be avoided). Others situated breastfeeding or providing breast milk as giving the “best start”²⁴⁵, as simply feeling “more natural”²⁴⁶ than formula, or as a means of avoiding formula.²⁴⁷

Many donors and recipients cited studies on the short and long term health benefits of breast milk or breastfeeding. In some cases, mothers were specific about the kinds of health benefits breastfeeding would bring, sometimes attributing immunological benefits in the short or long term or better digestion for the newborn. Some mothers attributed the overall health of their child to breastfeeding or their use of donor breast milk. Debbie, a recipient mother, who provided either her own breast milk or donor milk almost exclusively for a year said:

Regardless of what anybody wants to say or anybody wants to believe, science has proven that formula is in pretty much all ways inferior. Yeah it does the job and yeah nutritionally it works. But immunologically it just doesn't hold a candle to breast milk. I have a 3 year old who until he started preschool a month ago had never been sick.²⁴⁸

Similarly, John, a single gay dad who acquired breast milk for his daughter born of a surrogate, told me about how bright and healthy his 3 year old daughter is and how he must have “done something really right” in his use of donated breast milk.²⁴⁹

The “Abnormality” of Breastfeeding “Failure” and Donor Milk as Relief

Many recipients went to great lengths in order to breastfeed and used donor milk as an alternative to formula. For many, donated milk was valued as an extension of their breastfeeding efforts, allowing them to avoid formula and fulfill (as best possible) the perceived role of good mother. Whether recipients believed that their breastfeeding “failure” was, in fact, “abnormal” is impacted by the lactation discourse that separates surmountable from insurmountable “failure”. On the one hand, most lactation resources frame breastfeeding

problems (e.g., mastitis, engorgement, nipple pain, supply problems) as extremely common but *surmountable* given the right advice, supports and circumstances. As such, many manuals include a line reassuring mothers that 99% of women *can* breastfeed. On the other hand, physiological breastfeeding problems that *can not* be overcome are usually seen as extremely rare in the literature on breastfeeding. Given the extreme lengths I witnessed recipient mothers go to in order to try to produce breast milk, it would seem that they adopted this framing of insurmountable “failure” as extremely abnormal.

Some participants diagnosed themselves or were diagnosed by lactation consultants with insufficient glandular tissue (IGT), a lack of milk making tissue in the breasts (Cassar-Uhl 2014). This can be due to the underdevelopment of the mammary glands, which may or may not be visible (Cassar-Uhl 2014). For this reason, some mothers will, upon experiencing insufficient milk will diagnose themselves with IGT owing to one or two breasts that appear underdeveloped, even though breast appearance can vary widely and still be completely functional when it comes to lactation (Cassar-Uhl 2014). Many of my participants who diagnosed themselves with IGT or whose lactation consultants suggested it as a cause for their breastfeeding problems found comfort in this diagnosis having tried many strategies to make their breasts produce.

A number of mothers who ended up using informally donated milk had always believed they would breastfeed. For many, their lactation or supply problems were very surprising and even devastating. Some spoke of the “decision” to breastfeed as not a decision at all, but an integral part of their vision of motherhood. This was a very common sentiment among recipients. This perspective was also expressed by some donors who persevered with

breastfeeding despite enormous obstacles. For example, Jennifer, a donor experienced recurring mastitis (breast infection), a common complication of breastfeeding (and often a sign of over-production and blocked milk ducts). But it did not occur to her to stop nursing, despite the fact that she despised nursing for the first 10 months.²⁵⁰

I was surprised that two recipients who I interviewed who had prior breast reduction surgeries spoke similarly of their expectations that they could and would breastfeed. For example, Rene, a recipient told me:

I knew that I would want to breastfeed. But because I'd had a breast reduction, we had no clue [how it would go]. There are some women who are able to produce a full supply and there are some women that can't. And I didn't know where I was going to be in that spectrum but I wanted to try to do it...So I knew it was possible to breastfeed partially, that it didn't have to be all or nothing. And that helped keep us going but we hadn't figured out all the details.²⁵¹

Her husband Dan told me they purposively had not prepared for bottle feeding because to do so might actually jeopardize what success they did have with breastfeeding.²⁵²

Many participants framed their feeling of failure within contradictory breastfeeding promotion discourse. Here, *both* the ease/naturalness/normality of breastfeeding (e.g., the trope "all mothers can breastfeed") and the tenaciousness strategic work it takes to successfully do so (i.e., the need for expert lactation guidance, breastfeeding gear/gadgets and strategic breastfeeding practices) are equally articulated. Given this framing, "failure" is often situated by lactation experts as an unfortunate outcome of poor lactation supports (e.g., inadequate lactation expertise consultation or gear/gadgets/strategic practices) or a mothers' lack of perseverance (i.e., "giving up"), rather than an unavoidable physiological condition. Especially, for those without a medically-validated explanation for their under-production who anticipated breastfeeding as part of their life course, "failure" can be particularly devastating.

In this discursive space, I found that ardent efforts to make breasts produce milk or to gather donated milk can reassure mothers who cannot breastfeed exclusively that “everything” was done and her maternal role has been adequately fulfilled. If milk sharing were analyzed as a health-related social movement focused on a misunderstood or overlooked condition, it would be insufficient milk production. There are various causes and diagnoses, some obvious (e.g., adoption, breast reduction surgery), some multi-causal (e.g., infant’s tongue tie, bad latch, prematurity), and some speculative (e.g. insufficient glandular tissue - IGT).

Recipient mothers often experienced crushing disappointment or guilt over not being able to breastfeed their infants exclusively.²⁵³ These emotions were difficult to tease apart, both for the participants themselves and for the purposes of this analysis. For instance, many participants spoke of feeling “guilty” while simultaneously telling me they knew they *shouldn’t* feel guilty because they did everything possible and should only feel disappointed in an unpreventable eventuality. Others questioned whether they had made technical missteps along the way (e.g., “I should have pumped earlier” or “I should have had caught the tongue tie earlier”), and felt guilty for mismanaging a preventable problem. At the same time, these mothers regretted feeling guilty, also saying that they were following the best advice available.

Mothers often came to the traumatic realization that they were having an “abnormal” breastfeeding experience (having insufficient milk) by caring for a distressed newborn only to be told by a provider that the baby was “starving” and required supplemental feeding.²⁵⁴ Vanessa, a recipient whose best explanation for her low production was a self-diagnosis of insufficient glandular tissue (IGT), spoke of feeling like she was letting down her baby by not being able to breastfeed exclusively and not recognizing that she was hungry:

[What was so upsetting was] realizing that my child was hungry, and that she wasn't colicky. She wasn't going to be like this really tough baby, *she was just starving*. And I think I finally started putting the pieces together. Like, "oh that's why her lips are so dry", like she was really becoming dehydrated and "that's why she had these uric acid crystals" – I think that's what they are called – in her diaper. *I don't really know why, I really should have been relieved. Like, thank god we have a normal child and we just need to give her some food. I think it was just the combo of exhaustion and feeling so badly that your child was upset for so long and not being able to pick up on that cue. And then kind of a feeling of failure, like I'm letting her down, feeling like disappointed that I wasn't able to do what I figured would just happen so naturally.*²⁵⁵

Such chaotic flows of feelings were common in my interviews.

At the same time, some mothers felt guilty about not spending enough time with their babies because their efforts to produce breast milk (particularly pumping) actually took them away from their babies. Lisa, a recipient, spoke of missing out on the bonding experience that all mothers "should" have with their infants because she was spending so much time trying to make milk by pumping and other breastfeeding projects. This kind of guilt was felt acutely by Samantha, a recipient mother with twins who found that in order to breastfeed both, she would need to breastfeed and pump around the clock. This pattern was incredibly demanding and yet did not satisfy her that she was adequately mothering her babies. Like many of the recipients I spoke to, Samantha was not convinced that she had properly managed her lactation problems and that she might have had a better supply.

This type of insecurity during the unfolding of insufficient supply was not surprising given what I heard about conflicting and confusing breastfeeding tips and advice. However, many recipients who experienced guilt or devastation over low supply spoke of at the same time knowing that these feelings are not warranted, and of family and friends who tried desperately to reassure them. Other recipients, particularly those for whom breastfeeding was not an option (e.g., for reasons of adoption, or surrogacy), spoke of not having any guilt around

not breastfeeding. For example, Ellen, a recipient who used a surrogate and did not consider inducing lactation because she was undergoing breast cancer treatment told me:

...I'm giving my son [donated] breast milk and I actually have done some work to try to find this milk and I kind of felt like I don't think I really did have a pang [*to breastfeed*]. I think earlier in my time of infertility, seeing a pregnant woman *that* was more upsetting to me. *I don't think I had as much of this...this strong urge to be the person supplying that milk....* So despite that I didn't have to have a mastectomy, inducing lactation still wasn't something that I could consider and I was kind of relieved. *I don't have to feel guilty that I'm not going to try that, that that's just not going to work.* But I think it kind of made it easier on us that I wasn't breast feeding...²⁵⁶

Other mothers who had not suspected that breastfeeding would be so challenging spoke of feeling as though their bodies had betrayed them. Surprisingly, this expectation was held by Chris, a female to male transgender man who had put off physiological transition until after pregnancy, birth and lactation and expected breastfeeding to be straightforward. Chris had not taken male hormones or had breast reduction surgery but had long bound his breasts and presented as male or genderqueer. Chris felt especially devastated that his body could not do what any woman's body could do, especially given that he had put off most aspects of physiological transition. He wanted to prove to himself that he could breastfeed just as well as a woman. He eventually blamed the fact that he had bound his breasts for so many years for his lactation problems.²⁵⁷

Success was often redefined by participants as "doing everything possible" to breastfeed or provide breast milk rather than to breastfeed exclusively. Specifically, laborious breastfeeding projects themselves (e.g., pumping, using a supplemental nursing system, taking herbs or Domperidone and using donor breast milk) came to stand in for "success." They were also often a way to manage feelings of disappointment around insufficient supply. Over the course of my interviews, I found a wide range of practices related to increasing milk supply or

friends. Regardless of whether these efforts were “successful” in increasing milk, they were often experienced as successful steps on the path of optimal mothering. For example, Lisa, a recipient who had tried every thing under the sun to breastfeed her son, had a variety of possible explanations for why she was never able to do so exclusively. One explanation was that her son was tongue tied, an often a contested condition particularly over when it merits surgical treatment. Lisa told me she decided to have his tongue-tie repaired, even though her providers did not agree this was the best course of action, because it would put her mind at ease that everything had been done to give him a better latch.

I often observed that mothers, recipient mothers in particular, were unable to separate what they did for themselves from what they did for their babies. For example, even when mothers told me explicitly that their extensive efforts to breastfeed or get donor breast milk were for herself not for the baby, they did not separate this from health benefits bestowed on the baby. Carina, a recipient who struggled with breastfeeding told me:

I mean there are people in my mom’s group who said, “You’re crazy...You’re taking all these medications that make you sick, that make you uncomfortable. You’re spending hundreds and hundreds of dollars that you probably could spend elsewhere.” And I get all that. But for me to be happy with myself and to know I did everything I could...And I don’t think it was about my son. I do think it was about me. And, which is okay with me because I think ultimately it was good for him and sometimes I think if only I’d made a full supply and nursed him longer maybe he wouldn’t be so sick all the time...it was about me wanting to fix what I saw as broken in myself, I guess. I felt like I had been betrayed by my body and I wanted to show it that it could do it and kind of to figure out what works so that if next time I’m in the situation that I’m on Domperidone right away.²⁶⁰

Like Carina, many recipients recounted “the hell”²⁶¹ of their breastfeeding projects to me. They spoke of extreme sleep deprivation, emotional turmoil, and “raging” postpartum hormones all while looking after an often-unhappy infant being dragged to appointments with

lactation consultants, midwives and/or pediatricians. The supplemental nursing system (SnS) seemed an especially arduous piece of equipment with many bemoaning its inconvenience and the way their babies rejected it.²⁶² Rene, a recipient, told me that the emotional toll on her was not around “failing” at breastfeeding, but hating at all the machinery that was involved in making breastfeeding happen:

A lot of my, what I remember is my emotional response to things was hating all the machinery. Like I hated pumping and I really didn't like the, we had an SNS that we tried for a while. I just wanted to nurse. And not have to be hooked up to machines all the time.²⁶³

For some mothers, this hate for the machinery transferred into envy of breastfeeding that is so much smoother and less technologically mediated for others.

Some mothers set limits regarding how often they were willing to pump, particularly regarding interrupting sleep to pump. For nearly all recipient moms I spoke to who were trying to increase their supply, pumping was the most monotonous, exhausting and time intensive practice required. For instance, Carina, pumped during the day, took Domperidone and herbs, and used a supplemental nursing system (SnS), but was not willing to get up in the night and pump. She contrasted her limits with those she encountered on an online support group called MOBI²⁶⁴ that she described as full of women who would “go to all lengths” to breastfeed:

I mean's it's crazy making in a way, but I needed to feel like I did everything I could and I had the resources and the support to do it...I met with my lactation consultant and she said, “Would you do it again?” I said, “I don't think I'd be able to.” I don't think it would be possible. *And one of the things with these women on the MOBI website, these are women who've had 6, 7, 8 kids...Always with supply issues, always with Domperidone, pumping every two hours. There are definitely...things I could have done, things that I was not willing to sacrifice.*²⁶⁵

Ingrid was the one recipient mother I interviewed who made her own formula, a practice that, for her, was her way of adjusting to not using donor milk. She felt that other

babies needed it more than her 7 month old son, an issue discussed below. Ingrid seemed happy to make home made formula, despite the amount of work involved and the complex and expensive ingredients involved. However, she drew the line at using the SnS once she switched to using home made formula because it would always get stuck in the tubes.²⁶⁶

Many of the recipient mothers who I interviewed had a complicated relationship with formula. On the one hand, it was viewed as “poison” or a lesser and unnatural alternative to breastfeeding. On the other, many voiced their realization that their babies needed a supplement to breast milk such as formula in order to survive.

Lisa couldn’t breastfeed exclusively for largely unknown reasons but wanted to do avoid the hazards of formula because she heard that breastfeeding could prevent problems such as asthma that she herself had. Eventually gave her son formula:

For pretty much 6 months, I’d been taking herbs, pumping, power-pumping, nursing, and pumping. And pretty much for the first 3 months almost, I couldn’t leave the house because I was either nursing him or I was attached to the pump. It was hell. It was just so miserable. I was in tears all the time because I just felt like I couldn’t feed my baby. You know that - there’s a bit of you that knows that this it’s hormonal, a lot of that sadness, but it just doesn’t help. *And formula, I just felt like formula was poison. And I know it isn’t - I’m educated enough to know that it isn’t, but it’s just awful - I remember the first time we gave him a bottle when he was a few weeks old because he was desperate for food and I just sobbed, it was hideous.*²⁶⁷

The first formula feeding was often portrayed as an extremely upsetting experience for a recipient mother trying to breastfeed exclusively and came to realize that her baby was not getting enough breast milk.

At the same time many recipient mothers had mixed feelings about formula. Some came to be very glad that formula *exists* and became less judgmental of mothers who used formula for whatever reason. For instance, Carina, told me:

I had come to grips with using formula way before I realized that milk sharing existed. So I didn't have the same [distress around feeding formula]...I don't hold the same feelings about formula now as I did before I started needing it myself. I think there's a lot of really insidious mom bashing done by other moms about women who either choose to or have to use formula. *I'm proud and thankful that there was something I could give my son that kept him from dying.* I look back at the pictures from the first few weeks and it's just really hard because he was just skinny lethargic and not what you want to see in a brand new baby.²⁶⁸

Significantly, informally shared milk is emerging in these biosocial communities as an alternative to supplementation with formula.²⁶⁹ Many recipients were told by health professionals to supplement with formula because their baby was "failing to thrive." This term refers to newborns who are losing weight or not gaining weight fast enough. Carla, a recipient and donor, told me "supplementation doesn't always mean formula," even though most pediatricians recommend formula because they don't have training in lactation or the desire to encourage breastfeeding over difficult humps.²⁷⁰

In practice, recipients found a great deal of support and care through the very act of receiving shared breast milk. They came to see breastfeeding afresh as a practice that can incorporate a supportive network of other like-minded breastfeeding mothers. Some recipients spoke of feeling an affinity with their donors in that they were all "breastfeeding mothers", had similar "parenting styles" and/or that they were all part of a "protective network" of mothers who supported each other. Lindsay, a recipient, told me: "[Receiving donated milk] made it a lot easier to accept that it was okay to not exclusively breast feed...There was help out there."²⁷¹ Many recipients spoke of immense gratitude to their donors for helping them achieve their breastfeeding goals.

Oversupply as Problem Within Breastfeeding Projects and the Relief of Donation

Those unaware of the mechanics of breastfeeding supply might assume that over-supply is not a breastfeeding problem, simply an abundance of the desired product. In fact, the breastfeeding literature and my research both show that over-supply is often a problem, either indirectly as a consequence of addressing another lactation problem, or as a problem in and of itself. I raise this issue to frame over-supply as a problem to be addressed within one's overall commitment to a breastfeeding project (Avishai 2007). As such, donation can be a solution to an otherwise "bad" situation for women who are over-suppliers.

While the donors and recipients I interviewed were aware that both over-supply and under-supply can be "problems", all tended to view over-supply as the preferable problem. I observed a hesitation among donors to tell recipients their full story so as to avoid seeming to boast about having too much milk or underplay the trauma experienced by those without enough milk.

For some donors, too much milk was not the original problem, but rather a consequence of other breastfeeding problems (e.g., engorgement, mastitis, or forceful milk ejection) that through frequent pumping, led to oversupply. Jennifer, a donor with huge oversupply, had multiple lactation problems she described as "every complication in the book." She told me her story:

And from the very beginning nursing was really hard. He just wasn't interested in opening his mouth [enough]... And then you know, I ended up having every complication in the book for a prolonged period of time...I had the typical engorgement but then followed by a tremendous amount of nipple pain...And then, the main challenge ended up being a chronic mastitis...I had it probably about ten times. It just kept coming back. *So what I ended up doing was pumping huge amount as a means to either treat it or prevent [mastitis], and that's what ended up giving me such a surplus...I was really committed to continuing to nurse. It didn't occur to me to stop, but it was a*

miserable experience. And probably when he was 10 months old I had my first episode of enjoying nursing. And I still don't really like it... it's not a pleasant physical experience at all for the most part...²⁷²

Jennifer's nursing story was particularly difficult but I found the pattern common.

Jennifer told me about her interaction with her recipient:

Well it was hard not to have that little bit of guilt around [oversupply]. But it's interesting because not that long ago I made a comment [to my recipient] about how, I was like, "Isn't it so interesting that we both had...opposite problems." She didn't have enough and I had too much. But then we both had incredibly difficult breastfeeding experiences. Kind of traumatic. And she was just like, "I would've rather had yours"...and so would I. That's not debatable. But there was definitely a little bit of an edge there because it's hard to not feel jealous or resentful. I wasn't complaining about it. *I wouldn't complain about having too much milk to somebody who doesn't have enough. And it wasn't having too much milk [itself] was a problem, it was all the other stuff.*²⁷³

At times, oversupply itself was a nursing complication. Pumping was similarly employed as a solution to this challenge. Vivienne, a donor, told me about this situation:

She was latched and going to town within probably an hour of birth and soon nursing was very easy from the get-go. But, the challenge that we had was that I had so much milk and she would come off sputtering and it would be spraying everywhere and it was just a huge mess, especially when she was really little, she just couldn't handle it...She was eating way more than she needed, and so she was throwing up all the time. Huge projectile vomiting just like soaking me and her. It was like, "This is ridiculous". So at about two months old, as an experiment, I started seeing if I could just feed her on one side and pump on the other, and she got all she needed and, you know, would finish...She completely stopped throwing up. I mean, it happened once every five days and then not at all, so we were much happier.²⁷⁴

In nearly all cases, the donors I interviewed did not intend to donate breast milk until it became very clear that they had an oversupply and had accumulated more than could be used by their own infant. However, it was not uncommon for donors to increase or extend their pumping regimens in order to donate to a particular recipient once a relationship had been established.

Donors often told me about their pumping patterns or routines as hard to break, either because their bodies depended on pumping to relieve engorgement or because had operationalized pumping as a way to maintain a supply or collect needed pumped milk and hesitated to change an effective pattern. Dorothy started her pumping regimen in anticipation of a return to work, not in order to address a lactation problem. Like those donors discussed above, pumping for Dorothy was part of her broader breastfeeding project. She developed a very specific pattern of nursing and pumping that she hesitated to alter, even though it resulted in an oversupply, particularly because she knew how hard maintaining a supply could be for others:

It just...all of a sudden I was like, holy cow, I'm making a lot more than she's eating. But I didn't really know how to slow down. I didn't know...I'm a total creature of habit, so I think I was just like, "Well it's working. Better not break it" ...So I felt really blessed that I had no problems. I didn't have mastitis, I didn't have like, inverted nipples, I didn't have a problem with [under] supply...*But when it was going so well, I just didn't want to mess anything up.*²⁷⁵

I asked donors like Dorothy how they reflected both on their bodies and their hard-to-break pumping patterns that resulted in oversupply. For Dorothy, there was bodily and organizational pride at establishing a pattern that resulted in enough milk to feed her baby and another. She described feeling "like a machine," and felt pride in her body's abilities as well as the ancillary benefit of weight loss that she experienced as an over-supplier:

First of all it's amazing that your body makes a baby, and then all these things are just taken for granted because we see them every day, but when it happens to you, it's like "I can't believe I'm making milk!" Making food for somebody...And there's also all the ancillary benefits. I mean like, I weigh less now than I did before I was pregnant, and I was eating everything I wanted. And that was pretty enjoyable when life was pretty stressful in every other category.²⁷⁶

Other donors felt negatively about their attachment to pumping. Jennifer felt like she had an “unnatural” and “grotesque” relationship with her pump that dominated her life and made her feel like “one big function”.²⁷⁷ A number of donors described getting to the point where they needed to “get pumping under control” because their routines had become burdensome for them or on their family members who were impacted by the demands of pumping. This was felt particularly acutely by Margot, a donor who had acted as a traditional surrogate, then donated her pumped milk to the intended parents as part of their contract, and later donated to families met through milkshare.com. Margot told me her pumping routine held her back from being a “full capacity parent” to her own children, particularly in the summer months:

It wasn't because [pumping] was too much or too stressful, it actually was more difficult on my family. Because at that point I was really established in my pumping routine and it was pretty easy for me, but for my kids and for my fiancé they were like “Let's go to the beach.” I mean it was summer time...So they were wanting to do outside things and I'm like “I can't go to the beach, where can I plug in my pump?... where do I keep the milk?”²⁷⁸

Many donors spoke to me about their gratitude for being able to tell their stories to me. They often felt reluctant to “boast” to others about oversupply and to reveal “strange” pumping and collection habits.

For many donors, their decision to donate was largely spurred by finding themselves with too much pumped milk and not wanting to waste it. Pumping and storing milk requires a great deal of time, equipment, and fastidiousness that can impact donors, their families and their homes. Many donors said the fullness of freezers was a tipping point that launched and structured their donation practices. They had filled home freezers with pumped milk only to realize it would expire or would not be needed. But they could not bear to waste it. An irritated

spouse who often wanted the freezer space back and asked for the milk to be dealt with. When Dorothy, a donor, recounted:

It's a purely logistical problem. No more room in the freezer...And I had that freezer packed. And there were a few items of food in there, but there was mostly milk. And I just realized that I was producing like, twelve to twenty ounces more than she was drinking every day. So it built up, really fast. And so I didn't want to throw any out. It's just too valuable. So I decided to post and that's...so it was just logistical. I didn't have any more room.²⁷⁹

Dorothy developed a pattern with her recipient who lived in her neighborhood and who she had connected with on a neighborhood parents' listserv that whenever her freezer was full, she would email the recipient and her recipient would need to come pick up the milk as soon as possible. Dorothy who described their donation/pick up pattern as ideal said that what might have made their arrangement more challenging, was if the recipient hadn't been willing to come to pick up the milk right away.

Both participants who had too much or too little breast milk, could not *bear* to waste pumped breast milk, a feeling that played out in decisions to donate freezer stashes rather than waste them. For some, the reluctance to waste milk was akin to a reluctance to waste their ability to make extra milk. This was the case for Margot who donated her milk as stipulated in her contract as a traditional surrogate. She told me about her reluctance to waste her milk producing ability and how rare her attitude was compared with other surrogate mothers:

Yeah [donating milk as a surrogate] is really not common whatsoever. But to me, it felt totally normal. Because I was thinking like okay I'm going to have this baby but I don't have a baby at home to feed. This stuff is like liquid gold...*"Like this is so valuable, somebody's got to be able to use it." ...Because I just couldn't bear to dump it, I really couldn't.*²⁸⁰

Although donors were consistent in their reluctance to waste pumped milk, they held a variety of views of the supremacy of breast milk or breastfeeding over formula. Some were

adamant that they were not anti-formula, or saw milk sharing as necessary when a mothers' own milk is insufficient. For instance Dorothy, a donor, spoke of formula as a good option *and* donated milk as a good option, but not as existing on opposite ends of a spectrum.²⁸¹ Others felt very strongly that breast milk is far superior to formula and should be made available to all babies who are in need. Margot, a donor and surrogate mom told me:

[Breast milk] is obviously like liquid gold, people really need this...And it's so effortless for me...For me, it kind of required nothing. Like yes it required time and some forethought like "Where can I refrigerate it?" and this and that. But that was so nothing compared to what the cost or consequence would be if the babies didn't have it. I just felt like it was so [valuable] on [their] end and it was so effortless [for me] that it would just be insane to hold that back.²⁸²

Consistent among donors was that donation made them feel good about themselves, about the capacities of their bodies and about their abilities to help another mother or parent. For some this was described as "something good that came out of a bad thing"²⁸³ in that over-supply was an outcome of lactation problems or a lactation problem in-and-of itself. For others, this was described as stumbling upon a circumstantial "symbiotic" relationship with a mother who needed milk resulting in "the best feeling held in a long time".²⁸⁴

FIGURING IT OUT: PATTERNS OF BIOSOCIAL EXCHANGE

A number of the patterns I observed within informal breast milk exchanges are feeding back into these communities and establishing norms around "how this is done". That is, many of the participants I interviewed had never heard of such practices until their situation led them to seek milk or seek a home for surplus milk. They figured out how this works through interacting with donors, recipients, organizers and/or the online tools set up for sharing milk.

Through this process, participants learned how milk sharing is done and continue to teach others the patterned norms that are emerging through their shared practices.

Here I analyze these norms with an eye on following distinctive patterns of exchange that can be reduced to neither a gift nor a market economy. Instead, we see here how the philosophies and practices of milk sharing are generating their own distinct patterns of exchange. These patterns add new layers of meaning to milk sharing that reinforce its legitimacy, safety and the central responsibility of the individual milk sharing parent (usually mother).

First, I look at the practice of non-payment of donors holding milk sharing communities together through the moral legitimacy of unpaid care. I follow Hoeyer (2013) in his attempt to move outside questions of commodification or the reverse (giftification) and instead acknowledge “how the gift/market debate manifests a society trying to establish such foundational categories and borders” (p. 19). Implicitly and explicitly, participants here were demarcating their practices from both the historical practices of paid wet nursing and contemporary practices of informal milk selling. Today mothers can sell their breast milk informally on-line on a classified-style listing of buyers and sellers called onlythebreast.com. Alternatively, they can sell their milk formally to one of two corporate entities, Medolac and Prolacta (see chapter 6).²⁸⁵ Participants generally thought of the history of wet nursing as exploitative or unsafe. They often had the same concerns for contemporary informal milk selling but also worried that it could foster improper distribution (e.g., diverting milk to milk fetishists, away from milk banks or away from parents who could not afford to pay).

Second, I analyze the centrality of the individual donor or recipient parents through philosophies and practices, sometimes called “informed sharing”. Lastly, I analyze how milk sharing exchanges can be very transactional and how this challenges presumptions about what a “gift economy” that does not involve financial compensation. My analysis of these patterns does not suggest that care or support is not exchanged in these transactions. Rather, I suggest that the delivery of care and support is done *through* a distinct economic form (Zelizer 2011) that both disavows profit *and* sometimes has a transactional nature.

Not What We Do: The Rationales for Non-Payment

The non-payment of milk donors in milk sharing exchanges holds sharing communities together through the moral legitimacy of unpaid care. As we have seen above meanings concerning deficiency, devastation, guilt, over-abundance, pain, joy, support, good-motherhood and relief circulate in these exchanges. Below I document how meanings of safety, moral legitimacy and care are attached to the absence of financial exchange.

When I asked participants what they thought about donors being paid for milk or why donors were not paid in their informal exchanges, it became clear that non-payment was very important in these exchanges. However, their responses were not unequivocally *against* paying donors in all milk exchanges. Rather, they indicated a variety of rationales for this norm as “not what we do”²⁸⁶ in these communities of practice. A number of recipients told me, for instance, that they were initially unsure whether to offer money for milk but quickly learned that this was not the custom. They eventually came to feel that giving money would feel strange.

Here I discuss these responses, noting an admixture of the multiple rationales: non-payment makes milk accessible to those who would otherwise not be able to afford it and/or

those who are the most deserving; non-payment brings women together in communities of care/support; payment would cheapen the milk and payment could make the milk less safe.

Many recipients told me that they were not against paying donors in principle, especially given their understanding of the amount of work it is to pump and store milk. However, they also often told me that had they been asked to pay, they probably would not have been able to afford it. Emma Kwasnika, one of the founders of Human Milk 4 Human Babies (HM4HB) described the importance of non-payment given that HM4HB and other similar networks serve babies whose parents cannot afford BDM distributed through donor milk banks. Ms. Kwasnika expressed her support for milk banks and her understanding they need to charge for milk in order to pay for their processing costs:

There's no massive amount of people making a massive salary in the milk banks. We know that and we understand that, but still they pass the [processing] costs onto the families. So who can afford \$3-6/oz. for breast milk? Very few families can. But they do say in dire cases, they will give it out for free. But they can't do it for everyone and not everyone can afford it. *So some babies are slipping between the cracks there.*²⁸⁷

For Ms. Kwasnika it was important that sharing networks do not charge for milk so that it is accessible to babies who would otherwise not have access donated milk. Ms. Kwasnika, like others I interviewed was not against donors being paid. Instead, she “empowered” women to do what they wanted with their milk, even if that was to sell milk, but situated selling sites as often diverting some milk to men with milk fetishes rather than only to babies in need:

Again, I empower women if they want to sell their milk. By all means if you want to sell your milk to a guy who's going to do whatever he wants with it, doesn't matter. If you're getting paid, what do you care? And there's some women who do that. Great! More power to them.²⁸⁸

Similarly, for many interviewees, non-payment legitimized milk sharing as less weird, strange or illicit because donors felt like they had more control over where their milk was going.

For many participants, non-payment of donors was folded into seeing and experiencing milk sharing communities as communities of support, care and altruism. Ms. Kwasnika spoke to me about some HM4HB members who returned to milk sharing after selling their milk because they wanted to invest in supporting another mother and baby:

But there's lots who tried that and came back and said, "Well I just didn't feel good about it. I wanted to see the baby that I was feeding thrive and grow. I'd love to see that baby and see photos". There's a whole aspect that's altruistic, but at the same time, you get something back. It's not all altruism. When you are knowing that you are helping a baby to grow, that's pretty amazing.²⁸⁹

As discussed earlier, many recipients spoke of feeling support from the donors through the *act* of receiving milk. For some recipients it was important not to feel indebted to the donor for the milk as that would add an unwanted "edge" to the exchange. Most milk sharing exchanges I heard about complied with this unwritten rule. Occasionally, however, an exchange turned sour when a recipient was made to feel indebted (even if emotionally, not financially) for the donated milk. For example, Lisa, a recipient, told me about running into one of her donors on the street and the donor taking credit for the chubbiness of Lisa's baby in a boastful way. This interaction made Lisa upset that she was unable to provide sufficient milk for her baby and made her feel that she was emotionally indebted to her donor. Many similar comments I heard suggested that recipients did not want to feel they owed their donors *anything* beyond their own spontaneous statements of gratitude. Interestingly, money is usually thought of as mediating an impersonal exchange such that no feelings of indebtedness occur because it is made commensurate with the good received (Appadurai 1986). In all

informal sharing exchanges I observed, no money was exchanged and yet, when done according to the unwritten rules, no reciprocity was expected. If a donor made it seem like some form of gratitude was still “owed”, the exchange had failed to convey care and support.

As discussed earlier, many donors felt great about their abilities to help other babies, even if they donated as a matter of personal circumstance (e.g., full freezer, hooked on pumping, etc.). Many donors and recipients spoke of payment as not necessary because milk was surplus and unneeded by the donor and would otherwise be wasted. Carrie, a recipient told me:

I offered to reimburse [my donor] for the bags or give her hand me downs...I think she felt really funny about taking money per say. You know, because it just felt weird, it was something that her body was producing anyway, and she didn't want to throw it out. So I think mostly the donors felt like, I can't throw this out. And so you're helping me keep my freezer from completely exploding...the donors I talked to almost universally seemed to think that [paying for milk] would be weird...

Recipients often gave their donors replacement milk storage bags or other thank you gifts (e.g., cookies, home-cooked food, or hand me downs). Donors hesitated to ask for or accept money for milk, often because it was seen as unnecessary.

Many donors and recipients brought up health and safety concerns when asked about paying donors. For example, Vivienne, a donor, told me that the lack of money changing hands in informal exchanges is a good thing because:

...the potential problems that can come of that are too huge to make it safe. In that if I know I am going to get a dollar an once and I'm a single mom and scraping to make ends meet, am I going to start diluting what I'm giving to be able to get more, or deny my baby the food she needs to make more money selling the milk, or am I going to lie, about being out partying, drink too much, did heroine or whatever...It's too dangerous giving that added incentive beyond sharing a good thing.

Of note, this rationale is essentially identical to that used in milk banking for not paying donors.

For some interviewees, if milk is sold or any commercial aspect enters the exchange system, then the ability to make milk, breastfeeding, the sharing relationship and/or the networks themselves are “cheapened” in the process. I interviewed Pat and Lynn who were lesbian mothers who both received and donated milk. Unlike many of the other participants I interviewed, they both cross-nursed and donated/used donated pumped milk at different points largely between mothers they knew through “the queer parenting community”. Their experience was somewhat different than those of women who shared milk on-line in that the relationships developed with other mothers was very important to them and the lack of money changing hands in developing those relationships was important:

[Breast milk is] just like this *woman thing*, and I think it should just be *shared*. I mean, look what *we* can do. Look what these lactating mothers can do for one another and for each other's children and, it's amazing. [Making breast milk is]...this really incredible, amazing, miraculous thing that happens for women...selling it kind of cheapens it...

Pat's wife Lynn added:

Well, it makes it a commodity. But, in a way that...cheapens it...it loses some of its power...And to me nursing was always about a relationship, and so the giving and sharing of milk too is really relationship-based. And the relationship doesn't necessarily have to be with someone who you are close and intimate with. I think as a woman who was fortunate to be able to breast feed, and recognizing that there are women who aren't...if there's some way that we can contribute, participate, support her...that's my philosophy on it.

Ms. Kwasnika, the organizer of Human Milk 4 Human Babies (HM4HB) further stressed that HM4HB does not accept any form of commercial activity on their web sites (e.g. posts from companies offering free breastfeeding equipment, sponsored posts) just as they do not allow any buying or selling of milk on their sites because they are “about building relationships” not about selling milk.²⁹⁰ While such views about “relationship building” through milk sharing did

come up, often times, milk sharing exchanges were transactional, a point I get to below under “transactional care”.

The Responsibility of Informed Sharing

Milk sharing, particularly in its online manifestations, is characterized by the centrality of individual donor or recipient parents (usually mother) who are responsible for making good (safe, ethical, convenient) matches with other parents.²⁹¹ This reflects milk sharing as an individualistic health optimization project achieved through a shared project for appropriately distributing milk. The responsibility of individual parents to make good matches is an aspect that milk sharing organizers and participants themselves take very seriously. “Informed sharing” is the term used to describe this responsibility and is also used to differentiate milk *sharing* from milk *selling*.²⁹² That is, the terms used to describe informal milk circulations are highly contested. Public health, medical, and milk banking discourses tend to combine sharing and selling under the term “casual” to differentiate all informal circulations from those operated by formal milk banks where donors are screened and milk is pasteurized. Those within milk sharing communities, however, often take great pains to differentiate their practices from milk selling practices. “Peer-to-peer” milk sharing or “informed” milk sharing are two terms often used to challenge the term “casual” which, to some, suggests these practices are not thoroughly considered or engaged with responsibly.²⁹³

“Informed sharing” reflects that donors and recipients match themselves without the intermediary of a milk bank and make “informed” choices when entering an arrangement. As such, donors and recipients weigh the relative merit of the recipient (e.g., infant’s age and health condition, and a mothers’ ability to produce breast milk, etc.) and the desirability of the

donor (e.g., health status, medication use, dietary issues, lifestyle questions, location, amount of milk offered, etc.) before exchanging milk. Donors often told me about feeling good about knowing that their milk was getting a good home (though sometimes overwhelmed by the responsibility of juggling multiple requests for their milk and opting for a “first come, first served” approach).²⁹⁴ Recipients frequently spoke of their initial uncertainty but increasing confidence in establishing safety in matches as they got more used to the process.

Recipients also told me of asking screening questions, and sometimes asking for blood work. But, more often, I heard of contending with the risk of viral, chemical or bacterial transmission by framing their donors as not the “type of people” who would hide a health condition or medication use nor mishandle the expression or storage of milk. At times, this perspective drew deeply on the sanctity of the milk “sharing” (not *selling*) arrangement as that which will involve donors with the safest milk. At other times, this perspective drew on the difference between members of milk sharing communities versus communities perceived to be “risky”. For instance, Fiona, a recipient told me about how she had been referred to a donor by her lactation consultant (who had been a nurse in the Castro neighborhood in San Francisco in the 1980s) who reassured her of the safety of milk sharing by saying “this is nothing compared to HIV in the 1980s”.²⁹⁵ For some, there were racial or economic overtones to this assessment telling me that their donors “looked like them” but more often it was captured in a phrase like “these are breastfeeding mothers”.

Informed sharing practices place a great deal of emphasis on individuals making self-motivated choices for their particular “best” match. But it also places the responsibility for equitably distributing milk and maintaining the sanctity of milk sharing relationships on these

very interactions. How long is too long to be a recipient? How much is too much to request? The norms within these social worlds, as I observed it, is for recipients to seek milk until their baby is around one year old and with increasing hesitation thereafter as the child grows older or is healthy so as to allow other more “needy” babies the opportunity to receive milk.²⁹⁶ Likewise, the norm is also for recipients to avoid putting pressure on their donors (e.g., by repeat requests for more milk or requesting a continued pumping program that has not been promised).²⁹⁷ Although recipients may wish to have milk past a certain age, or more milk from a convenient donor, recipients tend to maintain the sanctity of what is perceived to be a gift by not being overly demanding, and maintaining the equitable distribution of milk by avoiding being greedy.

Transactional Care

Here I analyze some patterns of exchange I observed that paint a picture of an economic form where relationships between donors and recipients can be purely transactional (sometimes described as fleeting, “strange”, or temporary) and the recipient strategically and calculatedly seeks out a supposed “gift”. As such, this economic form challenges any preconceived notions we might have about what a “gift economy” might look like.

While I found some evidence to suggest that milk sharing exchanges could lead to friendships or continuous face-to-face relationships (especially when pre-existing relationships existed or cross-nursing was involved), milk sharing exchanges were *often* described to me as casual, friendly and supportive, but without movement towards face-to-face friendships or relationships.²⁹⁸ The fleetingness of many milk sharing exchanges is not surprising given that matches are frequently made on-line between would-be strangers or through third parties (e.g.

lactation consultants) who connect parents otherwise unknown to each other. Many participants were not seeking lasting face-to-face relationships/friendships and the on-line tools available for milk sharing fostered this kind of *friendly* but not *friend-making* encounter.²⁹⁹

Further, both donors and recipients spoke of the many barriers that prevented more robust relationships: they were busy parents juggling the demands of work, home and children. They may live at a fair distance from each other. Despite the relative lack of emergent face-to-face friendships, and the “strangeness” of these encounters that were often negotiated, recipients found considerable support and care through the very act of receiving milk while donors were grateful that their surplus milk was going to a good home and would not be wasted. The key analytic point here is that these feelings of care and support did not hinge on the formation of enduring friendships or relationships but rather on the very act of exchanging milk. In fact, *many* donors and recipients spoke of the casualness of their relationships as making the exchange *smoother* (e.g., less pressure than from a friend to keep pumping and less pressure to offer friendship in exchange for donated milk).

Recipients were generally expected to travel to the homes of donors to pick up milk, either on a one time or regular basis. Such trips were often undertaken with infants in the car or by a spouse who could travel without bringing along the baby. Many participants emphasized that picking up milk involved a great deal of time and effort for both recipient parents, especially taking a toll on the spouse (usually father) who took on this task while the mother cared for the baby.

When recipients did go into the homes of donors, they spoke of friendly but brief interactions and the strong urge to be grateful but not “get in the way”. Nancy, a recipient told me:

I do remember the sort of dance of coming into these people’s homes and not wanting to overstay my welcome, but also wanting to be really grateful, you know? And I was really grateful and wanting to demonstrate that but not wanting to take up all their time. So I was very mindful for that when I would go places.³⁰⁰

When matches were made between donors and recipients who lived far from each other, milk pick ups sometimes took place at half way points like Target parking lots where kids wouldn’t have to get out of the car. Many donors and recipients joked with me about how they felt “strange” about such “all business” transactions but stressed that these were the most convenient and efficient ways of picking up milk. Lisa, a recipient joked: “Yeah, sometimes, we joked that it was a little like a drug deal. She’d turn up in her car, roll down the window, and hand over a bag.”³⁰¹

Many donors and recipients referenced the strangeness of exchanging a “bodily fluid” with a stranger, at least initially, both as they experienced it (e.g., feeling like a drug deal) and how they sensed it was perceived by those in their wider community. Participants negotiated the reactions of their family and friends by limiting who they told and how much they told about their milk sharing and breastfeeding projects. For some, this was an issue of justifying to others the amount of work it took to pick up donated milk or produce breast milk when formula is usually seen as a perfectly acceptable supplement:

I think some of [my friends] thought [using donated milk] was a little bit weird...Some people didn’t understand why I would drive 40 miles each way twice a week when you could just use formula. And lots of people didn’t understand why I was using an SNS because it’s really cumbersome.³⁰²

Some recipients felt shy about divulging the sheer number of donors their baby had to friends and family: “I remember occasionally I would feel hesitant about telling people exactly how much breast milk we were taking from exactly how many people. Yeah, like Rayna has 15 milk mamas ... [jokes] totally normal!”³⁰³ Despite these negotiations around who and how much to tell, I was surprised to find that many donors and recipients felt supported overall in their efforts by their wider community: “I feel like the Bay Area is pretty darn accepting, and my friends are very open-minded. And I’m friends with a lot of health care providers, and there really wasn’t that much judgment about milk sharing.”³⁰⁴ Some recipients told me about their “freaked-out” families coming around to the idea and eventually offering full support.

The work of obtaining, storing and using donor milk

For many recipients, the work of obtaining, storing and using donor milk was considerable. As already outlined, milk recipients often came to seek milk after having spent considerable efforts to increase supply. Obtaining, storing and using donor milk, therefore, often came at an already taxing moment for families yet they still managed to expend the necessary work. I heard from many recipient mothers that they were too overwhelmed with lactation problems to take on finding donors or driving to their homes to pick up milk. In those cases, recipients often relied on spouses to post on Facebook sites, communicate with potential donors and pick up milk. This frequently observed dynamic speaks to the issues of privilege which remain implicit through this chapter. Parents seeking informally shared milk need to be able to afford the time, energy, freezer space, and usually a car to pick up milk. Further most of the milk recipients I spoke two were partnered and often the partner (usually husband) was very active in either communicating with donors or picking up milk.

Many recipients displayed an entrepreneurialism when it came to obtaining, storing and using donor milk. Debby, a recipient had an impressive knack for getting donated milk. She volunteered to show me her huge freezer stash of donor milk and, at the same time, she contrasted her day's pumping with that of one of her prolific donors.



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She told me about her strategies for getting the most milk for the least effort, generally calculating the travel needed to get to the milk against the amount of milk on offer. Like many other recipients I interviewed, Debby's questions for donors were: How much milk? And how far away? Debbie created metrics of calculation with which she would calculate whether milk was worth picking up and then focused on high producers in close proximity.

Some recipients told me of elaborate storage and cataloguing systems for their collections of donated milk and their carefully-crafted protocols for its use (whether to mix donations with formula, etc.). John, a recipient and single gay father described his chest cooler of milk as a “Double D Library”. In describing the value of his stash,³⁰⁶ John told me how he couldn’t bear to waste any of the donated milk he had acquired:

...I know that I got very protective over the breast milk that I have as far as my freezer looked like a Double D Library. I had it categorized by the donor moms and by expiration as far as how long it’s been since it was pumped and how close to the gestational age. So I had quite the system down. I knew that it was a very incredible gift and frankly very expensive if you try to buy it from the breast bank that every ounce is really expensive and knowing not to microwave it and not to sit out too long, and I went from the deep freeze to the regular freeze to the refrigerator, doing slow thaws, it was just an incredible system and people were just amazed on how anal retentive I was as far as how I did it.³⁰⁷

Debbie characterized the type of exchange involved in milk sharing as similar to “freecycle”, a website where users post offers of free *unwanted* goods for the fastest (and/or the chosen) recipient to accept. This characterization emphasizes a pattern I observed in milk sharing exchanges: some recipients adopted a strategic, calculative, entrepreneurial or business-like approach to collecting milk that was often unwanted by donors who were very reluctant to “waste” the milk. For example, This distinctive economic form similar to “freecycle” transforms milk that is often unwanted to donors but who are unwilling to accept the milk as “waste.”

Other social worlds: shared interest groups, and social movements

Informed sharing as a philosophy that guides a great deal of milk sharing also relates to other trends in contemporary motherhood-related interests and activities. These practices emphasize trusting women’s bodies and women’s abilities to make choices regarding maternal

and child health. I observed considerable overlap between milk sharing and home birthing groups, lactation groups, and attachment parenting philosophies that emphasize baby wearing, breastfeeding and co-sleeping as attachment building practices. I would suggest that like these social worlds, milk sharing also stresses the important biological role of the mother and her bond with her child. What is unique about milk sharing is that new biosocial communities, relationships and identities are being formed around *relational* and *embodied* experiences oriented toward health optimization of infants through managing the experience of over, under, or non breast milk production.

I observed a great deal of overlap between milk sharing and lactation movements. For example, I went with some of my participants to a rally or “nurse-in” at the Facebook headquarters in Menlo Park, California where mothers protested the removal of breastfeeding photos from Facebook as “obscene”. Emma Kwasnika, the organizer of HM4HB organized this protest and is a major player in the world of lactation activism (“lactivism”) as are many others involved in organizing milk sharing websites and referrals.



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The anti-medicalization and do it yourself (DIY) ethos of milk sharing is reminiscent of the women's health movement even though no participants mentioned a connection outright. Unlike the HIV/AIDS movement (Epstein 1996) the women's health movement was distinctively anti-medicalization (Clarke and Olesen 1999) and strands of it have ardently remained so. In general, the relationship between lactation and medicine is complex. The historical relationship between medicine and infant feeding reveals that pediatrics was built upon "scientific motherhood" that effectively deterred breastfeeding (Apple 1987) (see chapter 2). Today, medical associations and institutions officially recommend breastfeeding but many traces of medicine's anti-breastfeeding history remain. Hospital policies can be unsupportive of breastfeeding as can the lack of individual physician support or knowledge about breastfeeding.

As such, lactation activism (with milk sharing being a type of lactation activism) itself can itself have a decided anti-medicalization emphasis.

Some participants made connections between milk sharing and “empowering” mothers to decide how to best care for their children (e.g., extended breastfeeding, being a stay at home, or milk sharing). For Ajira, one of the founders of The Bay Area Breastfeeding Cooperative, milk sharing was a feminist movement about recognizing and supporting diverse mothering practices as equally valid. Ajira felt that the feminist movement had supported women getting into the workplace but had not validated mothers who chose to stay home with their children. That said, participants I interviewed had a wide variety of child care and work commitments and did not fall strictly into a “stay at home” mom category, especially donors who tended to pump more because they were away from their infants while at work (see Appendix A – Participants Summary).

There are also aspects of a health-related social movement in milk sharing. Insufficient milk production is a misunderstood or overlooked condition, particularly insurmountable causes such as insufficient glandular tissues (IGT). Many recipients could only speculate why they could not produce enough milk and came to adopt this contested diagnosis.

CONCLUSION

This chapter has analyzed patterns in contemporary human milk sharing as emerging forms of biosociality that often involve a shared commitment to breastfeeding, with milk sharing as an element of a “breastfeeding project”. We saw how both women who “under” and “over” produced breast milk sometimes turned to milk sharing as a form of relief within their

overall breastfeeding projects (either relief in being able to avoid formula and knowledge that “everything” was done to breastfeed or relief in knowing that surplus milk was not wasted).

We also saw how this affective economy is not one that is a “pure” gift economy but rather a distinct economic form that incorporates aspects of what I’ve called “transactional care”. The intensely time consuming and difficult work of exchanging milk reflects the reality that this practice is (as I observed it) mostly practiced among partnered, affluent, educated parents who have the time and resources to spare. Likewise, most of the practitioners I interviewed were white which reflects disparities in breastfeeding rates and which demographic is most likely to go to the greatest lengths to breastfeed and overcome obstacles.

It appears that this form of biosociality is both reflective of biomedicalization in emphasizing the value of individual healthism and the use of the Internet as a modern technology. At the same time, milk sharing emphasizes the role of lay knowledge formation and has an anti-medicalization “do it yourself” approach to health. Given that contemporary official medical statements caution against milk sharing, milk sharing can be read as a direct anti-medicalization practice responding to the medical mainstream’s de-facto acceptance of formula. At the same time, breastfeeding itself has been thoroughly medicalized and is the infant feeding practice recommended by the American Association of Pediatrics and other health organizations. As such, milk sharing practices flow with official medicalization trends and against their official guiding statements.

In the next chapter I take up case studies in a different vision for breast milk, a “biomedical mode of reproduction” where human milk is put to work in an industrial sense (Thompson 2005).

Chapter 6: Technoscience and the Future of Milk: Case Studies in a Biomedical Mode of Reproduction

INTRODUCTION

This dissertation has thus far analyzed the circulation of human breast milk within emerging contemporary economic forms and their interactions: human milk banking and sharing. This chapter turns to case studies that offer new economic forms in a biomedical mode of reproduction (Thompson 2005) where human milk may be put to work in an industrial sense. I follow the making of a human milk based fortifier (Prolacta), the extraction of stem cells from breast milk and their banking (Bennett Research Group³⁰⁹) and the use of human milk in the development of antibiotics (Hakansson Lab). In other chapters, these case studies demonstrate the co-construction of technologies/knowledges and economic forms alongside often innovative ontological/moral understandings about things (e.g., breast milk) and subjects (e.g., lactating mothers, scientists and investors).

Here I offer these case studies as visions for possible futures of breast milk that require financial, technoscientific and material (i.e., breast milk) investments that may pose challenges to (or a symbiosis with) the HMBANA non-profit human milk-banking model. Of course this chapter cannot wholly capture the social worlds or economic forms under consideration. In fact, many dimensions regarding these case studies have changed since initial research and emerging potential case studies also have entered the arena. For example, within the past year, Medolac, an Oregon-based “human milk nutritionals start-up” launched a product called “co-op donor milk”, a shelf-stable (i.e., does not require refrigeration) ready-to feed human milk

product. Medolac procures its milk from paid donors and has caused a great deal of controversy in its entry into the worlds of human milk exchanges and breastfeeding (see Chapter 1).³¹⁰

Data Sources

I conducted three interviews with Prolacta executives, two of which were in-depth and included follow up email communication. I visited their facilities in Monrovia, California twice where I was given a tour of their manufacturing facility. At Hakansson Lab, I conducted multiple in-depth interviews with Dr. Anders Hakansson and his graduate students and collaborators during a visit to his lab in Buffalo, New York. I was able to observe his students doing experiments on animal and cellular models. While I did not travel to Australia where the Bennett Research Group is located, I was able to research this group by attending the Global Human Milk and Lactation Research Society (GHMLRS)³¹¹ meetings Europe in 2012 and a Flowsave³¹² lactation showcase conference in the San Francisco Bay Area where the Bennett Group's research was presented. At the GHMLRS meetings, I interviewed two key scientists in that group and listened to a presentation given by another. In addition, I was able to travel to a laboratory in North America where collaborative work was being carried out with the Bennett group and interviewed a third key scientist there. Together, these interviews and observations constitute the data presented in this chapter.

Following Biomedical Modes of Reproduction

In this chapter, I employ Thompson's (2005) concept of a "biomedical mode of reproduction" as a sensitizing concept for the case studies under consideration. Thompson (2005) traces an overlapping shift from a capitalist mode of production to a "biomedical mode

of reproduction” with its own “characteristic systems of exchange and value, notions of the life course, epistemic norms, hegemonic political forms, security and hierarchies and definitions of commodities and personhood” (248). I launch this chapter by reviewing three of her observations about economic shifts, offering these as provocations or entry points for my own fieldwork.

First, Thompson (2005) describes the biomedical mode of reproduction as one which makes *both* production and reproduction parts of the economy. She describes the making of reproduction “productive in an industrial sense” through turning life into more or less standardized things capable of doing work (253). Thompson (2005) makes clear that this trend is *not* equivalent to demanding that the cost of reproductive “externalities” in capitalism be subsumed (as would be the case if things such as wet nursing, child care, housework, and dependent care became equitably distributed and/or compensated) (254). Rather, Thompson is clear that the biomedical mode of reproduction is a form of stratified reproduction (Colen 1995).³¹³

Second, Thompson (2005) asserts: “whereas under capitalism, workers risk being alienated from their labor, in the biomedical mode of reproduction, patients risk being alienated from their bodies or body parts” (255). While Thompson notes the creation of commodities in the biomedical mode of reproduction, she cautions that “commodity” or “commodification” are not the right words because the commodities produced are constitutively “reproductive, life saving or giving and promissory...not things in themselves” (257). As such, the risk of alienation is not alienation from labor, but alienation from body parts when mistakes occur in chains of custody and other kinds of biological relatedness.

Third, Thompson (2005) suggests that “whereas in capitalism, capital is accumulated, in biomedical enterprise, capital is promissory” (258). In the biomedical mode of reproduction, the primary dimension that is relevant for assigning economic value is the unfolding over time in the future: “likewise, [biomedical reproduction] signals a shift away from production, productivity, and profit and toward knowledge, technologies of life, and promise” (258). In the biomedical mode of reproduction, the intrinsic and promissory value of reproduction itself is at stake and, as such, canonical biological entities such as the embryo cannot be reduced to market value or the cost of the reproduction of human labor (255). Instead, biomedical objects and processes are *exchanged* in “quasi-markets” (255) and with many objects referencing possible future children whose existence determines their value, there are prohibitions against buying and selling some biomedical objects, such as embryos (259).

The Reproductive Production of Human Milk

From the outset, breast milk sits uneasily within the categories of “production” and “reproduction”, adding new layers of complexity to how breast milk as a medical, scientific or industrial “thing” is emerging in biomedicine and whether/how it reflects shifts towards biomedical reproduction (Thompson 2005). On the one hand, “production” is a key descriptor for breastfeeding. As we have seen throughout this dissertation, especially in chapter 5, breastfeeding, is *work* that *produces* breast milk (or “fails” to do so).³¹⁴ On the other hand, breastfeeding ones own baby is decidedly not *industrial* production; rather it is a gendered bodily production that follows *reproduction* and is more likely to be associated with unpaid maternal *care* work than paid *industrial work*³¹⁵.

Although other materials that circulate in a biomedical mode of reproduction have forms of exchange that exist “outside” of industry (e.g., sperm and eggs), there is a uniqueness about breast milk given that it is a species-specific *food* that nourishes a baby via a maternal-child interaction predicated on *maternal care work* that is always geographically and historically contextualized (see chapter 2). While many reproductive products that circulate in a biomedical mode of reproduction, (such as embryos) “reference possible future children” (Thompson 2005:259), breast milk additionally references the *maternal care work of breastfeeding*. This layer of meaning adds an element to the exchange of human milk in “quasi-markets” (255) and the various prohibitions against buying, selling (259) or making a profit from this particular biomedical object, breast milk.

I suggest that this defines a double life of breast milk – both produced by and extracted from a woman’s body (like blood or other tissues) *and* produced by a woman’s *labor* (usually maternal and unpaid). This double life shapes breast milk’s foray into the biomedical mode of reproduction through new socio-technical economic forms that engender new ontological/ethical understandings about things and subjects. Thompson described the biomedical mode of reproduction as a shift from exploitable labor to the extraction of a “bodily substance that is more or less exploitative depending on the knowledge, promise and profit appropriated” (cited in Franklin and Lock 2003:10). Given that breast milk is always already “reproductive production,” both a bodily substance and labor have the potential for alienation in these case studies.

HMBANA milk banks have dealt with this unique situation by establishing their own distinct economic form of non-profit milk banks that process donated milk then sell it to

hospitals and individuals in the community for what they call a “processing fee.” That is, hospitals and out-patients are not paying for the milk nor its maternal production per se, nor are banks making a profit. Gerstein Pineau’s (2012) historical study of HMBANA banks found that breast milk is sacralized therein as a symbol of good mothering, making its exchange for money at the point of maternal production (i.e., paying donors) morally reprehensible. Further, she found that in milk banking the mother-infant relationship is not ignored or removed but rather deeply embedded in the milk itself thus further legitimating the contemporary donor model of milk banking (see chapter 2). As argued in chapters 3 and 4, HMBANA banks have folded the unpaid donor into their sociotechnical networks and “quasi-markets” (Thompson 2005) with a decided lack of interest in industrial for-profit production.

However, newer models for the use of human milk are challenging the monopoly of HMBANA’s form of “moral exchange” (see chapter 3 and 4) by raising new applications for breast milk that could divert milk donations (now or in the future) away from non-profit HMBANA banks, by introducing for-profit models (some quasi-for profit, some overtly for-profit). This chapter starts by situating the case studies under consideration from the standpoint of HMBANA milk banking (where my ethnographic work was originally situated), then follows three of these sites of technoscientific work (Prolacta, the Hakansson Lab and the Bennett Research Group), reflecting upon their economic trend vis-à-vis the biomedical mode of reproduction outlined above.

Overview of Argument

I found that in all sites analyzed here, breast milk is put to work in a biomedical mode of reproduction and is highly valued as both that which is best for babies (for a multitude of reasons) but also as “throwing a curve ball”³¹⁶ at scientists by offering new resources for biomedical innovation. In the corporate site analyzed (Prolacta), these two meanings (“best for babies” and “scientific curve ball”) are intertwined in their manufacturing of an “exclusively human milk diet” through developing a human milk based fortifier (thus avoiding the need for a bovine-based fortifier). For the academic sites analyzed (HAMLET and the Bennett Research group), these two facets of breast milk are intertwined through research agendas that pursue both breast milk’s mechanisms that make it beneficial to babies and the “curve balls” with applications that may relate to breast milk’s benefits in infant feeding. For all the scientists and executives interviewed in these sites, there was the decided sense that breast milk’s profile was being raised, and that any of this research – whether on breast milk’s mechanisms and benefits or on breast milk’s promising components for biomedical innovation – might help increase breastfeeding rates, which is a social *good* in and of itself. In this sense, the meaning of “promissory” (Thompson 2005:258) in these case studies is multifaceted: the promises breast milk gives to babies and the promises it gives to scientists are intertwined and work to further sacralize breast milk (Gerstein Pineau 2012) as a “magical substance.”³¹⁷

These multifaceted constructions of “promissory” breast milk blend research trajectories by remaking of the natural through technological means. Given that breast milk is always already “reproductive production,” both labor and bodily substance have the potential for alienation in these case studies, as does the specter of the maternal care work of breastfeeding as well as the health and social promises that are attached to it.

ENTERING THE ARENA: COMPETITION, COLLABORATION, AND CONFUSION

Here, I situate development in a human milk biomedical mode of reproduction within contemporary human milk exchanges, as already discussed in this dissertation – non-profit human milk banking (HBMANA banks) and the growth in informal milk sharing largely facilitated by the internet. I came to discover these new applications as a matter of research on human milk banking and sharing and, as such, to situate them as offering “new” models for the potential of breast milk.

I began weekly ethnographic visits to the Mothers Milk Bank in San Jose in Fall, 2011. Immediately, MMB staff told me about their milk donation shortages were unusually bad, exceeding the expected drop off at the end of the calendar year.³¹⁸ Throughout these discussions, staff raised various possibilities to explain why shortages were occurring. One of the donor coordinators suspected that Prolacta’s recent affiliation (discussed below) with the Susan G. Komen foundation was attracting new donors there and steering them away from the MMB. Prolacta, a privately held life sciences company,³¹⁹ had been processing human milk based products from donated milk since 2006. At the time of my initial fieldwork, Prolacta had recently launched sophisticated donor recruitment strategies that the MMB and other HMBANA milk banks were struggling to equal.³²⁰

Especially in the early days of my field work, the MMB director, Pauline Sakamoto, tended to be equally concerned about both Prolacta and so-called “casual sharers” diverting donations away from HMBANA banks. Ms. Sakamoto repeatedly voiced her concern that donors were misinformed or confused about their multiple donation options, worrying that when potential donors searched on-line, the differences between Prolacta (a for-profit entity),

“casual sharing” web sites (both those that organize milk sharing and milk selling) and HMBANA milk banks were not easily or honestly differentiated.³²¹ I found that in the world of non-profit milk banking “casual sharers” are more likely to be viewed as naively or dangerously sharing a human tissue, creating a liability issue for HMBANA milk banks if an averse event occurs in a casual sharing exchange.³²² In contrast, Prolacta is usually charged with misleading or manipulating donors.³²³

For Ms. Sakamoto and HMBANA stakeholders, the issue of donor confusion is often translated into conserving the term human milk “bank” solely for HMBANA banks. Prolacta operates a series of affiliated or operated “milk banks” that work with Prolacta to screen donors and collect donated milk.³²⁴ Some of these are charitable milk banks, some are “for profit” milk banks and others are based in hospitals, but *all* send collected milk directly to Prolacta.³²⁵ Ms. Sakamoto found Prolacta’s use of the term “banks” to refer to these organizations as misleading, given that they are affiliated with Prolacta and neither process or distribute milk. She found that Prolacta mimicked HMBANA milk banks in their establishment of charitable non-profit “milk banks”, creating confusion about whether they actually were for-profit and who these “milk banks” were associated with.

And to this day, I think there is great confusion, because both of our monikers is “milk bank”. But if they were in our organization, they would be called depot sites or collection sites, not particularly milk banks...Even the name of [one of their milk banks] is the “National Milk Banking Association”. How they got that and the Human Milk Banking Association name so close...There’s great confusion.³²⁶

Breastfeeding bloggers have gone further and suggested that Prolacta has deliberately misled by obscuring their banks' affiliation with Prolacta³²⁷, a possibility that the CEO told me they work hard to avoid.³²⁸

During my ethnographic observations at the MMB I also became interested in other forms of possible "competition" that lay on the horizon for HMBANA banks. In our interview, Ms. Sakamoto pointed to both research conducted on HAMLET (a protein synthesized from breast milk that might lead to cancer or antibiotic therapies) and researchers who have been working on extracting stem cells from breast milk as possible future forces competing for breast milk. While these forms of "competition" are much farther afield and much more speculative than Prolacta, for Ms. Sakamoto, they clearly raised the issue of *volume* of donations. That is, with demand from NICUs for BDM skyrocketing, if it came to pass that other uses for breast milk were robustly developed, milk banks would need to establish the optimal use for their product so that NICUs could limit their use accordingly. This type of research does not exist (see chapter 4):

I think it's going to bode [HMBANA banks] well to start doing research to say "when is the time that you get the most bang out of the buck here?" and when is it to the point that the infant is so mature that giving him milk is not going to increase something or another in his lifetime?" That study hasn't been done. The studies about the compilation, the networking of each component in human milk, the effects of that, the antagonists, vice versa, no one has done that research. We don't know, so it's an interesting future for human milk. It's wide open...You know for the volume that we need, we're pretty much where blood banks were 50 years ago. The proliferation of blood banks to day is massive. I think people are beginning to say that's where we have to go. That's where we have to go quickly because the demand is just skyrocketing.³²⁹

It is interesting to note the way in which HMBANA banks would welcome research that might limit the use of BDM to when it would be most effective. This would be antithetical to

research by pharmaceutical companies where limits posed on the use of their products (e.g., when to *discontinue* use or how to maximize the smallest dose) are rarely studied (e.g., Dumit 2012). In the past, Prolacta referred to themselves as a “biopharmaceutical” company. But they have since moved towards calling themselves a “life sciences company,”³³⁰ likely seeking to distance themselves from the negative connotations attached to both “biotech” and “pharmaceutical” companies.

In my interview with Scott Elster, the CEO of Prolacta, he spoke of having a moral responsibility to make sure an all human milk diet was available to babies, suggesting a moral responsibility for his company to grow and expand, rather than put any kind of “best use” policy on scarce human milk. In sharp contrast, for HMBANA banks, their moral exchange is predicated on being non-profit, not paying or pressuring donors, caring for the milk along its chain of custody in prescribed ways and delineating milk’s rightful distribution through a HMBANA priority listing (see chapters 3 and 4). For Prolacta, their moral exchange is premised on doing everything they can do in a scientific/corporate model that makes an all-human milk diet available to more babies in more hospitals.

PROLACTA

Prolacta Biosciences, Inc. is a life sciences company located in Monrovia, California, that manufactures standardized human-milk based nutritional products for premature infants in neonatal intensive care units (NICUs).³³¹ At the time of my research (2011-2013), Prolacta was mainly developing, selling and running clinical studies of human milk based fortifiers. More recently, they have moved into manufacturing standardized pasteurized banked donor milk for use in the NICU. Human milk based fortifiers were developed by Prolacta in order to provide

concentrated human milk derived nutrition to premature infants who can only consume very small amounts but require additional nutrition on top of breast milk. Prolacta's fortifiers were designed to be added to human breast milk (either pumped by a premature baby's mother or provided by a donor milk bank), thus allowing Prolacta to develop a product that provides an "exclusively human milk based diet."³³² Conventional practice is for premature babies to be given a bovine-based fortifier (added to formula, breast milk or donor breast milk). However, it is believed that the presence of any bovine protein (whether from formula or bovine based fortifier) can be very harmful to the premature gut and can increase the odds of developing necrotizing enterocolitis (NEC) and surgical NEC, dangerous and potentially lethal conditions in fragile premature infants.³³³

Prolacta's critics generally agree that they have clarified their messaging and are no longer obscuring their relationship with their milk banks.³³⁴ In this discursive space, just as in "informed" milk sharing (see chapter 5), importance is placed on the *informed* donor and her knowledge of her milk's eventual allocation or its "chain of custody" (Thompson 2005). In developing new models for milk circulation, Prolacta has risked alienating women from their breast milk (Thompson 2005) through the possibility that they would be inadvertently donating milk to a corporation or misallocating milk away from HMBANA milk banks (both of which potentially move milk through unintended chains of custody). Prolacta's model continues to evolve within this space of potential donor alienation by offering three strategies³³⁵ that construct their economic form as offering a series of moral exchanges from the donor, through the company to the recipient. These "strategies" include: 1) feminizing the donation process through a strategy called "multiplying the good" and putting a female face on their milk banks;

2) embedding the (metaphorical) investment of unpaid milk donation and the financial investment into research and development within a socio-technical network that requires these inputs in order to manufacture a *needed* and *safe* product; and 3) vis-a-vis the issue of Prolacta diverting milk away from HMBANA banks, Prolacta has offered to convert HMBANA banks to Prolacta subsidiary banks (i.e., buy HMBANA out), thereby suggesting HMBANA banks are unfit to safely and adequately distribute BDM. Here, drawing on my interviews with Prolacta executives Scott Elster (Chief Executive Officer), Martin Lee (Chief Scientific Officer) and Scott Eaker (Vice President of Quality) and observations conducted during a tour of the facility, I address these three strategies within an overall “new”³³⁶ form of moral exchange that stresses Prolacta’s approach of “what’s good for the baby is good for us.”³³⁷

Feminizing Milk Collection or Multiplying the Good

To obtain breast milk donations, Prolacta affiliates with or operates “milk banks” (or “milk collection organizations”) from afar that follow HMBANA’s approach of sacralizing milk as a symbol of “good mothering” (Gerstein Pineau 2012) and milk donation as an extension of “maternal giving”. In both Prolacta and HMBANA’s case, maternal giving extends to giving milk to fragile babies in the NICU. But while HMBANA banks can represent themselves as a collective form of maternal giving (as non-profits largely run by women), Prolacta is not able to do so as a for-profit corporation largely run by men. Therefore, in my analysis, Prolacta so employs marketing strategies of “multiplying the good” or “feminizing milk donation” to incorporate the legacy of the unpaid donor in a for-profit model. (FIX: ADD NOTE ABOUT BLOGGER RESPONSE TO THIS IF NOT ELSEWHERE). Prolacta’s use of multiple milk banks is a strategy to recruit donors that reverses the way we are ACCUSTOMED to seeing women’s bodies in marketing

campaigns. Here, women and their breasts here are not sexual but rather decidedly maternal and giving.

These milk banks maintain separate on-line presences from Prolacta (a male-dominated corporate entity), thus publically insulating themselves publically from Prolacta's corporate interests. Thus, instead of Prolacta recruiting donors directly, their affiliated milk banks offer financial contributions to charities or hospitals as a way to market and promote unpaid donation to a corporate for-profit entity. Prolacta's milk banks are responsible for varying degrees of qualifying donors and collecting. However, "collecting milk" seems to mean having the milk sent directly from the donors to Prolacta. Scott Elster told me that this is because the more people that handle the milk, the more risk is introduced. Prolacta seeks to avoid regulating more spaces and freezers.³³⁸ Based on their Internet presence, I observed 3 types of such milk banks: Prolacta-operated, Prolacta-affiliated and Hospital-Prolacta partnerships.

Banks that are Prolacta-operated donate \$1 for every ounce collected to a charitable organization: Helping Hands Milk Bank gives to the Suzan G. Komen Foundation; Milk for Wishes Milk Bank gives to the Make a Wish Foundation.³³⁹ Scott Elster described this strategy as "multiplying the good" in that multiple benefits are created and women feel even better about the act of donation.³⁴⁰ Observers, such as Jodeine Chase (a blogger and advocate of breastfeeding, milk banking and milk sharing, who was also interviewed for this dissertation) are critical of such affiliations with charitable organizations, suggesting that a donor's feeling of "warm fuzzies" does not take away from the fact that such milk donations divert milk away from non-profit milk banks, a fact that donors might not realize.³⁴¹

Milk banks that are Prolacta-affiliated (“Milkin’ Mamas”, “National Milk Bank” and “The International Breast Milk Project”) represent themselves on-line as having an existence or “origin story” outside of Prolacta, often one with a decidedly female face. For example, under the “about us” tab, Milkin’ Mamas presents itself as run by twin identical sisters who are “mamas with young kids just like you.”³⁴² Likewise, the National Milk Bank, under their “about us” tab, presents itself as created by sisters-in-law who “like to think that [they] are somewhat knowledgeable in most things pertaining to mommyhood ☺”³⁴³

While Milkin’ Mamas and the National Milk Bank are for-profit banks that are paid for recruiting donors,³⁴⁴ the International Breast Milk Project (IBMP), also Prolacta-affiliated, is a non-profit organization begun by a Minnesotan mother collecting donor milk in the United States for distribution in South African orphanages.³⁴⁵ Later, she formed a partnership with Prolacta that stipulates that Prolacta process IBMP’s collected milk with 25% of it going to “infants suffering from HIV/AIDS, malnourishment, poverty and disease” in Africa and the remainder used for manufacturing fortifier for sale in the United States.³⁴⁶ This partnership represents both strategies of “multiplying the good”, putting on a female face and distancing milk collection from Prolacta’s actual operations.

It might be suggested that Prolacta’s use of a “female face” on some of their banks’ websites is an attempt to look more like HMBANA banks that are all female run, a suggestion that Pauline Sakamoto, the director of the MMB seemed to imply. The reality of authentic American HMBANA banks³⁴⁷, however, is much bleaker in that they are struggling to compete with Prolacta’s milk banks, especially given that HMBANA banks receive little or no federal financial assistance but are largely responsible for maintaining the supply of BDM. In discussing

Prolacta as a competitor for milk donations, the Mothers' Milk Bank Director, Pauline Sakamoto, told me that although HMBANA banks have always presented themselves as grassroots, non-corporate entities, they are struggling to stay afloat in their stripped down model, both financially and in terms of milk donations:

We just so want to stay grassroots and not look like business. That certainly is our adversary in some respects. [Prolacta] has tried so hard to look like us, which is kind of interesting. So we definitely need to develop our brand and our marketing skills savvy at least so that we can at least separate ourselves...But I think you know the future it's going to get grayer and grayer. And I can't see staying the way we are to survive the way we are in the same infrastructure in the same face. We do have to belly-up to the bar so to speak and become much more savvy and entrepreneurial and diverse...I think we're one of the very few countries of milk banks that are not getting federal funding and I think that's one of the problems of why we're struggling so hard right now. Like I said, we've got the accolades, and we've got that but nothing came of it, meeting that need. And I think you can see me at least in this milk bank the stressors put on that. [The Surgeon General and the American Academy of Pediatric endorsements] were a great thing but at the same time, we weren't expecting [demand for BDM] to change so dramatically and as quickly as it has.³⁴⁸

The federal government's lack of financial commitment to HMBANA banks is indicative of a neoliberal reliance on (often female worker and volunteer dominated) non-profit entities as the welfare state has been reduced (Drevland 2007). However, in this case, it could be argued that HMBANA milk banks never truly integrated themselves into American forms of social welfare and have always been peripheral.

In June 2013 Prolacta launched a milk bank program within hospitals called the "donor breast milk supply program" or the "hospital referral donor milk program" based on affiliations between Prolacta and 8 hospitals across the country.³⁴⁹ Through this program, hospitals recruit milk donors to Prolacta and, in return, "the hospital will be guaranteed a supply of donor breast milk based on the needs of their premature infant population, in part supported by the volume

of milk donated by nursing mothers from within the community.”³⁵⁰ My interviews were conducted at Prolacta in late 2012 and early 2013 before this initiative was launched. At that time, however, Scott Elster told me that hospitals were frequently contacting Prolacta seeking BDM because HMBANA banks were unable to meet their demand. Elster foresaw the demand for BDM quickly escalating and, based on its partnerships with hospitals, that Prolacta has established ways to meet that need in particular hospitals through strategic partnerships.

At the interview, Dr. Martin Lee anticipated that there would be room in the market for Prolacta to rethink “manufacturing” BDM.³⁵¹ Further, it appears that Prolacta has more actively entered the market in BDM (whereas previously they had focused on a human milk based fortifier). These programs encourage donors to donate because the hospital’s NICU patients will benefit through a guaranteed supply of BDM. It is, however, unclear at this point whether a “guarantee” is a subsidy or preferential purchasing. As with the previously discussed Prolacta banks where financial or milk donations are made to charitable organizations with every donation, these affiliations “multiply the good” by extending maternal giving to giving to hospitals and their ability to provide BDM. In essence, these partnerships build further infrastructures around the viability of an unpaid donor even in the context of a for-profit corporation.

Unpaid Milk Donations, Research and Development, “Belt and Suspenders” and The Manufacturing of a Standard

I would assert that Prolacta embeds the investment of unpaid milk donation and the financial investment of research and development within a socio-technical network that requires such inputs in order to manufacture a needed and safe product. Prolacta situates

human milk as a potentially dangerous substance extracted from fallible donors and presents themselves as using it to *manufacture* a safe, needed and efficacious standardized medical product that requires heavy investment in research and development and unpaid donations to assure safety, allow for innovation and demonstrate efficacy. As such, Prolacta has built a form of moral exchange around their socio-technical network, an “obligatory point of passage” (Callon 1986) where investments of unpaid milk donations and investments in R&D are required to manufacture a lifesaving product for premature babies.

While HMBANA milk banks usually do not standardize the nutritional content of their BDM and often describe their transformation of human milk into BDM as “processing”, Prolacta makes human milk “productive in an industrial sense” through transforming human milk by manufacturing standardized products that do work (Thompson 2005:253). Prolacta manufactures human milk based fortifiers in standardized nutritional quantities to be added to either BDM or a mother’s own milk. Throughout my interviews with Prolacta executives, they referred to their practices as “manufacturing”, not “processing”, although on their website “processing” is also used. It was vividly clear throughout my interviews that Prolacta executives saw themselves as inventing and innovating new products – not just *processing* milk. Especially in the beginning this required active differentiation from what was already available – BDM, bovine milk based formulas and bovine milk based human milk fortifiers. Initially, Prolacta hoped to subsume HMBANA banks, incorporating them as collection sites and doing all processing and distribution through Prolacta. However, this offer was rejected by HMBANA.³⁵² Prolacta quickly decided to move away from focusing on BDM since HMBANA already monopolized that arena. But they then found their products competing with bovine-based

fortified formulas designed for use in the NICU³⁵³ often given for free to hospitals by formula companies.³⁵⁴

Martin Lee, the CSO, told me they needed to find something categorically different to manufacture, as my field notes detail:

Dr. Lee told me about their initial conundrum. Blood is an easy sell. Hospitals need it in order for people to survive. But milk? They realized that it would be really easy for people to pull out of buying Prolacta's products and give formula because that is the standard of care. So, they needed to operate with the mentality that anything could go wrong and make their product failsafe. There are no tests that are 100% effective, therefore they need to make their process failsafe. For Prolacta, their failsafe manufacturing was that which made them *categorically* different.³⁵⁵

I learned through my interviews at Prolacta that many of their founders and employees came from the plasma industry where products such as albumin, fibrant sealant for wounds, and factor 8 for hemophiliacs are produced. This origin story is definitional vis-a-vis how they see themselves as innovating and patenting new processes and products.

When I asked where their initial manufacturing process came from, Mr. Elster told me "we invented it". He referred to their invention process as "a little bit here, and a little bit there" and as a "learning curve". He continually stressed that it takes a lot of highly skilled, trained people from the plasma industry to do this work. He noted there were 35 employees on the manufacturing side out of 62 employees total.

In fact, Prolacta holds a number of patents on their manufacturing and testing processes, some of which are oriented towards testing the safety of their product (e.g., DNA matching technologies that match a donor with her milk), others toward how to transform human milk into a fortifier.³⁵⁶ This approach to research with an emphasis on innovation, standardization and intellectual property is decidedly different from the MMB where "research" is generally limited to tracking donors and optimizing their screening and processing and testing techniques (see chapter 4). While Prolacta develops new technologies and holds a great number of patents

on their techniques, HMBANA banks establish their processing standards through external volunteer sub-committees and publish these standards for the public to purchase on their website.³⁵⁷ Thus while Prolacta actively creates new technoscientific knowledge, HMBANA banks are more likely to be consuming technoscientific knowledge or seeking advice from those at the calibrate their practices to emerging standards and market demands.

Throughout our interviews, both Dr. Lee and Scott Elster justified Prolacta's expensive, "redundant"³⁵⁸ and high-level safety standards and practices as both that which makes Prolacta unique and as that which is necessary for babies. Together, their accounts paint a picture for how they situate Prolacta as offering something decidedly new that is both "good for us [Prolacta] and good for the babies".³⁵⁹ Their high standards are good for Prolacta because they build up their intellectual property and differentiate their products from others on the market. And they are good for babies because they are they offer the greatest safety. I noted:

Mr. Elster stressed how the process of getting a milk donation is extremely expensive. Prolacta sends a phlebotomist who goes directly to the woman's home to test her milk. Prolacta pays for blood tests and the PCR test to find any viruses. He said that they spend \$500 before they even get any milk. Mr. Elster stressed how the most common misconception is that this is not expensive. Mr. Elster stressed that this is very expensive and it is all set up to protect the baby.

Both Scott Elster and Scott Eaker, the vice president of quality, referred to their philosophy as [wearing both] "belt and suspenders"³⁶⁰ or operating on a "single point of failure"³⁶¹ philosophy. Their manufacturing processes protect against multiple levels of failure without the milk being compromised:

Mr. Elster told me that he hears from HMBANA banks that Prolacta does "too much testing" but that Prolacta sees their approach as operating on a "single point of failure"...Mr. Elster demonstrated this to me by arranging his hands such that one set of fingers overlapped the gaps left between the other fingers indicating how layers of

safety checks are necessary just in case there's a flaw in the same spot happening twice. He made reference to people calling the layers of testing "pointless." But he said that this is the point. They should be pointless.³⁶²

Prolacta's "belt and suspenders" approach is more than just rhetoric as was apparent to me during my tour of their manufacturing facility. The moment I entered the hallway adjacent to the manufacturing rooms, my tour guide pointed out the pest management equipment that was monitored by an outside service company. I wondered aloud whether this was in fact necessary or part of compliance with tissue bank licensing or other regulation. My tour guide did not appreciate my comment and said that this is a very serious issue and they need to be on top of pest control.

I was shown a series of rooms where the milk is poured, sampled, transformed into fortifier and also pasteurized. At every level, their safety procedures appeared above and beyond what I have observed at HMBANA banks. For example, during the tour I was shown a "mini clean room" where milk samples underwent testing far beyond that conducted by HMBANA banks: DNA matching with cheek swabs for assured donor identification, drugs of abuse testing, bovine protein test (tests for adulteration) and viral screening using PCR testing for the presence of HIV-1, HBV, and HCV.³⁶³ For Prolacta, these expensive tests are a part of their intellectual property and "single point of failure" philosophy that includes a heightened degree of the assumption of fallibility of donors. They could accidentally donate another mothers' milk stored in her home freezer, could seroconvert in the time between blood test and donation, could adulterate her milk with cow's milk or another substance to increase profit,³⁶⁴ could neglect feeding her own baby to donate more milk or could hide a health

condition in order to donate.³⁶⁵ Elster made reference to having been charged with not trusting donors but said that this is not the case at all; rather “you don’t know what you don’t know.”³⁶⁶

Elster stressed that their non-payment of donors is part of their manufacturing of a safe product given their current technologies, telling me that they would pay donors if they had adequate technologies to assure safety. He stressed that if they were able to control the donation process (as is possible with other plasma products where donors are paid), they would be in a quite different position:

Mr. Elster said that not paying donors is a quality issue, not an ethical issue. They are only asking the question “Is this safe for our recipient babies?” We had a brief discussion comparing breast milk to other substances and why you can pay for bone marrow and plasma donations but not milk. He suggested that bone marrow and plasma can be controlled in that there is no prior separation of the substance from the donor until the moment of donation, unlike breast milk where donation takes place off site.³⁶⁷

Elster further conveyed that they would gladly pay donors if their tests for adulteration (then in development) were satisfactory. More recently, as of June 2014, Prolacta began paying donors \$1/ounce through opening up an additional bank called “Tiny Treasures.” Many believe this change is an effort to compete with Medolac, a corporation paying donors \$1/ounce for their breast milk to manufacture shelf-stable BDM.³⁶⁸

I have argued that Prolacta has situated itself as manufacturing something decidedly different that requires a belt and suspenders approach expensive testing, manufacturing and unpaid donation to achieve safety. These investments are packaged into Prolacta’s overall belief there is “no such thing as too much research and development” (a comment made to me by Mr. Elster).³⁶⁹ As we have seen, Prolacta’s R&D, testing and manufacturing processes are closely tied given the intellectual property they hold in various testing and manufacturing

processes. On Prolacta's milk bank websites, they respond to the FAQ whether they are a for-profit organization by writing:

Yes, Prolacta Bioscience is a for-profit company that makes the only human milk-based human milk fortifier available for fragile premature babies. We have invested over 40 million dollars in research, clinical studies and facilities to develop and test our human milk derived products. This world-class research and development would not have been possible in a non-profit business model.³⁷⁰

Prolacta thus frames its socio-technical network of intense R&D and for-profit organization as a "necessary package" to assure adequate care for fragile babies. In our interview, Mr. Elster and I discussed the hurdles they encounter as a for-profit model and he pointed out that "it's America" where there is nothing wrong with making a profit. Moreover, he stressed that Prolacta is doing good things for the American economy by offering skilled manufacturing jobs in the U.S.

When discussing Elster's views on HMBANA's testing and processing standards, he voiced concerns over the safety of their products as well as their lack of nutritional standardization and labeling. He went so far as to suggest that HMBANA banks do not "value" the milk. I took this to mean that HMBANA banks do not (in their opinion) put the necessary technologies to work and are compromising the safety of the milk supply. Similarly, Mr. Elster made reference to Prolacta having a "moral obligation" to assure milk supply and, as such, the HMBANA shortages he was observing were very distressing. Elster also spoke of casual sharing as very unsafe and distressing given that an adverse event could occur. He further asserted that casual sharing is a form of not valuing the milk, stating that he wished milk would stand up and say "casual sharing is unsafe".³⁷¹ This wish reflects a key theme of this dissertation: all the

economic forms under consideration see human milk as something that needs to be handled properly and their economic form represents part of that moral exchange.

Both Elster and Dr. Lee stressed that Prolacta found early on that if they wanted to sell their product, they needed the evidence of clinical trials to support them. Dr. Lee told me about clinical trials Prolacta has conducted on an “exclusively human milk based diet” in partnership with academic institutions that have shown a reduction in both NEC and surgical NEC, as well as increased cost-effectiveness.³⁷² If we include Prolacta’s clinical trials within their variant of biomedical reproduction (Thompson 2005), we can add another meaning to our understanding of “promissory” that interacts with the promises of breastfeeding. That is, in the same way that breastfeeding is promoted as preventing childhood illnesses and conferring of other preventative health benefits, human milk fortifier (via an exclusively human milk based diet for premature babies) is tested for its *preventative* rather than *curative* potential. That is, Prolacta fortifiers were developed and tested for preventing necrotizing enterocolitis (NEC) and to foster other developmental indicators, rather than treat any particular condition. These preventative indicators are the focus of Prolacta’s clinical research. Dr. Lee described the situation of extremely premature babies using their products as one where “nature didn’t intend for us to do this but it throws curve balls”. I took this to mean that extremely premature babies would not survive under “natural” circumstances and that “nature” has offered human milk as a curve ball that can be manufactured into a fortifier to help such babies survive and grow by preventative means.

Although the production of a standardized object is a feature of biomedical reproduction, and Prolacta certainly does that, their standardized product proves difficult to

test within the accepted gold standard of a clinical trial. This is because other feeding factors are difficult to standardize. That is, what does “breastfed” mean? Ever breast-fed? Breastfed for a certain period of time? Moreover babies cannot be truly randomized into the various feeding options because it is unethical to switch a baby off of breast milk when this is known to offer the best outcomes.³⁷³ As such, Prolacta’s sponsored clinical trials have been subject to speculation about whether they truly test their fortifier’s effects. During our interview, Dr. Lee took the time to walk me through their trials in an attempt to disprove any lingering doubt that exists about what they proved.

HAMLET and STEM CELLS

In addition to conducting interviews and observations at Prolacta, a life-sciences company, I also followed scientific work in two academic settings, the Hakansson Lab in Buffalo, New York, and the Bennett Research Group in Australia that may, in the future, offer new products derived from breast milk including antibiotic therapies and stem cells. Both these academic research programs *may* prove to “make reproduction productive in an industrial sense” (Thompson 2005) by offering new standardized biomedical products. However, at this time, both are in early stages and are far from Prolacta vis-a-vis marketing a biomedical therapy or product. In fact, the Bennett Group participants I spoke with expressed a very cautious approach to any kind of commercialization of their research, framing their investigations into stem cells more in line with basic research at the same time as creating a buzz around their research as possibly offering a future “ethical” source of stem cells for regenerative medicine.

Significantly, in both these academic settings, the research programs are not focused exclusively on the promise of extracting elements from breast milk for new applications.

Rather, both settings have broader research programs that include studies of breastfeeding, breast physiology and/or breast milk. The Hakansson lab also does more general microbiology research that overlaps with research on breastfeeding and breast milk. Further, in both settings, researchers have operationalized the double meaning of “promissory” through research that blends research on the benefits of breast milk with research on it’s possible applications. As such, they must negotiate the hopes of the public and lactation communities as to the possibilities held in breast milk as well their views around whether or how possible applications are rightful uses of breast milk.

Hakansson Lab

At the time of research (2012-2013), the Hakansson Lab was located at The University at Buffalo, State University of New York where it was run by microbiology professor Dr. Anders Hakansson. Dr. Hakansson has since relocated to the University of Lund in Lund, Sweden where he continues the same research projects. HAMLET (human alpha-lactalbumin made lethal to tumor cells) is a protein complex that was discovered in human milk by Dr. Hakansson in the early 1990s while working in a microbiology lab as a PhD student at the University of Lund under the supervision of Dr. Catharina Svanborg. The discovery of HAMLET and it’s effects was described to me by Dr. Hakansson as accidental and surprising. At the time, Dr. Svanborg was focused on urinary tract and respiratory infections and, as part of these projects, came to investigate human milk because it contains 200 versions of carbohydrate sequences. Dr. Hakansson explained to me that carbohydrates can be receptors for bacteria such that if you could make “that receptor [e.g., a specific carbohydrate], lots of it, and flush the whole system with that, then the bacteria will be covered with these receptors and wouldn’t be able to bind

to the cells. That would be the kind of the idea of a therapeutic.” He explained that this is the logic behind the view that cranberry juice helps with bladder infections because cranberry juice contains a lot of a specific carbohydrate. Dr. Hakansson explained that, at that time, many scientists were investigating whether carbohydrates could be used in pharmaceutical development for antibiotic treatments but that, in the end, this avenue proved futile given that the concentrations they needed were not possible.³⁷⁴

Dr. Hakansson told me about how early experiments involved fractioning the milk and testing its effects through using tumor cell lines “because those will grow and grow...and they are similar enough to normal cells that we can use them”.³⁷⁵ They ended up finding a strong effect from a milk fraction that contained protein, and specifically what they would later characterize as HAMLET:

So the thing that we saw primarily was that, from the beginning we were looking at bacterial binding and we saw really clearly that if we added this fraction that contained what we ended up calling HAMLET, there was no binding. So the binding of the bacteria went away. So that was kind of the primary finding in my experiments.³⁷⁶

It so happened that this milk fraction not only blocked bacterial binding but, more thoroughly, killed the tumor cells employed in the experiment. Dr. Hakansson described this as such:

But what I also saw under a microscope was the cells looked very funny. So now we had tumor cells and the tumor cells looked dead and we showed after awhile, we looked at them under a microscope and I did that a couple of times just to see that it wasn't a fluke or something. And then we said, no they don't look healthy. And then we tested them and saw that [the tumor cells] were all dead. And if we took our normal cells, they didn't die so it was only the tumor cells that died. And then we started becoming interesting, like this is pretty cool. We have to figure out what's going on here.

Alongside other researchers in the Svanborg lab, notably Dr. Molly Swenson, Dr. Hakansson investigated what sort of cell death was going on and worked to characterize the milk fraction

responsible. In the end, they called it HAMLET and showed it was made of two components they could combine: alpha-lactalbumin bound with an oleic acid. As Dr. Hakansson described it to me, when he finished his PhD, the tumor research was left with Dr. Svanborg lab and now Dr. Hakansson investigates HAMLET's role in causing bacterial cell death.³⁷⁷ Dr. Svanborg was not available for interview and, as such, this section focuses on Dr. Hakansson's current work and the traces of HAMLET's tumor killing potential that remained in his accounts as well as permeated other aspects of this dissertation research.

Howard Cohen

One of my early encounters with research on HAMLET, a protein complex found in breast milk, occurred when I interviewed Howard Cohen, an adult recipient of BDM from the MMB. The MMB provides BDM to community members who request it for a variety of conditions that fall outside newborn nutrition. Among these are children with metabolic disorders (Arnold 1995), and people with cancer, especially prostate cancer, as was the case with Dr. Howard Cohen. Dr. Cohen, it turned out, was the first patient the MMB supplied with raw unpasteurized breast milk, though since, there have been many more (Rough et al. 2009). I met with Mr. Cohen and his wife Barbara in their Palo Alto home. He explained to me how he managed to avoid prostate surgery through a regimen of his own design that included administering breast milk, both that received through friends and family members and that received through the MMB. He explained that he came to the idea through his wife who had done research on-line and had come across research in Sweden conducted on a component in breast milk, HAMLET that had been found to be lethal to tumor cells. Mr. Cohen, a physicist by training, and Silicon Valley entrepreneur by trade, did not consider his use of breast milk to be

“alternative medicine”, rather, he found it to be an under-studied but scientifically-grounded practice. After having his PSA levels drop following a breast milk regimen, he explained:

And so, at the end of the two months, I had been taking mother's milk for about a month, and I said okay...If I'm really lucky, maybe [my PSA] will just flatten out into a linear graph. If I'm extremely lucky, maybe it will stay the same as it was at the time of my biopsy. When it was measured in September, it was 2 [within normal range]. I was completely blown away, and I called the doctor and I told him, “I'm going to postpone [the prostate surgery]”. He said, “well, it maybe work for a while, but you'll be back.” Here it is, 12 and a half years later, and I've been back to cycle one. He was impressed.³⁷⁸

Other patients who have consumed breast milk as part of their cancer therapy have not had the same curative experience as Mr. Cohen, but many have spoken to its beneficial effects on quality of life while undergoing cancer treatments (Rough et al. 2009). Mr. Cohen catalogued his cancer diagnosis and the various treatments and screenings he has received along the way on his website.³⁷⁹ He found that drinking breast milk in smoothies made the undertaking more palatable, but he was clear to me that he and his wife were creating the regimen as they went along as no one had done studies to assess how breast milk was being digested and impacting tumors. As such, there existed no recommendations for how to administer breast milk to cancer patients. When his levels were stable, but not going down, Mr. Cohen started worrying about the money being spent on milk at the MMB, but his wife reassured him in saying “take a double dose and let's see what happens. As soon as he did, it started going down”.³⁸⁰

Therefore, Mr. Cohen remained committed to his regimen of breast milk consumption.

Mr. and Mrs. Cohen took a very active interest in research on breast milk and HAMLET, contacting researchers and avidly reading scientific papers. They had strong hopes for bench and clinical research on the consumption of breast milk in cancer patients, but were not

optimistic as they felt that Swedish researchers (where research on HAMLET's effects on cancer cells is located) were secretive about any developments because they were interested in making a profit from patents held on HAMLET. Mr. Cohen's initial attempts to get a prescription for BDM (a requirement of HMBANA banks) was met with resistance, an experience common to those in his situation (Rough et al. 2009). Mr. Cohen's doctor told him that "he didn't know anything about using breast milk for cancer treatment" and "he couldn't put his name on such a prescription."³⁸¹ Given that there are no clinical studies done on the consumption of breast milk in cancer patients, resistance is unsurprising.

Both Mr. and Mrs. Cohen spoke very highly of Dr. Anders Hakansson, a researcher in Buffalo who works on HAMLET's effects on bacteria discovered its tumor killing properties in a Swedish lab some years ago. I met with Dr. Hakansson at his lab in Buffalo over the course of 3 days in 2012. It was not surprising to me that Dr. Cohen spoke so highly of him, given his friendly demeanor and openness about his research. Dr. Hakansson was hesitant to speculate about HAMLET's effects on tumors given that this was no longer his area of research. However, he and his wife-collaborator Dr. Roche-Hakansson, told me that Dr. Hakansson answers *every* email that he receives from cancer patients asking about drinking breast milk, offering the same three points: "We know it increases quality of life; we know it is well tolerated and could help people jump back from treatment; and the therapeutic effects are unknown."³⁸² Although the effects are unknown, the use of breast milk by cancer patients for quality of life or curative reasons is part of a more general cultural attitude towards breast milk that views it as a wondrous substance full of known and unknown benefits.

At the time of interview (November 2012), Dr. Hakansson ran a lab at the University at Buffalo, State University of New York. There, his team investigated the effects of HAMLET on *Streptococcus Pneumoniae* (“Strep Pneumo”), the effects of HAMLET on bacteria, made resistant to antibiotics and the effects of breast milk on Strep Pneumo and other bacteria particularly vis-a-vis childhood diseases (respiratory tract infections, ear infections and dental carries). During my time at his lab, I witnessed these research programs, with the first two offering possible development of pharmaceuticals, likely antibiotic-combination therapies and the last offering evidence for breastfeeding as protective against dental carries.

This lab had many characteristics likely present in other scientific academic settings. Dr. Hakansson, the principle investigator was busy applying for government and private foundation grants to support his graduate students and the lab’s operating costs. Meanwhile, his students busily worked on countless repetitive experiments on cellular and animal models. In this particular setting, students and Dr. Hakansson shared a great deal of mutual respect while maintaining very high expectations of one another. Students spoke to me about the pressures to publish quickly as well as the overwhelming odds stacked against them in finding scientific jobs in academia. Drs. Hakansson and Roche-Hakansson spoke to me of the importance of mentorship and finding students who are well suited to scientific work.

Both students and faculty spoke of the “yuk” factor that is attached to their work on breast milk. For instance, one student spoke of avoiding drinking milk products after working with breast milk all day. Increasingly, for faculty, the yuk factor created difficulty in recruiting male PhD students to work with breast milk.

HAMLET Strep pneumo and Cell Death

As discussed above, Dr. Hakansson's interest in breast milk developed during his doctoral work in Lund, Sweden where he discovered and named a protein complex in breast milk found to be lethal to tumor cells: HAMLET (human alpha-lactalbumin made lethal to tumor cells). After finishing his PhD, he directed his research towards HAMLET's effects on bacteria, primarily Strep Pneumo. He thought that because HAMLET targeted the mitochondria in tumors, its effects on bacteria were probably similar given that mitochondria evolved into bacteria and so hold many of the same characteristics.³⁸³ He noted:

We found that as the protein went in [to the tumor cells], it really bound very strongly to the mitochondria. And then I started thinking, mitochondria used to be bacteria so maybe if the target in tumor cells is mitochondria and we saw some effect from the beginning on bacteria, maybe there are similarities to how tumor cells die and how bacteria die. Because the target is kind of similar....And we did find that there were similar things happening in the bacteria and in the tumor cells and that is something that we have found now, over the years. As well that we have similar signaling going on, we have similar molecules, but it's a more simple system in the bacteria. And much more kind of complicated and regulated and more molecules involved in the tumor cell system. But there is some kind of basic programmed cell that is in bacteria as well, that is very similar to what's going on in tumor cells.³⁸⁴

At the time of my interview, students in the lab were continuing the work of describing the mechanisms involved in HAMLET's effects on Strep Pneumo, particularly Dr. Emily Clementi who was preparing to defend her PhD when I interviewed her. She described her research as hypothesizing:

...that HAMLET kills *Streptococcus pneumoniae* by binding to its surface and inducing an apoptosis-like pathway of death...So our central objective of my overall study then was to develop a greater understanding of the mechanistic features. So, like what are the actual steps that occur in this process and the bacterial components that are involved in the pathway, particularly those that are related to membrane events.³⁸⁵

When I asked her why they use the term “apoptosis-like pathway of death” rather than simply “apoptosis”, she clarified that apoptosis is in eukaryotic cells (not bacteria) with nuclei and mitochondria, and the apoptosis “community would freak out” if the Hakansson lab used that term. That said, she described the type of cell death instigated by HAMLET as “apoptosis-like” because HAMLET is inducing the bacterial cells to activate a kind of self-destruction or “suicide” mechanism that is also seen in bacterial biofilm formation (discussed below). Eventually, the Hakansson lab established “that HAMLET effectively kills *Streptococcus pneumoniae* as well as other respiratory pathogens [but that] this killing is more effective in vivo in the presence of antibiotics as HAMLET acts synergistically with antibiotics to kill these bacteria.”³⁸⁶ As such, the promise of developing a pharmaceutical out of HAMLET lay in its synergistic effects with antibiotics. As Dr. Hakansson put it to me, “HAMLET alone doesn’t work terribly well.”³⁸⁷

The Promise of HAMLET and Methicillin

At the time of my interview, Drs. Hakansson and Roche-Hakansson’s lab was in the midst forming of a company to pursue a recent discovery that HAMLET, used in conjunction with antibiotics, sensitizes drug-resistant bacteria (e.g., MRSA, Methicillin-resistant *Staphylococcus aureus*) to antibiotic effects. Dr. Hakansson told me that you would expect Staph to become Methicillin resistant after 10 rounds of growth, but that with the addition of HAMLET, the antibiotic adapts and can kill this strain.³⁸⁸ He compared this idea to using a cocktail of drugs for HIV/AIDS treatment. Drs. Hakansson and Roche-Hakansson were working then towards a patent for combining HAMLET and antibiotics such as Methicillin and Vancomycin, and applying for a NIH small business grant to form a company and support this

research.³⁸⁹ Dr. Roche-Hakansson outlined the four point “pitch” they made in their grant proposal. First, using HAMLET will enable the use of older antibiotics that have fewer dangerous side effects:

If we add our protein, we can use methicillin again. And the good thing about that is that most of those antibiotics that used to be used...before antibiotic resistance came along...are much safer than the ones used now...So one of the pitches is that we can now actually in the presence of [HAMLET] use those safer ones again. So we can kind of prolong the treatment arsenal for much extended period.³⁹⁰

Second, even if a bacterial strain is not resistant, in combination with HAMLET, antibiotics can be used in lower dose. Third, HAMLET can actually *prevent* antibiotic resistance because bacteria does not become resistant in its presence. Last, HAMLET in combination with antibiotics kills bacteria made previously resistant to antibiotics:

We know that we get resistance against methicillin so that will increase. So the strains will be more resistant to methicillin. And in the presence of HAMLET, we will get less resistance development. But also that HAMLET will still work equally well in lowering the dosage needed. So we don't get any resistance to HAMLET in the bacteria. So that's also a good thing. That is the fourth pitch essentially that we're using. So those are the 4 main things.³⁹¹

Since then, Drs. Hakansson and Roche-Hakansson have launched a company called Evincor (“the name combines “evinco,” the Latin word for “overcome,” and the letter “R” for resistance”).³⁹² According to recent reports, they hope to begin testing the safety of combining HAMLET antibiotics for human use.

When I asked staff members and Dr. Hakansson about whether these eventual innovations would use HAMLET derived from breast milk or whether they would use HAMLET as an inspiration for synthesizing a new molecule, I got a variety of answers that suggested they were still in early stages. At one point, one graduate student told me that HAMLET was toxic,

only for Dr. Hakansson and Dr. Roche Hakansson to quickly correct her that it is *not* toxic because it is a protein complex found in breast milk.³⁹³ What was clear to me was that HAMLET itself may not be the best molecule to use given its instability and size such that they might end up treating it as a source of inspiration for a synthetic, rather than as a product in and of itself:

Dr. Hakansson: We're trying to kind of tease ourselves down to figure out what the mechanisms are [for strengthening antibiotics]. And then what we hope to do is that, if we can find all the different pieces of this puzzle, we hope to be able to find maybe other molecules than HAMLET that can actually, effectively activate this pathway. And we can make [then] make other antibiotics that are not made out of HAMLET per se. So that will be an idea. Because the problem with HAMLET is that it's a big molecule, it's a protein. So you can't eat it because it's probably going to be degraded to a big extent in the gut. If you inject it in the bloodstream like you would do with insulin which is also a protein, the half life is very short, meaning that it doesn't survive in the bloodstream very long. So you would have to inject it very often. And the other thing we know is that there are proteins that inhibit the activity of HAMLET in the blood. So it's not very effective in the blood. So we need something else that works much better if we are going to use this as a therapeutic....

Krista: So it's more about using the HAMLET protein as an inspiration for finding something that will work?

Dr. Hakansson: Exactly. So, it's kind of a like a tool we're using to understand how the bacteria die or how the tumor cells die. And then we hope to find, in the end, something that is more durable, something that is more stable and something that is more effective in activating exactly the same mechanism. That will be the best way to do it...if we can. We don't know.³⁹⁴

At the same time, Dr. Hakansson raised the possibility that HAMLET itself could be as part of a topical or inhaled treatment.

In the end, it depends a little bit. Because many [staph] infections [are] topical, meaning a skin infection or you have infections in your nose or something like that. And then you could topically apply it and you don't actually have to put it in the serum. So that could work. And we're exploring, for example, that pneumonia is one of the things that we could do. And you could have an inhalation system where you get it there and that's something that we could explore as well. A little bit depending on where. And so we might be able to use it. But if it's something inside the body, probably not.³⁹⁵

The highly emergent nature of HAMLET-based innovations is vivid here.

In addition to promissory research on biomedical innovations derived from HAMLET, the Hakansson lab also spends a great deal of time studying and describing the mechanisms of *whole* breast milk effects on bacterial pathogens. These include particularly strep pneumo (as it relates to upper respiratory infections and ear infections) and a variety of bacterial pathogens involved in causing dental carries in children.

During my time at the Hakansson Lab, followed Laura Marks, an extremely hard working and prolific MD/PhD student who, at the time, was studying Strep pneumo colonization into biofilms or “communities of bacteria”³⁹⁶ that can form in the nose or upper airway. Dr. Marks was testing the effects of breast milk on these colonies through mouse models. Dr. Hakansson described this research as filling in the gaps left by epidemiological evidence that shows that breastfeeding is protective against ear and respiratory infections:

So now we’re learning how these bacteria cause infection and how they move from sitting behind the nose into the middle ear and down to the lungs to cause pneumonia. The question that comes in is how does human milk protect against that? Because it does. So we know from epidemiological study that it really does. And now we want to know...more what is the mechanism of that. And to do that, we have animal models that we can look at and we can then dissect it down. So when we learn about those, we try to mimic what’s going on in the mouse model in the real world with simpler systems outside where we can use cells and bacteria and kind of Petri dishes and stuff like that.

I followed Dr. Marks as she infected mice with Strep pneumo or saline solution (as a control) in order to observe whether breast milk (some of the mice also had breast milk squirted up their noses) is protective against bacterial colonization. As Dr. Hakansson explained, breastfeeding is messy with breast milk getting in the nose and protecting against infection. I later watched Dr. Marks dissect mice to observe whether bacterial colonization had occurred.

At that time, Dr. Roche-Hakansson was leading a study on the effects of breast milk on childhood caries in an effort to challenge the commonly held view that breastfeeding *causes* cavities. She explained to me that, based on their research, it appears that breastfeeding *prevents* cavities, not causes them.

The Bennett Research Group

While The Hakansson lab conducts microbiology research on breast milk, its components and effects, the Bennett Research Group in Australia³⁹⁷ is, *by definition*, a human lactation research group. I interviewed Dr. John Bennett,³⁹⁸ its founder, at the meetings of the Global Human Milk and Lactation Research Society (GHMLRS) in 2012 meetings in a major European city.³⁹⁹ He described a series of unplanned opportunities that led to his founding the now thriving research group at Australia University.⁴⁰⁰ Dr. Bennett's initial degree was in agriculture and animal husbandry, but he turned towards studying lactation after receiving a scholarship at the University of Sydney to study lactation in dairy cows. He pursued this in a variety of academic and government positions until funding collapsed when Australia entered the common market and the Australian dairy industry began competing its British counterpart highly developed since World War I (Clarke 1998).

In the early 1970s, in a difficult job market, Dr. Bennett obtained a teaching position at Australia University, teaching biochemistry to medical students. At this point, he began research on human lactation as well as lactation in other animals. Finding that he had little competition for funding from government and non-government organizations, he then formed a research group accordingly. In the late 1990s, Dr. Bennett abandoned studying non-human

animal lactation, focusing exclusively on human lactation. His work was, of course, informed by years of studying lactation in other animals. At that point, Dr. Bennett began receiving funding from Flowsave,⁴⁰¹ a breast pump company that sought to become research-based. His group received unrestricted funding from Flowsave ever since.⁴⁰²

Today, the Bennett Research Group investigates the synthesis and secretion of breast milk as well as mechanisms of removal of milk from the breast by the suckling infant or electric breast pump. Drawing on both physiology and biochemistry, they investigate breast growth and development, milk synthesis, milk secretion, milk ejection, mechanisms of breastfeeding and infant appetite. Initially, they developed new technologies for studying lactation, having to move away from dairy methods to more sensitive and less invasive approaches to study smaller volumes of human milk.

Their group has to date developed understandings of the initiation of lactation and milk secretion and developed non-invasive breast measurement systems. They routinely look at the breast in breastfeeding as part of a lactation cycle that includes pregnancy, initiation of lactation, established lactation and weaning. This heterogeneous group includes lactation consultants, biochemists, biologists, nurses engineers and more. Recently, they have included research on preterm babies and their consumption of breast milk using ultrasound technologies and investigation into stem cells in breast milk (discussed below).⁴⁰³

Situating the science of human milk and lactation

Dr. Bennett explained to me that historically, breasts have no medical specialization and their research group is one effort to fill that gap:

You've just got to look at the human body. If your breasts are lactating, you are putting out 30% of your energy that you take in, into that. A lot of fuss is made about the brain, and it takes about 20%. The breast is really important for the development of the baby and we really don't have any medical concern for it *at all*. There's no [medical] model for it. You go to the physician, you have a liver problem, you are sent to a specialist. Neurological problem, neuroscience specialist. Breast problems have *nowhere*. There's the academy of breastfeeding medicine. But, those people are getting lactation consultant qualifications while practicing medicine. But, you know, a gynecologist doesn't do a midwifery course to be a specialist in gynecology or obstetrics. There's just been a complete ignoring of the importance of the breasts!⁴⁰⁴

Dr. Bennett told me that his research group is the only in existence that focuses exclusively on human lactation, although there is a milk genome group at University of California, Davis. Dr. Bennett further explained that "science hasn't really gotten serious about human lactation research at this point," noting that there are, for example, tens of thousands of neuroscience researchers, but are only a hundred or so human lactation researchers.

Our interview took place at the Global Human Milk and Lactation Research Society (GHMLRS) meetings. Dr. Bennett noted that the society's relatively small membership further reflects the small scale of scientific interest in human lactation. Elsewhere, I heard Dr. Bennett refer to GHMLRS as representative of "the hardcore science of breast milk."⁴⁰⁵ Indeed, from my observations at the conference, I found there to be multidisciplinary interest in breast milk with a definite scientific "hard core" bent towards compositional research and away from social science and public health research on breastfeeding. Here, I observed presentations by scientists investigating the composition of breast milk (e.g., on the effects of formula versus breast milk on a baby's microbiome, and on differences in composition between preterm, and term breast milk). But there were also lactation oriented investigations (e.g., genetic and epigenetic research on milk production/composition or the transmission of viral or other

pharmaceutical contaminants through breast feeding). GHMLRS limits its membership to researchers on *human milk and lactation* “with a doctoral degree or equivalent experience and at least two publications in peer-reviewed journals in the field of human milk or lactation.”⁴⁰⁶ It appeared to be mainly composed of bench scientists, physicians, and PhD nurses. Overall, conference content was weighted towards more “hard core” scientific research that did not include any social science research on lactation that may delve more into policy issues.⁴⁰⁷ In contrast, *breastfeeding* research is more a social science area of research (e.g., including questions regarding breastfeeding rates, barriers, and interventions). The fact that GHMLRS brackets a space for more “hard core” science indicates an attempt to set new boundaries for this work with social science research remaining within the broader paradigm of promoting breastfeeding as that which is optimal for infant and population health. Such boundary building is a very common strategy for emergent research specialties (e.g., Clarke 1998; Gieryn 1983).

Stem Cells in Breast Milk

The Bennett Research Group’s investigation of stem cells in breast milk includes but also goes beyond studying their functions in human breasts and breast milk. That is, the group’s research on stem cells in breast milk includes investigations into *why* those stem cells are present which may lead to their banking and/or therapeutic use. At the time of my interviews and observations of the research group (2012 and 2013), these directions were quite tangled. Dr. Bennett explained that some of their “promissory” (Thompson 2005) stem cell research exists at the periphery of their main-stream focus “which is still the clinical assessment of the function of human breasts and breast milk.”⁴⁰⁸ However, I found that the Bennett Group’s research on breast milk stem cells also adds new dimensions to understanding breast milk as a

“magical substance,”⁴⁰⁹ co-producing promises for babies with promises it holds for biomedicine more broadly.

Dr. Nicholas Robinson,⁴¹⁰ the scientist who first discovered stem cells in breast milk while working with the Bennett Research Group in the late 1990s and early 2000s, detailed how the Bennett group has followed three areas of research on stem cells in breast milk. Here, I describe these three areas and suggest that the last one is the most “peripheral” to the group’s mainstream focus as described by Dr. Bennett. First, is “the real exciting area”⁴¹¹ of research on the function of these stem cells in breast tissue. Dr. Robinson explained that when he and others first stumbled on stem cells in breast milk, they were surprised to find not just mammary gland stem cells, as one would expect in the breast, but all other varieties of stem cells including neural, muscle and bone stem cells which do *not* appear in resting (non-lactating) breast tissue, *but* only in breast milk:

Why are neural, why are brain stem cells in the milk? Why is there a muscle stem cell? Why is there a bone stem cell? Those organs don’t even touch milk. You can understand mammary stem cells being in milk because they could just be popping off from the tissue itself. Immune stem cells well you can understand that a little bit as well because there’s immune cells in there and the baby needs immune protection. But neural stem cells? Why is the brain tissue in the milk?...No one knows.⁴¹²

Dr. Robinson believes there must be reasons for these cells in breast milk, even if they remain unknown at present:

And everything in evolution is a mistake to start with, and unsuccessful mistakes don’t survive. But the successful mistakes that give a competitive advantage to an infant survive...There’s nothing there that’s there that doesn’t help the baby. Everything that is in milk has a function, either protecting the mother’s mammary gland, protecting the mom herself. Of course the baby will die without mom, so protect the mom or give that infant something to help it survive better. And so neural cells in breast milk, well there’s a reason for that. And there is animal work showing that these cells do survive digestion and end up in the tissues of the baby.⁴¹³

Researchers in the Bennett Group agree with Dr. Robinson, especially given the high volume of these cells in breast milk, and continue to investigate their functional role in breast tissue and breast milk. The scientist currently researching stem cells in breast milk with the Bennett Group, Dr. Bronwyn Jones, believes that pluripotent stem cells in breast milk are important for the remodeling of the breast toward a milk secretory organ.⁴¹⁴ The group has also done studies that show that these cells remain intact in the infant's digestive tract, transfer to the bloodstream and then integrate into different tissues.⁴¹⁵

Second, Dr. Robinson described the group's cancer research:

Because cancer is caused by stem cells gone crazy, the stem cells that lose control become cancer so they lose their regulation. And at the core of most, if not all, cancer is a stem cell. And so these stem cells gone crazy is the cause of cancer. As such, whenever you find a unique source of stem cells, there's great applications in cancer biology and treating cancer.⁴¹⁶

In interviews and in print, Dr. Jones, has described this aspect of their research as allowing investigation of normal and abnormal biology such as lactation pathologies (e.g., insufficient milk or oversupply of milk) or breast cancer.⁴¹⁷

Lastly, Dr. Robinson described imagined futures and possibilities for developing applications in regenerative medicine with stem cells found in breast milk. He finds this direction especially exciting and groundbreaking "because of the ease of source" of breast milk stem cells that will serve to avoid extracting embryonic stem cells which have "a huge question mark about their ethical nature".⁴¹⁸ In fact, a statement on the ethicality of extracting stem cells from breast milk is included in all the publications on stem cells released by the Bennett Group's lead researcher in this area, Dr. Bronwyn Jones.⁴¹⁹

I spent two days observing and interviewing Dr. Jones while she was collaborating with an American scientist at Coastal University.⁴²⁰ Dr. Jones has referenced in presentations and publications the comparative ethics of extracting stem cells from 1) breast milk, 2) lactating breast tissue (requiring surgical extraction), and 3) embryos. In our interview, she detailed stem cell retrieval from breast milk as the most ethical of these types of extraction, especially because it could replace or reduce embryonic stem cell use (which she found ethically troubling). Further, Dr. Jones stressed that those harvesting breast milk stem cells would harvest them from mothers with excess supply.

At the time of our meeting, Dr. Jones was working on her first publication characterizing stem cells she found in breast milk. She stressed that her first paper would include a *lot* of data because what they are saying is contradictory to what has generally been thought regarding adult stem cells. For that reason, they need to provide considerable evidence to prove their point. She explained that there are those in the field of stem cell research who are opposed to the idea of the existence of pluripotent stem cells in adults. They will therefore insist that in order to be classified as pluripotent stem cells, the stem cells found in breast milk would need to grow tumors when implanted *in vivo*, a usual test for pluripotency. However, breast milk stem cells do not grow tumors but meet her key criteria. Dr. Jones explained that her first paper will show for example that breast milk stem cells *do* pass the other tests of pluripotency in that they differentiate into cells originating from the three germ layers. Instead of claiming pluripotency, the Bennett Group's publications refer to such cells as "embryonic-like stem cells" or "human breast milk stem cells."⁴²¹ Thus the Bennett Group may be viewed as challenging the stem cell classificatory system *per se*.

Dr. Jones made clear that her research was far from offering stem cell banking or possible therapies. Yet, her frequent mention of “ethical source of stem cells” in her publications, presentations and interviews, made it clear that this *possibility* of potential promise anchored her work’s scientific legitimacy and created a significant “buzz” factor.

Like Dr. Hakansson, Dr. Jones was often in the position of having to manage the expectations of members of the public who were excited about her research. She told me about many women contacting her, offering to pay to have their stem cells banked and saved for possible future therapies. Dr. Jones made clear to such callers that the Bennett Group is not a banking company, nor do they have the technology available to bank stem cells at this time. She told them: We don’t know whether breast milk stem cells can be used for any purpose. This is basic science. My interest is to understand the biology and hope they can be used for betterment of society.⁴²²

In fact, I observed one interaction between Dr. Jones and a milk donor to her research who stopped by the lab. In this interaction, Dr. Jones showed the participant her breast milk stem cells under a microscope, and a bar graph that compared them to cells gathered from other participants. It turned out that this participant was diabetic and her breast milk stem cells were different from those of non-diabetic participants. Dr. Jones explained that this participant’s stem cells *did* make pancreatic cells and insulin but at a *lower* rate than the other participants’. The participant became visibly excited at the possibility of injecting these insulin-making cells into the body of someone like herself and the potential avoidance of anti-rejection drugs.⁴²³

When I pursued these interviews with Bennett Group members, knowing that they were funded by Flowsave, I anticipated overtly commercial interests to be expressed by Flowsave and Bennett Group members vis-à-vis the outcomes of their stem cell research. Instead, I heard some references to inquiries from international corporate entities during my interviews but saw no overt movements in these directions. I also saw some *disinterest* among the scientists as to possible commercial applications. In fact, in my interview with Dr. Robinson, at the same time as he expressed genuine enthusiasm for the possibility of regenerative medicine from breast milk stem cells, he stressed that the Bennett group itself is a decidedly *non-commercial* research group, and its partnership with Flowsave is also non-commercial. Dr. Robinson said the Bennett Group's knowledge generation does not directly help Flowsave in developing new products, though it may bolster the company's scientific legitimacy and foster fruitful "talking points" with the lactation community:

Most companies do research to make money. [Flowsave] clearly has to make money on the products to pay the staff and keep investing in research. But the research itself is a *separate* part of the company that *follows its own path*. And what it does, I think it's a truly underappreciated fact that this research actually brings up the knowledge level in the company. It's like you just let the medical research guys just do their thing. If they focus on products they're taking their mind off the game. Let them do their own thing...so [scientists] do all sort of breastfeeding research and [Flowsave] will never make a product. I'd say 95% of research John Bennett has done is never going to lead to a product. But what it's doing is: [Flowsave] staff is being exposed to [research] all the time [and staff] are brought up to such a [high] level. Suddenly, [Flowsave] goes out and talks on a totally different level to the customer than do the competitors. The competitors don't have that research...[Flowsave staff] just have access to these researchers and access to this knowledge that they helped generate. And then, of course, that filters through the company. The sellers get trained on it, they get exposed to it, they see the white papers. And suddenly they're going "I got a really good discussion point with my customers." And so you don't have to contaminate the research to get the benefits for the company. In fact you get more benefits by not contaminating [the research], if that makes sense.⁴²⁴

Although Flowsave holds the Bennett Group's stem cell patents, both Dr. Robinson and Dr. Jones told me that these patents are not intended to make a profit from this research but to protect it from unauthorized use by the formula industry, *which both of them considered to be an unethical application of their research*. Both Dr. Robinson and Dr. Jones spoke of the complexity of breast milk (e.g., cellular, thousands of components, alive) compared to formula ("just nutrition") and how their stem cell research elevates and explores the importance of lactation.

My impression is that the Bennett Group's research on stem cells has been well received by lactation communities, especially given the reputation of the research group for producing cutting edge lactation knowledge. For instance, I attended a mini-conference in The San Francisco Bay Area sponsored by Flowsave showcasing the Bennett Group's current projects. The conference was aimed at lactation consultants and other interested groups and was extremely well attended and the group's research presentations received enthusiastic responses from the audience. However, Dr. Robinson told me about one lactation blogger wrote a well-circulated post that objected to his patenting of innovations derived from human milk. The blogger suggested that such patents indicate secrecy and profit-making intentions and she objected to both.

CONCLUSIONS

This chapter examined three case studies of breast milk circulation in a biomedical mode of reproduction. In each case, we saw the co-construction of technologies/knowledges and economic forms with distinct systems of value and exchange. Further, distinctive ontologies and ethics were built into each of these economic forms concerning both materials (e.g., breast

milk) and subjects (e.g., lactating women, scientists, investors, corporations) and their possible futures.

Prolacta, offered a case with a techno-economic package aimed toward providing the safest, most advanced milk products possible given scientific advances. Eventually, Prolacta built into their model an ethical imperative to make up what they perceived as the failures of non-profit milk banks and to improve access to banked donor milk while also making a profit (“what’s good for them is good for us”). Prolacta also runs a series of feminized “milk banks” that build infrastructure around the viability of an unpaid donor even in the context of a for-profit corporation. This viability is oriented around extending the maternal ethos of giving through donation of breast milk.

In the HAMLET case study, scientists are exploring the promises of breast milk for applications alongside the promises it holds for breastfed babies. We saw how the history of HAMLET research has led some cancer patients to invest a great deal of hope in the promise of ingesting breast milk while Dr. Hakansson's Lab offers a different path for an application that uses a component of breast milk for antibiotic therapy.

At the Bennett Lab, in contrast, researchers are excited by the “ethical” promises offered by applying breast milk stem cells in various ways. Yet, the research remains largely motivated by understanding the role of stem cells in the human breast and in breast milk.

This chapter also resonates with three analytic frameworks that will be fruitful to explore in future iterations.

The Illegitimacy of Breast milk Science

First, underlying these case studies, especially that of the Bennett Research Group is the overall lateness (or possibly slowness) of the development of scientific research on lactation, breast milk and breastfeeding. In her analysis of the illegitimacy of the reproductive sciences Clarke (1998) offers four realms in which controversies have taken place over the past century: “their association with sexuality and reproduction, with controversial social movements, with clinical quackery, and with the ability to create “brave new worlds””(237). She counters these reasons for illegitimacy with countervailing forces that were “requisite for the reproductive scientists to be worth legitimacy risks for scientists and their institutions” (237). These forces were made up of: “emergent markets for scientific knowledge about reproduction, including academic departments of biology, medicine and agriculture, along with birth control, eugenics, and neo-Malthusian movements and philanthropic organizations” (237). It is interesting to think about where the case studies in biomedical reproduction offered in this chapter fit vis-à-vis this framing. It may be that suddenly there are markets for the products of this variant of reproductive science – especially Prolacta’s fortifier.

There is a case to be made, however, that breast milk and breastfeeding science is still not really off the ground. However, this is an empirical question outside of the scope of the data collected. It may be that Flowsave’s hands-off relationship with the Bennett group is indicative of an overall anti-industry chill that runs through scientific research on human milk or breastfeeding that has its own unique dynamics in the reproductive sciences. This is likely related both to not wanting to be compared to with the formula industry nor the histories of wet nursing. Illustratively, when Medolac, a for-profit corporation targeted African American

mothers as milk sellers (without consulting African American lactation communities), there was a rapid and successful objection (see introduction) primarily from African American activists and breastfeeding groups.⁴²⁵ These images below circulated on the Black Mothers Breastfeeding Association Facebook page:



These kinds of images and controversies likely reflect Clarke's analysis of "brave new social worlds" or dystopias that can haunt reproductive sciences. It may be that there are not enough "maverick scientists" (Clarke 2000) who want to do this sort of work given an contentious industrial climate with regards to breast milk and uncertainty around how to negotiate the raced and classed history and contemporary dynamics of breastfeeding. In the introductory chapter, under "background economies and stratified reproduction" I discuss the raced and classed disparities in health and breastfeeding that underlie the exchanges under consideration. As the Medolac controversy makes clear, these disparities come to light when a biomedical mode of reproduction *explicitly* targets a disadvantaged group in order to make a profit.

Classification

Issues of classification, classic STS questions, run through all case studies explored in this chapter and deserve further analysis. These classificatory issues are both scientific and bureaucratic. For instance, are Prolacta banks, in fact, banks? How can HAMLET's mechanisms on cell death be classified given that they are only apoptosis-like? How should embryonic-like stem cells be classified given that they do not meet all the requirements for pluripotency? Recently, Friese (2010) analyzed the classification of chimeras now understood to be "cells and bodies containing DNA from different organisms or species through processes that differ from sexual reproduction" (146). Friese found that "biology alone cannot determine the classification of these interspecies organisms. Rather, categorizing chimeras requires metaphoric, schematic references to more familiar entities [where] culture and biology are tools for classification" (145). Further research on my case studies might illustrate similar strategies.

The Economization of Life

Murphy's (2013) concept of "the economization of life" "names a matrix of practices emergent in the twentieth century that attributed quantitative value to human life relative to macro-economic growth and speculative time instead of ecological or evolutionary logics" (142). She describes this as a historically specific mode of making value in which sex and reproduction became "an experimental milieu for the development of technical infrastructures for governing life and speculating on human value" (Murphy 2013:144). For Murphy, the economization of life includes both "capital accumulation and ignorable, excess life" as constitutive. The case studies in biomedical reproduction that are offered in this chapter reflect experimental modes of making value through experiments involving reproduction and, possibly,

capital accumulation. Missing from these narratives are the ignorable, excess life of “the economization of life” (Murphy 2013:153) but it would be useful to consider what lives those might be.

Chapter 7: Conclusion

This dissertation and Chapter 1 “Introduction” frames “the two donor dynamic” and “the commodification problem” as the central problematics that structure both the historical and contemporary conditions of possibility for human milk exchanges. Chapter 2 “Background Histories and Implications” contextualizes historical and contemporary breastfeeding, wet nursing, milk banking and informal exchanges of milk. Chapters 3 “The Right Milk at the Right Price: Recruitment and Screening at a Human Milk Bank” and 4 “Purification and Stratification: Processing and Distribution at a Human Milk Bank” walk through how value is constructed at HMBANA banks, specifically the Mothers Milk Bank (MMB). These chapters document the logics of surplus, scarcity, safety and care and the ways they choreograph both the two donor dynamic and the commodification problem. We see here how attempts to move banked donor milk (BDM) into the medical mainstream are hindered, sometimes by the MMB’s very own construction of BDM as that which originates from an unpaid donor and is processed and distributed through a stripped down non-profit structure.

Chapter 5 “Health Optimization and the Redistribution of Productive Motherhood: Milk Sharing as Biosocial Exchange and Affective Economy” argues that informal sharing exchanges, often facilitated by the explosion of on-line platforms for sharing milk, construct value through extensions of breastfeeding projects. Milk sharing here is a biosocial affective economy where support is conveyed through the very act of giving milk and experienced through not wasting milk. Chapter 6 “Technoscience and the Future of Milk: Case Studies in a Biomedical Mode of Reproduction” follows the circulations of human milk within three biomedical modes of reproduction (Thompson 2005). Specifically, I examine the making of a human milk based

fortifier, the use of a human milk protein complex (HAMLET) in developing pharmaceuticals and the extraction of stem cells from breast milk. Here, value is constructed both through the promise that human milk holds for infants and the unlocked mysteries or “curve balls” that milk contains for other applications.

CONCLUSIONS AND IMPLICATIONS

Patterns of human milk exchanges are analyzed in this dissertation as distinct economic forms that organize labor, materials, resources, knowledges, technologies and bodies, particularly women and their reproductive abilities. I found that value is constructed within these distinctive economic forms in particular but interacting or blurred ways vis-a-vis both “the two donor dynamic” and “the commodification problem.” Here I briefly offer some observations of how these distinct economic forms negotiate these issues, suggesting some comparative observations that could be further developed. Additionally, I offer some themes that cut across the forms of exchange analyzed.

HMBANA milk banking has addressed “the two dynamic” by constructing a distinct economic form that eschews profit by either the donor or the milk bank. It places explicit limits on when milk can be considered “surplus” by actively monitoring the donor mother/baby dyad for adequate breastfeeding. Further, it places constraints on proper allocation of BDM (through the recipient priority listing) such that a mothers’ viable efforts to breastfeed are not replaced with banked donor milk (BDM), and such that the neediest dyads receive milk first. In many ways, HMBANA has created a constrained economic form for themselves that significantly limits milk procurement (through non-payd donation) and distribution (through a priority listing not exclusively based on ability to pay). As such, MMB is facing pressure from other

economic forms (e.g. Prolacta and Medolac) promised on more “free market” economic forms that are explicitly cutting edge scientific endeavors.

In sharp contrast, informal sharing networks address the two issues introduced by offering a distinct economic form where women as individuals are ethical pioneers (Rapp 1999) responsible for proper assessment of “surplus” and allocation decisions as well as negotiations of safety. These networks rely heavily on breastfeeding projects framed as biosocial (Rabinow 1992) affective economy for continuation. Further, milk sharing networks have addressed the two problems by offering decidedly non-commercial, women-centered forms of organization. Much of the legitimating discourse around milk sharing stresses the development of enduring friendships and relationships through the gifting of milk. While distinctive, there are also echoes of the affective economy (Ahmed 2004) of the La Leche League of the 1960s. However, I also found in milk sharing networks a distinct economic form where meaningful care and support can be experienced as transactional and “gift” receivers can be entrepreneurial in ways that are reminiscent of other peer-to-peer economies that may or may not involve financial transactions.

In the case studies of biomedical modes of reproduction (Thompson 2005), the scientific investigations under consideration dealt with these problems by blending their research on possible promissory innovations with the promise of breastfeeding or breast milk for breastfeeding mothers. In this sense, all these research trajectories were “in the name of breastfeeding” and were framed as somewhat reluctantly or only conveniently commercial, despite their clear biomedicalization (Clarke et al. 2003) of breast milk.

Across the exchanges under investigation, themes of medical neglect or medical indifference to conditions, products or parts of the body emerges. Milk banks have a long history of working toward medical legitimacy and are still working toward achieving this goal. They have recently made enormous strides, but still confront the obstacles of insurance reimbursement and new for-profit entities that may well eclipse non-profit milk banking. Informal milk sharing, as I observed it, is often a response to medical neglect or indifference to various lactation problems, especially insufficient glandular tissue (IGT). This is often identified by mothers themselves when they have exhausted all other explanations for insufficient milk and strategies for milk production. As we saw in the case studies of biomedical reproduction, the science of human milk and breastfeeding is still in its infancy when compared to other specializations, what Hess (2007) calls “undone science.”

The multiple constructions of milk and its rightful circulations form the major theme of this dissertation. Breast milk actively moves through every-day breastfeeding, technologically-mediated breastfeeding projects, informal exchanges (technologically mediated or not), human milk banks and scientific studies, making it a unique substance with multiple enrollments. It is an especially fluid fluid not easily contained within a mother/baby dyad, nor a scientific network, and has been further “liberated” through social media.

What has *not* been brought out enough in this dissertation and requires further research and analytical work are the relationships between the logics uncovered here (of scarcity, surplus, care and safety) and larger social, economic and health disparities that are their very conditions for possibility. That is, the background economies and their generation of stratified reproductions in the form of disparate breastfeeding rates and prematurity rates

deserve integration into the themes of this dissertation and it is my hope that my work will go in this direction.

LIMITATIONS OF THE RESEARCH

Although a situational analysis approach (Clarke 2005) does not promise representativeness, there are some empirical gaps in this dissertation that should be noted given that important perspectives are missing that could strengthen an analysis of human milk exchanges.

The majority of the interviews I conducted with recipients from the Mothers' Milk Bank (MMB) were with community or outpatient recipients. Additionally, most of my interviews conducted with MMB recipients were with outpatient private clients, not MediCal clients whose insurance covered the cost of BDM. The MMB assisted me in recruiting equally both MediCal and private-pay recipients but this gap reflects who responded to letters the MMB sent out on my behalf.

This left a gap in my knowledge of the perspectives held by the parents of the major target recipients for banked donor milk (BDM) – babies in the neonatal intensive care unit (NICU). The MMB kindly generously assisted me with recruitment, but they are only in communication with outpatients, not patients in the NICU. Given privacy concerns and the importance of maintaining good relationships with hospital clients, at the time of research, the MMB leadership was reluctant to facilitate relationships with their hospital clients.

In an effort to reach NICU parents, I recruited through Northern Hospital (pseudonym), a San Francisco Bay Area hospital maternity ward where BDM from the MMB was being introduced and also from which MMB donors had long been recruited. I was unable to reach

recipients this way probably both because I was not present at the site, and because the NICU was just then introducing BDM and did not want to introduce a study to new users.

My research on informal sharing networks did not capture forms of milk exchange conducted within immigrant communities that I heard referenced in many interviews but did not encounter directly. For example, lactation consultants I interviewed at Northern Hospital spoke of having encountered informal exchanges in the hospital, particularly among immigrant communities where sisters or other relatives would nurse a newborn before a new mother's milk came in.

The case studies of biomedical innovation are illustrative but not wholly representative of the growing scientific interest in human milk. Major scientific actors and centers are absent including those working at University of California, Davis, under the direction of Dr. Bruce German, who are investigating the physical, functional and nutritional properties of milk components and applying these as principles for foods. Additionally, I observed at the Global Human Milk and Lactation Research Society (GHMLRS) meetings growing interest in the genetics of human milk and the micro biome. This trend is also missing from my data sources.

Last, this dissertation did not include interviews with donors to the sites of biomedical innovation. I did not recruit Prolacta donors or recipients directly for interviews. The degree of access to Prolacta I did achieve took a great deal of effort on my part. However, one Human Milk 4 Human Babies (HM4HB) organizer had, in the past, donated to Prolacta and told me of her experience. Further access to Prolacta donors was beyond the scope of this dissertation. How these donors experience and reflect on the procurement of their milk toward a biomedical mode of reproduction is therefore missing from this analysis.

FUTURE DIRECTIONS

Given the abundance of data collected for this dissertation, I was unable to analyze all of it with the attention that it deserves. Significantly, I did not analyze my interviews with MMB recipients within this dissertation and donors to the MMB are only analyzed briefly. I chose not to provide this analysis because many of the interviews contained similar perspectives to those found in informal sharing recipients. It would be fruitful to further analyze these interviews and compare the perspectives of the MMB recipients with those who participated in informal sharing networks.

The topic of patterns in human milk exchange has proven to be constantly evolving such that “exiting the field” has been especially challenging. Important developments and perspectives continue to emerge. For instance, at the same time as Medolac has raised controversy around their targeted recruitment of African American milk sellers, some actors in non-profit milk banking have raised the possibility of cooperating with informal sharing networks by offering on site milk testing services or two grades of milk (with higher bacterial load for healthy babies that would otherwise be served within informal networks). These developments are fascinating and merit continued attention.

Most significantly, this dissertation did not provide thorough comparative analysis between the different forms of milk exchange. I do some preliminary conclusions regarding comparative points under “CONCLUSIONS AND IMPLICATIONS” above, to be elaborated in the future, in particular those concerning background economies and stratified reproduction.

This dissertation does not attempt to provide a transnational comparative analysis of human milk banking or informal exchanges. Thus, there is a distinct “American-ness” to this

dissertation that should be acknowledged. Notably, milk banking is very well established in Brazil, the United Kingdom, and Scandinavian countries, with each country having its own histories and practices. Other countries, such as Australia and Canada, have notable advocates for milk banking moving its development forward. At this time, it would be interesting to offer a comparative perspective on some of the issues raised in this dissertation.

Women's health movements received scant attention throughout this dissertation and yet form a great deal of the background for why/how these phenomena are emerging in this way. It would be fruitful to investigate this theme further by looking at comparative areas in the history of women's health.

There are a number of potential areas of erasure in these exchanges that deserve further attention. Most significantly, many NICU recipients are premature babies who come from low-income African American families but this stratification is largely rendered invisible within the milk banking infrastructure. I observed no reference to this underlying stratification which may reflect that milk banking, like other biomedical products and pharmaceuticals can be easily depoliticized in its circulation, even when its reasons for existence may link to issues of social, racial and economic justice. This dynamic deserves further research and analysis as it represents probably the largest instance of invisible users (Star 1991) of BDM.

Overall, this dissertation has opened up analyses into contemporary forms of human milk exchange that are unique but will continue to evolve and possibly be eclipsed by newer forms. It is my hope that all forms of human milk exchange can be evaluated based on their impacts on women, maternal and infant health and that contemporary circulations be

empirically studied rather than judged out of hand without attention to actual patterns and practices.

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- ¹ This strategy was actively opposed by a coalition led by the Detroit-based Black Mothers Breastfeeding Association who questioned how this strategy, which would manufacture the milk into a shelf-stable product for sale to hospitals across the U.S. Retrieved July 12, 2015.
- ² <http://www.theguardian.com/commentisfree/2015/mar/23/for-profit-breast-milk-her-body-her-choice> Retrieved July 12, 2015.
- ³ http://www.nytimes.com/2015/03/21/business/breast-milk-products-commercialization.html?_r=0 Retrieved July 12, 2015.
- ⁴ http://www.nytimes.com/2015/03/21/business/breast-milk-products-commercialization.html?_r=0 Retrieved July 12, 2015.
- ⁵ Interview with Scott Elster, CEO of Prolacta Biosciences, November 19, 2012.
- ⁶ <http://www.newsweek.com/booming-market-breast-milk-335151> Retrieved July 12, 2015.
- ⁷ Interview with Pauline Sakamoto, current president of HMBANA and director of Mothers Milk Bank, November 28, 2011.
- ⁸ Prolacta's main product (a human milk based fortifier) has generally *not* competed with HMBANA's only product (banked donor milk) in that the two products are often used together. However, this might change as Prolacta develops more partnerships with hospitals that are discussed in chapter 6. Little is known about whether Medolac has begun selling their shelf stable product to hospitals as is evidenced in this blog post from the most impressive lay-journalist of "human milk news" Jodeine Chase. <http://bfnews.blogspot.com/2015/01/are-there-any-hospitals-using-medolacs.html>
- ⁹ Interview with Emma Kwasnika, organizer of Human Milk 4 Human Babies, December 15, 2011.
- ¹⁰ <http://www.hc-sc.gc.ca/fn-an/nutrition/infant-nourisson/human-milk-don-lait-maternel-eng.php> Retrieved July 12, 2015.
- ¹¹ <http://www.fda.gov/ScienceResearch/SpecialTopics/PediatricTherapeuticsResearch/ucm235203.htm> Retrieved July 12, 2015.
- ¹² <https://www.hmbana.org/sites/default/files/EMBA%20HMBANA%20Milk%20Sharing%20State%20ment%20FINAL%20January%202015.pdf> Retrieved July 12, 2015.
- ¹³ <http://www.nytimes.com/2014/08/17/technology/in-the-sharing-economy-workers-find-both-freedom-and-uncertainty.html> Retrieved July 12, 2015.
- ¹⁴ http://www.nytimes.com/2015/03/21/business/breast-milk-products-commercialization.html?_r=0 Retrieved July 12, 2015.
- ¹⁵ http://www.wired.com/2011/05/ff_milk/ Retrieved July 12, 2015.
- ¹⁶ Interview with Pauline Sakamoto, current president of HMBANA and director of Mothers Milk Bank, November 28, 2011.
- ¹⁷ Interview with John Bennett (pseudonym), September 29, 2012.
- ¹⁸ A freestanding HMBANA bank located in a building leased from the Santa Clara Valley Medical Center, San Jose, California.
- ¹⁹ a HMBANA bank part of the University of Iowa Children's Hospital, Iowa City, Iowa.
- ²⁰ a HMBANA bank part of the B.C. Women's Hospital and Health Care Center, Vancouver, B.C., Canada

²² I am particularly grateful to Charis Thompson for helping write this section.

²³ Interview with Pauline Sakamoto, current president of HMBANA and director of Mothers Milk Bank, November 28, 2011.

²⁴ Paradoxically, grossness applies to breastfeeding in and of itself and disrupting the mother/baby dyad pushes the potential “grossness” farther, much in the same way that breastfeeding a baby for extended periods of time also elicits “gross” factors.

²⁵ Paradoxically, grossness applies to breastfeeding in and of itself and disrupting the mother/baby dyad pushes the potential “grossness” farther, much in the same way that breastfeeding a baby for extended periods of time also elicits “gross” factors.

²⁶ For example, Black Breastfeeding Week is now held every year and is sponsored by Free to Breastfeed: Voices from Black Mothers, The Black Mothers Breastfeeding Association and Mocha Manual: Motherhood in Color. <http://blackbreastfeedingweek.org/> Accessed September 1, 2015.

²⁷ Panelists included Monique Sims-Harper, Lydia Boyd and Brandi Gates.

²⁸ I am particularly grateful to Charis Thompson for helping write this section and to Kate Darling for her editorial support.

²⁹ The Nestle boycott and emergence of “breast is best” is very much part of the 1970s women’s health movement (Adele Clarke, personal communication). See also Ruzek, Sheryl B. 1978. *The Women's Health Movement: Feminist Alternatives to Medical Control*. New York: Praeger.

³⁰ <http://www.who.int/nutrition/topics/bfhi/en/> Accessed March 10, 2015.

³¹ <https://www.babyfriendlyusa.org/> Accessed March 10, 2015.

³² In contrast, Martucci (2015) suggests that “natural motherhood” and an emphasis on breastfeeding existed continuously in countercultural form throughout the era of “scientific motherhood.” For Martucci, the LLL is an indication of this counterculture but not entirely responsible for a later resurgence in breastfeeding.

³³ Further, as was pointed out to me by Dr. John Bennett (pseudonym), a leading lactation researcher, there is no medical specialty of the breast or its functions. As such breasts and breastfeeding have not been thoroughly medicalized in the same way as other body parts and bodily functions. Interview with John Bennett (pseudonym), September 29, 2012.

³⁴ Physicians, nurses, midwives or independent practitioners can train and qualify to become an “IBCLC” (an international board certified lactation consultant) by the International Board of Lactation Consultant Examiners. This training is not offered within medical or nursing education. <http://iblce.org/> Accessed February 15, 2015.

³⁵ http://www.nytimes.com/2011/03/11/nyregion/11breast.html?_r=2&smid=fb-nytimes&WT.mc_id=NY-SM-E-FB-SM-LIN-BFB-031011-NYT-NA&WT.mc_ev=click Accessed July 27, 2015.

³⁶ E.g., <http://www.newrepublic.com/article/105638/amy-sullivan-unapologetic-case-formula-feeding> Accessed February 10, 2015.

³⁷ In March 2010 as part of the Patient Protection and Affordable Care Act (PPACA), the law now requires employers to provide “reasonable break time and private – non-bathroom – space for mothers to pump milk. The degree to which this law is enforced remains to be seen, and it is likely that women with higher status jobs are more likely to see that the law is

enforced. Blum Blum, Linda. 2000. *At the Breast: Ideologies of Breastfeeding and Motherhood in the Contemporary United States*. Boston, MA: Beacon Press. reminds us that pumping rooms are low cost way to help working moms, much cheaper than reforms like extended paid leaves or on site nurseries. <http://healthland.time.com/2011/02/24/dont-want-the-boss-to-see-your-breasts-government-solicits-feedback-from-breast-feeding-moms-on-new-nursing-breaks-law/>³⁸ http://www.newyorker.com/reporting/2009/01/19/090119fa_fact_lepore Accessed July 1, 2015.

³⁹ This enabled wet nurses to keep up their milk supply given that premature babies took very little and often from a dropper. Also, requiring wet nurses to keep their own babies with them was consistent with “morally redeeming” fallen women, a mandate of reformers in that era (Golden 1996).

⁴⁰ The term “wet nurse” was applied to women who directly breastfed babies and those who sold bottled milk.

⁴¹ It is difficult to separate gratitude from necessity in some accounts. In 1917, the Detroit Women’s Hospital and Infant’s Home collected and distributed over 23,000 ounces over a six month period of time by arranging for young unmarried mothers to stay at the hospital and express extra milk Jones, Frances. 2003. "History of North American Donor Milk Banking: One Hundred Years of Progress." *Journal of Human Lactation* 19(3):313-18.. The women were invited to stay so long as they were producing enough milk.

⁴² Much of this debate depends on what is considered a “milk bank”. By today’s standards, kitchen milk banks would not be considered milk banks, for instance.

⁴³ It is my understanding that by this point kitchen milk banks had ceased to exist and those convened to form HMBANA were hospital-based or affiliated.

⁴⁴ Interview with Francis Jones, B.C. Women’s Provincial Milk Bank director.

⁴⁵ <https://www.hmbana.org/locations> Accessed June 23, 2015.

⁴⁶ In interview with Pauline Sakamoto the executive director of the Mothers Milk Bank in San Jose and current president of HMBANA, she has suggested that HMBANA banks have been able to manage these shortages by reaching out to other HMBANA banks in time of need. On the other hand, Scott Elster at Prolacta told me in interview that the shortages have been catastrophic for NICUs and their orders have not been met by HMBANA banks.

⁴⁷ This was a perspective that was reflected in many of the donors and recipients to informal milk sharing that I interviewed. Similarly, the staff at the Mothers Milk Bank in San Jose reported to me that they had this inaccurate reputation given they serve many Medi-Cal community patients.

⁴⁸ Recently, Prolacta has started paying some of its donors. This is discussed in chapter 6.

⁴⁹ Personal communication with Linda Fentiman.

⁵⁰ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

⁵¹ Rhonda Shaw quoted in

<http://www.guardian.co.uk/society/2007/jan/05/health.medicineandhealth>

⁵² www.washingtonpost.com/wp-dyn/content/article/2007/01/12/AR2007011201849.html

⁵³ www.washingtonpost.com/wpdyn/content/article/2007/01/12/AR2007011201849.html

⁵⁴ <http://www.dailymail.co.uk/femail/article-480407/The-return-wet-nurse.html#>

⁵⁵ <http://normalizebreastfeeding.org/2015/01/breast-milk-donors-rally-for-breastfed-baby-after-tragic-loss-of-mother/> Accessed June 19, 2015.

⁵⁶ <http://www.fda.gov/ScienceResearch/SpecialTopics/PediatricTherapeuticsResearch/ucm235203.htm> Accessed June 19, 2015.

⁵⁷ <http://www.hc-sc.gc.ca/fn-an/nutrition/infant-nourisson/human-milk-don-lait-maternel-eng.php> Accessed June 19, 2015.

⁵⁸ <http://www.lli.org/release/milksharing.html> Accessed June 19, 2015.

⁵⁹ <http://hm4hb.net/> Accessed June 19, 2015.

⁶⁰ https://www.youtube.com/watch?v=YRhsH1UFc_s Accessed June 19, 2015.

⁶¹ <http://jscms.jrn.columbia.edu/cns/2007-04-10/levenson-breastmilkfetish.html>

⁶² <http://jezebel.com/5803416/the-breast-milk-black-market> Accessed June 19, 2015.

⁶³ <http://hm4hb.net/statement-pediatrics/> Accessed June 19, 2015.

⁶⁴ A supplementary nursing system (SnS) or “supplementary feeding device” is...a bottle or a bag filled with expressed breastmilk, banked breastmilk or artificial infant milk, that is worn around the neck or clipped to clothing or hidden in a shirt pocket. Thin tubes leading from the bottle or bag attach to both breasts. The baby then breastfeed from the breast normally. <http://mamadearest.ca/en/download/newman/induced-lactation.pdf> Retrieved March 26, 2015

Women who have had breast surgery, either as a result of cancer, or for cosmetic reasons, may also use supplementary nursing systems in order to maintain a breastfeeding relationship when milk supply is not sufficient. Further, mothers who have hormonal reasons for insufficient milk may employ the strategies involved in induced lactation, particularly taking domperidone.

⁶⁵ It could be argued that the woman as the producer of breast milk is increasingly erased with technoscientific advances around breast milk. This echoes the erasure of the mother as also a patient in fetal surgery as found by Casper, Monica. 1998. *The Making of the Unborn Patient: A Social Anatomy of Fetal Surgery* New Brunswick, N.J.: Rutgers University Press.

⁶⁶ In nearly all geographical locations in the United States, a woman can donate her breast milk to a HMBANA bank through shipping that is paid for by the milk bank but often potential donors are not aware of this and think they can not donate because there is no milk bank in their area. Sakamoto, Pauline, Naomi Bar-Yam and Maryanne Tigchelaar Perrin. 2014. "Research-Based Insights into Increasing the Global Supply and Affordability of Donor Milk." *Breastfeeding Medicine* 9(3):166-67.

⁶⁷ <http://www.babble.com/parenting/i-used-donor-breast-milk-for-my-baby/>

⁶⁸ These authors point to the 2002 World Health Organization declaration that: “For those few health situations where infants cannot, or should not be breastfed, the choice of the best alternative – expressed breast milk from an infant’s own mother, breast milk from a healthy wet-nurse or human milk bank, or a breast milk substituted fed with a cup...depends on individual circumstances” (WHO, UNICEF: Global Strategy for Infant and Young Child Feeding Geneva 2003 Cited in Akre, Briggie and Michin 2011).

⁶⁹ NICUs levels reflect different levels of care, with level 1 referring to basic newborn care for full term babies and level 3 a site of care for “very low weight (<1500 grams) infants who are at

increased risk for NEC, the prevention of which is a major indication for [BDM] use” (Parker, Berrero-Castillero, Corwin, Kavanagh, Belfort and Wang 2013: 383).

⁷⁰ The Mothers Milk Bank (MMB) is also known as the “San Jose Mothers Milk Bank” and sometimes the “California Mothers Milk Bank” but MMB is their official name (Mothers Milk Bank 2014). In 2013 the MMB launched a new website with a new logo and overall branding within a marketing strategy. Emphasizing their true name, the MMB’s website moved from an old URL <<http://sanjosemilkbank.com/>> to a new URL <<http://mothersmilk.org/>> emphasizing their brand. The name “MMB” is significant for two reasons. First, unlike the “San Jose Mothers Milk Bank”, it stresses that the MMB does not just serve the San Jose area, or even just California. In fact, the MMB serves most Western States and Maryland (where, like in California, a tissue bank license is required of milk banks). Second, term “mothers milk bank” itself is a trademarked name of the Human Milk Banking Association of North America (HMBANA), an organization of non-profit milk banks, such that only HMBANA member milk banks may use “mothers milk bank” (HMBANA 2007). This trademarking likely resulted from wanting to separate HMBANA milk banks from Prolacta, a for-profit entity that started making a human milk based fortifier in 2006.

⁷¹ Interview with Pauline Sakamoto, MMB director, November 28, 2011.

⁷² Interview with Pauline Sakamoto, MMB director, November 28, 2011.

⁷³ Interview with Ron Cohen, Medical Director of Mothers Milk Bank. August 23, 2014.

⁷⁴ Interview with Pauline Sakamoto, Executive Director of Mothers Milk Bank. August 23, 2014.

⁷⁵ E.g., Interview with Scott Elster, CEO of Prolacta Bioscience, November 19, 2012.

⁷⁶ Field notes following interview with Susan (pseudonym) the MMB recipient coordinator December 11, 2011. The issue of access to BDM will be further discussed in Chapter 3.

⁷⁷ Field notes following interview with Susan (pseudonym) the MMB recipient coordinator December 11, 2011. The issue of access to BDM will be further discussed in Chapter 3.

⁷⁸ Interview with Ron Cohen, Medical Director of Mothers Milk Bank. August 23, 2014

⁷⁹ Interview with Pauline Sakamoto, Executive Director of Mothers Milk Bank. August 23, 2014.

My interviews with MMB out-patient recipients confirmed that there were unmet requests for milk from those who fell at the bottom of the HMBANA priority listing for dispensed milk.

⁸⁰ “Developing milk bank” refers to a new milk bank that is under the mentorship of a HMBANA milk bank but has not yet met all HMBANA requirements and has not yet started processing milk.

⁸¹ <https://www.hmbana.org/locations> Accessed July 15, 2015.

⁸² Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.

⁸³ Interview with Jean Drulis, Iowa MMB executive director, May 6, 2013.

⁸⁴ Interview with Jean Drulis, Iowa MMB executive director, May 6, 2013.

⁸⁵ “Milk banker” is a term often used by those involved in milk banking to identify membership to or affinity with the milk banking community – e.g. I was often asked during my fieldwork “are you a milk banker? This term is used loosely to include those who volunteer/work at milk banks or exist in a supportive role like a researcher, board member, milk donor, or lactivist mother who advocates for milk banks.

⁸⁶ (what I call informal sharing or what is often called “peer to peer sharing”)

⁸⁷ Dr. Hamilton Spence calculated that Prolacta and HMBANA milk banks collected 2.7 million ounces of milk in 2011 but that there is 16 billion ounces of excess milk 'out there.' "Donor Milk in the NICU- effects and outcomes" presentation given by Erin Hmlton, Spence at HMBANA 2012 meetings in Las Vegas. April 23, 2012.

⁸⁸ Field notes from ethnographic visit to MMB June 8, 2012.

⁸⁹ HMBANA milk banks do not have significant resources to dedicate to marketing. HMBANA has one full time staff member who works out of a volunteer satellite milk bank office and individual milk banks are generally responsible for reaching donors. Prolacta, on the other hand, has a marketing department that is dedicated to reaching donors. For example, Prolacta had long used Google ad sense to promote its donation sites before HMBANA milk banks followed suit. Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

⁹⁰ Field notes from MMB focus group held June 20, 2012.

⁹¹ Rachel (pseudonym) paraphrased in MMB focus group held June 20, 2012.

⁹² In fact, HMBANA banks have struggled with the misperception that a donor needs to live in close proximity to a milk bank in order to donate. They now make efforts to include clarifying statements about how HMBANA banks will pay for "safe overnight transportation at no cost to you. So, don't let the distance between you and a milk bank keep you from calling!"

<https://www.hmbana.org/locations> Accessed June 1, 2015.

⁹³ MMB Facebook website, October 24, 2014. Names are pseudonyms.

⁹⁴ For example, the Miracle Milk Stroll held May 2014 that I attended.

⁹⁵ Interview with Lisa (pseudonym), MMB donor coordinator December 5, 2011.

⁹⁶ Image taken January 18, 2013 as popped up in Google ads.

⁹⁷ MMB Facebook page, June 2, 2014.

⁹⁸ Eats on Feets, for example, the first major global on line milk sharing network launched itself on Facebook in Oct 2010 and has since exploded (splitting into two networks, Eats on Feets and Human Milk 4 Human Babies, HM4HB). The MMB, on the other hand, only joined Facebook in February 2012 and only got going in a more robust sense in 2013. Facebook's key role in developing on-line milk sharing was stressed to me in interview with Emma Kwasnika, one of the founders of HM4HB. Interview with Emma Kwasnika, December 15, 2011.

⁹⁹ "Baby wearing" is a term used to refer to carrying a baby in a baby carrier. Baby wearing is often associated with breastfeeding because often those who advocate for breastfeeding, also advocate for baby wearing as a "bonding" practice that can stimulate milk production and successful breastfeeding. Dr. William Sears, a pediatrician, is the dominant voice of this philosophy.

¹⁰⁰ MMB Facebook page May 19, 2014.

¹⁰¹ Interview with Ron Cohen, Medical Director of Mothers Milk Bank. August 23, 2014.

¹⁰² Interview with Pauline Sakamoto, MMB director, November 28, 2011.

¹⁰³ Numerous staff members at the MMB are certified lactation consultants and the director, herself considers increasing lactation to be one of the primary goals of milk banks. At the same time, the director told me that one of the biggest challenges facing milk banks is lactation promotion in that they have largely failed at this.

¹⁰⁴ Ben Hartman “Milk Banking in Australia” presentation given at 2012 HMBANA meetings in Las Vegas.

¹⁰⁵ WIC has often been criticized for promoting formula feeding by including formula in their free food packages. The pump rental program is part of an attempt to reverse the disincentivising of breast feeding through free formula.

¹⁰⁶ Interview with Pauline Sakamoto, MMB director, November 28, 2011.

¹⁰⁷ The FDA held a meeting with the Pediatric Advisory Committee in 2010 to obtain information on the practices, benefits and risks associated with donation and banking of human milk. No FDA regulation of milk banking resulted from these meetings.

<http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/PediatricAdvisoryCommittee/UCM251799.pdf> Accessed June 10, 2015.

¹⁰⁸ Field Notes from MMB, June 8, 2012.

¹⁰⁹ Interview with Jean Drulis, executive director of Iowa Mothers Milk Bank May 8, 2013. This is consistent with what I observed at the MMB focus group where participants brainstormed how to promote the “good feelings” that can come along with milk donation (rather than payment). Similarly, associations with pressuring donors were discouraged. One focus group participant spoke of not wanting to distribute flyers for the MMB because it was mistaken for corporate marketing material (like chord blood banking). At this point the focus group conversation was steered away from “how to get more brochures out there” to “how to increase the good feelings of milk donation” and how to “promote” awareness of the MMB. Field notes from MMB focus group held June 20, 2012.

¹¹⁰ <https://www.youtube.com/watch?v=qFEQZrwyGy4> Accessed May 1, 2015.

¹¹¹ Interview with Ron Cohen, Medical Director of Mothers Milk Bank. August 23, 2013

¹¹² Interview with Ron Cohen, Medical Director of Mothers Milk Bank. August 23, 2013

¹¹³ Field Notes from MMB, June 8, 2012.

¹¹⁴ Legal scholar Linda Fentiman confirmed by phone that it is not illegal to buy or sell breast milk because it is not considered a tissue under federal law that makes the buying and selling of tissues illegal. She assumed that the reason milk banking is considered a “service” in health and safety code is so that it is not subject to product liability. These issues are beyond the scope of this current research but are nonetheless provocative.

¹¹⁵ Interview with Jean Drulis, executive director of Iowa Mothers’ Milk Bank May 8, 2013.

¹¹⁶ A recurring refrain in interviews with milk banking directors concerned “not being in it to make money” either personally or as a collective undertaking. At the time of research, HMBANA had a very small budget – only enough to hire one administrative staff. Interview with Jean Drulis, executive director of Iowa Mothers Milk Bank, May 8, 2013.

¹¹⁷ Interview with Marjorie (pseudonym), lactation consultant responsible for the introduction of BDM at Northern Hospital (pseudonym).

¹¹⁸ Pseudonym

¹¹⁹ In the one interview I did with a bereaved mother who donated to the milk bank, her donation experience was much more circumstantial than therapeutic but HMBANA newsletters attest to many bereaved donor experiences that bring comfort to mothers whose babies have died.

¹²⁰ That said, I observed that donor coordinators were instructed to treat *all* donors with high levels of sensitivity and care and as such, I see this illustration of bereaved mothers as an extreme example of this. For example, I observed a post-it note on one of the donor coordinator's computer's that reminded her to be friendly and cheerful with all donation inquiries. Field Notes MMB, March 28, 2012.

¹²¹ Interview with Lisa (pseudonym), donor coordinator at MMB December 5, 2011.

¹²² Interview with Tina (pseudonym), donor coordinator at MMB March 8, 2012.

¹²³ Interview with Lisa, donor coordinator at MMB December 5, 2011.

¹²⁴ This notation system can fail. Lisa, a donor coordinator, told me about accidentally following up with a bereaved donor, not realizing that she had was a bereaved donor and had told the other coordinator she had chosen not to donate. Lisa regretted having put pressure on the bereaved donor by following up with her and expressed regret that she had missed her classification as "BD". Interview with Lisa, donor coordinator at MMB December 5, 2011.

¹²⁵ Pseudonym

¹²⁶ The MMB has a policy of not using a mother's milk for distribution to babies after any positive serological test, even if it turns out to have been a false positive. Field Notes from MMB, June 8, 2012.

¹²⁷ Interview with Nicole, MMB donor March 29, 2012.

¹²⁸ During my observations at the Hakanson lab (discussed in chapter 5), Anders Hakansson made reference to buying milk from the MMB and this was the only concrete reference I had to a research study where MMB extra milk went.

¹²⁹ Most milk banks tend to have a minimum donation of 100 oz. (some more)

<https://www.hmbana.org/donate-milk> but this standard is not an official HMBANA requirement, rather it is one that milk banks can adjust depending on their donation needs. I observed this standard ebb and flow at the MMB of CA depending on their need at that time.

¹³⁰ Interview with Patricia (pseudonym), milk donor to informal sharing networks, November 30, 2011.

¹³¹ Interview with Lisa, donor coordinator at MMB December 5, 2011.

¹³² Because HMBANA guidelines are *minimum* standards, some milk banks (prior to the 2013 guidelines) have had stricter rejection practices than others. For example, Colace, a stool softener often taken by mothers after giving birth, has a zero day half life in Hale's book, so you would expect it to also have a zero day deferral period. However, the MMBCA, during the time of my observations, would not accept milk pumped while the mother was taking Colace, while others (e.g. the Mothers Milk bank of Austin) would. Interview with Lisa, donor coordinator at MMB December 5, 2011.

¹³³ Interview with Lisa, donor coordinator at MMB December 5, 2011.

¹³⁴ These are practices that Prolacta, a for-profit manufacturer of human milk based fortifiers, use to assure their milk's purity.

¹³⁵ Field notes from MMB focus group held June 20, 2012.

¹³⁶ Field notes from MMB focus group held June 20, 2012.

¹³⁷ Interview with Nicole, MMB donor March 29, 2012

¹³⁸ Participant observation at the 2012 HMBANA Conference in Las Vegas entitled "Embracing Human Milk in the 21st Century: Practice, research and results." April 23-24, 2012.

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- ¹³⁹ Interview with Jean Drulis, executive director of Iowa Mothers Milk Bank, May 8, 2013.
- ¹⁴⁰ Thompson's (2005) analysis of biomedical reproduction is taken up in chapter 6.
- ¹⁴¹ It would seem that mothers engaged in donating to the MMB are "intensive mothers" to the extreme. However, the picture I got from spending time and interviewing donors was more nuanced and contradictory than that. A number of donors I interviewed did have extreme views about the benefits of breastfeeding and the hazards of formula. However, many others rejected any extreme views that made breastfeeding the pinnacle of successful mothering. Many stressed their views on the importance of tempering the frenzy around breastfeeding. What I am arguing here is not that donors necessarily "believed" in intensive motherhood but rather that they knew the ideology of "intensive motherhood" to be in existence and that the pressures to breastfeed can be felt acutely by those who are unsuccessful.
- ¹⁴² Interview with Molly (pseudonym), MMB donor, November 11, 2011. Molly consulted a lactation consultant who suggested pumping as a means of relief for forceful let down. A forceful let-down is when milk is coming out of the breast too fast and is often a by-product of an over-supply of milk. Babies can be overwhelmed by this, causing them to gag, choke, gasp and dislike nursing or refuse to nurse altogether (Kellymom 2011). Pumping can help with this problem but can also set the production level far too high than one baby requires.
- ¹⁴³ Interview with Kate (pseudonym), MMB donor, November 21, 2011. Engorgement occurs when a mother's milk comes in 3-5 days after birth when breasts begin to feel full and hard. Frequent breastfeeding is usually suggested and pumping only as a last result since it can increase milk supply and make a mother reliant on pumping for relief. (Kellymom 2011).
- ¹⁴⁴ Interview with Lydia (pseudonym), MMB donor, July 8, 2012. A foremilk/hind milk imbalance refers to how breast milk transitions from foremilk (lower fat content) to hind milk (higher fat content) as the baby empties the breast. Babies who breastfeed from mothers with an oversupply may be getting too much foremilk and not enough hind milk because they are filling up before emptying the breast. This can result in digestive or weight gain issues for a baby. (La Leche League 2008) <http://www.llli.org/faq/foremilk.html>
- ¹⁴⁵ Interview with Rupi (pseudonym), MMB donor, November 2, 2012.
- ¹⁴⁶ Interviews with Nicole (pseudonym), MMB donor, March 29, 2012; Amanda (pseudonym), MMB donor, June 25, 2012; and Rachel (pseudonym), MMB donor, July 6, 2012.
- ¹⁴⁷ Interview with Lydia (pseudonym), MMB donor July 8, 2012.
- ¹⁴⁸ Interview with Rachel (pseudonym), MMB donor July 6, 2012.
- ¹⁴⁹ Interview with Rachel (pseudonym), MMB donor July 6, 2012.
- ¹⁵⁰ Interview with Molly (pseudonym), MMB donor November 18, 2011.
- ¹⁵¹ Interview with Amanda (pseudonym), MMB donor June 25, 2012.
- ¹⁵² This contrasts somewhat to the findings of Gerstein Pineau (2012) who found that some donors to the MMB wanted to be paid. However, it may be that her participants were more economically diverse than mine and could have benefitted more relatively speaking from financial payment for milk.
- ¹⁵³ Interview with Rupi (pseudonym), MMB donor, November 2, 2012.
- ¹⁵⁴ Interview with Rupi (pseudonym), MMB donor, November 2, 2012.
- ¹⁵⁵ Interview with Molly (pseudonym), MMB donor, November 18, 2011
- ¹⁵⁶ Interview with Amanda (pseudonym), MMB donor, June 25, 2012.

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- ¹⁵⁷ Interview with Lydia (pseudonym), MMB donor July 8, 2012.
- ¹⁵⁸ Interview with Nicole (pseudonym), MMB donor, March 29, 2012.
- ¹⁵⁹ For example, the MMB website refers to a processing fee on their website in the following: “Our processing fee is \$15.00 per 4-ounce bottle for outpatient recipients and \$9.50 per 2-ounce bottle for hospitals. Currently, MediCal covers outpatient costs and some insurance companies do as well. MMB is actively advocating for policies to ensure that all insurance companies cover donor milk for families who need it. To find out if your insurance covers this cost, call your provider. The Milk Bank will gladly offer extra support for this matter upon request. Shipping charges are additional.” <http://mothersmilk.org/milk-recipients/> Retrieved October 16, 2014.
- ¹⁶⁰ Milk bank leaders situate HMBANA’s non-payment of donors as a safety policy such that undesirable donors are not incentivized to donate, donors do not adulterate their milk, and donors’ babies are not neglected so that a donor’s milk can be donated. (Interview with Jean Drulis, May 6, 2013; Interview with Ron Cohen, August 23, 2013).
- ¹⁶¹ Field notes following interview with Ron Cohen, MMB medical director, August 23, 2013.
- ¹⁶² Interview with Lisa, MMB staff member, December 5, 2011.
- ¹⁶³ Interview with Ron Cohen, MMB medical director, August 23, 2013.
- ¹⁶⁴ Interview with Ron Cohen, MMB medical director, August 23, 2013.
- ¹⁶⁵ In rare circumstances, the MMB can do more than just supply un-screened milk and will supply a small amount of research dollars to outside researchers, as was the case with research undertaken at the University of Northern Carolina by nutritional scientist, Dr. April Fogleman. However, this was the only instance of this kind of funding that I came across and was described as largely one of a partnership and only a nominally a funding mechanism. (Interview with Ron Cohen, MMB medical director, August 23, 2013).
- ¹⁶⁶ Photograph of donor milk reserved for use in research at the MMB. Taken with permission.
- ¹⁶⁷ Field notes, MMB, January 12, 2012.
- ¹⁶⁸ There are areas where the clinical need and efficacy for human milk have started to appear in human milk bank processing, particularly with regard to the issue of nutritional content. One of the divisive issues over the use of BDM is that the nutritional quality is *not* standardized. Some milk banks have started to standardize their nutritional content of their BDM by using milk analyzers while others have rejected this practice citing it unnecessary and too expensive. Interview with Ron Cohen, August 23, 2013.
- ¹⁶⁹ Interview with Ron Cohen, MMB medical director, August 23, 2013. It was unclear whether he meant \$1 per year or per month. In either case, it was a nominal fee.
- ¹⁷⁰ Interview with Pauline Sakamoto, MMB executive director, August 23, 2013.
- ¹⁷¹ Interview with Pauline Sakamoto, MMB executive director, August 23, 2013.
- ¹⁷² Interview with Pauline Sakamoto, MMB executive director, August 22, 2013.
- ¹⁷³ Field notes, MMB, January 12, 2012.
- ¹⁷⁴ Photograph of sample taken for bacteriological testing at the MMB. Taken with permission.
- ¹⁷⁵ Field notes, Prolacta, November 19, 2012.
- ¹⁷⁶ Photograph of pooled milk during processing. Taken with permission at the Iowa MMB.
- ¹⁷⁷ This was a term used by MMB staff, especially the lab director.
- ¹⁷⁸ Interview with Pauline Sakamoto, MMB executive director, August 22, 2013.

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- ¹⁷⁹ Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.
- ¹⁸⁰ Field notes from interview with Scott Elster, CEO, Prolacta, November 19, 2012.
- ¹⁸¹ Field notes from interview with Scott Elster, CEO, Prolacta, November 19, 2012.
- ¹⁸² Field notes from interview with Scott Elster, CEO, Prolacta, November 19, 2012.
- ¹⁸³ Ms. Sakamoto thought that the most probable type of adulteration would be legal pharmaceuticals like pain medications, not addictive illegal drugs that she knew Prolacta was testing for. She did not see the incentive of donating while addicted to drugs given that there is no payment for milk. Interview with Pauline Sakamoto, MMB executive director, August 22, 2013.
- ¹⁸⁴ Field notes, MMB, January 12, 2012.
- ¹⁸⁵ Field notes, MMB, January 26, 2012.
- ¹⁸⁶ Field notes, MMB, November 17, 2011.
- ¹⁸⁷ Field Notes, MMB, March 8, 2012.
- ¹⁸⁸ Field Notes, MMB, January 12, 2012.
- ¹⁸⁹ Field Notes, MMB, January 12, 2012.
- ¹⁹⁰ Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.
- ¹⁹¹ Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.
- ¹⁹² Interview with Pauline Sakamoto, MMB executive director, August 22, 2013.
- ¹⁹³ Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.
- ¹⁹⁴ Interview with Jean Drulis, Iowa MMB executive director, May 6, 2013.
- ¹⁹⁵ Interview with Pauline Sakamoto, MMB director, November 28, 2011.
- ¹⁹⁶ Interview with Jean Drulis, Iowa MMB executive director, May 6, 2013.
- ¹⁹⁷ Interview with Ron Cohen, MMB medical director, August 23, 2013.
- ¹⁹⁸ Interview with Ron Cohen, MMB medical director, August 23, 2013
- ¹⁹⁹ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.
- ²⁰⁰ Interview with Pauline Sakamoto, MMB director, November 28, 2011. The FDA held a meeting with the Pediatric Advisory Committee in 2010 to obtain information on the practices, benefits and risks associated with donation and banking of human milk. <http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/PediatricAdvisoryCommittee/UCM251799.pdf> Accessed June 10, 2015.
- ²⁰¹ Interview with Ron Cohen, August 23, 2013.
- ²⁰² Photo of freezers where BDM separated as “ready” or “waiting”. Taken with permission at the MMB. Cite field notes.
- ²⁰³ Pseudonym
- ²⁰⁴ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.
- ²⁰⁵ “Changing Attitudes: Introducing Donor Milk into the NICU”, presentation given by Ron Cohen at HMBANA 2012 meetings in Las Vegas, April 24, 2012.

²⁰⁶ Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.

²⁰⁷ Interview with Lisa (pseudonym), donor coordinator at MMB December 5, 2011.

²⁰⁸ Interview with Pauline Sakamoto, MMB executive director, August 22, 2013.

²⁰⁹ It was unclear to me whether only unusable milk is sold for research or whether a portion of usable milk is also sold.

²¹⁰ A typical set of bottles of BDM heading out in a shipment. Taken with permission at the MMB.

²¹¹ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²¹² Interview with Jean Drulis, Iowa MMB executive director, email message to author, June 7, 2013.

²¹³ The availability of BDM in a given hospital is generally not a politicized issue given the invisibility of fragile premature babies who may be at risk of NEC (necrotizing enterocolitis), a disease believed to be prevented through human milk. I attended the Miracle Milk Stroll, an awareness and fundraising event for BDM put on by the NEC (Necrotizing Enterocolitis) society and affiliated with the MMB. This type of event tries to garner interest around NEC and possible prevention strategies, particularly human milk, by putting a human face on families that have been impacted by the birth and sometimes death of a premature infant. Field notes from Miracle Milk Stroll, May 2014.

²¹⁴ Pauline Sakamoto speech given at Miracle Milk Stroll, May 2014.

²¹⁵ All hospitals within California that order from the MMB are required to have a tissue bank license because human milk is considered a tissue in California but hospitals outside of California are not required to have a tissue bank license in order to purchase milk from the MMB. For this reason, the MMB is the only milk bank that can sell to hospitals in Maryland where a tissue bank licensing for milk is also required. Interview with Pauline Sakamoto, MMB director, November 28, 2011. Recently, Kaiser hospitals have announced that all of their NICUs will order BDM, a significant victory for HMBANA banking. Interview with Ron Cohen, August 23, 2013.

²¹⁶ I have noticed more mothers and community members getting involved and collaborating in promoting the use of BDM in hospitals, as was evidenced in the recent Miracle Milk Stroll where mothers, milk bank staff and affiliate organizations (the NEC society and Best for Babes) put on a walk to raise awareness and raise funds for milk banking and the NEC society. Field notes from Miracle Milk Stroll, May 2014.

²¹⁷ A typical shipment of BDM at the MMB. Taken with permission.

²¹⁸ There is debate over this fact. See Chapter 1 – Introduction.

²¹⁹ Interview with Jean Drulis, Iowa MMB executive director.

²²⁰ “Donor Milk in the NICU- effects and outcomes” presentation given by Erin Hmlton, Spence at HMBANA 2012 meetings in Las Vegas, April 23, 2012.

²²¹ Interview with Ron Cohen, August 23, 2013.

²²² He listed 1) cost (hospitals are expected to absorb the cost for donor milk because it is usually not reimbursed by insurance companies); 2) pressure from formula companies and 3) ambivalence about the available evidence for the use of donor milk.

²²³ Interview with Dr. Eckhart Ziegler, founder and former medical director of the MMB of Iowa and practicing neonatologist at The University of Iowa Hospital, May 7, 2013.

²²⁴ Pseudonym.

²²⁵ Interview with Dr. Tara Colaizy, University of Iowa, May 6, 2013.

²²⁶ Interview with Ron Cohen, August 23, 2013.

²²⁷ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²²⁸ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²²⁹ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³⁰ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³¹ Interview with Sonia (pseudonym), MediCal out-patient BDM recipient, MMB, October, 26, 2012.

²³² Additionally, older children can access BDM for treatment of metabolic disorders as can adults with cancer, a phenomena discussed briefly in chapter 6.

²³³ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³⁴ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³⁵ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³⁶ Interview with recipient coordinator, Susan (pseudonym), December 7, 2011.

²³⁷ “Shared” is the term used by many who exchange milk informally without financial compensation for the donor. “Milk matches” is often used to identify the match made between a donor and recipient.

²³⁸ A supplemental nursing system (SnS) is a lactation device that mothers who are either struggling to produce enough breast milk or who are attempting to re-lactate/induce lactation use in order to simultaneously stimulate milk production through the infant’s suckling and provide nutrition to the infant. An SnS is made up of a tube that is attached to the breastfeeding mothers’ (or fathers’) nipple and supplies pumped breast milk, donor human milk, or infant formula while the infant breastfeeds directly. They are often used in neonatal intensive care units (NICUs) but are also used in the community as is evidenced in my participants who struggled to attain exclusive supply or who induced lactation.

²³⁹ These figures are drawn from www.hm4hb.net/community-pages/#CA accessed January 22, 2015. These figures appear to be under-reporting the number of actual pages in operation.

²⁴⁰ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

²⁴¹ I say “health problem” because the inability to breastfeed (exclusively) is not a typical health problem, though there may be more typical health problems related to this (e.g., breast cancer, a baby’s prematurity, etc.).

²⁴² It could be argued that there is no overt “biomedical intervention” for lactation “failure” and that the fields responsible for lactation support are marginalized from the medical mainstream.

²⁴³ It appears that breastfeeding promotion discourse is moving away from “breast is best” messaging towards an emphasis on normalizing breastfeeding. For instance, the California Breastfeeding Coalition, a collective of breastfeeding advocates, names “normalization” as one of the barriers that needs to be overcome in order for breastfeeding rates to increase. At a recent conference, many speakers made reference to the failure of the “breast is best” messaging.

²⁴⁴ Interview with Patricia (pseudonym), donor, November 30, 2011.

²⁴⁵ Interview with Ellen (pseudonym), recipient, March 1, 2012.

²⁴⁶ Interview with Vanessa (pseudonym), recipient, October 27, 2011.

²⁴⁷ Interview with Lisa (pseudonym), recipient, October 13, 2011.

²⁴⁸ Interview with Debby (pseudonym), recipient, November 2, 2012.

²⁴⁹ Interview with John (pseudonym), recipient, April 2, 2012.

²⁵⁰ Interview with Jennifer (pseudonym), donor, December 2, 2011.

²⁵¹ Interview with Rene (pseudonym), recipient, April 15, 2012.

²⁵² Interview with Dan (pseudonym), recipient, April 15, 2012.

²⁵³ Guilt itself is a hotly debated affect in the public and professional literature on breastfeeding: is it appropriate for mothers who can't or choose not to breastfeed to feel guilt? If so, is it appropriate to employ guilt tactics in promoting breastfeeding?

²⁵⁴ This in and of itself is a contentious issue in pediatrics and lactation support. Many lactation experts will argue that pediatricians are too quick to suggest supplementation, particularly because weight charts are based on formula feeding. Many mothers who are keen breast feeders know about this possible source of pressure and are inclined to resist it.

²⁵⁵ Interview with Vanessa (pseudonym), recipient, October 27, 2011.

²⁵⁶ Interview with Ellen (pseudonym), recipient, March 1, 2012. Unlike Ellen, some non-birth mothers do choose to induce lactation. Gina, an adoptive mother who induced lactation because she hoped to get the same feeling of bonding that she had with her older biological child referred to her inducing lactation as "one of the coolest things I've ever done in my life" but cautioned that she would never say that mothers in her position should feel that they *should* induce lactation and be made to feel guilty if they don't. Interview with Gina (pseudonym), adoptive mother who induced lactation, November 21, 2011.

²⁵⁷ Interview with Chris (pseudonym), recipient, February 4, 2012.

²⁵⁸ Additionally, I interviewed one recipient, Ingrid who, when she could not produce enough milk and felt she had already claimed enough donor milk, made her own formula as a strategy to avoid commercially prepared formula. Interview with Ingrid, recipient, March 27, 2012.

²⁵⁹ Photo from Interview with Vanessa (pseudonym), recipient, October 27, 2011.

²⁶⁰ Interview with Carina (pseudonym), recipient, July 9, 2012.

²⁶¹ Interview with Lisa (pseudonym), recipient, October 13, 2011.

²⁶² Interview with Vanessa (pseudonym), recipient, October 27, 2011.

²⁶³ Interview with Rene (pseudonym), recipient, April 15, 2012.

²⁶⁴ MOBI stands for Mothers Overcoming Breastfeeding Issues. For Carina, this website helped her "redefine her success" a term used throughout the website and by the LLL advice book for women breastfeeding after breast surgeries.

²⁶⁵ Interview with Carina (pseudonym), recipient, July 9, 2012.

²⁶⁶ Interview with Ingrid, recipient, March 27, 2012.

²⁶⁷ Interview with Lisa (pseudonym), recipient, October 13, 2011.

²⁶⁸ Interview with Carina (pseudonym), recipient, July 9, 2012.

²⁶⁹ The ardent breastfeeding practices that I encountered in my fieldwork (e.g., pumping around the clock, using supplemental nursing systems, etc.) are part of a resistance to immediate supplementation with commercially prepared formula. In addition, one recipient

told me about how she made her own formula. Interview with Ingrid (pseudonym), recipient, March 27, 2012.

²⁷⁰ Interview with Carla (pseudonym), donor and recipient, November 25, 2011.

²⁷¹ Interview with Lindsay (pseudonym) recipient, February 23, 2012.

²⁷² Interview with Jennifer (pseudonym), donor, December 2, 2011.

²⁷³ Interview with Jennifer (pseudonym), donor, December 2, 2011.

²⁷⁴ Interview with Vivienne (pseudonym), donor, March 5, 2012.

²⁷⁵ Interview with Dorothy (pseudonym), donor, December 13, 2011.

²⁷⁶ Interview with Dorothy (pseudonym), donor, December 13, 2011.

²⁷⁷ Interview with Jennifer (pseudonym), donor, December 2, 2011.

²⁷⁸ Interview with Margot (pseudonym), donor, June 15, 2012.

²⁷⁹ Interview with Dorothy (pseudonym), donor, December 13, 2011.

²⁸⁰ Interview with Margot (pseudonym), donor, June 15, 2012.

²⁸¹ Interview with Dorothy (pseudonym), donor, December 13, 2011.

²⁸² Interview with Margot (pseudonym), donor, June 15, 2012.

²⁸³ Interview with Jennifer (pseudonym), donor, December 2, 2011.

²⁸⁴ Interview with Dorothy (pseudonym), donor, December 13, 2011.

²⁸⁵ Prolacta generally does not pay donors for its sourced breast milk. However, recently, it launched a milk bank “Tiny Treasures” that pays mothers \$1/ounce for milk. It is thought that this is an effort to compete with Medolac that pays all its donors. Interview with Jodeine Chase, human milk news blogger and lactation activist. September 6, 2016.

²⁸⁶ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

²⁸⁷ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

Not all those I spoke to in milk sharing communities were as sympathetic to milk banking and their need to charge individuals for milk. Some thought milk banks were all for-profit entities, and others thought milk banks should be prevented from charging for milk at all.

²⁸⁸ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

²⁸⁹ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

²⁹⁰ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011.

²⁹¹ There are complications to an individual parent’s centrality when donor communities spring up around a particular baby in need of milk, e.g., when a mother has died after childbirth, or is undergoing medical treatment and cannot breastfeed. In such cases, a friend of the mother, the father, or a family member will rally communities around donating milk. For example this recent California case where a mother with a newborn died unexpectedly of cardiac arrest http://www.huffingtonpost.com/2015/01/12/breast-milk-donation-liz-marquez-milk-for-brixton_n_6457694.html retrieved February 8, 2015.

²⁹² This research only examines milk *sharing* where milk is exchanged without financial compensation. My attempt to recruit individuals who had bought or sold milk through informal exchanges was unsuccessful. Likewise, my attempt to recruit the founder of onlythebreast.com (the major site where buying and selling occurs) for interview was also unsuccessful.

²⁹³ Interview with Emma Kwasnika, organizer of HM4HB Global Network, December 15, 2011

²⁹⁴ Interview with Vivienne (pseudonym), donor, March 5, 2012.

²⁹⁵ Interview with Fiona (pseudonym), recipient, March 20, 2012. At the same time, I was often told of spouses who were much more concerned about the safety of milk sharing than the recipient mother who spearheaded the search for milk. For instance, I heard of two recipient fathers who found it especially troubling to involve more and more donors, increasing the odds of viral or bacterial contamination and encouraged their partners to stop seeking milk.

²⁹⁶ Interview with Samantha (pseudonym), recipient, March 15, 2012.

²⁹⁷ Interview with Vanessa (pseudonym), recipient, October 27, 2011.

²⁹⁸ I observed that when cross-nursing was involved, it was usually following an already established friendship or, at least, face-to-face relationship of some sort (e.g. membership to a play group) that might have been strengthened as a result of the cross-nursing or may have just been part of the relationship as it stood.

²⁹⁹ Participants who met each other through Facebook platforms for milk sharing often became “friends” on Facebook and, as such, were able to see photos of each other’s children. This type of friendship, however, did not usually develop into a face-to-face friendship.

³⁰⁰ Interview with Nancy (pseudonym), recipient, April 12, 2012.

³⁰¹ Interview with Lisa (pseudonym), recipient, October 13, 2011.

³⁰² Interview with Nancy (pseudonym), recipient, April 12, 2012.

³⁰³ Interview with Vanessa (pseudonym), recipient, October 27, 2011.

³⁰⁴ Interview with Vanessa (pseudonym), recipient, October 27, 2011.

³⁰⁵ Photo from Interview with Debby (pseudonym), recipient, November 2, 2012.

³⁰⁶ “Stash” was the word I heard used most often to describe a donor or recipient’s stockpile of her own or another’s pumped milk, as in “I have a good stash” or “my stash is low”.

³⁰⁷ Interview with John (pseudonym), recipient, April 2, 2012.

³⁰⁸ Photo of poster taken at Facebook protests, Monday February 6, 2012. Group photo published in San Francisco Chronicle article Breastfeeding moms hold Facebook nurse-in protest

<http://www.sfgate.com/business/article/Breastfeeding-moms-hold-Facebook-nurse-in-protest-3087893.php#photo-2281964> Accessed July 15, 2015.

³⁰⁹ “Bennett Group” is a pseudonym used to protect the anonymity of scientist-participants who did not wish to be named.

³¹⁰ <http://www.donormilk.com/> Accessed July 14, 2015.

³¹¹ “Global Human Milk and Lactation Research Society (GHMLRS)” is a pseudonym used to protect the anonymity of scientist-participants who did not wish to be named.

³¹² “Flowsave” is a pseudonym for an industry funder used to protect the anonymity of scientist-participants who did not wish to be named.

³¹³ In the sites discussed in this chapter, the potential for subsuming wet nursing (or paid breast milk production) under the biomedical mode of reproduction is cautiously done by Prolacta and overtly done by another competing company, Medolac, discussed in the introductory chapter.

³¹⁴ Although the narratives focused on there were that of when production is out of kilter (under or over), breastfeeding itself, even when smooth, requires time, technique, and effort, although discourses vary to the extent this work is pleasurable or laborious

³¹⁵ This is not to say that breastfeeding isn’t laborious work. Many breastfeeding mothers who I interviewed were acutely aware of the amount of work breastfeeding or pumping can be, even

if they themselves found breastfeeding easy or pleasurable and even if they unquestioningly framed breastfeeding (and donating pumped milk) within unpaid maternal care duty/work.

³¹⁶ Field notes from interview with Martin Lee, Chief Scientific Officer of Prolacta, January 31, 2013.

³¹⁷ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012

³¹⁸ Field notes from observations at Mothers Milk Bank, October 28, 2011, November 12, 2011 and November 28, 2011.

³¹⁹ Prolacta web presence avoids the term “biotechnology” likely to avoid the connotations with that term.

³²⁰ Field notes from interview with Pauline Sakamoto June 8, 2012.

³²¹ Interview with Pauline Sakamoto November 28, 2011.

³²² Frances Jones “HMBANA Topics” HMBANA Conference “Embracing Human Milk in the 21st Century” April 2010.

³²³ Interview with Frances Jones, director of British Columbia Women’s Milk Bank July 17, 2012.

³²⁴ <http://www.prolacta.com/find-a-milk-bank> retrieved March 18, 2015

³²⁵ Field notes from interview with Scott Elster, November 19, 2012.

³²⁶ Interview with Pauline Sakamoto November 28, 2011.

³²⁷ From 2007: <http://www.breastfeedingsymbol.org/2007/09/02/thinking-of-donating-your-breastmilk-read-this-first/> and, more recently: <http://bfnews.blogspot.com/2012/08/us-company-prolacta-milks-donors.html> I happened to come across an add for Milkin’ Mamas, a Prolacta affiliated milk bank in a 2006 issue of “Mothering Magazine”. Indeed, there was no mention of Prolacta in the print ad, but for a line at the bottom that read “For profit bank. Donations made to a 3rd Party”.

³²⁸ Field notes from interview with Scott Elster, Chief Executive Officer of Prolacta, November 19, 2012.

³²⁹ Interview with Pauline Sakamoto November 28, 2011.

³³⁰ See website from 2003 at

<http://web.archive.org/web/20030922041458/http://prolacta.com/> Retrieved March 10, 2015 and more recently at <http://www.prolacta.com/>

³³¹ prolacta.com Retrieved March 10, 2015.

³³² Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³³³ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³³⁴ See Human Milk News <http://bfnews.blogspot.com/2012/08/us-company-prolacta-milks-donors.html> Retrieved March 18, 2015.

³³⁵ It is outside the scope of this research to address whether Prolacta’s donors are in-fact informed about the chains of custody for their milk donations as I did not interview Prolacta’s donors. My use of “offering strategies” is to mark the way Prolacta is interacting with this potential issue.

³³⁶ See chapter 2 for a historical review of the different models that have been offered for the circulation of milk in North America. There are elements of “new” and “old” in what Prolacta is

offering but I say “new” here to differentiate it from HMBANA as previously holding the contemporary monopoly on formal milk exchanges.

³³⁷ Field notes from interview with Scott Elster, Chief Executive Officer of Prolacta, November 19, 2012.

³³⁸ <http://www.prolacta.com/faqs> and <http://www.prolacta.com/find-a-milk-bank> Retrieved March 10, 2015. Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³³⁹ Retrieved March 10, 2015. Since conducting interviews at Prolacta, they have begun offering another milk bank “Tiny Treasures” that pays donors \$1 per oz. donated. I was unable to ask the executive director about this new strategy but I discuss it in this chapter as related to their previous hesitation to pay donors.

³⁴⁰ Field notes from interview with Scott Elster, November 19, 2012.

³⁴¹ See Human Milk News <http://bfnews.blogspot.com/2012/08/us-company-prolacta-milks-donors.html> Retrieved March 18, 2015.

³⁴² E.g., The “Milkin’ Mamas” <http://www.milkinmamas.com/about-us/> and The National Milk Bank <http://www.nationalmilkbank.org/index.php/about-us/what-we-re-about>

³⁴³ <http://www.nationalmilkbank.org/index.php/about-us/what-we-re-about> Retrieved March 10, 2015.

³⁴⁴ This is a difficult fact to find and is buried in their website but was confirmed to me in interview with Mr. Elster. Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁴⁵ <http://www.breastmilkproject.org/about/> Retrieved March 10, 2015.

³⁴⁶ <http://www.prolacta.com/find-a-milk-bank> Retrieved March 10, 2015. Field

³⁴⁷ HMBANA banks in Canada (like other milk banks around the world) likely do not experience this kind of financial strain in that they receive a higher degree of state based support. For instance, the B.C. Women’s Provincial Milk Bank located in Vancouver, B.C., Canada, is housed within a provincially funded hospital and distributes milk according to a federally funded universal health insurance program. (Interview with Frances Jones, director of the B.C. Women’s Provincial Milk Bank, July 17, 2012). At the time of interview, this milk bank was the only one in Canada. Since that date, HMBANA banks have opened in Calgary and Toronto, Canada.

³⁴⁸ Interview with Pauline Sakamoto November 28, 2011.

³⁴⁹ http://www.prolacta.com/data/sites/14/media/press_release_pdf/2013-06-18_Prolacta_Bioscience_Announces_Donor_Breast_Milk_Supply_Program_for_Preemies_in_Hospital_Neonatal_Intensive_Care_Units.pdf Retrieved March 10, 2015.

³⁵⁰ http://www.prolacta.com/data/sites/14/media/press_release_pdf/2013-06-18_Prolacta_Bioscience_Announces_Donor_Breast_Milk_Supply_Program_for_Preemies_in_Hospital_Neonatal_Intensive_Care_Units.pdf Retrieved March 10, 2015.

³⁵¹ Field notes from interview with Martin Lee, Chief Scientific Officer of Prolacta, January 31, 2013.

³⁵² Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012. See also Prolacta’s early website from 2003 where they voiced the desire to “support”

non-profit human milk banking.

<http://web.archive.org/web/20030922041458/http://prolacta.com/> Retrieved March 10, 2015

³⁵³ Field notes from interview with Martin Lee, Chief Scientific Officer of Prolacta, January 31, 2013.

³⁵⁴ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁵⁵ Field notes from interview with Martin Lee, Chief Scientific Officer, Prolacta, January 31, 2013.

³⁵⁶ See <http://www.prolacta.com/our-intellectual-property>

³⁵⁷ HMBANA publications are made available for purchase on-line at

<https://www.hmbana.org/publications> Retrieved July 14, 2015.

³⁵⁸ "Redundant" was the term used by Scott Elster to refer to the repetitive nature of their testing and seeming "redundancy".

³⁵⁹ Field notes from interview with Martin Lee, Chief Scientific Officer, Prolacta, January 31, 2013.

³⁶⁰ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012 and field notes from interview with Scott Eaker, Vice President of Quality, Prolacta, November 19, 2012.

³⁶¹ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁶² Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁶³ [http://www.prolacta.com/data/sites/14/media/products/MKT-0173%20Rev-1%20Prolactas%20State-of-the-](http://www.prolacta.com/data/sites/14/media/products/MKT-0173%20Rev-1%20Prolactas%20State-of-the-Art%20Testing,%20Screening,%20and%20Standardized%20Production%20Process.pdf)

[Art%20Testing,%20Screening,%20and%20Standardized%20Production%20Process.pdf](http://www.prolacta.com/data/sites/14/media/products/MKT-0173%20Rev-1%20Prolactas%20State-of-the-Art%20Testing,%20Screening,%20and%20Standardized%20Production%20Process.pdf)

Retrieved March 10, 2015.

³⁶⁴ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁶⁵ <http://www.milkinmamas.com/faq/> Accessed March 10, 2015.

³⁶⁶ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁶⁷ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁶⁸ I have emailed to the CEO of Prolacta to inquire about this new payment program (have their technologies improved to allow for payment?) but it was not in effect at the time of interview.

³⁶⁹ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁷⁰ <http://www.milkinmamas.com/faq/> Retrieved March 10, 2015.

³⁷¹ Field notes from interview with Scott Elster, Chief Executive Officer, Prolacta, November 19, 2012.

³⁷² Field notes from interview with Martin Lee, Chief Scientific Officer, Prolacta, January 31, 2013.

³⁷³ Field notes from interview with Martin Lee, Chief Scientific Officer, Prolacta, January 31, 2013.

³⁷⁴ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁷⁵ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁷⁶ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁷⁷ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁷⁸ Interview with Howard Cohen, MMB recipient, March 22, 2012.

³⁷⁹ http://www.cohensw.com/mvpcsg_nov99_text.html Retrieved March 10, 2015.

³⁸⁰ Interview with Barbara Cohen, wife of MMB recipient, March 22, 2012.

³⁸¹ Interview with Howard Cohen, MMB recipient, March 22, 2012.

³⁸² Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁸³ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁸⁴ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁸⁵ Interview with Emily Clementi, Hakansson Lab, November 28-30, 2012.

³⁸⁶ Hakansson Lab website. Retrieved March 10, 2015. Accessed at <http://www.acsu.buffalo.edu/~andersh/research/HAMLET.asp>

³⁸⁷ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁸⁸ Field notes from Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁸⁹ Field notes from Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁹⁰ Interviews with Hazeline Roche-Hakansson, Hakansson Lab, November 28-30, 2012.

³⁹¹ Interviews with Hazeline Roche-Hakansson, Hakansson Lab, November 28-30, 2012.

³⁹² "Building a biotech industry: 277 companies and counting - The Buffalo News." Retrieved March 10, 2015 from <http://www.buffalonews.com/business/prospectus/building-a-biotech-industry-277-companies-and-counting-20140126>

³⁹³ Field notes from Interviews with Anders Hakansson and Hazeline Roche-Hakansson, Hakansson Lab, November 28-30, 2012

³⁹⁴ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁹⁵ Interviews with Anders Hakansson, Hakansson Lab, November 28-30, 2012

³⁹⁶ Field notes from interviews with Laura Marks, Hakansson Lab, November 28-30, 2012.

³⁹⁷ "Bennett Research Group" is a pseudonym used to protect the identity of scientists who wished not to be identified.

³⁹⁸ Pseudonym

³⁹⁹ GHMLRS is a pseudonym used to protect the anonymity of scientist-participants who did not wish to be named.

⁴⁰⁰ Pseudonym

⁴⁰¹ Pseudonym

⁴⁰² Interview with John Bennett (pseudonym), September 29, 2012.

⁴⁰³ Interview with John Bennett (pseudonym), September 29, 2012.

⁴⁰⁴ Interview with John Bennett (pseudonym), September 29, 2012.

⁴⁰⁵ John Bennett conference presentation, at "Research Updates from Australia" (pseudonym), Walnut Creek, CA, April 27, 2012.

⁴⁰⁶ GHLMRS Website (No URL given because this is a pseudonym). Accessed May 10, 2015.

⁴⁰⁷ Thank you to Dr. Ifeyinwa Asiodu for helping me with this analysis.

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- ⁴⁰⁸ Interview with John Bennett (pseudonym), September 29, 2012.
- ⁴⁰⁹ Interview with Bronwyn Jones (pseudonym), February 14, 2012.
- ⁴¹⁰ Pseudonym
- ⁴¹¹ Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴¹² Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴¹³ Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴¹⁴ Publication of Dr. Bronwyn Jones (pseudonym).
- ⁴¹⁵ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012. Publication of Dr. Bronwyn Jones (pseudonym).
- ⁴¹⁶ Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴¹⁷ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012.
- ⁴¹⁸ Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴¹⁹ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012. Publication of Dr. Bronwyn Jones (pseudonym).
- ⁴²⁰ Pseudonym
- ⁴²¹ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012.
- ⁴²² Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012.
- ⁴²³ Field notes from interview with Bronwyn Jones (pseudonym), February 14, 2012.
- ⁴²⁴ Interview with Dr. Nicholas Robinson (pseudonym), September 28, 2012.
- ⁴²⁵ <http://parenting.blogs.nytimes.com/2014/12/03/inviting-african-american-mothers-to-sell-their-breast-milk-and-profiting/> Retrieved July 14, 2015.
- ⁴²⁶ Black Mothers Breastfeeding Association <https://www.facebook.com/BMBFA?fref=ts> Posted January 13, 2015 and January 15, 2015. Retrieved July 14, 2015.

Appendix A: Participants Summary

Pseudonym	Donor or Recipient	Context of informal sharing	Current or former occupation	Current or former occupation of partner	Relationship status and/or Sexual Orientation	Annual family income	Highest Level of Education	Year of Birth	Gender identity	Self-identified Race or Ethnicity	Grew up Rural or Urban	Likely to Vote in U.S. Elections	Health Insurance Status
Amanda	Formal Donor	Pumped to return to work; developed unneeded supply; continued to pump to donate.	Lactation consultant	Product supervisor in biotech	Heterosexual marriage	More than \$75,000	College degree	1979	Female	Caucasian	Rural	Democrat	Insured through employer
Kate	Formal Donor	Accidentally caused an oversupply by pumping to relieve engorgement; Donated unneeded supply to milk bank.	Clinical psychologist in private practice.	Product developer	Heterosexual marriage	More than \$75,000	Postgraduate degree	1975	Female	White and Japanese	Urban	Democrat	Insured through husband's employer
Lydia	Formal Donor	Pumped to manage lactation problems and developed unneeded supply; Donated to milk bank.	Paralegal	Accountant	Heterosexual marriage	More than \$75,000	College degree and certificate program.	1980	Female	Caucasian	Rural	Democrat	Insured through employer
Molly	Formal Donor	La Leche League leader who wanted to be a milk bank donor before birth of child; Pumped extra in order to donate to the milk bank.	Stay-at-home Mom; former English as a second language teacher.	Cancer researcher	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1976	Female	Caucasian	Rural	Democrat	Insured through husband's employer
Nicole	Formal Donor	Donated to milk bank after two separate births. The first time because she developed an unneeded supply because her baby was intolerant to her milk. The second time because her baby died and she had developed a supply of pumped milk.	Vice president in nonprofit sector.	Translator	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1973	Female	Latina	Urban	Does not vote	Insured through employer
Rachel	Formal Donor	Wanted to donate from early pregnancy; developed stockpile of pumped milk for donation to milk bank.	Engineer	Engineer	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1982	Female	Caucasian (Greek/Tail an)	Urban	Democrat	Insured through husband's employer
Rupi	Formal Donor	Pumped in order to return to work and maintain supply; donated unneeded supply to milk bank.	Researcher	New business development	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1978	Female	Asian (Indian)	Urban	Democrat	Insured through employer
Michelle	Formal Recipient (in-hospital and private-pay out-patient)	Insufficient supply following premature birth and baby's hospitalization in the NICU; received banked donor milk in hospital and bought milk upon return home directly from milk bank.	Esthetician	Store manager at grocery store	Heterosexual marriage	More than \$75,000	High school degree	1975	Female	Hispanic - Puerto Rico and Mexican	Urban	Other	Insured through husband's employer
Debbie	Formal Recipient (in-hospital); Informal recipient.	Received banked donor milk in the hospital following child's illness. Unexplained low supply; possibly tongue tie. Acquired pumped milk through milk sharing websites.	Stay-at-home Mom	Programmer	Heterosexual marriage	More than \$75,000	Some college	1976	Female	Mixed race: South East Asian, Native	Rural	Other	Insured through husband's employer
Samantha	Formal Recipient (in-hospital); Informal Recipient.	Low supply following premature birth of twins; received BDM in the hospital; also received pumped milk through doula referrals and milk sharing websites.	Stay-at-home Mom; former attorney.	Attorney	Heterosexual marriage.	\$35-50,000	Postgraduate education or degree	1968	Female	White	Suburban	Unknown	Self-insured through private insurance.
Debbie	Formal Recipient (in-hospital); Informal Recipient.	Unexplained low supply; possibly tongue tie; also received banked donor milk in the hospital. Acquired pumped milk through milk sharing websites.	Stay-at-home Mom	Programmer	Heterosexual marriage	More than \$75,000	Some college	1976	Female	Mixed race: South East Asian, Native	Rural	Other	Insured through husband's employer
Samantha	Formal Recipient (in-hospital); Informal Recipient.	Low supply following premature birth of twins; also received BDM in the hospital; received pumped milk through doula referrals and milk sharing websites.	Stay-at-home Mom; former attorney.	Attorney	Heterosexual marriage.	\$35-50,000	Postgraduate education or degree	1968	Female	White	Suburban	Unknown	Self-insured through private insurance.
Erin	Formal Recipient (MediCal out-patient)	Lactation problems leading to the baby getting inadequate nutrition. Was able to access banked donor milk through MediCal.	Unemployed	N/A	Separated from heterosexual marriage	Less than \$15,000	College degree	1980	Female	Caucasian	Urban	Does not vote	Baby on Med/Cal; Mother uninsured
Sonia	Formal Recipient (private-pay out-patient)	Adoptive mom; used milk from the milk bank and induced lactation.	Stay at home mom; formerly administrator.	Software engineer	Heterosexual marriage	More than \$75,000	College degree	1972	Female	White	Urban	Democrat	Insured through employer
Stephanie	Formal Recipient (private-pay out-patient)	Low milk supply following traumatic c-section.	unknown	unknown	Heterosexual marriage	unknown	unknown	unknown	Female	Unknown	unknown	unknown	unknown
Tracy	Formal Recipient (private-pay out-patient)	Insufficient milk supply because of bad latch and possible insufficient glandular tissue (IGT).	Stay-at-home Mom; former doctoral candidate and teacher.	Researcher and computer scientist	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1972	Female	Caucasian	Suburban and Rural	Democrat	Insured through employer

Pamela	Formal Recipient (private-pay out-patient). Informal recipient.	Unexplained low supply; bought milk from milk bank and brought it into hospital independently and brought it home. Acquired pumped milk informally through a hospital-affiliated lactation support group.	Banking	Insurance	Heterosexual marriage	More than \$75,000	College degree	1972	Female	Caucasian	Urban	Republican	Insured through employer
Howard and Barbara (real names as requested)	Formal Recipient (private-pay out-patient). Informal recipient.	Howard drank donated milk as part of a cancer treatment program. He acquired milk informally through friends and through the milk bank.	Scientist, Software engineer and consultant.	Psychotherapist	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1945	Howard: Male; Barbara: Female	Howard: Caucasian; Barbara: Caucasian	Howard: Urban; Barbara: unknown	Howard: Democrat; Barbara: Democrat	MediCare plus supplement.
Dawn	Formal Recipient (private-pay out-patient). Informal recipient.	Has triplets born of two surrogates. All were premature. Family purchased BDM for the infants. Also received two shipments of breast milk directly from one surrogate.	Stay at home mom; formerly program manager.	CEO of own company	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1969	Female	Indian	Urban	Can't vote; husband would vote Republican.	Insured through husband's employer
Pamela	Formal Recipient (private-pay out-patient). Informal Recipient.	Unexplained low supply; also bought milk from milk bank and brought it into hospital. Acquired pumped milk through a hospital-affiliated lactation support group.	Banking	Insurance	Heterosexual marriage	More than \$75,000	College degree	1972	Female	Female	Caucasian	Republican	Insured through employer
Howard and Barbara (real names as requested)	Formal Recipient (private-pay out-patient). Informal Recipient.	Howard drank donated milk as part of a cancer treatment program. He acquired milk through friends and through the milk bank.	Scientist, Software engineer and consultant.	Psychotherapist	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1945	Howard: Male; Barbara: Female	Howard: Caucasian; Barbara: Caucasian	Howard: Urban; Barbara: unknown	Howard: Democrat; Barbara: Democrat	MediCare plus supplement.
Dawn	Formal Recipient (private-pay out-patient). Informal Recipient.	Has triplets born of two surrogates. All were premature. Family purchased BDM for the infants.	Stay at home mom; formerly program manager.	CEO of own company	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1969	Female	Indian	Urban	Can't vote; husband would vote Republican.	Insured through husband's employer
Angie	Informal Donor	Pumped to address poor latch; developed unneeded supply; Donated milk through a parenting listserv.	Accountant	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Ann	Informal Donor	Pumped on return to work; developed unneeded supply. Gave to mother who had a double mastectomy met through NP referral.	Registered Nurse	Accountant	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1977	Female	Hispanic and mixed race.	Rural	Republican	Insured through employer
Christie	Informal Donor	Pumped to relieve breastfeeding problems and for return to work; developed unneeded supply. Donated through midwife referral.	Entrepreneur	Electrical Engineer	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1979	Female	White/Caucasian	Suburban	Democrat	Insured through employer
Dorothy	Informal Donor	Pumped for return to work; developed unneeded supply; donated pumped milk through match made on a neighborhood listserv.	Financial Advisor	Partner at architecture firm	Heterosexual marriage	More than \$75,000	College degree	1969	Female	Caucasian	Rural	Democrat	Insured through employer
Emily	Informal Donor	Pumped on return to work; developed unneeded supply; donated pumped milk through neighborhood listserv.	Psychologist in private practice	Unknown	Heterosexual marriage	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Jennifer	Informal Donor	Pumped to resolve engagement; developed unneeded supply.	Nurse midwife	N/A	Single parent; living with same-sex partner met after birth of child.	More than \$75,000	Postgraduate education or degree	1971	Female	Caucasian	Suburban and Urban	Democrat	Insured through employer
Julie	Informal Donor	Pumped to return to work. Developed unneeded supply. Donated pumped milk through mom's group.	Designer	Developer	Heterosexual marriage	More than \$75,000	College degree	1970	Female	Caucasian	Suburban	Democrat	Insured through employer
Leah	Informal Donor	Pumped while baby in NICU; Unable to donate to milk bank because of having resided in the U.K.; Always had an oversupply.	Stay-at-home Mom	Army	Heterosexual marriage	Unknown	College degree	1989	Female	Caucasian	Urban and Rural	Can not vote; would vote republican.	Insured through husband's employer
Leigh	Informal Donor	Pumped to regulate oversupply; developed unneeded supply. Donated through friends and parenting listservs.	Early childhood educator	Computer engineer	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1976	Female	White	Rural	Democrat	Insured through husband's employer

Margot	Informal Donor	Has been a surrogate multiple times; gave milk to intended family and donated milk through a milk sharing website.	Nursing student	PHD Student in Neuroscience	Engaged to be in heterosexual marriage	\$15-25,000	Some college	1981	Female	Caucasian	Urban	Democrat	Insured through employer and private plan.
Phoebe	Informal Donor	Pumped to relieve breastfeeding problems and for return to work; developed unneeded supply. Donated pumped milk through parenting listserve.	Sales	Unknown	Heterosexual marriage	Unknown	Unknown	Unknown	Female	Unknown	Unknown	Unknown	Unknown
Sylvia	Informal Donor	Pumped to manage over supply; donated excess bottled milk to mom met on milk sharing website.	Stay-at-home Mom	Studio Director in Advertising	Heterosexual Marriage	More than \$75,000	Postgraduate education or degree	1975	Female	White	Suburban	Democrat	Insured through husband's employer
Vivienne	Informal Donor	Pumped to relieve forceful let down. Developed unneeded supply. Donated pumped milk through milk sharing websites.	Episcopal priest and graduate student	Preschool Teacher	Heterosexual marriage	\$15-25,000	Postgraduate education or degree	1985	Female	White	Rural	Democrat	Self-insured through private insurance; daughter on employer
Patricia	Informal Donor	Pumped to resolve forceful letdown, poor latch and foremilk/hindmilk imbalance; developed unneeded supply; continued to pump for donation. Gross nursed as part of baby-sitting swap arrangement. Milk turned away from Milk bank for Zoloft use. Shared milk through milk sharing websites and friendship connections.	Stay-at-home Mom; Former teacher and educational bank for Zoloft use. Shared milk through milk sharing websites and friendship connections.	Software Engineer	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1982	Female	Caucasian	Urban	Democrat	Insured through husband's employer
Monica	Informal Donor (attempted)	Attempted to donate milk to a friend in a mom's group who was ill. Donated milk was not accepted because of its having overactive lipase (not dangerous but giving milk a bad taste and smell when pumped and bottled).	Social worker	Building Contractor	Heterosexual marriage	\$35-50,000	Postgraduate education or degree	1980	Female	White	Urban	Other	MediCal
Heather	Informal Donor. Informal Recipient	Low supply on going back to work; took domperidone and used pumped milk from a friend, and also had baby cross nursed by that friend. Subsequently donated excess pumped milk to a friend.	Nurse midwife	Banker	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1975	Female	Latina	Urban	Democrat	Insured through husband's employer
Pat and Lynn (couple interviewed together)	Informal Donor. Informal Recipient	Temporary need for milk while breastfeeding mother travelling away from infant; temporary extra milk while breastfeeding mother travelling. Pump milk donated and used. Baby was also cross nursed by friends in a group of queer mothers.	Kris: Stay-at-home Mom and student	Lynn: Social worker	Same-sex marriage	More than \$75,000	Kris: College degree Lynn: Postgraduate education or degree	Kris: 1969; Lynn: unknown	Kris: Female; Lynn: Female	Kris: White and Cherokee; Lynn: unknown.	Kris: Urban and Rural. Lynn: unknown.	Kris: Democrat; Lynn: Unknown	Insured through Lynn's employer
Carla	Informal Donor. Informal Recipient	Had a temporary need for milk before milk supply came in. Sought pumped donor milk through friendships, clients and parenting listserve. Had excess milk after pumping to increase supply. Gave pumped milk to clients and friends.	Lactation Counselor and Postpartum Doula	Unknown	Heterosexual marriage	Unknown	Unknown	Unknown	Female	Unknown	Unknown	Unknown	Unknown
Carina	Informal Recipient	Low supply caused by late diagnosed tongue tie; acquired pumped milk from friends, coworkers and through milk sharing websites.	Attorney	Marketing	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1979	Female	Caucasian Jewish	Suburban	Democrat	Insured through employer
Carrie	Informal Recipient	Unexplained low supply; acquired pumped milk from milk sharing websites.	Account director in marketing	Self-employed in telecommunication	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1973	Female	White	Suburban	Democrat	Insured through employer
Chris and Leo (2 of 3 co-parents interviewed separately)	Informal Recipient	Chris is a female to male (FTM) transgender person who is the biological mother of an infant. Chris had unexplained insufficient milk production, possibly because of glandular tissue damage from having bound breasts. Chris acquired pumped milk from friends, coworkers, midwife referrals and milk sharing websites. The family includes 3 co-parents. Leo is the biological father of the infant and is a co-parent. Chris is partnered with another FTM transgender person Simon (pseudonym) who is also a co-parent but was not interviewed.	Chris: Student; Leo: Massage Therapist.	Simon: Office Manager	Chris is single for tax purposes and also to allow Leo to adopt infant legally. However, Chris and Simon identify as being in a same sex marriage.	\$50-70,000	Chris: High School; Leo: Unknown.	Chris: 1979; Leo: Unknown	Chris: Gender: White; Leo: unknown	Chris: Suburban; Leo: unknown	Chris: Democrat; Leo: unknown	Chris: Insured through Simon's employer; Leo: Unknown.	
Ellen	Informal Recipient	Baby was born of a surrogate; acquired pumped milk through physician referrals and parenting listserve.	Marketing research consultant	Software Engineer	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1965	Female	Caucasian	Urban	Democrat	Self-insured through private insurance.
Fiona	Informal Recipient	Unexplained low supply; acquired pumped milk from milk sharing websites.	Scientist	Attorney	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1978	Female	Caucasian	Suburban and Urban	Democrat	Insured through employer
Hailey	Informal Recipient	Painful breastfeeding leading to exclusive pumping; supply drop on return to work. Acquired milk through milk sharing websites.	Accountant	Veterinary technician	Same-sex marriage	More than \$75,000	College degree	1977	Female	White	Rural	Democrat	Insured through employer

Ingrid	Informal Recipient	Unexplained low supply; possible tongue tie; acquired pumped milk through parenting listservs.	Unknown	Unknown	Heterosexual marriage	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
John	Informal Recipient	Single gay dad with two children both of whom used informally shared milk. Both babies were born of a surrogate and milk was acquired through milk sharing websites and references made through a lactation consultant.	N/A	Single gay dad	More than \$75,000	Postgraduate education or degree	1970	Male	Caucasian	Rural	Democrat	Insured through employer		
Lindsay	Informal Recipient	Unexplained low supply; acquired pumped milk from milk sharing websites.	Stay-at-home Mom; Formerly in software customer service.	Heterosexual marriage	More than \$75,000	Some college	1987	Female	Caucasian	Urban	Democrat	Insured through husband's employer		
Nancy	Informal Recipient	Insufficient supply owing to breast reduction surgery; acquired pumped milk through milk sharing websites.	Director of consulting team at a medical center	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1972	Female	Female	Suburban	Democrat	Insured through employer		
Rene and Dan (couple interviewed together)	Informal Recipient	Insufficient supply owing to breast reduction surgery; acquired pumped milk through coworkers and friends.	Rene: Journalist Dan: Software engineer	Heterosexual domestic partnership.	More than \$75,000	College degree; Dan: unknown	1973	Rene: female; Dan: male.	Rene: female; Dan: male	Rene: Rural; Dan: unknown	Rene: Democrat or other; Dan: Democrat	Insured through Dan's employer		
Vanessa	Informal Recipient	Unexplained low supply; possibly insufficient Glandular Tissue (GT); Used referrals through midwife, and lactation consultants as well as milk sharing websites to reach donors. Acquired pumped milk.	Registered Nurse Practitioner	Heterosexual marriage	More than \$75,000	Postgraduate education or degree	1978	Female	White/Jewish	Urban	Democrat	Insured through husband's employer		

Appendix B: Interview Guides

Breast Milk Donors

Thank you for taking the time to talk with me today. I've contacted you because you donated milk through _____ and I look forward to hearing your observations and reflections on the experience.

Open Ended Question	Probes
1. Please tell me about your family.	What has it been like caring for an infant?
2. Could you tell me about your experience breastfeeding?	Tell me how you came to breastfeed and how you came to find yourself with extra milk.
3. Tell me about your experience donating breast milk.	What motivated you to do this? How did you decide upon the way that you donated milk?
4. Could you describe the events that led up to you donating milk and what contributed to your decision to do so?	What was going on in your life then? Have things changed for you since you donated milk? How did it feel to have enough milk to donate?
5. Please explain to me the process by which you donated milk.	What was pumping/storing/pasteurizing/transporting milk like?
6. What are your thoughts and feelings about the current networks/milk banks in place for sharing milk?	Is there anything that you think should change? Do you think women should be paid for milk donation? Should milk banks or others make a profit from breast milk donation?
7. How would you describe your relationship with the milk recipient?	Was it important to have a relationship? What are the expectations of this relationship? Were there any challenges or benefits to the relationship?
8. How do you feel about the milk?	How do you describe the milk?
9. Can you tell me about the bank/website/friend group that helped you donate milk.	What were the advantages or disadvantages you experienced with the bank/website/ friend group? Were you compensated?
10. Can you tell me about what your family and friends think about your milk donation?	What have been the nature of their reactions? How have they influenced your thoughts on the issue? Has your experience influenced their opinions?
11. Could you describe any safety concerns that you have in donating milk and how you addressed these?	Were you ever screened? What was your screening experience like?
12. Would you compare donating breast milk to other kinds of donation?	Tell me about these comparisons.
13. What health benefits to you associate with breastfeeding or the use of donated breast milk?	Where do you get information on the health benefits of breast feeding or breast milk? What is the difference between breast feeding breast

	milk?
14. As you look back at your experiencing donating breast milk, are there any events or people that stand out in your mind?	Do you have any other comments about breast milk sharing or breastfeeding that you would like to share with me?

Breast Milk Recipients

Thank you for taking the time to talk with me today. I've contacted you because you received donated milk through _____ and I look forward to hearing your observations and reflections on the experience.

Open Ended Question	Probes
1. Please tell me about your family.	What has it been like caring for your infant?
2. Could you tell me about your infant feeding experience?	Can you tell me about what led up to you acquiring donated breast milk and [if relevant] the challenges you had with breastfeeding or your experience of having a sick infant.
3. Tell me about your experience receiving donated breast milk.	What motivated you to do this? How did you decide upon the way that you donated milk? How did it feel to need donated breast milk?
4. Could you describe the events that led up to you receiving donated milk and what contributed to your decision to do so?	What was going on in your life then? Can you explain how the decision to use donated milk was made? Have things changed for you since you received donated milk?
5. Please explain to me the process by which you received donated milk.	What was storing/pasteurizing/transporting/bottling donated milk like? How did you go about getting a prescription, if you did?
6. What are your thoughts and feelings about the current networks/milk banks in place for sharing milk?	Is there anything that you think should change? Do you think women should be paid for milk donation? Should milk banks or others make a profit from breast milk donation?
7. How would you describe your relationship with the milk donor?	Was it important to have a relationship? What are the expectations of this relationship? Were there any challenges or benefits to the relationship?
8. How do you feel about the milk?	How do you describe the donated milk?
9. Can you tell me about the bank/website/friend group that helped you receive donated milk.	What were the advantages or disadvantages you experienced with the bank/website/friend group? Was the donor compensated? How were you supported?
10. Can you tell me about what your family and friends think about your using donated milk?	What have been the nature of their reactions? How have they influenced your thoughts on the issue? Has your experience influenced their opinions?
11. Could you describe any safety concerns that you have in using donated milk and how you addressed these?	Were donors screened? How were you involved in that screening process?

12. Would you compare donating breast milk to other kinds of donation?	Tell me about these comparisons.
13. What health benefits to you associate with breastfeeding or the use of donated breast milk?	Where do you get information on the health benefits of breast feeding or breast milk? What is the difference between breast feeding breast milk?
14. As you look back at your experiencing donating breast milk, are there any events or people that stand out in your mind?	Do you have any other comments about breast milk sharing or breastfeeding that you would like to share with me?

Workers at Breast Milk Banks / Sharing Websites

Thank you for taking the time to talk with me today. I have contacted you because you work at ____ and I look forward to hearing about your experiences with and observations on breast milk sharing.

Open Ended Question	Probes
1. Tell me about your work at the breast milk bank/sharing website.	What is your title? What are your responsibilities? Please describe an average work day. How did your milk bank/website come to be?
2. What is it's organizational structure?	What is it's financial structure? Would you compare it to other websites or milk banks?
3. Can you walk me through how milk gets from a donor to a recipient?	Can you tell me about how word gets out about your milk bank/website? How are donors recruited/screened/supported/compensated? How is breast milk tested/stored/transported? What is the role of your bank/website in these processes?
4. Could you describe what a parent needs in order go acquire donated breast milk?	What are the costs to the recipient? How does a recipient go about getting a prescription if necessary? What is it like when parents cannot access breast milk through your service?
5. Can you describe how money changes hands in your domain?	Are donors paid? What is the cost of breast milk to recipients? How were these decisions made?
6. Can you describe your relationships you have with others involved in milk sharing.	With donors? Recipients? Shareholders? Board members? The general community? Hospitals and medical professionals? Other corporations? Other non-profits? Government institutions/regulators?
7. What are your thoughts and feelings about the current networks/milk banks in place for sharing milk?	What do you think of informal breast milk sharing networks/websites? Milk banks? Wet nursing? Cross nursing? What are the strengths and weaknesses of the different ways of sharing milk?
8. What similarities and differences do you see between the different ways breast milk is shared?	How do you think of the differences between for-profit milk banks/not for profit milk banks/milk sharing websites/wet nursing/cross nursing?

9. Please describe the parents who access your milk bank?	What are the donors and recipients like? What are their demographics?
10. What health benefits to you associate with breastfeeding or the use of donated breast milk?	Where do you get information on the health benefits of breast feeding or breast milk? What is the difference between breast feeding breast milk?
11. Would you compare donating breast milk to other kinds of donation?	Tell me about these comparisons.
12. Could you describe any health and safety concerns that you have with regards to breast milk sharing and how you address these concerns?	Were donors screened? How were you involved in that screening process? Is the milk tested? How were you involved in this process? Are there any laws or regulations that your website/milk bank must address in its operation?
13. As you look back at your experience working at a milk bank/sharing website, are there any events or people that stand out in your mind?	Do you have any other comments about breast milk sharing or breastfeeding that you would like to share with me?

Parents who Induce Lactation and/or Use Lactation Devices*

Open Ended Question	Probes
1. Please tell me about your family.	What has it been like caring for your infant?
2. Could you tell me about your infant feeding experience?	Can you tell me about what led up to you inducing lactation and/or using lactation devices?
3. Tell me about your infant feeding experience before inducing lactation or using devices?	What strategies did you use in breastfeeding? What resources did you access?
4. What was inducing lactation or using lactation devices like?	Can you describe for me how you went about inducing lactation or using lactation devices?
5. Would you walk me through how you induced lactation or used lactation devices?	
6. How did you define success in inducing lactation or using lactation devices?	What were your feelings around this?
7. Can you tell me how you gathered information on inducing lactation or using lactation devices?	Tell me about how friends, family members, websites, or health professionals were involved in your process.
8. What did inducing lactation or using lactation devices mean to you?	What did these mean to you as a parent/mother? What did it mean to be able to simulate nursing or provide breast milk? What did it mean that you were not able to breastfeed in a standard way?
9. How did these experiences make you think about your body and its role in parenting?	Can you tell me how they caused you to reflect on your experience of breast surgery or as a non-gestational mother/parent?
10. Tell me about the attitudes of your friends and family throughout your infant feeding experience?	Tell me about any encouragement disapproval or pressures that you felt during this process.
11. What health benefits to you associate with breastfeeding in general or inducing lactation/using lactation devices in particular?	Where do you get information on the health benefits of breast feeding or breast milk? What is the difference between breast feeding and breast milk?
12. As you look back at your experience inducing lactation or using lactation devices, are there any events or people that stand out in your mind?	Do you have any other comments about breast milk or breastfeeding that you would like to share with me?

*If these participants have also used donated breast milk, I will also use the interview guide designed for recipients of donated breast milk listed above.

Scientists Working to Regenerate Breast Tissue or Make Fortifiers out of Human Breast Milk

1. Can you tell me about the biotech company that you work for.	What are the various projects that it works on? What is common about the various projects?
2. Would you tell me about your role with your company?	Can you tell me about your background and how you came to work in this position?
3. Would you describe to me your projects related to breast tissue regeneration or breast milk fortification?	How did these projects originate? How are they relevant to breast feeding or breast milk? What scientific or medical promise do they hold?
4. What technological or scientific innovations are involved in breast tissue regeneration or breast milk fortification?	What advances have been made recently that have allowed for these developments? What advances still need to be made in order for more progress to be made?
5. Can you explain what has motivated your scientists to work on breast tissue regeneration?	What is it about breast tissue that makes it a good venue for stem-cell enhanced adipose tissue regeneration? What markets do you foresee for this work?
6. How does this work relate to other issues and challenges surrounding stem cell research?	
7. How does this work relate to those undergoing reconstructive breast surgery following cancer?	How does this work relate to those undergoing breast reduction or enhancement surgery?
8. Can you explain what has motivated your scientists to work on making milk fortifiers out of breast milk?	How does this milk differ from others available to sick newborns in the NICU? What is the difference between cow's milk and human milk?
9. How do sick babies attain human milk fortifiers?	Is the fortifier distributed in hospitals? What is the cost to families?
10. Can you tell me about whether babies in the NICU benefit from your product?	Can you tell me about any studies that have been done on this?
11. Would you walk me through the process that breast milk undergoes in order to become a fortifier?	What labs, technologies, and scientific practices are involved? How is the fortifier used?
12. Can you walk me through the process by which breast milk is donated, screened and stored?	Are donors paid? What is the relationship between your company and the milk banks from which donated milk is generated?
13. What are the barriers to accessing your product?	Can parents who cannot afford your products access them in other ways? What areas of the country/world is it available?

14. Are there any events or experiences that stand out for you in this area of science?

Do you have any further comments about breast regrowth or breast milk based fortifier that you would like to share?

Appendix C: Demographic Questionnaire

Background Information Questionnaire - Emerging Milk Markets: Human Milk Banking, Sharing, and Technoscience

Participant pseudonym:

Request : This questionnaire is designed to collect background information from study participants. Some of the questions are of a personal nature, and so it is entirely **your** choice whether or not you answer a specific question. We will appreciate any information you feel comfortable sharing. Your name does **not** appear on this questionnaire and your anonymity will be strictly protected.

What is your current or former primary occupation?

What is the current or former primary occupation of your partner/spouse with whom you live (write “N/A” if not applicable)?

What is your relationship status (e.g. married, divorced, single, domestic partnership)?

Please estimate your annual family income (check one box below)

- | | |
|---|---|
| <input type="checkbox"/> Less than \$15,000 | <input type="checkbox"/> \$35,000 to \$50,000 |
| <input type="checkbox"/> \$15,000 to \$25,000 | <input type="checkbox"/> \$50,000 to \$75,000 |
| <input type="checkbox"/> \$25,000 to \$35,000 | <input type="checkbox"/> More than \$75,000 |

Please indicate your highest level of education (check one box below)

- | | |
|---|---|
| <input type="checkbox"/> Some high school | <input type="checkbox"/> College degree |
| <input type="checkbox"/> High school degree | <input type="checkbox"/> Postgraduate education or degree |
| <input type="checkbox"/> Some college | |

When were you born (year)? _____

With what gender do you identify?

With what race or ethnicity do you identify?

Did you grow up in a rural or urban setting?

In US elections are you more likely to vote Republican, Democrat or other?

What is your health insurance status? (e.g. insured through employer, MediCal, uninsured,)

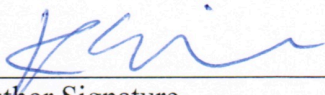
THANK YOU FOR YOUR TIME.

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Author Signature

09/09/2015

Date