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Tobacco use in transitional homeless shelters in Los Angeles County: Examining the role of the meso and micro social, policy and built environments

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Tobacco use in transitional homeless shelters in Los Angeles County: Examining the role of the meso and micro social, policy, and built environments

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in Public Health

by

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2014

ABSTRACT OF THE DISSERTATION

Tobacco use in transitional homeless shelters in Los Angeles County:

Examining the role of the meso and micro social, policy and built environments

by

Minal Rashmi Patel

Doctor of Philosophy in Public Health

University of California, Los Angeles, 2014

Professor Marjorie Kagawa Singer, Chair

The homeless population in the United States (US) is diverse and consists of men, women, families, youth and veterans dealing with a range of issues related to domestic violence, post-traumatic stress disorder, mental illness, substance abuse, and poor physical health. Homeless populations are especially vulnerable to chronic diseases including lung and colorectal cancer, asthma, heart disease, chronic obstructive pulmonary disease, and stroke, all of which are exacerbated by their poor housing conditions and lifestyle behaviors. Tobacco use is highly prevalent and an understudied health issue in homeless populations. Up to 80% of those who are homeless are using tobacco. Homeless individuals recognize the negative consequences of smoking, including the dangers to their health, to their appearance, and the high cost of smoking. Notably, evidence suggests that 37%-76% of homeless adult smokers would like to quit their smoking habit.

Yet, remarkably few studies on tobacco use and cessation among homeless populations have been conducted, despite their known vulnerability to tobacco use. This dissertation addresses a unique set of gaps in the literature that focus on the possible influences of the built environment and local or city/county-level tobacco use policies on tobacco use prevalence among homeless adults living in transitional shelters in Los Angeles County. The findings from this research can inform the efforts of

policy makers, shelter staff, and homeless services providers to create more relevant and effective programs for addressing tobacco use in this vulnerable population.

There are several important findings from this dissertation. First, rates of smoking are high among those living in transitional homeless shelters in Los Angeles County, with 63% of participants reporting being a current smoker. Second, we did not find the expected individual-level demographic differences, with the exception of Latinos, who reported less smoking than other race/ethnicity subgroups. Third, there were few differences at the shelter level in regards to residents' smoking status, contrary to what was expected considering the variations in populations served at the various shelters. Fourth, qualitative data analyses indicated findings showed a need for tobacco use reduction/cessation efforts at the shelter-level, and identified suggestions for improving the effectiveness of smoking reduction interventions with this population. Finally, to our knowledge, this research constitutes the first study to assess tobacco use behaviors in conjunction with conventional measures of the built and policy environments surrounding transitional shelters. The new as well as the unexpected findings for transitional shelters for the homeless support the need to expand on current measures of the social, built, and policy environment to include attention to more informal sources of tobacco and better measures to capture the cultural rules operating for this unique population.

The dissertation of Minal Rashmi Patel is approved.

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2014

For my parents, Rashmi Patel and Geeta Patel.

Your dedication to hard work and family

has shaped me into the woman I am today and I am eternally grateful.

And for my husband, Omi Vaidya, my rock.

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CHAPTER 1:

Introduction to the Dissertation

1.1. Problem Statement

Tobacco use is an important health issue that disproportionally affects vulnerable populations, such as homeless individuals. Homeless individuals are one of the most underserved populations in California, and suffer from disproportionality high rates of tobacco use, with up to 70-80% of those who are homeless using tobacco (Connor, Cook, Herbert, Neal, & Williams, 2002; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013; Tsai & Rosenheck, 2012). Health disparities on a range of health conditions are especially profound among homeless individuals, who are especially disadvantaged financially and have reduced access to resources (Marr, DeVerteuil, & Snow, 2009; Plumb, 2000).

The homeless population in the United States (US) is very diverse and consists of men, women, families, youth and veterans dealing with a range of issues related to domestic violence, post-traumatic stress disorder, mental illness, substance abuse, and poor physical health. Homeless populations are especially vulnerable to chronic diseases including lung and colorectal cancer, asthma, heart disease, chronic obstructive pulmonary disease, depression, and stroke due to their poor housing conditions and risky health behaviors (Moore, Gerdtz, & Manias, 2007). The severity of these chronic diseases is extremely high compared to the general population due to factors related to extreme poverty, and lack of continuous medical care (Hwang, 2001). Racial/ethnic minority groups are disproportionately homeless compared to non-minority populations, and also have greater health-related disparities including a lack of access to health care services (Hwang, 2001; Moore et al., 2007).

Homeless individuals recognize the negative factors related to smoking, including the dangers to their health, appearance, and the high cost of smoking (Butler et al., 2002; Porter, Houston, Anderson, & Maryman, 2011), and have indicated in studies that they would like to quit. Estimates range from 37%-76% of homeless individuals residing in shelters who reported a readiness to quit within the next six

months (Connor et al., 2002; K. S. Okuyemi et al., 2006). It is unclear, however, how these estimates relate to the homeless population in Los Angeles County. In addition, it is unknown which elements of a tobacco reduction programs might benefit this population.

Given that the data on tobacco use and cessation among homeless populations are sparse, this dissertation addresses a serious gap in the tobacco control and homelessness literature. In particular, most tobacco reduction/cessation programs focus on individual behavior change through individual outreach and educational curricula, often accompanied by population-based change through policy restrictions. Among the many diverse populations studied, few studies have been conducted on tobacco use and cessation among homeless populations, and additional and important gaps addressed in this dissertation include the possible influences of the built environment and local or city/county level tobacco use policies, which all could theoretically influence tobacco use prevalence in this population. Additionally, social, built and policy level influences have not been addressed specifically for homeless individuals living in transitional shelters, The findings from this research can inform the efforts of policy makers, shelter staff, and homeless services providers to create effective and potentially sustainable programs for addressing tobacco use in this vulnerable population.

1.2. Purpose

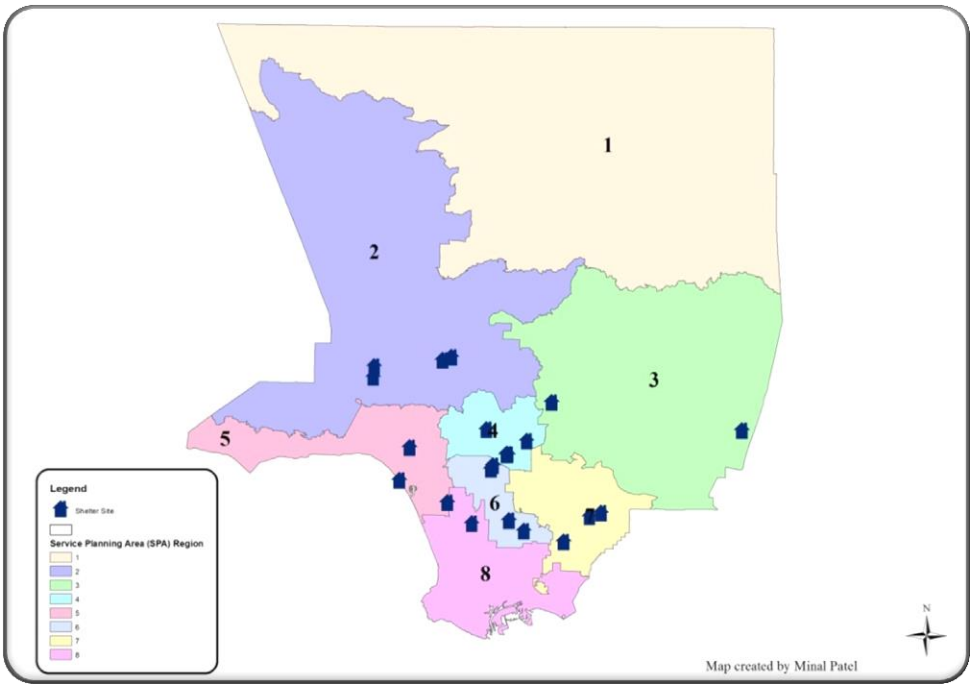
The purpose of this dissertation research is to improve our understanding of how elements of the social, built, and policy environment may influence tobacco use by residents and staff of transitional shelters, and smoking reduction efforts in transitional housing shelters. The research reported here includes an analysis of data collected as part of a larger program to reduce tobacco use in 26 randomly selected transitional shelters in Los Angeles County. The effectiveness and applicability of a tobacco use reduction program for those living in transitional shelters is analyzed through a mixed-methods approach.

1.3. Background

As part of the CDC Communities Putting Prevention to Work (CPPW) initiative, Los Angeles (LA) County was awarded a grant of $16.2 million to address tobacco use throughout the County. UCLA

applied for and received a subcontract to this grant for $595,000 to address tobacco use among residents and staff of transitional shelters for homeless individuals. Because the CDC did not allow for CPPW funds to be used for research, an intervention program with a relatively unsophisticated evaluation plan (pre-post demonstration project rather than a randomized controlled trial design) was developed to assist shelters in starting a smoking reduction program at their sites. Previous research had established that 95% of Los Angeles area shelters were receptive to participating in a smoking reduction program if the resources to support this activity were provided externally (Arangua, McCarthy, Moskowitz, Gelberg, & Kuo, 2007). A list of all potential transitional shelters in LA County was compiled based on a shelter level telephone survey (Shelter Level Survey, SLS), and 26 shelters were randomly selected from 76 eligible potential sites. Eligibility criteria included shelters that offered a minimum stay of 6 months and had at least 28 adult beds. Shelters varied in regards to resident demographics and included shelters focused on issues ranging from addiction to substance use to coping with domestic violence to housing for veterans. The sites were randomly selected after being stratified by geographic region based on service planning area in LA County, to ensure that there was variation in the type and location of the shelter (LACDPH, 2014). Figure 1.1 shows a map of the randomly selected shelter locations by service planning areas.

Figure 1.1: Map of Participating Shelters within LA County in a Tobacco Use Reduction Program



Each of the 26 sites was offered a $5000 mini-grant, and key facilitators (usually existing drug abuse counselors) from each organization were trained in a two-day Peer to Peer Smoking Cessation Training Program (P2P) created by Chad Morris at the University of Colorado. The P2P program is a tobacco cessation program tailored to the needs of the mentally ill population as well as those suffering from addiction to other drugs (Fazel, Khosla, Doll, & Geddes, 2008). Many homeless individuals also suffer from emotional disorders and polydrug use, so the Peer to Peer Smoking Cessation program was deemed to be an appropriate starting point for the Smoking Reduction intervention Program (SRP) implemented under this contract (Fazel et al., 2008). Since there is no existing tobacco use cessation program that targets homeless populations to our knowledge, the shelter facilitators were encouraged to adapt elements of the SRP relevant to their specific population. Intervention elements and suggested modifications are discussed in Chapter 4. Each shelter was required, as part of the mini-grant, to provide at least 1-one hour session weekly for 8 weeks aimed at reducing participants' tobacco use. Shelters were encouraged to make reduction in the number of cigarettes smoked per day the behavioral change endpoint of their SRP instead of complete cessation, so as not to deter residents of shelters who otherwise might

have felt overwhelmed by the magnitude of the long term goal. At the end of each weekly session, part of the mini-grant funds was distributed in the form of $10 gift card incentives to each participant, up to 10 participants per session. In addition to facilitating weekly SRP discussions, shelter facilitators also were responsible for measuring the exhaled carbon monoxide (CO) levels of participants weekly.

Using a community based participatory research (CBPR) model (citations needed (Israel, Schulz, Parker, & Becker, 1998; Minkler, Blackwell, Thompson, & Tamir, 2003; Wallerstein & Duran, 2006), in partnership with the LA Coalition to End Hunger and Homelessness, UCLA evaluators, including myself, conducted a mixed method study and collected five sources of data: 1) individual-level self-reported smoking status information from program participants at baseline and 3 month follow-up, 2) an environmental audit of the area in and around each transitional shelter to assess micro level factors related to tobacco use, such as cigarette butt density at the facility entrances and exits, 3)a neighborhood assessment using a GPS tool in a 1000 foot radius around each transitional shelter, to capture meso-built environment characteristics, such as proximate licensed tobacco retailers, 4) a telephone survey (Shelter Policy Survey) with shelter executives at each of the 26 transitional shelters to document the current tobacco control policies at the transitional shelters that may affect tobacco use, and 5) qualitative data collected through Mutual Learning Dialogues (MLDs), using guided interviews, at the 3-month follow-up with key staff at each site to get a better understanding of the aspects of the program that were effective in program implementation, and ultimately what aspects were and were not seen as effective in reducing tobacco use among participants.

This dissertation aims to clarify the possible influences of the social, built, and policy environments on tobacco behaviors related to preventable chronic diseases, such as cancer and heart disease, that disproportionately affect this vulnerable population. Each chapter addresses different perspectives on tobacco use among the homeless living in transitional shelters. Chapter 2 addresses the demographics and smoking behaviors of staff and residents at the randomly selected transitional homeless shelters in the study. Chapter 3 describes and evaluates a smoking reduction program within these shelters through mixed methods using descriptive and qualitative data analyses. Chapter 4 further explores the

built and policy environments and potential measurement issues as determined through mixed methods using quantitative and qualitative data collected through the Mutual Learning Dialogues; and Chapter 5 presents the synthesis of the mixed method approach and conclusions.

1.4. Literature Review

1.4.1. U.S. and Los Angeles County Homelessness Demographics

In its latest report that includes demographic breakdowns, The U.S. Department of Housing and Urban Development (HUD) states that of the 1.56 million sheltered homeless individuals in the US, the majority are men (78%), single (64%), belong to a racial/ethnic group of color (62%), and are younger than the general US population. People from racial/ethnic minorities are overrepresented in the homeless population, as they only make up 34.6% of the general US population. African Americans comprise 38.7% of the US homeless population, compared to 12.4% of the general population (Cortes, Khadduri, Buron, & Culhane, 2010). Those identifying as Hispanic comprise 11.6% of the homeless population, as opposed to 9.6% of the general US population (Cortes et al., 2010). Asian Americans, Native Hawaiians, American Indian/Alaska Natives and other racial groups are lumped into a single "other" race (4.7%) or multiple race (7.0%) groups in the HUD survey, which is less than their representation in the U.S. population (~8%) (Cortes et al., 2010). Homeless individuals in 2010 are young, with 38% falling into the 31-50 age category and only 17.2% are age 51 and higher, as compared to 29.3% of the general US population (Cortes et al., 2010). Adult veterans comprise 11.1% of the homeless population, which is slightly higher than their 9.7% share of the general US population (Cortes et al., 2010).

The Los Angeles Homeless Services Authority (LAHSA) surveyed LA County in January 2011 and found 51,340 homeless residents in the County (LAHSA, 2011). Similar to the national portrait, racial/ethnic minorities are disproportionately represented among the homeless population in LA County. In LA County, 43.7% of homeless individuals are African American, 27.7% Latino, and 24.9% White. Asian Americans (2.3%) and American Indian/Alaska Natives (1.4%) are among smaller racial/ethnic groups found in the homeless population in LA County. The racial/ethnic breakdown of the general

population in LA County is as follows: Non-Hispanic White (27.6%), Hispanic or Latino (48.1%), African American (9.3%), American Indian/Alaska Natives (1.5%), Asian American (14.2%) and multiple races (2.8%) (Census, 2012). Comparing LAHSA survey data to the Census, African Americans appear to be greatly overrepresented in the LA County homeless population. Data regarding demographics are presented in Table 1.1.

Table 1.1—Homeless population demographics in the US and Los Angeles County

	General US Population (2008, unless specified)	US Homeless Population ~1.5 Million (2008, unless specified)	General Los Angeles County Population (2012)	Los Angeles County Homeless population ~51,000 (2011)
Men	49.2%*	78%	49.3%	66%
Single	43.4%*	64%	55.3%	79%
African American	12.4%	38.7%	9.3%	43.7%
Hispanic	9.6%	11.6%	48.1%	27.7%
White	65.4%	38.1%	27.6%	24.9%
Asian Americans	4.8%	--	14.2%	2.3%
American	0.9%	--	1.5%	1.4%
Veterans	9.7%	11.1%	--	18%
Source:	(HUD, 2011), (Census, 2012)	(HUD, 2011)	(Census, 2012)	(LAHSA, 2011)

Homeless individuals, along with lack of permanent shelter, are also likely to be dealing with one or more comorbidities such as mental illnesses and drug and other addictions (Fazel et al., 2008; Johnson, Freels, Parsons, & Vangeest, 1997). According to the National Resource and Training Center on Homelessness and Mental Illness, between 20-25% of homeless adults suffer from a severe form of mental illness (NRTCHMI, 2003), which is comparable to the general US population at 22.3% (Kessler, Chiu, Demler, & Walters, 2005). However, according to the most recent LAHSA report, 33.3% of homeless individuals in LA County suffer from mental illness (LAHSA, 2011). In addition, 34% of homeless individuals in LA County experience substance abuse, and 22% are physically disabled (LAHSA, 2011).

1.4.2. Tobacco Use and Chronic Diseases

Tobacco use continues to be a significant public health problem in the United States (US), with approximately 18% of adults in the US being current smokers (Agaku, King, & Dube, 2014). Tobacco use remains the leading cause of preventable morbidity and mortality in the US (Agaku et al., 2014). Annually, approximately 443,000 deaths in the US are attributable to smoking-related diseases (Agaku et

al., 2014; CDC, 2011), such as cancer, heart disease, stroke and chronic obstructive pulmonary disease (Agaku et al., 2014; CDC, 2010, 2011; USDHHS, 2004). Cancers alone constitute 37% of the tobacco related deaths (CDC, 2012; USDHHS, 2004).

Tobacco types include cigarettes, pipes, cigars, and bidis, all which are commonly smoked (Vineis et al., 2004). Some of the main types of cancers caused by tobacco use include "cancers of the lung, larynx, oral cavity, pharynx, esophagus, pancreas, bladder, kidney, cervix, and stomach, and acute myeloid leukemia" (USDHHS, 2004). Close to one third of all deaths from cancer and 87% of deaths from lung cancer are related to smoking in the US (Agaku et al., 2014). However, the distribution of these deaths among socioeconomic groups and ethnicities is not even. Health disparities in cancer related deaths due to tobacco use remain high (K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013; Vineis et al., 2004).

In LA County, the 14% prevalence rate of smoking is significantly lower than the US prevalence rate of 18%. However, current trends show that this rate is no longer dropping as fast as it had in past years (LACDPH, 2010). Over 8,500 deaths annually in LA County are attributable to smoking-related diseases (LACDPH, 2006, 2010). Moreover, as noted, the rates are considerably higher (80%) among the homeless population (Baggett & Rigotti, 2010; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, B. Sewali, et al., 2013).

1.4.3. Health Disparities and Tobacco Use

Health disparities are defined as "potentially avoidable differences in health between groups of people who are more and less advantaged socially; these differences systematically place socially disadvantaged groups at further disadvantage on health" (Braveman, 2006). In 2002, the National Conference on Tobacco and Health Disparities brought together researchers from various disciplines to define tobacco use- related disparities as: "differences in the patterns, prevention, and treatment of tobacco use; the risk, incidence, morbidity, mortality, and burden of tobacco-related illness that exist

among specific population groups in the United States; and related differences in capacity and infrastructure, access to resources, and environmental tobacco smoke exposure" (Fagan et al., 2004).

Tobacco use-related disparities in the US. In terms of race are described in varying ways. Nationally, African Americans smoke fewer cigarettes per day than Whites. However, African American men have the highest rate of tobacco use related deaths and incidence of lung, oral, and pancreatic cancers, among others (Edwards et al., 2005; Fagan, Moolchan, Lawrence, Fernander, & Ponder, 2007). In terms of poverty, smoking rates and the prevalence of related diseases are generally higher among low-income and underserved populations (K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013).

1.4.4. Tobacco Use-Related Disparities and Homelessness

Homeless individuals are one of the most underserved populations in California, and suffer from disproportionality high rates of tobacco use, with up to 80% of those who are homeless using tobacco (Connor et al., 2002; Kolawole S Okuyemi et al., 2013; Tsai & Rosenheck, 2012). This smoking rate is considerably higher than the national rate of 18 percent and the California rate of 14% (CDC, 2012; LACDPH, 2010). Since cigarette smoking usually begins in adolescence, with 80% of adult smokers having started smoking before the age of 18, homeless adults are likely to be set in their tobacco habits (USDHHS, 2004).

Very little data are available about why homeless populations are disproportionately vulnerable to tobacco use dependency and illnesses related to tobacco use. Research has shown, however, that those who have a lower socioeconomic status (SES) have more problems with quitting and have more smoking related deaths compared to higher income groups (Honjo, Tsutsumi, Kawachi, & Kawakami, 2006; Jha et al., 2006; Stead, MacAskill, MacKintosh, Reece, & Eadie, 2001). Very few studies have addressed tobacco use and reduction in the homeless population. The little research that exists on homeless and tobacco use is based on pilot studies, and seldom include a diverse population such as that found in LA County.

1.4.5. Tobacco Use Cessation and the Homeless

Tobacco use dependency is tenaciously addictive, similar to the addiction cycles of cocaine and heroin (Neal L. Benowitz, 1988; USDHHS, 1988). For smokers with long smoking histories, withdrawal symptoms following attempts to quit are strong and persistent, leading to relapse more often than not (Neal L Benowitz, 2010).Research has shown that approximately 40% of adults who use tobacco have made a serious attempt to quit in the past year and usually failed to remain abstinent (CDC, 2005). Studies have indicated that homeless individuals recognize the negative factors related to smoking including the dangers to their health, appearance, and the high monetary cost of smoking (Butler 2005, Porter 2011). For example, in a study by Connor and colleagues (Connor et al., 2002), 37% of homeless residing in shelters reported a readiness to quit within the next six months. In addition, results from a focus group conducted with homeless participants indicated that as many as 76% planned on quitting smoking in the next 6 months (Kolawole S Okuyemi et al., 2006). Connor and colleagues also found that among homeless smokers, 72% had made a quit attempt at least once (Connor et al., 2002).

The literature on tobacco cessation in the homeless is limited to feasibility pilot studies (Connor et al., 2002; Goldade et al., 2011; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013; K. S. Okuyemi et al., 2006; Shelley, Cantrell, Warn, & Wong, 2010). Some shelters have tried individual behavioral therapy, resulting in marginally effective tobacco use reduction (Lancaster & Stead, 2005). Several reasons why smoking cessation programs have not been more widely attempted in homeless shelters have been posited. The first reason is that more pressing problems, such as drug abuse, mental illnesses, and a need for stable housing have higher priority (Gelberg, Linn, Usatine, & Smith, 1990; Pletsch, Morgan, & Pieper, 2003). A second reason is that funding for homeless shelters is limited, and staffs are generally overworked. Thus staffs are often unable to meet even the basic needs of the homeless population (Weinreb & Buckner, 1993). A third reason is that research has suggested that smoking may help homeless individuals deal with other stressors in their lives (Pletsch et al., 2003; Zapka, Goins, Pbert, & Ockene, 2004). More research is needed to clarify what additional benefits a tobacco use cessation program targeting homeless populations might provide. For

example, research on substance users has shown that those abusing heroin are more likely to be successful at quitting if paired with quitting smoking as well, due to the pairing of these behaviors by users. Thus, tobacco serves as a cue to action, and when removed, can help users abstain from heroin use (Hser et al., 2004).

One of the goals of this dissertation is to begin building a better understanding of smoking cessation and reduction in this population. For the reasons described above, few researchers have examined social determinants of tobacco use (Kolawole S Okuyemi et al., 2013; Shelley et al., 2010), and no tobacco use related studies have been conducted with this unique population that look beyond traditional influences The research that does exist suggests important barriers to tobacco cessation for homeless populations, including high rates of psychological stress, high rates of tobacco use among both residents and staff of shelters, morbidities due to use of other substances (Goldade et al., 2011); lack of access to general health and mental health services and nicotine replacement therapy (NRT) (Gelberg, Andersen, & Leake, 2000; Gelberg, Gallagher, Andersen, & Koegel, 1997; Goldade et al., 2011); and competing demands on time and resources such as access to food and clothing, as smoking is a hunger suppressant (Kolawole S Okuyemi et al., 2006; K. S. Okuyemi et al., 2006).

1.4.6. Tobacco Use and the Environment

Research involving the environment is often broken up into three separate domains: natural, social, and built (Hynes & Lopez, 2009). The social and built environments may influence behaviors related to the uptake and use of tobacco among homeless populations, who are considered to be "resource-poor by definition" (Marr et al., 2009). The environment within which homeless persons live, may have a large influence on their ability to survive and utilize existing resources (Marr et al., 2009).

1.4.7. Built Environment and Health

The built environment refers to aspects of the environment that are modified by humans, such as homes, schools and workplaces (Glanz & Kegler, 2005; Hynes & Lopez, 2009). Research regarding neighborhood and the built environment, on a range of health-related outcomes, has been growing

steadily in the past few years (Diez Roux, 2001; Hynes & Lopez, 2009). The majority of the research has focused on factors related to physical activity and nutrition (Handy, Boarnet, Ewing, & Killingsworth, 2002; Hillier et al., 2009; Humpel, Owen, & Leslie, 2002; Walton, Pearce, & Day, 2009). This research indicates that individuals are more physically active in neighborhoods where there is greater access to recreational facilities, varied land use, and high street network connectivity (Humpel et al., 2002); the proximity to supermarkets has been associated with greater consumption of fruits and vegetables, even among low-income residents (Rose & Richards, 2004). Conversely, exposure to fast food establishments negatively impacts healthy behaviors (Humpel et al., 2002; Li, Harmer, Cardinal, Bosworth, & Johnson-Shelton, 2009), and the lack of availability of healthy foods is associated with higher obesity rates for both adults and youth (Morland, Diez Roux, & Wing, 2006; Powell, Auld, Chaloupka, O'Malley, & Johnston, 2007). Some researchers, however, have found no significant association between neighborhood food environments and obesity related behaviors (An & Sturm, 2012; Sturm & Cohen, 2009).

Although the research on the built environment and obesity has not been conclusive, lessons learned from research focused on the environmental influences on food choice behavior may be applicable to the tobacco control area. Tobacco use behavior may be influenced by the proximity of tobacco retailers. For example, experimentation with tobacco use amongst teens has been found to be significantly associated with the presence of tobacco retailers (McCarthy et al., 2009)). The limited research in tobacco control suggests that presence of tobacco retailers near homes and schools may influence adolescent tobacco use by making cigarettes easier to obtain (Henriksen et al., 2008; Leatherdale & Strath, 2007; McCarthy et al., 2009; Novak, Reardon, Raudenbush, & Buka, 2006).

1.4.8. Natural Environment

Though not the focus of this dissertation, the natural, or physical, environment refers to elements found in nature that create the landscape and geography of a region (Hynes & Lopez, 2009). These elements include the physical nature of the land, such as elevation and land type, as well as air quality,

water quality, and natural resources (Fjørtoft & Sageie, 2000; Frumkin, 2001). Traditionally, research in environmental health has focused on the natural environment. A commonly studied element of the natural environment is air quality. Air pollution is known to be related to the onset of asthma in children, as well as adults who have never smoked (Künzli et al., 2009; Salam, Islam, & Gilliland, 2008).

1.4.9. Social Environment

The social environment refers to social influences such as social support, social norms, community beliefs, and community attitudes (Glanz & Kegler, 2005; Hynes & Lopez, 2009). Several elements of the social environment have been linked to health, including family structure, social networks, and work settings. Social networks are important, as a greater number of close contacts has been shown to be related to lower mortality rates (Berkman & Syme, 1979). Social networks have also been shown to affect risk of smoking, depending on the strength and closeness of the social ties (Christakis & Fowler, 2008).

1.4.10. Tobacco Use and Policies

Tobacco control policies have proliferated as evidence accumulates demonstrating that such policies affect tobacco use and cessation (Levy, Chaloupka, & Gitchell, 2004). Varying groups and communities have worked for more legislation at the state and local levels to curtail tobacco accessibility. The Institute of Medicine recently called for states to limit the number of tobacco retail outlets for the express purpose of reducing tobacco use through reduced access (Bonnie, 2007). Policy activists have started to organize communities to work together to adopt zoning restrictions and conditional use permits which limit sales of tobacco products near schools (McCarthy et al., 2009).

There is some evidence that policies affect tobacco use and cessation(Levy et al., 2004). Researchers found that people working in settings where worksite smoke-free policies were implemented or maintained between 1993 and 2001 were almost twice as to quit smoking than people not working in such settings (Bauer, Hyland, Li, Steger, & Cummings, 2005). Policies that advocate for the licensing of tobacco retailers and conditioning retention of the license have been used to restrict tobacco sales to

minors (Romley, Cohen, Ringel, & Sturm, 2007). In terms of school-based policies, Lipperman-Kreda and Grube showed that the perceived enforcement of school policies was positively related to perceived community norms, and that personal beliefs mediated the relationship between perceived enforcement and current smoking; they also found that school level policies mediated the relationship between community norms and smoking beliefs (Lipperman-Kreda & Grube, 2009). These relationships may also apply to homeless individuals living in transitional shelters, as they are likely to spend a considerable amount of time at the shelter, thus being exposed to any existing tobacco-related policies.

1.5. Theoretical and Conceptual Models

Social Determinants of Health and Environmental Health Promotion (SDHEHP) Model

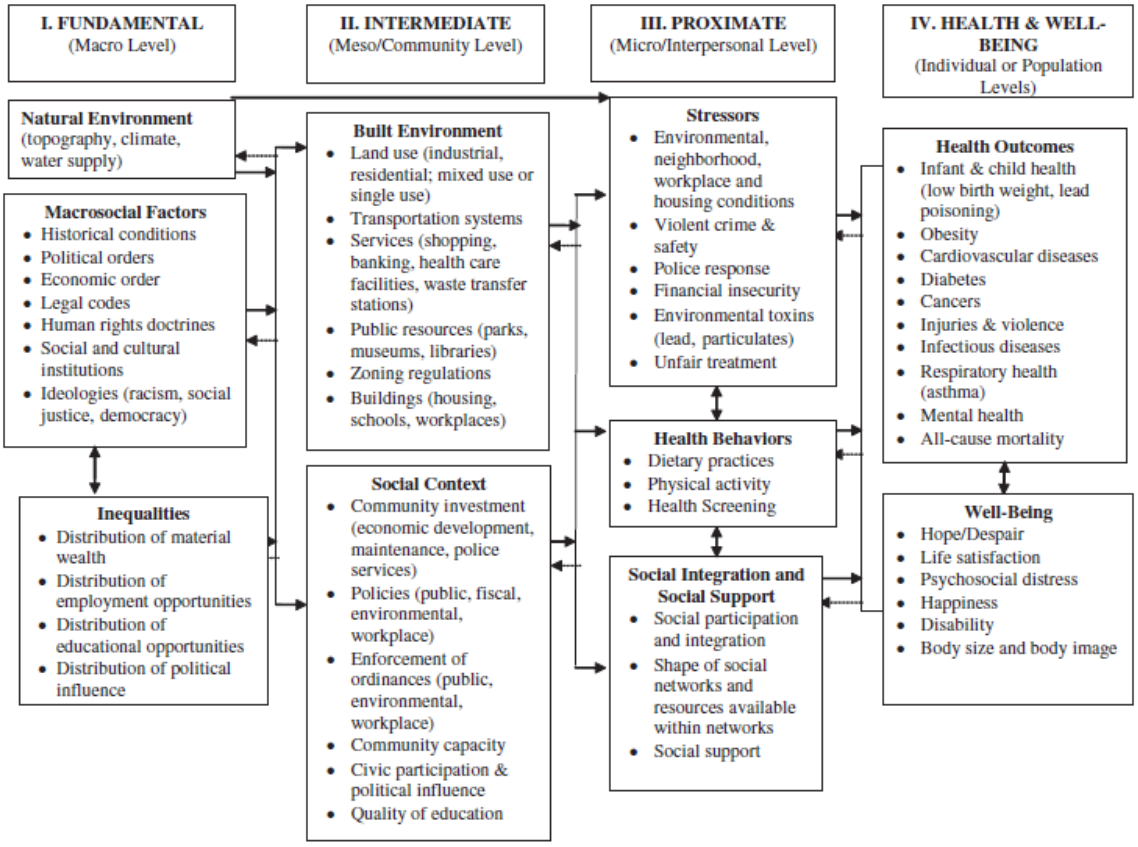
The Social Determinants of Health and Environmental Health Promotion (SDHEHP) Model focuses on the social and environmental determinants of health. This model was created by Schulz and Northridge to address the gap in conceptual models related to disparities research (A. Schulz & Northridge, 2004). Figure 1.2 lays out the 4 different levels and associated constructs, starting at the macro level, and moving to the meso or community level to the micro or interpersonal level, and then to the health and well-being of individuals or populations. The SDHEHP Model is based on Ecological Systems theories (Bronfenbrenner, 1997) and is similar to other ecological models in that several different explanatory levels are invoked to account for individual-level health. However, the SDHEHP Model does not place an emphasis on biology or genetics. The interconnectedness of the different levels highlights their influence not just on the outcomes, but on one another as well. This is a strength of the SDHEHP model, as it accommodates explanations of behaviors in the context of a neighborhood.[1]

Research using the SDHEHP model has primarily been in the physical activity and nutrition fields. Schulz and colleagues used this model to examine diabetes risk and disparities among African Americans who are more likely to suffer from related morbidity and mortality than other racial groups (A.

[1] Since the SDHEHP model incorporates the construct of the built environment, it is likely a better fit for the analysis than other neighborhood level and social determinants models, such as the social-ecological model proposed by Flay and colleagues for tobacco cessation (Flay, Snyder, & Petraitis, 2009).

J. Schulz et al., 2005). Different aspects of the model including social and economic factors were addressed, along with neighborhood-level data to understand income distribution and segregation. In addition, the built environment was also assessed by accounting for the availability of healthy foods that influence dietary choices (A. J. Schulz et al., 2005). After addressing various components of the model, recommendations were made to intervene at different levels of the model to improve diabetes outcomes through policy and environmental changes (A. J. Schulz et al., 2005). Franzini and colleagues also used the SDHEHP model to study childhood obesity. They focused on relationships among the intermediate level, namely the physical environment, the proximate level, which addressed the social environment and physical activity, and the individual level of obesity (Franzini et al., 2009). Due to a lack of data, they were not able to assess the fundamental level factors such as economic inequalities and racial segregation. Figure 1.1 shows the SDHEHP model as conceptualized by Schulz and Northridge.

Figure 1.2: Social Determinants of Health and Environmental Health Promotion (SDHEHP) Model.

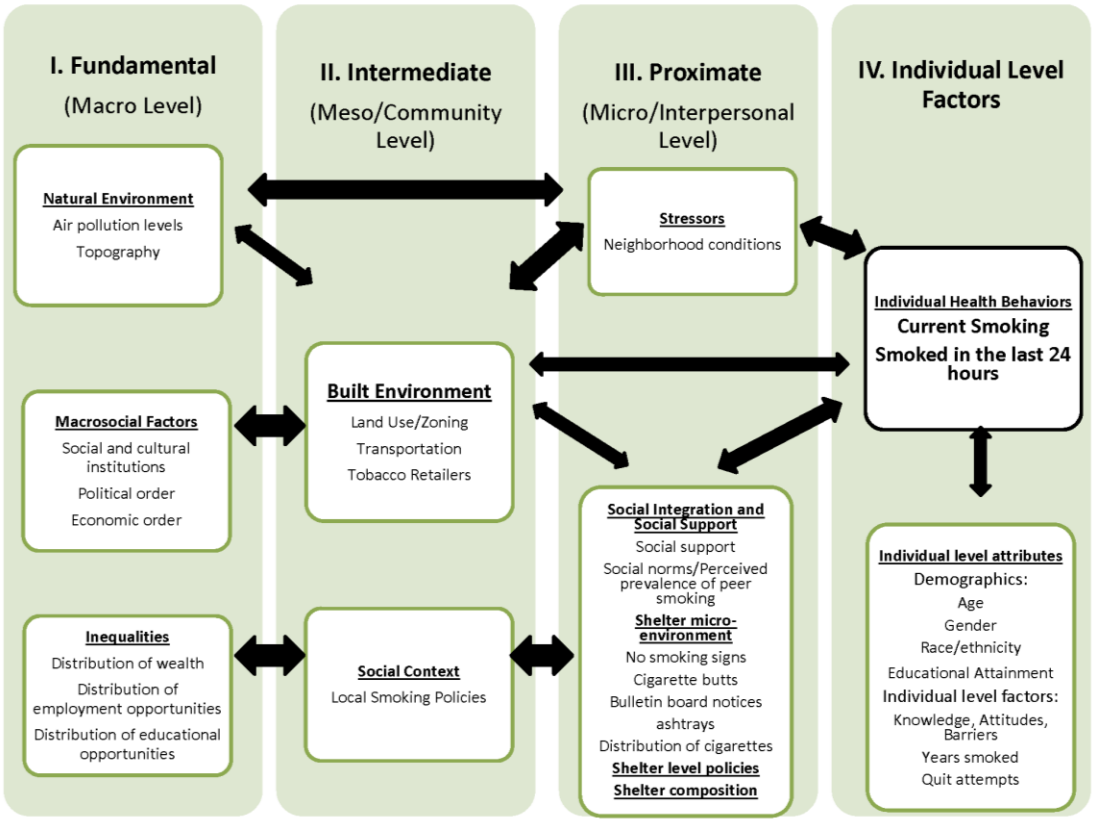


Source: Schulz and Northridge, 2004.

1.6. Conceptual Model

I adapted the SDHEHP model to better frame the research aims for this dissertation (Figure 1.3). This conceptual model closely resembles the original SDHEHP model, with a few changes regarding individual and micro level factors. Double sided arrows represent bi-directional relationships. Rather than considering tobacco use behaviors as micro level factors, they were moved to the individual-level factors column. This change is consistent with the Ecological Systems Theory and Evans-Stoddart models considering behaviors to be an individual-level factor (Bronfenbrenner, 1997; Evans & Stoddart, 1990). Another change from the SDHEHP model is that individual-level factors, such as race, age, and gender, which may be considered control factors, were added to the individual-level column, as they were absent in the SDHEHP model. Previous research addressing tobacco use in the general population indicates the importance of retaining individual demographic level factors that could influence tobacco use and reduction.

Figure 1.3: Conceptual Model for Tobacco Use among Homeless Populations; based primarily on the SDHEHP Model



1.7. Purpose of Research

The purpose of this research is to explain tobacco use prevalence and behaviors and tobacco use reduction behaviors among those living and working in transitional homeless shelters, by focusing on social, policy, and built environment factors. The research proposed here is an analysis of data collected as part of an intervention program designed to reduce tobacco use in the residents and staff of 26 randomly selected transitional homeless shelters in LA County. The dissertation consists of three studies, discussed in Chapters 2-4, which highlight different dimensions of the analysis.

Study 1 aims to describe the prevalence of tobacco use within the culture of transitional housing shelters. In study 1, I analyze tobacco use rates of those living and working in transitional shelters, and conduct descriptive statistical analyses in order to examine factors related to shelter composition and individual characteristics. To my knowledge, describing tobacco use in the context of transitional shelters in LA County has not been done before; thus this study provides a much needed addition to the literature. Paper 1 also examines, using descriptive statistics, potential factors that may affect tobacco use in the micro and meso built environments, and micro and meso policy environments. Micro level factors involve built and policy environment factors at the shelter level, whereas meso level features involve policies and built environment level features at the neighborhood level. The results point to factors that are most important in explaining any variations in tobacco use among residents and staff in transitional homeless shelters.

Study 2 describes and assesses a tobacco reduction intervention program targeting homeless residents in transitional shelters in LA County using a mixed methods approach. Descriptive data regarding tobacco use at baseline and 3 months follow-up is used in conjunction with the qualitative data. Tobacco use by program participants was assessed before and after implementation of an eight week intervention. Qualitative data collected through mutual learning dialogues (guided interviews, structured by both the investigator team and the shelter team) were used to uncover lessons learned about the feasibility of interventions designed to reduce tobacco use among the residents of transitional shelters.

The results provide insights into remaining gaps to effective intervention design and delivery aimed at reducing tobacco use at transitional homeless shelters.

Study 3 focuses on the lessons learned for measuring the micro and meso built, social, and policy environments in analyzing tobacco use and cessation for residents and staff of transitional homeless shelters. As one of, if not the first, study that examines built environment and policy factors influencing tobacco use in transitional homeless shelters, the results find some significant new information about smoking practices in this population, and point to still remaining and important gaps and challenges in the ways that conventional measures are used in hard to reach and underserved populations, such as the homeless. The results of this analysis indicate an agenda for the application of innovative conceptualizations, measurement and data collection that should help researchers and policy makers to better align data with the unique circumstances of homeless populations.

1.8. Contribution to the Literature

The extant literature shows that tobacco use among homeless individuals is high (Baggett & Rigotti, 2010; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013). Research on youth and tobacco suggests a relationship between built environment and policy factors to tobacco use. To date, however, no studies have examined whether meso and micro built and policy environment factors affect tobacco use among homeless adults, and there are no existing interventions targeting homeless tobacco cessation in transitional shelters.

This dissertation study is therefore important in several ways. First, this study is the first to investigate the tobacco use and cessation efforts among individuals living in transitional homeless shelters, providing much needed empirical data that both describe current tobacco use behavior and the variations in such behavior across a randomly selected sample of LA County transitional shelters. Second, this study is the first of its kind to assess an intervention delivered in transitional homeless shelters aimed at tobacco use reduction. As tobacco use reduction may have other benefits, such as reinforcing heroin use reduction, (Hser et al., 2004), designing and delivering effective tobacco use reduction interventions

is important for addressing health disparities. Third, this study found that conceptualizations of the built environment and tobacco use are likely not applicable to this heretofore unstudied population. Lastly, the analysis suggests that adaptation of existing interventions to homeless populations may be premature. The results suggest that measurement development using formative research may first be necessary to accurately measure the important factors pertaining to homeless populations and settings. Without appropriate and accurate measurements, challenges to effective and cost effective interventions will be difficult to overcome.

1.9. References

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CHAPTER 2:

Prevalence of tobacco use among staff and residents at the randomly selected transitional homeless shelters in Los Angeles County (Study 1)

2.1. Abstract

Objective: The purpose of this study is to extend limited previous research on tobacco use among homeless individuals to increase understanding of smoking prevalence rates of residents of transitional homeless shelters at the individual level. The aim of this research is also to examine potential individual variations in smoking prevalence rates across transitional shelters at the shelter level.

Problem Focus and Research Question: A growing literature indicates that homeless individuals suffer from disproportionality high rates of tobacco use, with prevalence rates ranging from 57-80% among the general homeless population (Travis P Baggett & Rigotti, 2010; Connor, Cook, Herbert, Neal, & Williams, 2002; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, H. Guo, et al., 2013; Tsai & Rosenheck, 2012) compared with a national mean prevalence rate of 19.3, indicating that tobacco use is an important health issue that disproportionally affects this population (CDC, 2011). Yet, readiness to quit estimates have ranged from 37% of homeless residing in shelters reporting a readiness to quit within the next six months (Connor 2002) to 76% planning on quitting in the next six months (Kolawole S Okuyemi et al., 2006). One subgroup, in particular, of the homeless population may be more amenable to tobacco cessation are those in this subpopulation of homeless individuals transitional shelters. No studies on tobacco cessation exist on this population. Therefore, this study constitutes the first analysis to address individual and shelter-level factors that affect rates of current smoking and rates of having smoked in the past 24 hours.

Methods: Descriptive, bivariate, and multivariate analyses were conducted of data obtained from a census of Los Angeles County-area shelters and from a survey of a random sample of residents and staff of 26 randomly selected shelters participating in a smoking reduction program. The sample consists of 261 residents of the transitional shelter and staff.

Results: Current smoking rates were uniformly high, with 66% of the male respondents and 63% of the female respondents reporting that they smoked. Few demographic differences existed within this sample, with the exception that Latinas were less likely to smoke than members of other ethnic groups.

Conclusion: Consistent with the literature on homeless populations, the smoking rates of residents of transitional homeless shelters in Los Angeles County are notably high compared to the general population. Antecedents of homelessness (e.g., psychiatric diagnosis, comorbid drug use) may explain these consistently high smoking rates. More attention to these antecedent conditions is warranted, given the need to promote tobacco control in this vulnerable population. The findings in this study extend previous surveillance research of the homeless population, specifically by providing smoking prevalence data for residents and staff of transitional homeless shelters. Given that the data on tobacco use and smoking cessation of residents living in transitional homeless shelters are sparse, this study fills a much needed gap in the literature.

2.2. Introduction

2.2.1. Health Disparities and Homeless Populations

Health disparities on a range of health conditions are especially profound for homeless individuals who are especially disadvantaged financially and have reduced access to resources compared to the general population (Marr, DeVerteuil, & Snow, 2009; Plumb, 2000). They are one of the most underserved populations in California. Ethnic minority groups of color are disproportionately homeless compared to their distribution in the general population, and have greater health-related disparities, including a lack of access to health care services (Hwang, 2001; Moore, Gerdtz, & Manias, 2007). Despite these recognized disparities, current efforts to provide resources to prevent and treat their health needs remains inadequate, with little existing research on ways to improve their health conditions. Baggett and colleagues found that cancer and heart disease accounted for 15.8% and 15.6% of deaths, respectively, among the homeless population, preceded only by drug abuse, which accounted for 16.8% of deaths (T. P. Baggett, Hwang, et al., 2013; T. P. Baggett, Lebrun-Harris, & Rigotti, 2013). But this may be misleading, inasmuch as polydrug use is confounded with tobacco use. When tobacco use was distinguished from alcohol use and other illicit drug use as predictors of mortality in a heroin-using population followed for 25 years, it was tobacco use that was most often associated with early mortality (Hser, McCarthy, & Anglin, 1994). Tobacco is directly related to over 30% of both cancer and heart disease for all populations, yet remarkably little research has been conducted to reduce the extremely high rates of smoking in the homeless population (Goldade et al., 2011; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, B. Sewali, et al., 2013; Shelley, Cantrell, Warn, & Wong, 2010; Shim, Kelly, & Hornik, 2006). Therefore, this study was designed to investigate the demographics and smoking behaviors of staff and residents at 26 randomly selected transitional homeless shelters in Los Angeles County.

2.2.2. Homeless Adults, Smoking, and Transitional Homeless Shelters

The living situation for homeless individuals varies greatly, as some are living on the streets or staying with friends or family, whereas others are sheltered in emergency shelters and transitional shelters (Henry, Cortes, Morris, Khadduri, & Culhane, 2013). Emergency shelters consist of short term housing, and are available only for fixed amount of time, which can range from a day at day shelters to usually no longer than 90 days (Henry et al., 2013; LAHSA, 2011). The concept of transitional housing is relatively new, first emerging on the national scene in the 1980s and adapted from programs for mental health patients and formerly incarcerated persons (Burt, 2006). Transitional shelters are focused on assisting homeless individuals to integrate back into society and provide supportive services, such as job placement, skills building, and access to health and mental health services (Henry et al., 2013). Transitional shelters differ in their target population and services offered, but generally offer housing from 6 to 24 months, with goals to assist residents to moving into more permanent housing (Henry et al., 2013; LAHSA, 2011). However, few health-behavior related interventions have been implemented in transitional homeless shelters, and little is known about behaviors such as smoking that are related to chronic diseases.

2.2.3. National Smoking Prevalence

Cigarette smoking prevalence rates have been decreasing over time, nationally, and at a greater rate in California, in part to tobacco restrictions and cigarette taxes (CDC, 2011). California has the lowest adult smoking prevalence rate in the US (11.9%), second only to Utah (11.3%) (CDC, 2011). However, rates of smoking differ by geography and demographics within California.

Smoking Prevalence in the General Population

Approximately 19.3% of the US adult population was current smokers as of 2010 (CDC, 2011). Men were more likely to be current smokers (21.5%) than women (17.3%). In regards to race/ethnicity, American Indians/Alaska Natives were more likely to be current smokers (31.4%) than other racial/ethnic populations, followed by Whites (21.0%), African Americans (20.6%), Hispanics (12.5%), and Asians

(9.2%). Of those living below the federal poverty level (FPL), 28.9% reported being current smokers, a smoking rate considerably higher than the national average (CDC, 2011).

California Smoking Prevalence

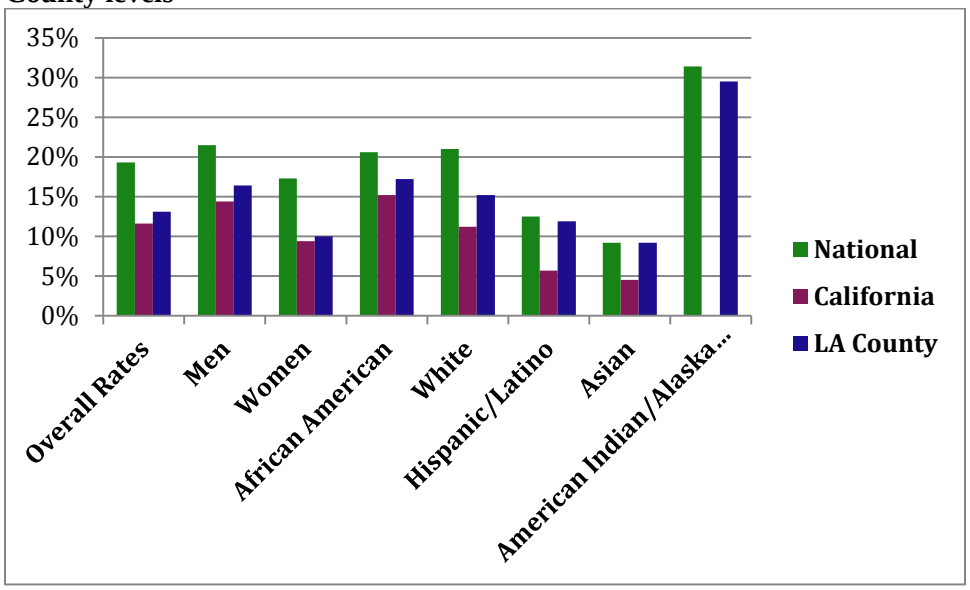
Data from the California Health Interview Survey reveal an overall smoking rate of 11.9% in the general population (CHIS, 2013). Men are more likely to smoke (14.4%) than women (9.4%). California smoking prevalence rates show that tobacco use is highest among African Americans (15.2%), followed by Whites (11.2%), Hispanics (5.7%), and Asians/Pacific Islanders (4.5%) (CDPH, 2013). Furthermore, those in the lowest socioeconomic status (SES) groups had the highest rates of smoking (16.9%) compared to middle SES (15.3%) and high SES (3.9%) groups (CDPH, 2013).

Los Angeles County Smoking Prevalence

The Los Angeles County Health Survey conducted in 2011 found overall rates of current smokers to be 13.1%, with a greater percent of men (16.4%) being current smokers than women (10.0%). In regards to race/ethnicity, American Indian /Alaskan Natives had the highest rate of current smokers (29.5%), followed by African Americans (17.2%), Whites (15.2%), Latinos (11.9%), and Asians (9.2%). Of those living below the FPL, 14.6% were current smokers compared to 11.9% living at 200% or above the FPL (LACDPH, 2012).

Figure 2.1 shows the current smoking prevalence rates of subpopulations at the national, state, and county level. Current smoking rates for LA County are lower than national levels, but higher than CA state rates in general.

Figure 2.1: Comparison of Current Smoking Rates at the National, CA State, and Los Angeles County levels*



*Data obtained from (CDC, 2011)(National), (CDPH, 2013) (California), and (LACDPH, 2012) (LA County).

Based on the smoking rates at the national, state, and county levels, we would expect those living in transitional shelters to follow similar trends, with American Indian /Alaskan Natives and African Americans to have higher smoking rates than Whites and Asians. In addition, we would expect rates to be higher among those living in transitional shelters than the general population because they are more similar in terms of SES to those living below the poverty level. However, limited epidemiological research has been conducted to document smoking prevalence in the homeless population, and the existing literature may not be generalizable to those living in transitional shelters (Arnsten, Reid, Bierer, & Rigotti, 2004; Travis P Baggett & Rigotti, 2010). For example, homeless persons receiving smoking related advice from health clinics on a walk-in basis may differ in their tobacco use behaviors from those living in transitional shelters. More research is needed to understand smoking prevalence among the homeless population, and specifically those living in transitional shelters. Homeless individuals living in transitional shelters differ from the general population as they may more likely to be making active changes to integrate back into society, including acquiring job seeking skills and actively trying to reduce their substance abuse dependency as a requirement of residency.

2.2.4. Tobacco Use Prevalence and the Homeless

A growing national research base indicates that homeless individuals experience disproportionally high rates of tobacco use, with rates ranging from 57-80% among the general homeless population (Travis P Baggett & Rigotti, 2010; Connor et al., 2002; Kolawole S Okuyemi et al., 2013; Tsai & Rosenheck, 2012). However, it is unclear how these nationally-derived estimates relate to the rates of tobacco use among the homeless population living in LA County. Furthermore, these estimates are derived from the general homeless population, and are not specific to those living in transitional shelters.

2.3. Study Purpose

Readiness to quit estimates have ranged from 37% of homeless adults residing in shelters reporting a readiness to quit within the next six months (Connor et al., 2002) to 76% planning on quitting in the next six months (Kolawole S Okuyemi et al., 2006). Given this limited surveillance literature indicating substantial interest in tobacco use reduction/cessation among homeless individuals, smoking reduction/cessation programs specifically tailored for this population need to be created and evaluated. However, few studies have been conducted on smoking behaviors in the homeless population in general, and no previous tobacco use surveillance has been done specifically involving residents and staff of transitional homeless shelters, including taking into account the demographic and individual-level characteristics of shelter residents (Connor et al., 2002; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, B. Sewali, et al., 2013).

In addition, past national surveillance research may have not accounted for the diversity found in LA County (LACDPH, 2012) (see Figure 2.1). More specifically, this analysis extends previous surveillance research in the homeless population, specifically by providing smoking prevalence data for residents and staff of transitional homeless shelters in LA County. Given that the data on tobacco use and smoking cessation among residents of transitional homeless shelters are sparse, this study fills a much needed gap in the literature.

2.3.1. Hypotheses

Since California general population smoking rates and ethnic-specific smoking rates are lower than corresponding national rates, it seemed reasonable to predict that smoking rates among residents in LA County transitional homeless shelters would be lower than the corresponding national rates for the homeless population (Travis P Baggett & Rigotti, 2010; K. S. Okuyemi et al., 2006). However, in parallel with national surveillance statistics on tobacco use in the homeless population, we predicted that the rates of tobacco use among residents of transitional homeless shelters would be higher than corresponding rates for California general population and ethnic subgroups (CDPH, 2013; CHIS, 2013; LACDPH, 2012). We also hypothesized that relationships between demographic variables and smoking rates would parallel those surveillance statistics obtained from national surveillance of homeless individuals (Travis P Baggett & Rigotti, 2010; Connor et al., 2002; K. S. Okuyemi, K. Goldade, G. L. Whembolua, J. L. Thomas, S. Eischen, B. Sewali, et al., 2013). Arangua and colleagues assessed shelter-level composition in LA County and receptivity to hosting tobacco control programs, but that study did not attempt to document how smoking prevalence was associated with shelter characteristics (Arangua, McCarthy, Moskowitz, Gelberg, & Kuo, 2007).

In designing the study, we hypothesized that select shelter-level characteristics would be related to tobacco use behaviors. More specifically, since previous surveillance literature has documented significant associations between being formerly incarcerated, diagnosed with mental illness, and having served in the U.S. military with smoking prevalence rates (Travis P Baggett & Rigotti, 2010), we hypothesized that shelters with a target population of formerly incarcerated individuals (including parolees), residents diagnosed with mental illness, and veteran status would have higher rates of tobacco use. We further hypothesized that shelters serving women and families would have a lower prevalence of tobacco use, because ethnic minority women are consistently less likely to smoke than ethnic minority men (CDC, 2004; CDPH, 2013; LACDPH, 2012) Based on this literature, we hypothesized the following:

Hypothesis 1: Relationships between demographic variables and smoking rates would parallel those of data obtained from national surveillance of homeless individuals in the context of individual and shelter-level covariates.

Hypothesis 2: Rates of tobacco use among residents of transitional homeless shelters would be higher than corresponding rates for California general population and ethnic subgroups in the context of individual and shelter-level covariates.

Hypothesis 3: Rates of tobacco use would be higher among residents of transitional homeless shelters targeting persons dealing with mental illness, substance abuse, and formerly incarcerated individuals, and lower in shelters that target mothers and families.

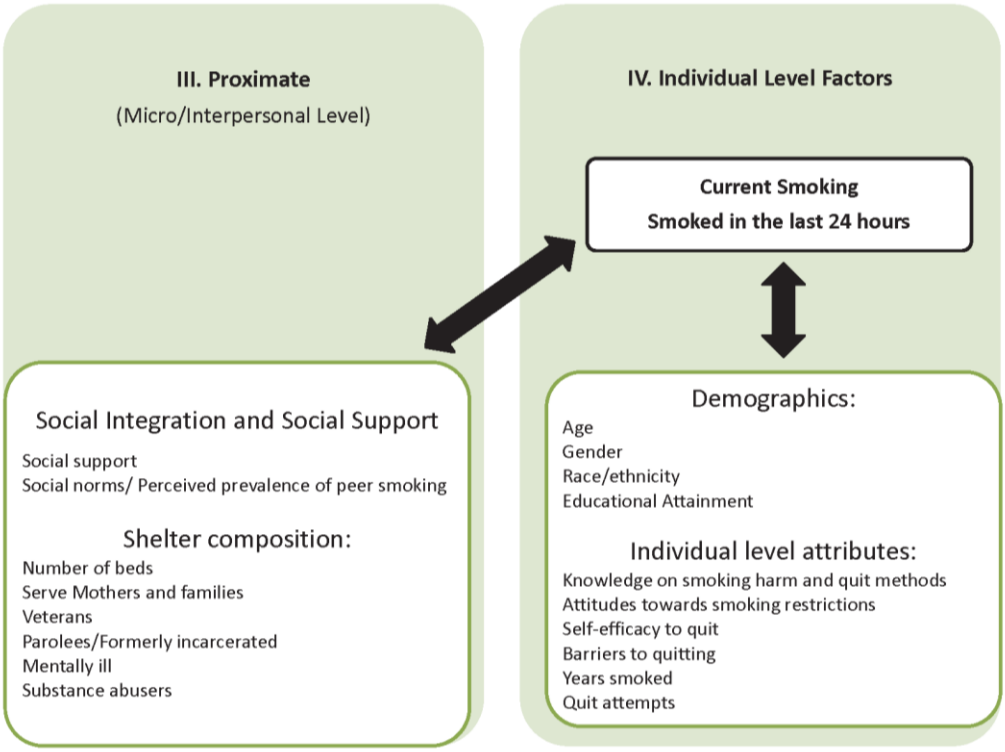
2.3.2. Conceptual and Analytical Models

The Social Determinants of Health and Environmental Health Promotion (SDHEHP) Model created by Schulz and Northridge addresses the social and environmental determinants of health (Schulz & Northridge, 2004). The conceptual model I adapted from the SDHEHP closely resembles the original model, with a few changes regarding individual and micro level factors. Chapter 1 describes the theoretical model in more detail. Figure 2.2 depicts the analytical model, which focuses on the proximate environmental and individual-level factors related to current smoking status and smoking in the past 24 hours in transitional homeless shelters. Proximate environmental factors include factors related to social support and norms, as well as shelter-level factors related to the composition of the shelter. Individual-level factors include specific behaviors perhaps more prevalent among residents living in transitional homeless shelters.

The analytical model includes directional arrows. However, because these data are cross-sectional, causation cannot be tested and the directionality of the relationships remains unclear. For example, social norms may influence a resident to smoke; the relationship can also be addressed in the other direction where smoking prevalence may create a social norm of smoking. This remains a limitation of the analytical model given the available data. That being said, the analytical model is comprehensive

and accounts for potential individual factors related to tobacco use behaviors in the transitional homeless shelter population. Each of the variables in this model is further discussed in the methods section. Figure 2.1 features the full conceptual model and highlights the various components related to tobacco use behaviors. More information on the theoretical model and basis for creation of the conceptual model is described in Chapter 1.

Figure 2.2: Analytical Model



2.4. Methods

2.4.1. Data sources

Los Angeles (LA) County was awarded a grant of $16.2 million to address tobacco use throughout the County as part of the CDC Communities Putting Prevention to Work (CPPW) initiative. We received a subcontract to address tobacco use among residents and staff of transitional homeless shelters. However, since the CDC did not allow for funds to be used towards research, an intervention program with a relatively unsophisticated evaluation plan (uncontrolled demonstration project rather than

a randomized controlled trial design) was developed to assist shelters in starting a smoking reduction/cessation program at their sites. Previous research established that 95% of Los Angeles area shelters were receptive to participating in a smoking reduction/cessation program if the resources to support this activity were provided externally (Arangua et al., 2007). This study does not focus on the intervention portion; rather, this study examines individual and shelter-level factors related to the prevalence of smoking behaviors in transitional homeless shelters. Data sources included a county-level shelter-level survey (SLS) and random sample survey (RSS). Human subjects approval for use of all data was obtained from the UCLA Institutional Review Board (IRB).

2.4.1.1. Shelter-level Survey

We identified all potential transitional shelters throughout LA County, and conducted an exhaustive shelter-level telephone survey of all the ones we could reach. From this comprehensive list of 90 shelters, 26 were randomly selected from 76 eligible potential sites to participate in a smoking reduction/cessation program; 14 shelters out of the original 90 did not meet eligibility requirements. Eligibility criteria included shelters that offered a minimum stay of 6 months and had at least 28 adult beds. Eligibility was determined through a telephone survey with shelter staff that included questions about shelter-level demographics, target populations, services offered, and the number of beds in the facility. The list of shelters was then stratified by groupings of LA County service planning areas (SPAs), and 26 shelters were randomly selected to equally represent these groupings. T-tests comparing the 26 shelters on key demographics did not show any differences (not presented) from the full list of 90 shelters. Therefore, we feel fairly confident that our 26 shelters are representative of the current transitional shelters in LA County that met the eligibility requirements. Since individual-level smoking-related data are nested within shelters, shelter-level data are necessary to include in the multivariate analyses to provide accurate estimates of variability for the observed residents' tobacco use behaviors.

2.4.1.2. Random Sample Survey

After selecting the 26 shelters to participate in the study, we obtained an exhaustive list of all residents and staff from each site; 15 participants were then randomly chosen to participate in the random sample survey prior to the sites' involvement in the intervention program. At baseline, the data from two of the participating shelters were lost so the number of shelters for which we have baseline data and that are included in this analysis is 24 for a total respondent sample of 261, or a response rate of 72.5%. For subsequent components of the intervention program data were collected at all 26 sites. The sample size of 261 is relatively small, given the number of variables we were interested in addressing in the multivariate analyses. However, the sample size is still sufficient for examining basic relationships between demographic characteristics and tobacco use behaviors.

It should be noted that a question on the survey regarding staff or resident status was not included because of the high probability of deductive disclosure of the staff respondents participating in the survey, given how few were randomly selected. Approximately 10 residents were surveyed for every staff member. For that reason, we cannot differentiate staff and resident smoking behaviors, as survey questionnaires were randomly distributed among both staff and residents. From informal conversations with staff, it seems that many staff were previously homeless, and thus may be more similar to residents than staff at other types of structured programs.

2.4.2. Measures

Two outcomes of interest were analyzed in the multivariate models: current smoking and having smoked in the past 24 hours.

2.4.2.1. Main Dependent Variable: Current Smoking

Current smoking was assessed using two self-reported measures of tobacco use. The measure of "current smoking" was created by combining responses to 1) the frequency with which the respondent smoked cigarettes in the past 30 days and 2) Had the respondent ever smoked at least 100 cigarettes in lifetime. Those who responded "Every day" or "Some days" to the frequency question and "yes" to having ever smoked at least 100 cigarettes were combined to create the new variable of "current

smoking". Definitions used are based on conventions used by the Centers for Disease Control and Prevention (CDC, 2012).

2.4.2.2. Secondary Dependent Variable: Smoking in the Past 24 Hours

The secondary outcome of interest was smoking in the past 24 hours, as this measure indicates whether the smoking behavior is by an addicted everyday smoker, or by those engaged in "social" smoking, who were not so addicted that they could not forego smoking for a day. This variable has been used in other research related to tobacco use surrounding vulnerable populations, such as infant victims of SIDS (Hutchison, Stewart, & Mitchell, 2006). Smoking in the past 24 hours is also an important factor for understanding the effectiveness of smoking cessation and reduction programs.

2.4.2.3. Other Outcomes Variables

Other questions related to smoking behaviors were asked of all survey respondents and were included in the univariate analyses. These variables included: 1) the number of days smoked in the last the last 30 days, 2) number of cigarettes smoked daily in the last 30 days. These variables were not used in bivariate or multivariate analyses as outcome variables, but are nonetheless important in better understanding the tobacco use behaviors of those living and working in transitional shelters. Descriptive data on these variables provide contextual information of staff and residents living in transitional shelters.

2.4.2.4. Covariates of Interest

Individual-level Factors: Demographic Variables

Demographic variables were included to evaluate how much observed relationships in our study population mirror findings from previous research in non-homeless populations. Previous individual-level research has shown that demographic variables including age (continuous measure), gender, and race/ethnicity are related to tobacco use (Tyas & Pederson, 1998).

The four demographic variables included age, gender, race/ethnicity and education. The study group was limited to adults 18 and over. Gender was included in the model, as research shows women are

less likely to smoke than men. Women were set as the referent group in multivariate analyses. Race/ethnicity was included to understand potential differences between groups regarding smoking behaviors. The original categories included: Non-Hispanic White (White), Hispanic, African American, Asian, Native Hawaiian/Pacific Islander and Native American/American Indian. However, due to the small sample sizes of some of the categories, the variable was collapsed for bivariate and multivariate analyses to include the categories of: White, African American, Hispanic, and other. Although this is not ideal, aggregating race/ethnicity data was the only way to obtain reasonable estimates of variability within the categories for which we did have a large enough sample size. For comparison purposes, the reference group was set to Whites. Educational attainment refers to the highest level achieved and is categorized as follows: "less than high school", "high school", "some college or junior college" and "college graduate or postgraduate". The reference category for multivariate analyses is "less than high school".

Individual-level Attributes

Individual-level attributes that may be related to smoking behaviors include: the different types of quit attempts, years smoked, and knowledge, attitudes and barriers regarding tobacco use reduction.

Individual-level Factors: Quit Attempts

Based on the various forms of quitting attempted, a total count variable was created, which represents the number of different quit methods already attempted by participants of the random sample survey. The number of different types of quit methods attempted were summed and included as a covariate. Studies suggest that it takes an average of 5-7 prior quit attempts to be successful at quitting (Hughes, 2000). Therefore, those who have attempted to quit, but have not yet succeeded, are likely to be current smokers.

Individual-level Factors: Years Smoked

The number of years smoked is a categorical variable from the random sample survey with responses of "Less than 1 year" "1-3 years", "4-10 years" "Greater than 10 years" and "Don't know", and was asked of those who had smoked 100 cigarettes or more in their lifetime. Since the sample size is

small, the variable was dichotomized; “not greater than 10 years” was used as the reference category for multivariate analyses.

Individual-level Factors: Planning on Quitting

Another variable from the random sample survey was whether the participants were planning on quitting smoking in the near future. Response options included: “Not currently smoking”, “Yes, in the next 3 months”, “Yes, in the next 6 months”, “Yes, in the next 12 months”, “Yes, but not in the next 12 months”, and “No, not planning to quit smoking”.

Individual-level Factors: Knowledge, Attitudes, and Barriers Factor Scores

Participants were asked a series of questions regarding their knowledge, attitudes and barriers related to tobacco use and related factors, scaled on a forced-choice Likert scale, with a response of “Strongly agree, Agree, Disagree, or Strongly disagree” for each statement. Because the answers to the 22 questions about knowledge, attitudes and barriers were highly correlated, we used principal components analysis to reduce the dimensions being evaluated. The resulting factor scores were used to relate knowledge, attitudes, and barriers to tobacco use status. The descriptive results of these individual factors are in Appendix Table 2.1. Appendix Table**s** 2.2-2.5 show the correlation matrix of the four different factor scores created.

“Knowledge of Tobacco Harmfulness Factor Score” is a continuous variable, consisting of factor scores. Items and factor loadings contributing to this variable were: Smoking can harm every organ of the human body and can cause severe diseases (0.70), Smoking can harm people at all ages including infants (0.78), Smoking is an addictive behavior (0.66), Breathing in cigarette smoke can cause cancer among non-smokers (0.83), and Any amount of cigarette smoke exposure is harmful (0.73) (Cronbach’s alpha = 0.841). Item correlations are listed in Appendix Table 2.2.

“Attitudes towards Tobacco Restriction Factor Score” is a continuous variable, consisting of factor scores. Items and factor loadings contributing to this variable were: Smoking should not be allowed

in a) public indoor areas such as homeless shelters and treatment centers (0.62), b) public outdoor areas like the patio outside a treatment center or a homeless shelter (0.70), c) private indoor areas such as apartments if the cigarette smoke from an apartment can affect neighboring apartments (0.71), and d) near entrances of residential buildings or within 20 feet of apartment windows so that nonsmoking residents can be smoke-free (0.74) (Cronbach's alpha = 0.772). Item correlations are listed in Appendix Table 2.3.

"Knowledge of Tobacco Quit Methods Factor Score" is a continuous variable, consisting of factor scores. Items and factor loadings contributing to this variable were: Nicotine gum and patch are useful for helping smokers quit smoking (0.61), Some pills can help smokers quit (0.57), Calling a quit line may help smokers quit smoking (0.79), One-on-one counseling may help smokers quit smoking (0.90), and Group counseling may help smokers quit smoking (0.85) (Cronbach's alpha = 0.772). Item correlations are listed in Appendix Table 2.4.

"Barriers to Quitting Factor Score" is a continuous variable, consisting of factor scores. Items and factor loadings contributing to this variable were: I don't know where to get nicotine gum or patches (0.81), I don't know where to get help for quitting smoking (0.93), and I don't have money to buy medicine to help me quit smoking (0.50) (Cronbach's alpha's = 0.772). Item correlations are listed in Appendix Table 2.5.

Two variables from the factor scores representing, respectively, the factors: "Attitudes toward Tobacco Restriction" and "Barriers to Quitting" were separated out to test bivariate relationships to smoking status. Since these variables were the dominant variables defining their respective factors, each of these individual variables was added to the multivariate factors, rather than the factors scores that they helped to define. The question "Smoking should not be allowed in outdoor areas smoking" with response categories of "Strongly agree, Agree, Disagree, or Strongly disagree", was dichotomized (Reference: Agree, Strongly Agree) and used in the multivariate model in lieu of the factor scores reflecting the factor: "Attitudes toward Tobacco Restriction", since this factor remained significant in bivariate and multivariate analyses of the smoking behaviors, but the association was not clear when included as a loading on a factor. The question**:** "I don't have money to buy medicine to help me quit smoking" with

responses of "Strongly agree, Agree, Disagree, or Strongly disagree", was dichotomized (Reference: Agree, Strongly Agree) and included in the multivariate analyses in lieu of the factor scores reflecting the factor: "Barriers to Quitting." This was done since this factor remained significant in bivariate and multivariate analyses, but the association was not clear when included as a loading on a factor, so isolating this relationship separately helped us to better understand the barriers to smoking use reduction/cessation.

Individual-level Factors: Self-efficacy for Quitting

Two questions were asked on the random sample survey questionnaire: "I can quit smoking on my own" and "I believe that I can successfully quit smoking." Both variables have possible responses of "Strongly agree, Agree, Disagree, Strongly disagree), which were dichotomized (Reference: Agree, Strongly Agree) for multivariate analyses. Greater self-efficacy is an important predictor of short-term success at quitting smoking (Arnsten 2004). In addition, self-efficacy is related to tobacco use status, as well as knowledge, attitudes and barriers to quitting smoking, so this baseline measure was included as a potential confounder in later assessment of intervention impact of the Smoking Reduction Program (SRP), which is addressed in Chapter 3.

Proximate (Interpersonal Level) Factors: Social Support

Social support is an important factor, as the opinions of peers regarding tobacco use can influence individual tobacco use behavior. As demonstrated by the Social Cognitive Theory (SCT), and smoking cessation literature (Powell, Tauras, & Ross, 2005), people are likely to pattern their behaviors on behaviors modeled by others in their social environment (Bandura, 1986). If the social environment commonly includes tobacco use, according to the SCT, people are more likely to adopt this behavior. Therefore, if the shelter has a culture supportive of cigarette smoking, residents are more likely to smoke. Similarly, social support for tobacco use abstinence at the shelter-level is a potentially important influence on residents' smoking status. Research on youth has shown that school-based prevention programs can delay initiation of tobacco use (Backinger, Fagan, Matthews, & Grana, 2003; Lantz et al., 2000). These programs offer institutional social support by changing social norms. Transitional homeless shelters offer

services to residents and often staff to improve skills and increase their ability to find employment and permanent housing. In this way, transitional homeless shelters offer classes similar to a school-based setting, and residents are exposed to and interact with their peers on a continuous basis. Results of descriptive statistics from the random sample survey are found in Table 2.2.

At the shelter level, support for abstinence from tobacco use was measured by the questions: "Is the shelter open to adopting new policies designed to reduce tobacco use?" and also by the degree to which respondents agreed with "It is easy for staff to suggest and carry out new ideas," using the response options of "Strongly agree, Agree, Disagree, or Strongly disagree". Univariate descriptive results of shelter-level factors are found in Table 2.3. Since there was little variation in these shelter-level variables, they were not included in the multivariate models.

Proximate (Interpersonal Level) Factors: Social norms/Perceived prevalence of Peer Smoking

Attitudes regarding tobacco use have become increasingly hostile in California in the past decade (Gilpin, Lee, & Pierce, 2004). Social norms at the shelter may influence tobacco use/non-use among the residents. Social influences that have been found to be related to tobacco use include friends who smoke, and the perceived prevalence of peer smoking (Voorhees et al., 2011). Similar to youth, homeless individuals do not have as much spending money with which to purchase cigarettes. For youth, there are many social sources for obtaining cigarettes, including borrowing and stealing from parents, siblings, and friends (DiFranza & Coleman, 2001). Homeless adults may similarly depend on social sources for their tobacco use, such as borrowing cigarettes from peers. Peer smoking is assessed in the self-reported random sample survey, with a question regarding how much people around them smoke. The self-reported random sample survey questionnaire included a question regarding how acceptable the respondent perceives tobacco use to be at the shelter. Participants were asked "During the past 7 days, on how many days were you in the same room with someone who was smoking cigarettes?". The response to this question provides a proxy measure about the social norms of how acceptable it is to smoke around others at the transitional homeless shelter. As a proxy measure, this question serves to represent peer smoking norms. The data were further collapsed to create a dichotomous variable of being in the same

room as someone smoking cigarettes all 7 days, versus not being in the same room with someone smoking every day. The dichotomous variable was used in multivariate analyses. This variable also speaks to a latent measure of social norms, where the number of days being exposed to a smoker in the same room may also reflect the social norms and culture of the shelter.

Proximate (Interpersonal Level) Factors: Shelter Composition

To clarify the types of target populations being served by the transitional homeless shelters, shelter-level composition is important. The norms of a shelter may vary by the demographics of the shelter residents, or the populations served or targeted by the transitional homeless shelter. The context of individual-level behaviors is framed by the shelter-level variables, and shelter-level characteristics may influence smoking prevalence. Questions regarding shelter demographics were asked including the average age groups, populations served, the number of beds available, receptivity to tobacco interventions, current policies and services offered.

Variables included in bivariate and multivariate models include shelters that serve mothers and families, and shelters with target subpopulations of: veterans, formerly incarcerated, mentally ill individuals, and substance abusers. It should be noted that these questions were not exclusive to one another, and a shelter could have multiple target populations that they served.

2.4.3. Statistical Analyses

Prior to quantitative statistical analyses, data were inspected to identify missing data, outliers, or other influential features. Stata (Stata Corp, 2013) was used for descriptive calculations, group comparisons, and regression modeling. Because the individual-level data are clustered within shelters, all 95% confidence intervals were estimated using variances corrected for the fact that the individual data are clustered within shelters. Relevant analyses were conducted to answer research questions that bear on the different pathways by which shelter-level characteristics might affect individual smoking status.

First, descriptive statistics were used to describe the study sample at the individual level. Table 2.1 describes the demographic characteristics of participants of the random sample survey, disaggregated

by current smoking status. Table 2.2 describes tobacco use behaviors reported in the random sample survey. Appendix Table 2.1 includes descriptive data on questions related to knowledge, attitudes, and barriers used to create the factor scores. Appendix tables 2.2-2.5 show the polychoric correlations between the factors. Polychoric correlations are used, rather than Pearson correlations, which would not be able to account for the ordinal nature of the variables (Holgado–Tello, Chacón–Moscoso, Barbero–García, & Vila–Abad, 2010). Univariate descriptive characteristics of the shelter composition are displayed in Table 2.3.

Next, bivariate analyses with predictors of tobacco use are assessed at the individual shelter level. Results are displayed in Table 2.4 for both outcomes of current smoking and smoking in the past 24 hours. Interactions were tested for gender and other individual-level variables, including race/ethnicity but significant results were not found (not presented). Statistical methods included: Chi-squared ($\chi 2$) analysis for categorical variables and logistic regression for continuous variables. In addition, Kruskal–Wallis one-way analysis of variance by ranks was also conducted to evaluate the relationship of ordinal categorical variables to the outcome variables of current smoking and smoking in the past 24 hours (not shown); the chi-square statistic with correction for ties was used to test for statistical significance. Results of Kruskal–Wallis tests converged with logistic regression analyses, thus adding more confidence to the bivariate results obtained through bivariate logistic regressions. Only unadjusted odds ratios are reported in Table 2.4, as they refer only to the bivariate relationship with smoking behaviors.

Simple logistic regression models were conducted to evaluate the importance of shelter-level composition on tobacco use prevalence of residents and staff at each of the shelters, while accounting for the nesting of data within shelters. Multilevel modeling is an alternative option, but was not used since the null model intraclass correlation (ICC) for current smoking (ICC=0.026) and having smoked in the past 24 hours (ICC=0.031) were relatively small. Thus, multivariate analyses accounting for the clustered nature of the data were more appropriate ways of estimating model parameters. Since individual-level smoking related data are nested within shelters, shelter-level data are important to include in evaluating the influence of the social context on the residents' tobacco use. Both current smoking status and smoking

in the past 24 hours are operationalized as dichotomous variables; therefore, a random intercept logistic regression model (Stata command svy: logistic) was used to evaluate the relationship of individual and shelter-level covariates with tobacco use, since the data are not longitudinal data.

The statistical equation for the model is:

$$\text{Logistic}[\Pr(\text{currentsmoker} = 1)] = \beta_0 + \beta_1 \text{age}_i + \beta_2 \text{race}_i + \beta_3 \text{education1}_i + \ldots + \beta_x X_i + e_i, \text{ where } j=1,\ldots 24 \text{ shelters, with } i=1\ldots., n_i \text{ participants.}$$

Table 2.5 includes results of two separate logistic regression models for the outcomes of current smoking and smoking in the past 24 hours.

Multiple Imputations

An issue with our dataset is that there were several variables missing responses. A test for missing completely at random (MCAR) was run, but this test was not statistically significant. It was assumed that the data were therefore missing at random. Multiple imputation of randomly missing data was attempted in order to improve the power of the bivariate and multivariate analyses (Rubin & Schenker, 1991). Complex imputation models including MICE and Stata v.13 showed variables to be improperly imputed as the models failed to converge when estimated. The lack of convergence was attributable in part to the majority of variables that were being imputed actually being ordinal variables, and even when collapsed to dichotomous variables (i.e. Agree, Disagree from Strongly agree, Agree, Disagree, and Strongly disagree variable responses), the models did not converge when estimated. Hotdeck imputation methods were also attempted with similar results. For that reason, simple imputations by replacing missing values with mean or modal values were created with the knowledge that this likely resulted in inflating the possibility of Type 1 errors, and artificially reducing the variance in the models.

For the purposes of this research, the analytical sample varies depending on the outcome of current smoker status, or smoking in the past 24 hours. Because results of imputed models did not differ appreciably from models with non-imputed data, results reported in this study do not include the imputed data. This is not ideal, as the sample size should not change when comparing models or between bivariate

and multivariate analyses. However, when simple imputations were conducted, significance and test statistics ($\chi 2$, odds ratios) remained the same, and therefore, the analysis of the original data, rather than imputed data are presented in this chapter. However, since multiple imputation models failed to converge, the original data without imputations may be the best representation of what is actually occurring. In addition, it should be noted that listwise deletion would be a good option, but since data are presumably missing at random, and since they are missing for different variables per respondent, the final n is too small to allow inclusion of all variables of interest. The multivariate analyses used listwise deletion for missing values, hence there is a different sample size for each outcome.

2.5. Results

2.5.1. Sample characteristics

Table 2.1 shows the individual-level demographics of the participants in the random sample survey. The data are presented for the full sample, and then stratified by current smoking status. The study population has a much higher percentage of Latinos than the national levels of 12.5%, but matches the percentage of Latino homeless in LA County (27.7%) (CDC, 2011; LACDPH, 2012). A greater percentage of current smokers were African American compared to the total sample (42.9% vs. 39.0%). The rest of the race/ethnicity variables matched between full sample and current smokers, but there were fewer Hispanic/Latinos among the current smokers (23.7% vs. 28.0%) than in the full sample.

Table 2.1—Sample Characteristics of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=236)+

	Total Sample	Current Smokers	Not Current Smokers
Characteristic	**Mean± SD or %***	**Mean± SD or %***	**Mean± SD or %***
Demographics			
Age (mean) (SD) (range = 19-71)	42.9 (11.9)	42.4 (12.1)	44.0 (11.6)
Race/Ethnicity			
African American/Black %	39.0%	43.0 %	31.3 %
Hispanic/Latino %	28.0%	22.4 %	38.8%
Asian %	3.4 %	3.2 %	3.8 %
White %	22.0 %	23.7 %	18.8 %
American Indian/Alaska Native %	0.9 %	0.6 %	1.3 %
Native Hawaiian/Other Pacific %	6.8 %	7.1 %	6.3 %
Gender			
Female %	41.1 %	40.4 %	42.5 %
Male %	58.9 %	59.6 %	57.5 %
Educational Attainment			
Less than high school %	18.6 %	18.6 %	18.8 %
High school graduate %	30.1 %	33.9 %	22.5 %
Some college or junior college %	35.6 %	36.5 %	33.8 %
College graduate or postgraduate %	15.7 %	10.9 %	25.0 %

*Mean and standard deviation reported for age, which is a continuous variable.
+Full sample included n of 261, but only 236 are included in this table, as listwise deletion was used for incomplete cases.

Table 2.2 presents individual-level data from the random sample survey regarding smoking behaviors. Current smoking rates among the residents and staff (65.3 %) are higher than the general LA County rates of 13.1%, and even compared to the lowest income FPL group of LA County (14.6%) (LACDPH, 2012). Rates are lower, however, compared to current smoking prevalence rates among the general homeless population nationally (73%) (Travis P Baggett & Rigotti, 2010), but are closer to the rates found in other studies (68%) of the general homeless population (Connor et al., 2002). The percentage of those intending to quit in the next 12 months is high: approximately 38% planned to quit smoking in the next three months, and an additional 8.6% planned to quit in six months, and 4.3% additionally in the next 12 months. The number of days smoked in the last 30 averaged: 14.2. It should be noted that the range is 0-30, so these rates are not restricted to current smokers, and may include occasional smokers. Only 18.7 % of the sample had not made a previous quit attempt to stop smoking. The average number of cigarettes smoked daily was 6.6. Over 53% of the sample smoked greater than 10

years, which highlights how ingrained the tobacco use behavior may be for these residents and staff of transitional homeless shelters. Self-efficacy is also high, with 46.4% strongly agreeing that they can quit successfully in the next year, and an additional 41.4% agreeing [but not strongly], which is almost the entire sample. Fewer people were as confident that they could quit on their own, however (30.1% strongly agree, 31.4% agree), though they still comprise the majority of the participants surveyed.

Table 2.2—Tobacco Use Behaviors of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=261)

Characteristic	Total Sample	Men	Women
Smoking Behaviors	**Mean± SD or %***	**Mean± SD or %***	**Mean± SD or %***
Current Smoker	***(n=248)***	***(n=140)***	***(n=105)***
Yes %	65.3%	66.4%	62.9%
No %	34.9%	33.6%	37.1%
Frequency smoked cigarettes in the past 30 days	***(n=261)***	***(n=149)***	***(n=109)***
Every day %	51.3%	54.4%	47.7%
Some days %	15.7%	14.1%	16.5%
Not at all %	32.6%	30.9%	37.8%
Don't know %	0.4%	0.7%	0%
Smoked at least 100 cigarettes in lifetime	***(n=257)***	***(n=146)***	***(n=108)***
Yes %	80.2%	78.1%	82.4%
No %	17.1%	19.9%	13.9%
Don't know %	2.7%	2.1%	3.7%
Smoked in the past 24 hours	***(n=259)***	***(n=147)***	***(n=109)***
Yes %	63.3%	64.0%	61.5%
No %	36.7%	36.0%	38.5%
Number of days smoked in the last 30 days *(range = 0-30)*	***(n=212)***	***(n=116)***	***(n=93)***
	14.2 (13.6)	14.6 (13.5)	13.8 (13.7)
Number of cigarettes smoked daily in the last 30 days *(range = 0-77)* **(mean) (SD)**	***(n=253)***	***(n=146)***	***(n=104)***
	6.6 (8.7)	6.8 (8.0)	6.3 (9.8)
Years in total smoked regularly	***(n=234)***	***(n=135)***	***(n=96)***
Less than 1 year %	8.1%	8.2%	8.3%
1-3 years %	9.4%	8.2%	10.4%
4- 10 years %	19.2%	17.8%	21.9%
Greater than 10 years %	53.0%	53.3%	52.1%
Don't know %	10.3%	12.6%	7.3%
During the past 7 days, number of days in the same room with someone who was smoking	***(n=258)***	***(n=147)***	***(n=108)***
0 days %	39.2%	41.1%	37.0%
1–2 days %	12.0%	12.2%	12.0%
3–4 days %	8.1%	6.8%	9.3%
5 or 6 days %	7.4%	5.4%	10.2%

7 days %	25.6%	26.5%	24.1%
Don't know %	7.8%	7.5%	7.4%
Quit Attempts			
Planning to quit smoking in the near future	***(n=232)***	***(n=133)***	***(n=96)***
Not currently smoking %	31.5%	28.6%	36.5%
Yes, in the next 3 months %	38.4%	35.3%	41.7%
Yes, in the next 6 months %	8.6%	9.8%	7.3%
Yes, in the next 12 months %	4.3%	6.0%	2.1%
Yes, but not in the next 12 months %	8.2%	6.8%	9.4%
No, not planning to quit smoking %	9.1%	13.5%	3.1%
Forms of quitting attempted**	***(n=261)***	***(n=149)***	***(n=109)***
Have never tried to quit smoking %	18.7%	19.5%	16.5%
Used nicotine replacement products such as nicotine gum or patches %	19.9%	16.8%	23.9%
Attended group counseling %	6.5%	6.0%	7.3%
Attended one-on-one counseling %	2.3%	3.4%	0.9%
Called a help line or quit line %	3.1%	3.4%	2.8%
Used resources from the internet %	3.1%	3.4%	2.8%
Tried to quit by switching to other type of tobacco product	6.9%	7.4%	6.4%
Tried to quit by switching to electronic cigarettes %	1.9%	2.0%	1.8%
Used a prescription pill such as Chantix, Zyban, or	2.7%	2.7%	2.8%
Sought help or support from family or friends %	7.3%	6.0%	9.2%
Quit on their own %	45.8%	46.3%	45.9%
Quit with other methods %	10.7%	12.1%	9.2%
Self-efficacy for quitting			
Belief can successfully quit smoking %	***(n=239)***	***(n=136)***	***(n=100)***
Strongly agree %	46.4%	44.9%	49.0%
Agree %	41.4%	42.7%	40.0%
Disagree %	10.4%	12.5%	8.0%
Strongly disagree %	1.6%	0%	3.0%
Belief can quit on their own	***(n=239)***	***(n=137)***	***(n=99)***
Strongly agree %	30.1%	30.7%	30.3%
Agree %	31.4%	32.1%	30.3%
Disagree %	28.5%	29.9%	26.3%
Strongly disagree %	10.0%	7.3%	13.1%

* Prevalence estimates have been adjusted to reflect the survey design and adjusted for differential non-response across centers
**Not exclusive, may have attempted several quit methods.

Table 2.3 addresses the shelter-level composition based on the shelter-level survey. It should be noted that although shelter-level data were available for all 26 sites that were randomized into an intervention trial (discussed in Chapter 4), random sample survey data were only available for 24 shelters prior to the implementation of the intervention. Therefore, the analyses in this study only reference 24

shelters. A table listing shelter characteristics of all 26 shelters in the intervention is available in Appendix Table 2.6.

Shelters primarily house residents in the middle age category of 31-50 years, with 49.9% of shelters responding that this was the average age group of residents. There is a greater percentage of men than women (57.8% vs. 42.4%) on average, as expected, as there are more homeless men (63%) than women (37%), nationally in sheltered housing (HUD, 2011). The average number of beds per shelter is 113, with a wide range from 30 to 340 beds. The maximum length of stay on average is 1.5 years, ranging from 6 months to over 100 months. The average length of stay is a little over a year (12.5 months). Shelter staff members were asked about the shelter-level receptivity to policy changes to reduce tobacco use; 95% of shelters were open to such policies. Questions regarding services offered ranged from substance abuse counseling to job placement, and family therapy (all with rates greater than 70%). This high prevalence of services highlights that the express purpose of these shelters is to provide housing and offer social services which can improve residents' lives in the long term.

Table 2.3—Characteristics of Randomly Selected Transitional Homeless Shelters in Los Angeles County (N=24)

Characteristic	**N**	**Mean± SD or %***
Demographics: Average Shelter Clientele		
Age (%)	24	
Age 18–30 % (range = 5-80) **(mean) (SD)**		29.5% (18.6)
Age 31–50 % (range = 11-80) **(mean) (SD)**		49.9% (17.6)
Age 51+ % (range = 13.25) **(mean) (SD)**		13.3% (9.7)
Race/Ethnicity (%)	23	
African American/Black % (range = 0-80) **(mean) (SD)**		40.6% (24.1)
Hispanic/Latino % (range = 10-98) **(mean) (SD)**		32.4% (19.7)
White % (range = 1-40) **(mean) (SD)**		21.0% (12.6)
Asian % (range = 0-3) **(mean) (SD)**		0.5% (0.96)
Other % (range = 0 – 10) **(mean) (SD)**		3.0% (3.9)
Gender	24	
Female % (range = 0 -100)		42.3% (38.4)
Male % (range = 0 – 100)		57.8% (38.4)
Demographics: Facility Characteristics		
Populations Served*		
Single women only (%yes)	24	79.2%
Single mothers and children only (%yes)	24	33.3%
Families (mother and father with children) (%yes)	24	12.5%

Single men (%yes)	24	83.3%
Number of beds and clientele		
Number of beds available for clientele *(range = 30 -340)* **(mean) (SD)**	24	112.9 (89.7)
Average number of beds occupied per night *(range = 30 -270)* **(mean) (SD)**	24	97.3 (76.2)
Length of stay		
Maximum length of stay (months) *(range = 6-100)* **(mean) (SD)**	23	18.4 (19.3)
Average length of stay (months) *(range = 3-60)* **(mean) (SD)**	24	12.5 (11.9)
Smoking policies		
Indoor no smoking policy (%yes)	24	95.8%
Designated no smoking area (%yes)	23	100.0%
Attempt to limit smoking? (%yes)	23	78.%
Receptivity to policy change*		
Open to adopting new policies designed to reduce tobacco use (%yes)	22	95.7%
Organizational readiness for change: Easy for staff to suggest and carry out new ideas	24	
Strongly disagree		0%
Disagree		4.2%
Agree		70.8%
Strongly agree		25.0%
Services offered		
Substance abuse counseling and program (%yes)	24	87.5%
Alcoholic anonymous (%yes)	24	87.5%
Life skills training (e.g., reading, writing, personal finance) (%yes)	24	91.7%
Job counseling and placement services (%yes)	24	75.0%
Crafts or job training (%yes)	24	70.8%
Linking clients to public assistance programs (%yes)	24	87.5%
Family therapy counseling (%yes)	24	37.5%
Mental health services (%yes)	24	75.0%
Health care services (%yes)	24	75.0%
Other (%yes)	24	25.0%
Shelter level Target Populations		
Veterans (%yes)	24	20.8%
Formerly incarcerated(%yes)	23	26.1%
Mentally ill(%yes)	24	12.5%
Substance abusers(%yes)	24	75.0%
Shelter level Smoking*		
Residents that smoke (mean) (SD) (range = 25-90)	21	63.6%(19.2)
Staff that smoke (mean) (SD) (range = 2 – 90)	20	29.8% (21.8)

*Shelters may serve more than one population, and categories are not mutually exclusive
**Perceptions of staff member interviewed

2.5.2. Bivariate analyses

Table 2.4 shows the bivariate analyses of individual characteristics from the individual random sample survey in relation to current smoking status. Unadjusted odds ratios for individual-level and

shelter-level characteristics as predictors of current smoking status and smoking in the past 24 hours were calculated.

2.5.2.1. Individual-level and Shelter-level variables and Current Smoking Status

A higher odds of current smoking status was found for those who smoked for a duration greater than 10 years (OR=5.17, 95% CI: [2.87, 9.33]), as well as those who reported being in the same room with a smoker on a daily basis (OR= 5.45, 95% CI: [2.46, 12.08]). In addition, the factor scores for "Knowledge of Tobacco Harmfulness" (OR=1.77, 95% CI: [1.25, 2.52]), "Attitudes towards Tobacco Restriction" (OR=2.65, 95% CI: [1.82, 3.86]), and "Knowledge of Tobacco Quit Methods Factor Score" (OR=1.53, 95% CI: [1.15, 2.05]) were all significantly positively associated with current smoking status. The factor score for "Attitudes towards Tobacco Restriction" was further broken down; those who disagreed/strongly disagreed that smoking should not be allowed outdoors had an odds ratio of 4.44 (95% CI: [2.53, 7.80]) for current smoking status. Although residents and staff may agree with restricting tobacco in indoor spaces, there was a strong inverse association of tobacco use status with support for restricting tobacco in outdoor spaces. This makes sense, as this is the only place that smokers may be permitted to smoke at times.

A lower odds of current smoking status was found for residents and staff who self-identified as Hispanic/Latino. Based on crosstabs, among the categories of African American/Black, White, Hispanic/Latino and Other, Hispanic/Latinos had the lowest rates of current smoking (51.7% for women, and 51.4% for men) (data not shown). African American men had the highest rate of current smoking (74.6%), followed closely by White men (73.1%), White women (70.4%), and Women of "other" ethnicities (69.2%) and African American Women (63.9%). However, none of these differences were statistically significantly related to current smoking status except for Hispanic/Latinos. Data were examined by gender, and no gender/race interactions were found. No other demographic associations were found to be significant. A statistically significant lower odds of current smoking status was also found among those who disagreed/strongly disagreed that they do not have the money to quit. This

finding is unique to this population and has not been observed in other research. However, the finding is plausible; if respondents report that they do not have the money to quit, they may also report that they do not to have the money to smoke, thus reducing their odds of being a current smoker. Notably, no shelter-level variables were significantly associated with current smoking status.

2.5.2.2. Individual and Shelter-level variables and Smoking in the Past 24 Hours

There were no statistically significant demographic associations for gender and race/ethnicity with smoking in the past 24 hours. Although the other categories of educational status were not significantly associated with smoking in the past 24 hours, those who reported that they had a college degree or higher had a 0.32 odds ratio (95% CI: [0.13, 0.76]) of smoking in the past 24 hours compared to those who reported that they were without a high school degree. The data are in line with research that shows a negative relationship with higher education and tobacco use (Giovino, Schooley, et al., 1994).

Similar to the relationship with current smoking status, positive significant relationships were found for those who smoked for a duration greater than 10 years (OR=3.31; 95% CI: [1.92, 5.69]), as well as those who reported being in the same room with a smoker on a daily basis (OR= 3.85; 95% CI: [1.90, 7.82]). The odds ratios for these relationships are smaller than the corresponding relationships between these variables and current smoking. In addition, factor scores for "Knowledge of Tobacco Harmfulness" (OR=1.60; 95% CI: [1.16, 2.21]), "Attitudes towards Tobacco Restriction" (OR=2.62 CI: [1.83, 3.75]), and "Knowledge of Tobacco Quit Methods Factor Score" (OR=1.61; 95% CI: [1.21, 2.14]) are all significantly positively associated to smoking in the past 24 hours. Those who disagreed/strongly disagreed that smoking should not be allowed outdoors had an odds ratio of 4.64 (95% CI: [2.69, 8.02]) for having smoked in the past 24 hours.

Unlike with current smoking status, shelter-level variables were significantly associated with having smoked in the past 24 hours. More specifically, shelters that targeted a mentally ill population were significantly more likely to report smoking in the past 24 hours (OR=2.17; 95% CI: [1.01, 4.67]). This finding is consistent with literature at the individual level regarding high rates of smoking among

those diagnosed with a mental illness or disorder (Lasser et al., 2000). Contrary to expectations, shelters targeting substance abusers had statistically significantly lower odds of smoking in the past 24 hours (OR=0.57; 95% CI:[0.32, 0.98]) (Bobo & Husten, 2000).

In addition to addressing bivariate relationships with smoking status, having smoked 10 years or more was significantly related to the current smoking status, and to the covariate of attitudes towards tobacco restrictions. Because duration of smoking history could be a confounder of other relationships, this variable was included as a covariate in the multivariate analyses.

Table 2.4—Characteristics of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Relationship to Tobacco Use Behaviors in Los Angeles County, Bivariate Analyses (N=261)*

	Current Smokers			Smoked in past 24 hours		
	N	**OR (95% CI)**	**P-value**	**N**	**OR (95% CI)**	**P-value**
Individual-level Categorical Variables						
Demographic characteristics						
Race/Ethnicity (Ref=White)	246			257		
African American/Black		0.97 (0.46, 2.02)	0.93		1.04 (0.51, 2.17)	0.901
Hispanic/Latino		**0.43 (0.20, 0.93)**	**0.03**		0.50 (0.24, 1.04)	0.065
Other		0.74 (0.27, 2.04)	0.57		0.75 (0.29, 1.94)	0.551
Gender (Ref=Female)	245			256		
Male		1.17 (0.68, 1.98)	0.56		1.12 (0.67, 1.86)	
Educational Attainment (Ref= Less than high school)	246			257		
High school graduate		0.65 (0.72, 3.56)	0.25		1.31 (0.60, 2.84)	0.49
Some college or junior		0.44 (0.54, 2.43)	0.73		0.84 (0.41, 1.73)	0.64
College graduate or postgraduate		0.20 (0.19, 1.08)	0.07		**0.32 (0.13, 0.76)**	**0.01**
Sum of different types of quit attempts	248	1.16 (0.91, 0.48)	0.23	259	1.11 (0.88, 1.40)	0.37
Greater than 10 years in total smoked regularly (Ref=Not greater than 10 years)	245	**5.17 (2.87, 9.33)**	**0.001**		**3.31 (1.92, 5.69)**	**0.001**
In the same room with someone who was smoking everyday	245	**5.45 (2.46, 12.08)**	**0.001**	256	**3.85 (1.90, 7.82)**	**0.001**
Attitudes: Smoking should not be allowed in outdoor areas**(Ref= Strongly Agree/Agree)**	245	**4.44 (2.53, 7.80)**	**0.001**	255	**4.64 (2.69, 8.02)**	**0.001**

Barriers: I don't have money to buy medicine to help me quit smoking **(Ref= Strongly Agree)**	245			239		
Agree		1.76(0.82, 3.77)	0.15		1.86 (0.08, 0.92)	0.08
Disagree		0.47(0.22, 1.02)	0.06		0.69 (0.34, 0.33)	0.34
Strongly Disagree		**0.32(1.48, 4.20)**	**0.01**		0.46 (0.08, 0.19)	0.08
Individual-level Continuous Variables						
Age	240	0.99 (0.97,1.01)	0.38	251	0.99 (0.97,1.01)	0.27
Knowledge of Tobacco Harmfulness Factor Score	248	**1.77 (1.25, 2.52)**	**0.001**	259	**1.60 (1.16, 2.21)**	**0.004**
Attitudes towards Tobacco Restriction Factor Score	235	**2.65 (1.82, 3.86)**	**0.001**	245	**2.62 (1.83, 3.75)**	**0.001**
Knowledge of Tobacco Quit Methods Factor Score	248	**1.53(1.15, 2.05)**	**0.001**	259	**1.61 (1.21, 2.14)**	**0.001**
Barriers to Quitting Factor Score	248	0.75 (.55, 1.00)	0.050	259	0.90 (0.69, 1.18)	0.448
shelter-level Variables						
Serve Mothers and families (%yes)	248	0.82 (0.47, 1.43)	0.49	259	0.90 (0.53, 1.54)	0.71
Number of beds	248	0.99 (0.99, 1.01)	0.12	259	0.99 (0.99, 1.01)	0.054
Target Populations						
Veterans (%yes)	248	0.74 (0.38, 1.41)	0.359	259	0.85 (0.45, 1.63)	0.644
Formerly incarcerated(%yes)	248	1.50 (0.77, 2.91)	0.230	259	1.38 (0.74, 2.58)	0.312
Mentally ill(%yes)	248	2.06 (0.93, 4.54)	0.075	259	**2.17 (1.01, 4.67)**	**0.048**
Substance abusers (%yes)	248	0.67 (0.37, 1.20)	0.177	259	**0.57 (0.32, 0.98)**	**0.046**

* For the purposes of this research, the analytical sample varies depending on the outcome due to missing data.

2.5.3. Multivariate Analyses

Multivariate results are presented in Table 2.5 for both current smoking status and having smoked in the past 24 hours. Three models are presented. The first model includes only individual-level covariates including demographic characteristics, number of quit attempts, being in the same room as a smoker, having smoked greater than 10 years, and knowledge, attitude and behavior factor scores. The second model includes only shelter-level covariates including the number of beds, whether the shelter served women and children, and target populations of veterans, formerly incarcerated individuals, mentally ill individuals, and substance abusers. The third model combines both individual and shelter-level predictors of smoking status. Various models were tested, and a parsimonious model is presented in the above table. Some variables that were not significant at the shelter-level in bivariate comparisons were not included.

Table 2.5—Characteristics of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Relationship to Tobacco Behaviors in Los Angeles County, Multivariate Analyses

	Current Smokers OR (95% CI)			Smoked in past 24 hours OR (95% CI)		
	Individual level factors only	**Shelter level variables only**	**Full Model**	**Individual level factors only**	**Shelter level variables only**	**Full Model**
Individual level Categorical Variables	**(N=190)**	**(N=248)**	**(N=190)**	**(N=199)**	**(N=259)**	**(N=199)**
Demographics						
Race/Ethnicity (Ref=White)						
African American/Black	0.26 (0.05, 1.30)		0.31 (0.07, 1.41)	0.40 (0.13, 1.23)		0.39 (0.12, 1.33)
Hispanic/Latino	**0.09 (0.03, 0.35)****		**0.10 (0.03, 0.32)*****	**0.18 (0.07, 0.49)****		**0.16 (0.07, 0.39)*****
Other	0.42 (0.09, 1.88)		0.43 (0.10, 1.80)	0.38 (0.09, 1.56)		0.39 (0.07, 2.04)
Gender (Ref=Female)						
Male	1.31 (0.53, 3.21)		1.15 (0. 40, 3.34)	1.03 (0.40, 2.62)		1.89 (0.31, 2.56)
Educational Attainment (Ref= Less than high school)						
High school graduate	1.70 (0.48, 5.92)		1.86 (0.47, 7.37)	1.02 (0.32, 3.21)		0.89 (0.20, 3.85)
Some college or junior college	1.01 (0.29, 3.52)		1.07 (0.33, 3.48)	0.64 (0.20, 1.99)		0.55 (0.16, 1.93)
College graduate or	0.63 (0.10, 3.95)		0.60 (0.10, 3.53)	0.38 (0.11, 1.43)		0.30 (0.07, 1.23)
Sum of different types of quit attempts	1.26 (0.76, 2.06)		1.27 (079, 2.05)	1.12 (0.80, 1.57)		1.13 (0.79, 1.62)
Years in total smoked regularly (Ref=Not greater than 10 years)						
Greater than 10 years	**3.05 (1.21, 7.68)***		**3.16 (1.27, 7.87)***	1.46 (0.71, 3.02)		1.33 (0.63, 2.81)
Self-efficacy: Belief can quit on own	**0.21 (0.08, 0.60)****		**0.20 (0.07 , 0.57)****	**0.35 (0.13, 0.97)***		0.38 (0.12, 1.18)
In the same room with someone who was smoking everyday	**5.52 (1.18, 25.80)***		**4.56 (1.05, 19.78)***	**2.73 (1.03, 7.26)***		2.58 (0.89, 7.44)
Attitudes towards outdoor smoking restrictions (Reference: Agree, Strongly Agree)^	2.10 (0.66, 6.72)		2.38 (0.65, 8.63)	2.19 (0.83, 5.75)		2.41 (0.84, 6.96)

Money Barrier to Quitting (Reference: Agree, Strongly Agree)^^	**0.22 (0.09, 0.53)****		**0.23 (0.09, 0.61)****	**0.40 (0.18, 0.90)***		**0.42 (0.21, 0.84)***
Individual level Continuous Variables						
Age	**0.96 (0.92, 0.99)***		0.97 (0.92, 1.02)	0.97 (0.94, 1.01)		0.98 (0.94, 1.03)
Knowledge of Tobacco Harmfulness Factor Score	**1.80 (1.06, 3.07)***		1.73 (0.98, 3.06)	1.19 (0.65, 2.19)		1.17 (0.63, 2.16)
Knowledge of Tobacco Quit Methods Factor Score	1.26 (0.77, 2.04)		1.22 (0.74, 2.01)	1.42 (0.82, 2.45)		1.40 (0.80, 2.46)
Shelter level Variables						
Number of beds		1.00 (0.99, 1.00)	1.00 (0.99, 1.00)		1.00 (0.99, 1.00)	1.00 (0.99, 1.00)
Serve mothers and families (%yes)		0.72 (0.41, 1.24)	0.97 (0.33, 2.80)		0.75 (0.42, 1.33)	0.91 (0.31, 2.63)
Target Populations						
Veterans (%yes)		1.21 (0.67, 2.20)	0.95 (0.24, 3.71)		1.53 (0.78, 2.98)	1.74 (0.52, 5.76)
Formerly incarcerated(%yes)		1.81 (0.69, 4.74)	1.15 (0.25, 5.35)		1.74 (0.95, 3.18)	1.92 (0.33, 2.53)
Mentally ill(%yes)		**2.67 (1.41, 5.05)****	2.87 (0.76, 10.91)		**2.99 (1.75, 5.11)*****	**4.19 (1.38, 12.75)***
Substance abusers(%yes)		0.62 (0.33, 1.14)	1.26 (0.52, 3.03)		**0.52 (0.29, 0.91)***	0.56 (0.19, 1.56)
Constant	74.42 (6.68, 829.73)	0.93 (0.20, 4.27)	5.59 (0.33, 93.58)	32.06 (4.20, 244.98)	0.84 (0.25, 2.486)	5.18 (0.67, 40.30)

Statistically significant results are bolded with an asterisk: *p<0.05; **p<0.01; ***p<0.001; statistically significant results are bolded with an asterisk.

Model 1 included the following covariates: race/ethnicity, gender, educational attainment, age, sum of different types of quit attempts, years in total smoked regularly , self-efficacy, being in the same room with someone who was smoking everyday , attitudes towards outdoor smoking restrictions, money barrier to quitting, knowledge of tobacco harmfulness factor score, and knowledge of tobacco quit methods factor score
Model 2 included the following covariates: number of beds, serve mothers and families, target populations of: veterans, parolees/formerly incarcerated, mentally ill, and substance abusers
Model 3 combined the variables in both Models 1 and 2 for each outcome.

^ **Attitudes towards outdoor smoking restrictions refers to response from: "**Smoking should not be allowed in outdoor areas smoking (strongly agree, agree=1, disagree, strongly disagree=0)", which was dichotomized (Reference: Agree, Strongly Agree).
^^ **Money Barriers refers to response from: "**I don't have money to buy medicine to help me quit smoking" (strongly agree, agree=1, disagree, strongly disagree=0)", which was dichotomized (Reference: Agree, Strongly Agree)

2.5.4. Individual-level data

At the individual level, current smoking status was positively associated with smoking for greater than 10 years (OR=3.05; 95% CI: [1.21, 7.68]), being in the same room as a smoker everyday (OR= 5.52; 95% CI: [1.18, 25.80]), and knowledge of the harmfulness of tobacco (OR=1.80; 95% CI: [1.06, 3.07]). Similar to bivariate analyses, Hispanics/Latinos had a lower odds (OR=0.09; 95% CI: [0.03, 0.35]) of current smoking status. Self-efficacy in believing that they could quit on their own was also associated with lower odds of current smoking status (OR=0.21; 95% CI: [0.08, 0.60]). Not having enough money to quit smoking was associated with lower odds of current smoking status (OR=0.22; 95% CI:[0.09, 0.53]). Unlike in bivariate analyses, when controlling for other covariates, age is significantly related to a lower current smoking status (OR=0.96; 95% CI: [0.92, 0.99]); with every year age increase, there is a lower likelihood of current smoking status. This association was not present in bivariate analyses, but is also consistent with the literature (Giovino, Henningfield, Tomar, Escobedo, & Slade, 1994). It should be noted that the confidence interval for age is small, but close to including 1. Therefore, although the result is statistically significant, it is possible that this effect becomes statistically non-significant when controlling for other shelter-level factors in the full model.

There was only one positive association between individual-level covariates and having smoked in the past 24 hours: being in the same room as a smoker (OR=2.73; 95% CI: [1.03, 7.26]). Similar to current smoking status, Hispanics/Latinos remained at lower odds (OR=0.18; 95% CI: [0.07, 0.49]) of smoking in the past 24 hours. Self-efficacy (belief in their ability to quit on their own) (OR=0.35; 95% CI: [0.13, 0.97]), and disagreeing/strongly disagreeing that they do not have the money to quit were also associated with lower odds (OR=0.40; 95% CI: [0.18, 0.90]) of having smoked in the past 24 hours.

2.5.5. Shelter-level data

At the shelter-level, shelters serving mothers and families, or targeting veterans, formerly incarcerated individuals, and substance abusers did not show a statistically significant difference in odds of being a current smoker. However, shelters targeting mentally ill homeless individuals had a statistically

significant higher odds of current smoking status (OR =2.67; 95% CI: [1.41, 5.05]). For the outcome of smoking in the past 24 hours, shelters serving mothers and families, or targeting veterans or formerly incarcerated individuals did not show a statistically significant difference. Similar to current smoking status, shelters targeting mentally ill homeless individuals were associated with a higher odds of having smoked in the past 24 hours (OR=2.99; 95% CI: [1.75, 5.11]). Unlike current smoking status, shelters targeting substance abusers had a lower odds of having smoked in the past 24 hours (OR=0.52; 95% CI: 0.29, 0.91]). As noted, this is contrary to what would be expected in the literature, but matches what was found in bivariate analyses (Degenhardt & Hall, 2001).

2.5.6. Full model

When including individual and shelter-level predictors, some associations found in the individual-level only and shelter-level only models no longer remained significant, after controlling for other factors on both levels. For Hispanics/Latinos, the association with current smoking status (OR=0.10; 95% CI: [0.03, 0.32]) remained significant. Additional relationships that remained significant for predicting current smoking status were smoking duration greater than 10 years (OR=3.16; 95% CI: [1.27, 7.87]), being in the same room as a smoker everyday (OR= 4.56; 95% CI: [1.05, 19.78]), self-efficacy (belief that they could quit on their own) (OR=0.20; 95% CI: [0.07, 0.57]), and disagreeing/strongly disagreeing that they do not have the money to quit (OR=0.23; 95% CI: [0.09, 0.61]). Age was no longer significant as a predictor for either current smoking status or having smoked in the past 24 hours in the full models. For smoking in the past 24 hours, the predictor variables that remained significantly associated with this outcome measure were being Hispanic/Latino (OR =0.16; 95% CI: [0.07, 0.39]) and disagreeing/strongly disagreeing that they do not have the money to quit (OR= 0.42; 95% CI: [0.21, 0.84]). No shelter-level variables remained significantly associated with current smoking status, but shelters targeting mentally ill homeless individuals were associated with a higher odds of having smoked in the past 24 hours (OR=4.19; 95% CI:[1.38, 12.75]).

Exploratory models including individual-level factors were then stratified by gender (not shown) and multivariate analyses were conducted (not presented) for individual factors. The association of Hispanic/Latino in the race /ethnicity categories to current smoking status remained significant for both men and women, who were significantly less likely to be current smokers than other race/ethnicity categories (women: OR=0.012, 95% CI:[0.01, 1.50]; men: OR=0.031, 95% CI: [0.01, 0.19]). However, since the sample size was small when stratifying, these models were not further analyzed.

Based on the full models for current smoking status and having smoked in the past 24 hours, Table 2.6 presents the results in relation to our original hypotheses.

Table 2.6—Results of Hypothesis Testing

Hypothesis	**Results support**	**Notes**
Hypothesis 1: Relationships between demographic variables and smoking rates would parallel those of data obtained from national surveillance of the homeless population in the context of individual and shelter-level covariates.	**Yes**	Prevalence rates of current smoking (65.3%) are in the range of national surveillance rates (Tsai 2012, Baggett 2010, Connor 2002, Okuyemi 2012).
Hypothesis 2: Rates of tobacco use among residents of long-term transitional shelters would be higher than corresponding rates for California general population ethnic subgroups in the context of individual and shelter-level covariates.	**Yes**	Prevalence rates for African Americans, Non-Hispanic Whites, and Hispanic/Latinos were higher overall than CA rates, but there were no statistically differences for demographics except for Hispanic/Latinos, who smoked less than other ethnic subgroups.
Hypothesis 3: Rates of tobacco use would be higher among residents of shelters targeting persons dealing with mental illness, substance abuse, and formerly incarcerated individuals, and lower in shelters that serve mothers and families.	**No**	Only shelters targeting mentally ill individuals had a higher prevalence of having smoked in the past 24 hours. All other relationships were not significantly associated.

2.6. Discussion

To our knowledge, this is the first study addressing smoking prevalence rates among staff and residents at transitional homeless shelters. This study builds on previous literature by examining individual-level smoking prevalence in transitional homeless shelters. Although individual-level factors and shelter characteristics have been examined separately, research has not been reported previously that

involved both in relation to individual smoking status (Arangua et al., 2007; Travis P Baggett & Rigotti, 2010). Examining both of these levels of data together allows us to better understand tobacco use among those residing and working in transitional housing shelters.

Based on this research, it seems that factors that protect general populations from being current smokers does not hold true for the homeless population. Null findings in regards to demographic characteristics are interesting as research in other populations has shown a relationship between demographic factors and tobacco use. Namely, African American and Latinos are more likely to smoke than Whites and Asians (CDC, 2011; LACDPH, 2012), but based on our research, this does not hold true for the transitional homeless shelter population. Baggett and colleagues found similar results to current national trends regarding race/ethnicity as a predictor or smoking prevalence in a national sample of the homeless population, not restricted to residents in transitional homeless shelters (Travis P Baggett & Rigotti, 2010). The only finding in our study in regards to the influence of demographic factors that is comparable to the influence of demographic factors in the general population involved Hispanic/Latino women and smoking status, as respondents in this demographic category were less likely to be a current smoker or to have smoked in the past 24 hours, taking into account other factors. Although Hispanic women reported smoking less than other racial/ethnic subgroups nationally, research has shown that half of Hispanic women who have ever smoked are likely to remain current smokers (Pérez-Stable et al., 2001). However, this does not explain the results among Hispanic men, who, nationally, are more likely to smoke than Hispanic women (CDC, 2011; LACDPH, 2012). Although Hispanic women may have protective factors that help them from becoming current smokers or having smoked in the past 24 hours, once they start smoking, they are likely to have the same issues as other racial/ethnic subgroups. Researchers have found that Hispanic smokers are more likely than African Americans or Whites to quit or reduce their smoking as prices increase (CDC, 1998). This may partly explain why there are fewer Hispanic/Latino men and women smoking in our study population. Perhaps the conditions that contribute to homelessness such as psychiatric diagnosis and comorbid illicit drug use are a much greater influence

on tobacco use prevalence for this population than traditional demographic factors such as race/ethnicity, gender, and educational status effects in less vulnerable population groups.

In the full models, there are some interesting findings regarding individual-level correlates with both current smoking status and having smoked in the past 24 hours. First, data regarding social norms (being in a room daily with a smoker) show a higher odds of current smoking status. This is in line with previous research highlighting the impact of social norms on health behaviors, such as smoking (Godin & Kok, 1996; Valente, Unger, & Johnson, 2005). The more often individuals are exposed to a smoker in the same room, the more likely it is that they would be current smokers. A second individual-level factor that was statistically significantly associated in a positive manner with current smoking status was smoking for greater than 10 years. This is another individual-level correlate that makes sense and has been illustrated in the literature for the general population (Wetter et al., 2004). Reporting a sense of self-efficacy for being able to quit on their own and its negative relationship to current smoking status was also an intuitively expected relationship that has been previously found in the general population (Etter, Bergman, Humair, & Perneger, 2000; Prochaska, DiClemente, Velicer, Ginpil, & Norcross, 1985). Residents and staff who believe they are able to quit on their own are less likely to be current smokers, because they likely have quit already. One unique finding that has not been well documented in past literature is the barrier of money for quitting smoking. In this study, we find that those who did not believe that money was a barrier to quitting smoking were less likely to be current smokers or to have smoked in the past 24 hours. This finding makes sense for our population; it is likely that those who do not believe money is a barrier to quitting, have already quit, whereas those who are still current smokers may use not having enough money as a rationale to continue their current smoking behaviors. This needs to be studied further, as they may be using tobacco and its psychotropic effects to cope with the fact that they do not have enough money.

No shelter-level variables remained significantly associated with current smoking status, but shelters targeting mentally ill homeless individuals were associated with a higher odds of having smoked in the past 24 hours. Although not all shelter-level associations remained significant in the full model, the

findings in the shelter-level model are notable and can provide insight for future interventions. For both smoking outcomes, shelters targeting a mentally ill population had a greater odds of including smokers. This implies that there is something about the culture of these types of shelters that supports smoking, even if such support takes the form of passive consent. This finding is in line with historical data regarding high rates of smoking among mentally ill individuals, as well as within mental health institutions (Lasser et al., 2000). For shelters targeting substance abusers, there are lower odds of smoking in the past 24 hours. This may be in part due to some shelters and institutions banning all substance use, including tobacco. However, this is unlikely, as smoking rates are generally high among those with substance abuse issues and programs like Alcoholics Anonymous historically are known for allowing smoking as an alternative behavior to drinking alcohol (Bobo & Husten, 2000). It could be that those who are homeless are limited monetarily and have been using their limited money on substances other than cigarettes, thus leading to lower odds of current smoking status and having smoked in the last 24 hours. Often times, smoking is the only break in structured programs, so the culture implicitly rewards smoking with desirable breaks that would not occur without the smoking. This practice is consistent for programs related to mental health and substance abuse (Bobo & Husten, 2000; Lasser et al., 2000). Individual-level factors seem to be better predictors of smoking status than shelter-level factors; however the results do not always concur with corresponding findings involving the general population (CDC, 2011).

2.6.1. Limitations

Several limitations are associated with this study. First, due to the cross-sectional nature of the data, causal direction cannot be determined. For example, does being exposed to smokers in the same room everyday lead to a greater likelihood of being a current smoker, or does having a large group of current smokers influence the number of days that staff and residents report being exposed to smoking in the same room? Either causal scenario is plausible, and it may be that being exposed can lead to more smoking, which can lead to more exposure, reflecting a bidirectional effect. With cross-sectional data, it is not possible to discern the direction of the relationship. Another limitation with the data is that they are

self-reported and were completed without the presence of a trained researcher. This may mean that some of the data may not be as accurate as measurements taken in person by a trained researcher, or through in-person conversations, or validated by expired carbon monoxide or serum cotinine testing. Although the survey questionnaire was designed for a fifth-grade reading level and included validated measures, the actual survey questionnaire was not pretested in the homeless population. A related limitation of self-reported data is that there were several variables with data missing at random. The use of listwise deletion as the way of dealing with cases that were missing led to a reduction in statistical power. We tried to deal with the missing values by imputing data, but the models did not converge when estimated. Better-resourced data collection and more exhaustive checking of each survey questionnaire after completion would have yielded more complete data, which would have allowed us to better analyze the variables of interest, without the observed reduction of statistical power. Additionally, shelter-level variation was low as based on the low null model intraclass correlations; thus it was difficult to justify multilevel models. A broader sampling of shelters may have yielded more variation, thus allowing the power to address associations in a multilevel analysis.

In order to better understand smoking prevalence in this population, it would be ideal if all measures of the conceptual model were available for analysis. For example, alcohol dependence at the individual level is an important behavior that is tied closely to tobacco use. It is estimated that approximately 88% of alcoholics also smoke regularly (Batel, Pessione, Maitre, & Rueff, 1995), which can impede tobacco use cessation, as rates of smoking cessation are lower among smokers who have a history of alcohol dependence (DiFranza & Guerrera, 1990). Therefore, understanding alcohol dependence as an individual-level risk is especially important for understanding tobacco use.

To gain a better understanding of tobacco use prevalence, other forms of tobacco use such as cigar and cigarillo use also need to be included. However, to keep respondent burden to a tolerable level, these measures were not included in the survey questionnaire. In addition, questions regarding loose tobacco, and chewing tobacco should also have been included, as they may be cheaper alternatives to

cigarettes, and therefore more desirable for our population. Prevalence use rates of alternative tobacco products among homeless individuals are relatively unknown.

Better measures for individual-level factors could have been used as well. For example, for self-efficacy, rather than looking at two variables, a scale can be used: Schnoll and colleagues used a 12 item scale "The Smoking Self-efficacy Questionnaire (SSQ)," which has demonstrated good reliability and validity in smoking cessation interventions (Etter et al., 2000; Schnoll et al., 2011). Our study looked at two measures of self-efficacy, but only believing that one can quit on one's own was statistically significantly related to current smoking and smoking in the past 24 hours. Perhaps a better scale would allow us to assess self-efficacy. However, since self-efficacy is more important in determining quit rates, and not prevalence rates, this is not the more theoretically important factor to focus on regarding smoking prevalence.

Since shelter-level results showed a relationship of shelters targeting mentally ill homeless individuals and homeless substance abusers, it would have been ideal to assess mental health status and substance abuse behaviors at the individual level. Perhaps the individual-level data would have shown a more clear relationship, rather than at the shelter-level. However, due to IRB constraints, questions on alcohol dependence, illicit drug use and mental health status were not asked of shelter staff and residents. As mentioned, we did control for shelter-level factors that target these groups, which can serve as a proxy, as individuals' chances of having a mental illness or substance abuse issue are higher if the shelter targets that particular subpopulation.

Another limitation is that multiple analyses were conducted, which can increase the chances of Type I error, and lead to null results being erroneously rejected. In addition, the models also include a large number of covariates in the model, thus increasing the chances of finding statistically significant results. However, because the analytical models are based on the conceptual models, only variables of interest were included that were consistent with the conceptual model, thus reducing this risk, because the inclusion of variables was determined a priori on the basis of theoretical expectations. In order to further counter this issue, a more parsimonious model was used for both current smoking and smoking in the past

24 hours. The final models therefore did not include all individual-level variables, such as the factor score for attitudes towards tobacco restrictions, nor other shelter-level variables, such as the likelihood of adopting new tobacco use restrictions. Despite these limitations, however, these data are theoretically important, based on what was observed in our limited sample, a more parsimonious model focusing on individual-level factors was sufficient to provide insight into the reasons for variations in tobacco use prevalence among those living and working in transitional shelters.

2.6.2. Conclusion

Given that the purpose of a transitional homeless shelter is to help individuals transition and make positive behavior changes that would enable them to integrate back into a permanent housing situation, it seemed theoretically reasonable to expect that this population would be open to making changes related to their health behaviors, such as smoking. However, there are many other barriers that homeless individuals face simultaneously. Smoking may be perceived by this population as helping them deal with the larger barriers of integrating back into society. Very few of the associations that we hypothesized at the individual and shelter-level were statistically significant, even in bivariate analyses. It seems that the conditions that contribute to homelessness, such as mental illness and polydrug addiction, trump other individual and shelter-level factors when it comes to predicting smoking prevalence. Because smoking prevalence rates are so high in this population, more tobacco control resources need to be invested in learning more effective contextual and socialization approaches to helping homeless individuals overcome the barriers to quitting and abstaining long-term from smoking cigarettes.

This study found that rates of current smoking status in this population are much higher than rates at the county, state, and national level (CDC, 2011; CDPH, 2013; LACDPH, 2012). The mean prevalence rate of 65 percent who report current smoking status in this population is in the same range as the prevalence estimates found in other research studies involving the general homeless population, with national rates of 57-80% (Travis P Baggett & Rigotti, 2010; HUD, 2011). However, even if the California smoking prevalence rate among homeless populations living in transitional shelters may be marginally

lower than some national estimates of the general homeless population, it is still 4.9-5.9 times greater than the current smoking rates observed in the general CA and Los Angeles County population. Because California smoking prevalence rates are lower than prevalence rates in the US population, we had expected our study to show prevalence rates that were considerably lower than rates that were similar to those observed in the general US homeless population. The protective factors associated with living in California that have yielded lower smoking prevalence rates for the general population seem not to have been protective for residents and staff of transitional homeless shelters. Many of the strides in lowering CA's tobacco use prevalence have been attributed to policy changes, such as restrictions on smoking in public venues, but these policy changes have not protected the residents and staff of transitional homeless shelters. More research is needed to better understand how tobacco control policies and other environmental influences might, in fact, make a difference in this vulnerable population.

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Appendix Table 2.1—Knowledge, Attitudes, and Barriers Regarding Tobacco Use of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=261)

	Participant Responses				
	N	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
Knowledge of Tobacco Harmfulness					
Smoking can harm every organ of the human body and can cause severe diseases like heart disease, chronic lung disease, and cancer	261	78.54%	19.92%	1.15%	0.38%
Smoking can harm people at all ages including infants	260	80.77%	18.08%	0.77%	0.38%
Quitting smoking can prevent smokers from getting the diseases related to smoking	256	43.75%	32.03%	19.14%	5.08%
Smoking is an addictive behavior	252	76.98%	18.25%	2.38%	2.38%
Breathing in cigarette smoke can cause cancer among non-smokers	257	60.31%	33.46%	5.45%	0.78%
Any amount of cigarette smoke exposure is harmful	256	55.47%	36.72%	7.42%	0.39%
Attitudes towards Tobacco Restriction					
Smoking should not be allowed in public indoor areas such as homeless shelters and treatment centers	254	57.87%	24.80%	14.57%	2.76%
Smoking should not be allowed in public outdoor areas like the patio outside a treatment center or a homeless shelter	257	24.90%	19.07%	36.58%	19.46%
Smoking should not be allowed in private indoor areas such as apartments if the cigarette smoke from an apartment can affect neighboring apartments	258	40.70%	30.62%	20.16%	8.53%
Smoking should not be allowed near entrances of residential buildings or within 20 feet of apartment windows so that nonsmoking residents can be smoke-free	261	44.06%	37.93%	14.94%	3.07%
Knowledge of Tobacco Quit Methods					
Nicotine gum and patch are useful for helping smokers quit smoking	253	35.97%	45.85%	14.23%	3.95%
Some pills can help smokers quit	241	19.92%	49.79%	25.73%	4.56%
Calling a quit line may help smokers quit smoking	244	21.31%	47.95%	27.46%	3.28%
One-on-one counseling may help smokers quit smoking	256	23.44%	52.34%	19.53%	4.69%
Group counseling may help smokers quit smoking	252	29.76%	51.98%	15.48%	2.78%
Barriers to Quitting					
I don't know where to get nicotine gum or patches	251	12.75%	18.33%	43.43%	25.50%
I don't know where to get help for quitting smoking	245	10.61%	17.14%	46.94%	25.31%
I don't have money to buy medicine to help me quit smoking	241	30.71%	36.10%	20.75%	12.45%
I would like some outside help to quit smoking	240	29.58%	35.00%	23.33%	12.08%
There are some services in this treatment center or shelter that can help people quit smoking	255	45.67%	44.49%	8.27%	1.57%

Appendix Table 2.1 shows the variables used to create factor scores for the "Knowledge of Tobacco Harmfulness", "Attitudes towards Tobacco Restriction", "Knowledge of Tobacco Quit Methods" and "Barriers to Quitting".

Appendix Table 2.2—Polychoric Correlation Matrix* of Knowledge of Harmfulness of Tobacco Use of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=242)

	Smoking can harm every organ of the human body	Smoking can harm people at all ages including infants	Smoking is an addictive behavior	Breathing in cigarette smoke can cause cancer among non-smokers	Any amount of cigarette smoke exposure is harmful
Smoking can harm every organ of the human body and can cause severe diseases	1.000				
Smoking can harm people at all ages including infants	0.844	1.000			
Smoking is an addictive behavior	0.691	0.737	1.000		
Breathing in cigarette smoke can cause cancer among non-smokers	0.560	0.733	0.725	1.000	
Any amount of cigarette smoke exposure is harmful	0.589	0.707	0.607	0.872	1.000

* Polychoric Correlation Matrix chosen over pairwise correlations due to the ordinal nature of the variables

Appendix Table 2.3—Polychoric Correlation Matrix of Attitudes Toward Tobacco Restrictions of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=247)

Smoking should not be allowed in:	public indoor areas such as homeless shelters and treatment centers	public outdoor areas like the patio outside a treatment center or a homeless shelter	private indoor areas such as apartments if the cigarette smoke from an apartment can affect neighboring apartments	near entrances of residential buildings or within 20 feet of apartment windows so that nonsmoking residents can be smoke-free
public indoor areas such as homeless shelters and treatment centers	1.000			
public outdoor areas like the patio outside a treatment center or a homeless shelter	0.597	1.000		
private indoor areas such as apartments if the cigarette smoke from an apartment can affect neighboring apartments	0.533	0.539	1.000	
near entrances of residential buildings or within 20 feet of apartment windows so that nonsmoking residents can be smoke-free	0.530	0.597	0.651	1.000

* Polychoric Correlation Matrix chosen over pairwise correlations due to the ordinal nature of the variables

Appendix Table 2.4—Polychoric Correlation Matrix of Knowledge of Tobacco Quit Methods of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=226)

	Nicotine gum and patch are useful for helping smokers quit smoking	Some pills can help smokers quit	Calling a quit line may help smokers quit smoking	One-on-one counseling may help smokers quit smoking
Nicotine gum and patch are useful for helping smokers quit smoking	1.000			
Some pills can help smokers quit	0.557	1.000		
Calling a quit line may help smokers quit smoking	0.555	0.570	1.000	
One-on-one counseling may help smokers quit smoking	0.524	0.489	0.795	1.000
Group counseling may help smokers quit smoking	0.545	0.432	0.722	0.900

* Polychoric Correlation Matrix chosen over pairwise correlations due to the ordinal nature of the variables

Appendix Table 2.5—Polychoric Correlation Matrix of Barriers to Quitting of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Los Angeles County (N=221)

	I don't know where to get nicotine gum or patches	I don't know where to get help for quitting smoking	I don't have money to buy medicine to help me quit smoking
I don't know where to get nicotine gum or patches	1.000		
I don't know where to get help for quitting smoking	0.810	1.000	
I don't have money to buy medicine to help me quit smoking	0.424	0.565	1.000

* Polychoric Correlation Matrix chosen over pairwise correlations due to the ordinal nature of the variables

Appendix Table 2.6—Characteristics of Randomly Selected Transitional Homeless Shelters in Los Angeles County (N=26)

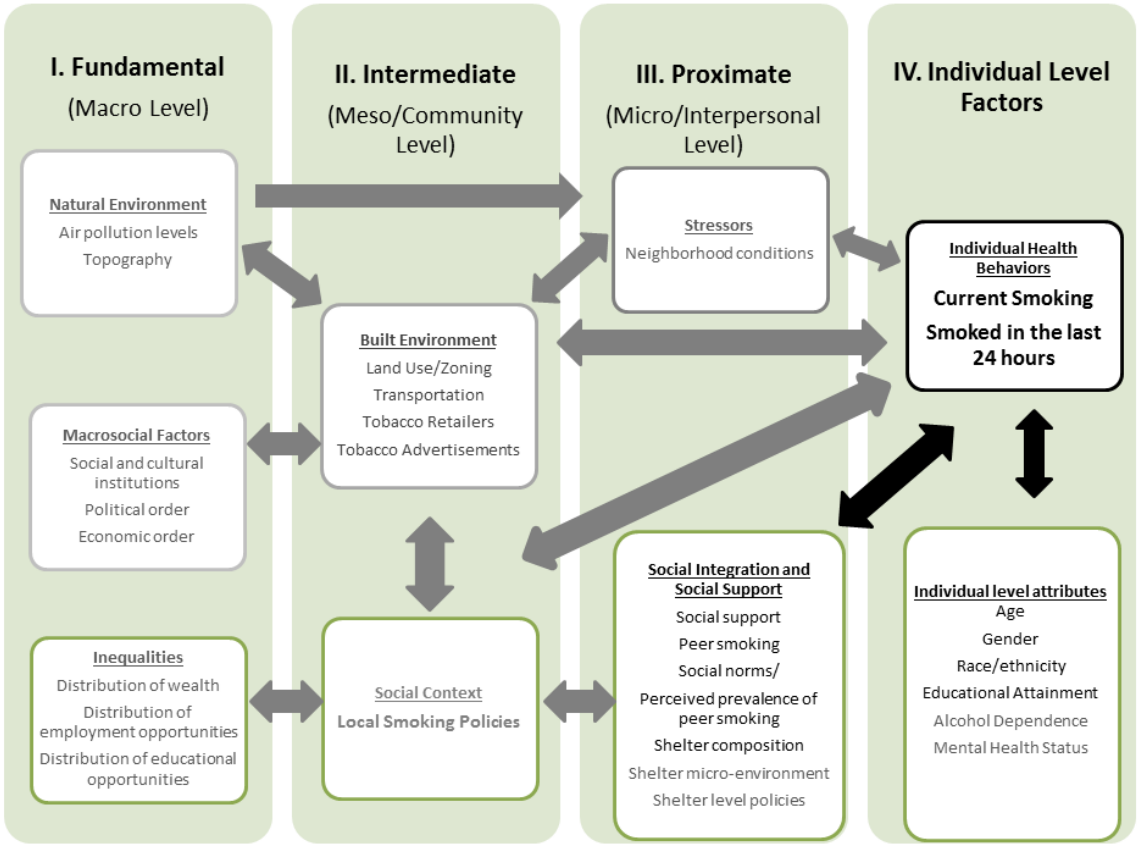
Characteristic	N	Mean± SD or %*
Demographics: Average Shelter Clientele		
Age (%)	26	
Age 18–30 (range = 5-80)		29.5 (18.0)
Age 31–50 (range = 11-80)		50.2 (17.2)
Age 51+ (range = 0-30)		13.4 (9.3)
Race/Ethnicity (%)	25	
African American/Black (range = 0-80)		40.5 (23.2)
Hispanic/Latino (range = 10-98)		32.2 (18.9)
White (range = 1-40)		21.2 (12.2)
Asian (range = 0-3)		0.5 (0.9)
Other (range = 0 -10)		3.2 (4.1
Gender	26	
Female (range = 0 – 100)		40.4 (37.8)
Male (range = 0 -100)		59.7 (37.8)
Demographics: Facility Characteristics		
Populations Served*	26	
Single women only (%yes)		76.9%
Single mothers and children only (%yes)		30.8 %
Families (mother and father with children) (%yes)		11.5 %
Single men (%yes)		84.6%
Number of beds and clientele		
Number of beds available for clientele *(range = 30-340)*	26	109.7 (89.7)
Average number of beds occupied per night *(range = 30-270)*	25	94.7 (76.2)
Length of stay		
Maximum length of stay (months) *(range = 6 – 100)*	25	18.1 (18.7)
Average length of stay (months) *(range = 3 -60)*	26	12.2(11.6)
Smoking policies		
Indoor no smoking policy (%yes)	26	96.2 %
Designated no smoking area (%yes)	25	96.0 %
Attempt to limit smoking? (%yes)	25	72.0 %
Receptivity to policy change*		
Open to adopting new policies designed to reduce tobacco use (%yes)	24	95.8 %
Organizational readiness for change: Easy for staff to suggest and carry out new ideas	26	
Strongly disagree		0%
disagree		3.9 %
agree		69.3 %
strongly agree		26.9 %
Services offered		
Substance abuse counseling and program (%yes)	26	88.5 %
Alcoholic anonymous (%yes)	26	88.5 %
Life skills training (e.g., reading, writing, personal finance) (%yes)	26	92.3 %
Job counseling and placement services (%yes)	26	76.9 %
Crafts or job training (%yes)	26	65.4 %
Linking clients to public assistance programs (%yes)	26	88.5 %
Family therapy counseling (%yes)	26	38.5 %
Mental health services (%yes)	26	69.2 %
Health care services (%yes)	26	73.1 %
Other (%yes)	26	26.9 %

Shelter level Smoking**		
Shelter-level Target Populations		
Veterans(%yes)	26	23.1%
Formerly incarcerated(%yes)	25	28.0%
Mentally ill(%yes)	26	15.4%
Substance abusers(%yes)	26	76.9%
Shelter -level Smoking**		
Residents that smoke *(range = 25-90)*	22	64.8 (19.6)
Staff that smoke *(range = 2-90)*	21	32.6 (25.0)

*Shelters may serve more than one population

**Perceptions of staff member interviewed

Appendix Figure 2.3: Conceptual Model for Study 1



CHAPTER 3:

A mixed methods approach to evaluating tobacco use reduction/cessation programs in transitional homeless shelters: Intervention effect and lessons learned through Community Based Participatory Research (CBPR) methods (Study 2)

3.1. Abstract

Objective: This study examines the effects of a tobacco reduction/cessation program implemented using a Community Based Participatory Research (CBPR) approach at transitional homeless shelters in Los Angeles County. Qualitative research methods are used to identify possible effects and gaps.

Background: Tobacco use reduction/cessation programs for residents of transitional homeless shelters have not been evaluated. In fact, limited research exists regarding tobacco use cessation programs for homeless populations at all.

Methods: Residents and staff of transitional homeless shelters participated in an eight week tobacco reduction/cessation program at 26 randomly selected shelters in Los Angeles County. Data regarding cigarette use and expired carbon monoxide levels were collected at baseline and 3 month follow-up. Further information regarding the intervention implementation was gathered through guided interviews and focus groups with shelter staff and residents. Descriptive statistics and qualitative analysis are used to examine the possible effects of the intervention on smoking behaviors.

Results: Student's T-tests and Fishers exact scores showed significant differences between baseline and follow-up for several smoking outcomes. ANCOVA confirmed differences, while accounting for demographic variables. Qualitative data further explained the impact and limitations of the intervention.

Conclusion: A mixed methods study showed significant effects of a tobacco reduction/cessation program on smoking behavior at transitional homeless shelters in Los Angeles County as well as important modifications. More research is needed to explore these effects and whether these results might hold in other settings.

3.2. Introduction

3.2.1. Tobacco use and homeless populations

Tobacco use is an important health issue that disproportionately affects homeless populations, as homeless individuals are more likely to smoke cigarettes than the wider population. The epidemiology of tobacco use involving homeless people indicates rates of tobacco use greater than 65%, as seen in Chapter 2, despite successful statewide reduction to 11.9% of adults in the general California population (Travis P Baggett & Rigotti, 2010; Sharon E Connor, Cook, Herbert, Neal, & Williams, 2002; Okuyemi et al., 2013; Tsai & Rosenheck, 2012).

Tobacco use is a complicated behavior for homeless populations, as they are likely to be using it as a means for coping with the daily stresses of their lives as well as the positive physiologic effects experienced through tobacco use. Research on low income residents highlights the use of smoking as a means to cope with stresses such as low income, high level of crime, and limited access to resources (Stead, MacAskill, MacKintosh, Reece, & Eadie, 2001). Despite these short-term benefits, homeless adults recognize the negative factors related to the long-term consequences of smoking, including the dangers to their health, appearance, and the high cost of smoking (Butler et al., 2002; Porter, Houston, Anderson, & Maryman, 2011). Further, studies have suggested that readiness to quit smoking among homeless adults ranges from 37%-76% (Sharon E Connor et al., 2002; Okuyemi et al., 2013) and 72% have made a quit attempt at least once (Sharon E Connor et al., 2002), compared to general population of smokers with rates of 26%–41% (Stockings et al., 2013). What constitutes an effective tobacco reduction/cessation intervention for this population is unknown.

3.2.2. Community Based Participatory Research Approach

A Community Based Participatory Research (CBPR) approach is conducted through partnerships with community members at each stage of the research process, from planning and implementation, through evaluation (Israel, Schulz, Parker, & Becker, 1998; Minkler, Blackwell, Thompson, & Tamir, 2003). CBPR has a focus on social justice, and is important in addressing health disparities (Wallerstein

& Duran, 2006). CBPR has been used to develop a culturally sensitive smoking intervention for African American women in low income housing (Andrews, Bentley, Crawford, Pretlow, & Tingen, 2007). The few tobacco reduction/cessation interventions targeting homeless populations have not used CBPR techniques.

3.2.3. Tobacco use reduction/cessation and homeless populations

Notably, few studies have addressed tobacco use reduction/cessation interventions in homeless populations, and those interventions that have been studied are oftentimes implemented by health care providers (T. P. Baggett et al., 2012; S. E. Connor, Scharf, Jonkman, & Herbert, 2014). The little research at the shelter level that exists is based on pilot studies, and does not include a diverse population such as that found in Los Angeles County (Okuyemi et al., 2013). These studies have used a variety of evidence-based techniques including motivational interviewing (Goldade et al., 2011; Okuyemi et al., 2013), utilization of the 5 A's (Ask, Assess, Advise, Assist, Arrange) (S. E. Connor et al., 2014), one-on-one counseling (Spector, Alpert, & Karam-Hage, 2007), cognitive behavior therapy (Shelley, Cantrell, Warn, & Wong, 2010), and nicotine replacement therapy (Okuyemi et al., 2013; Okuyemi et al., 2006). Evaluation of these interventions has been limited, and has not focused on the relevance or tailoring of the intervention to the homeless population.

3.2.4. Smoking Reduction Program Intervention

As part of the CDC Communities Putting Prevention to Work (CPPW) initiative, Los Angeles (LA) County was awarded a grant of $16.2 million to address tobacco use throughout the County. UCLA applied for and received a subcontract for $595,000 to address tobacco use among residents and staff of transitional homeless shelters. Because the CDC did not allow for CPPW funds to be used for research, the intervention program evaluated in this study has a relatively unsophisticated evaluation plan. This study uses the intervention as a pilot study or demonstration project rather than a randomized controlled trial design. The tobacco reduction/cessation program was developed to assist shelters in starting a smoking reduction program at their sites. Previous research had established that 95% of Los Angeles area

shelters were receptive to participating in a smoking reduction program if the resources to support this activity were provided externally (Arangua, McCarthy, Moskowitz, Gelberg, & Kuo, 2007). A list of all potential transitional homeless shelters in LA County was compiled based on a shelter level telephone survey (Shelter Level Survey, SLS), and 26 shelters were randomly selected from 76 eligible potential sites. Eligibility criteria included shelters that offered a minimum stay of 6 months and had at least 28 adult beds. Shelters varied in regards to demographics and included shelters focused on issues ranging from substance abuse to domestic violence to housing for veterans. The sites were randomly selected after being stratified by geographic region based on service planning area in Los Angeles County, to ensure that there was variation in the type and location of the shelter (LACDPH, 2014).

Each of the 26 sites was offered a $5000 mini-grant, and key facilitators (usually existing drug abuse counselors) from each organization were trained in a two-day Peer to Peer Smoking Cessation Training Program (P2P) created by Chad Morris at the University of Colorado. The P2P program is a tobacco cessation program tailored to the needs of the mentally ill population as well as those suffering from addiction to other drugs (Fazel, Khosla, Doll, & Geddes, 2008). Since many homeless individuals also experience emotional disorders and polydrug use, the Peer to Peer Smoking Cessation program was deemed to be an appropriate starting point for the Smoking Reduction intervention Program (SRP) implemented under this contract (Fazel et al., 2008).

Curriculum for the program included six different lessons, designed to be repeated for the course of the intervention through a six week cycle. We also encouraged facilitators to spread out the six lessons over the course of the Smoking Reduction Program (SRP). The topics for each of the sessions included: 1) Healthy Behaviors, 2) Truth about Tobacco, 3) Changing Behaviors, 4) Coping with Cravings, 5) Managing Stress, and 6) Planning Ahead (Morris CD, Waxmonsky J, May M, Giese AA, & L., 2009). Table 3.1 summarizes the concepts discussed during each session.

Table 3.1—Summary of Topics in the Peer to Peer Smoking Cessation Training Program

Session	Topic	Summary
1	Healthy Behaviors	Tips on general healthy behaviors, and how to adopt them regarding increasing exercise, improving food choices, health benefits of quitting smoking
2	Truth about Tobacco	Common myths of smoking and mental illness, chemicals in cigarettes, what carbon monoxide is, how tobacco harms the body
3	Changing Behaviors	Cost of smoking, tips on saving money/alternative uses of saved money, alternative behaviors to smoking
4	Coping with Cravings	Nicotine/why cigarettes are addictive, biological/psychological/social factors related to addiction, cravings, medications/NRT
5	Managing Stress	Coping strategies for dealing with cravings/stress, managing stress, deep breathing exercises
6	Planning Ahead	Visualization exercises as a nonsmoker, role playing/saying no (dealing with peer pressure), and

Though the program elements had to be implemented, shelter facilitators were also encouraged to make elements of the SRP relevant to their specific population and sites. Each shelter was required, as part of the mini-grant, to provide at least one 1- hour session for 8 weeks aimed at reducing tobacco use. Shelters were encouraged to make reduction in the number of cigarettes smoked per day the behavioral change endpoint of their SRP instead of complete cessation, so as not to deter residents of shelters who otherwise might feel overwhelmed by the magnitude of the long term goal. At the end of each weekly session, part of the mini-grant funds was distributed in the form of $10 gift card incentives to each participant, up to 10 participants per session. Additional participants were welcome in group sessions, but not compensated. In addition to facilitating weekly SRP discussions, shelter facilitators also were responsible for measuring the exhaled carbon monoxide (CO) levels of participants weekly.

Individual-level self-reported smoking status information as well as the biological measure of expired carbon monoxide were collected at baseline, and at 3 month follow-up. Focus groups and guided interviews were conducted at the 3-month follow-up with key staff and residents at each site for a process evaluation.

3.2.5. Study Purpose and Hypotheses

This study sought to examine potential challenges, benefits, and suggested improvements to a tobacco reduction/cessation program in transitional homeless shelters in Los Angeles County. No studies to date have included both quantitative and qualitative methods in research designed to increase understanding of effective interventions for tobacco use reduction/cessation targeting homeless populations. The first aim of this study utilizes the quantitative data, and the second aim focuses on the qualitative data.

Aim 1: Identify individual level and environmental level influences on tobacco use reduction among smokers living and working in transitional homeless shelters who participated in an 8 week tobacco reduction program.

Aim 1 uses quantitative data collected during the eight week tobacco reduction program that was implemented in 26 shelters in LA County. Data from individuals prior to and after the intervention (self-report and biomarkers) were designed to provide estimates of tobacco use. Quantitative data sources included a survey and expired carbon monoxide biomarker monitoring at baseline and three months following the start of the intervention with study participants.

The **hypothesis for Aim 1** is: The smoking reduction program in transitional homeless shelters where residents reside for a minimum of 6 months helped smokers reduce their tobacco use.

The tobacco reduction program used in the transitional homeless shelters was originally designed by Dr. Chad Morris at the University of Colorado, and was originally designed to target populations with high rates of mental illness (Morris CD et al., 2009). This program was based on the Transtheoretical Model (TTM) and Cognitive Behavioral Therapy (CBT) (Schroeder & Morris, 2010). The TTM is used within this program to assess the participant's self-efficacy and the readiness to change tobacco use behavior. CBT is used to change behaviors related to tobacco use through group counseling and one-on-one motivational interviewing (Schroeder & Morris, 2010). The SRP was not modified for the homeless population, and was kept essentially in its original form. The SRP program followed the same theoretical

model as proposed by Morris, and is the basic theoretical explanation for how the tobacco reduction/cessation protocol used in this study was expected to work.

Aim 2: Identify barriers and successes of a tobacco reduction program among smokers living and working in transitional homeless shelters.

The purpose of Aim 2 was to examine the nuances and intricacies of implementing a tobacco use reduction program in homeless shelters among residents and employees using an inductive qualitative approach. Among the different points of interest are lessons that were learned regarding feasibility and acceptance of reduction programs, the curriculum relevance and transferability of a program developed primarily for a substance abuse/mentally ill population, and potential changes that could be made for future dissemination of a tobacco use reduction program for the homeless. Questions regarding these topics cannot simply be answered using survey data from the participants. Rather, more intensive questioning is required through inductive research, allowing for the proper questions and points of interest for the population to be uncovered. For this reason, the research question for this aim was broad as the inductive research approach is guided by responses from the shelter staff and participants, and is designed to generate conceptual models, not test them.

The research question for Aim 2 was: On the basis of your experience with the SRP at your facility, are smoking reduction programs in transitional homeless shelters feasible and effective and what additional benefits do they provide for existing shelters? This research question was developed based on pilot study evidence of tobacco use cessation trials among homeless populations conducted recently in New York and Minnesota (Okuyemi et al., 2013; Shelley et al., 2010). Both studies concluded that a smoking cessation program may be feasible in the homeless population. However, these studies were not conducted in Los Angeles, which is known to have a very diverse population and the largest count of homeless individuals in the US (LAHSA, 2011). Suggestions for improving the intervention regarding the curriculum, NRT, and CO testing are described in detail in the results. The discussion guide sought to elicit from shelter staff their judgments as to the success or lack thereof of these efforts to increase

participant smoking reduction self-efficacy. The impact of the intervention was assessed through a variety of methods and data collection as described below.

3.3. Methods

3.3.1. Data sources

Multiple sources of data were used to examine the effects of the eight week intervention program on tobacco use in transitional homeless shelters in LA County. Table 3.2 shows a summary of the datasets used in this analysis. Self-reported survey data were gathered at baseline and 3 month follow-up and were used to assess Aim 1. Aim 2 data were collected through mutual learning dialogues, structured from semi-structured guided interviews. "Mutual Learning Dialogues" (MLDs), a term created by our community partners, using the methodology of guided interviews, were conducted at the 3-month follow-up with key staff at each site to get a better understanding of what aspects of the program were effective in program implementation, and ultimately what aspects were effective in reducing tobacco use among participants. Semi-structured interviews are more flexible than structured interviews, but still allow topics of interest to be discussed (Britten, 1995). The interview guide that was created in collaboration with our community partners and who led the interviews is shown in Appendix 3.1. MLDs were conducted from October 2011 through March 2012 at the shelter sites. Questions were asked in one-hour sessions based on responses from the shelter staff and often residents regarding a range of topics from the curriculum itself to the use of nicotine replacement therapy (NRTs) to implementation of the program and barriers encountered. The questions asked were based on responses from the shelter representatives, and therefore are not the same across each site. Twenty-five interviews were conducted representing the 26 sites in our program, using the interview guide as reference (input about two sites was collected simultaneously, since the site director was the same for both). Detailed interview notes were taken at 4 interviews, and 19 interviews were recorded, due to issues with recorders and obtaining permission in advance. The remaining 2 interviews had notes in the form of summaries, but detailed notes were not available, due to

miscommunication of Coalition and UCLA staff. Descriptions of the participant demographics are available in Table 3.5. The UCLA Institutional Review Board reviewed and approved these protocols.

Table 3.2—Summary of Data Sources for Study 3

Dataset	Source	Aim	Variables	Variable examples	Dataset Type, N
Individual Survey (Self-reported)	Shelter Tobacco Reduction Program	1	Individual level variables	Ex: Tobacco use, individual level correlates, social norms, social support,	Panel data; (Baseline N=266; 3 Month N=117
Expired Carbon Monoxide Levels	Shelter Tobacco Reduction Program	1	Individual level variables	CO levels of participants	Panel data; (Baseline N=266; 3 Month N=117
Mutual Learning Dialogues	Shelter Tobacco Reduction Program	2	Shelter level intervention data	Ex: barriers and successes of the program	Guided interviews N=25, representing 26 shelters (one interview represented two shelters)

3.3.2. Measures

Three outcome measures were used to determine changes in tobacco use behaviors for Aim 1: (1) category of the average number of cigarettes smoked on days that residents smoked in the last 30 days, (2) the number of cigarettes smoked in the past 24 hours, and (3) individual expired CO level. Since 97.7% of study participants had smoked in the last 30 days, and 96.4% had smoked 100 cigarettes in their lifetime, using current smoking status as the outcome would likely yield little variation. Therefore, actual number of cigarettes smoked per day and expired CO level were deemed to be more appropriate measures for assessing changes in tobacco use behaviors. For Aim 2 there were no a priori measures because the outcomes were expected to be themes emerging from content analyses of the qualitative data, and these themes were not predetermined (i.e., the analysis was inductive, and not deductive).

3.3.1.1. Main Dependent Variable: Average number of cigarettes smoked daily

Respondents were asked the average number of cigarettes they smoked on days that they smoked in the last 30 days. This was a categorical variable with the following options: "Did not smoke in the past 30 days", "1–5 cigarettes per day", "6–10 cigarettes per day", "11–20 cigarettes per day", and "More than 20 cigarettes per day". Those who did not smoke in the last 30 days were collapsed into the first category, which was changed to 0-5 cigarettes. Only 2.3% of participants at baseline had responded that they had not smoked in the past 30 days. It should be noted that of the 6 participants who did list that they had not smoked, 4 had a CO level of 20+ parts per million (ppm), indicating that it was unlikely that they had not smoked in the past 30 days. Descriptive data regarding tobacco use behaviors at baseline and follow-up are available in Table 3.4. Analysis of covariance (ANCOVA) was used to test whether a difference between baseline and follow-up was found, holding into account other variables of interest. The results of the ANCOVA are presented in the results section.

3.3.1.2. Secondary Dependent Variable: Number of cigarettes smoked in the past 24 hours

The secondary outcome of interest was the number of cigarettes smoked in the past 24 hours. This variable accounts for new smokers, as well as recreational smokers who have not smoked 100 cigarettes in their lifetime, although baseline data indicated that only 3.6% of the study sample fit into the category of people who had not smoked 100 cigarettes in their lifetime. This variable was also included in the study as a secondary outcome as it provides insight into recent smoking behavior. This was a count variable that ranged from 0-40 at baseline. Smoking in the past 24 hours is an important factor for understanding the effectiveness of smoking cessation and reduction programs. In order to understand the difference in the number of cigarettes at baseline and follow-up, a change score was created subtracting the number of cigarettes at baseline from the number reported at follow-up. Since negative values represent a reduction, and positive values represent an increase, this variable is no longer a count variable, and regression models were used to estimate tobacco use reduction. Descriptive data regarding tobacco use behaviors at baseline and follow-up are available in Table 3.4.

3.3.1.3. Tertiary Dependent Variable: Expired Carbon Monoxide Level

The final dependent variable is expired carbon monoxide (CO) level, measured at parts per million (ppm), which was collected at baseline and follow-up. This was an ordinal variable with the following categories: "1 to 6 ppm", indicating a non-smoker, "7-10 ppm", indicating a light smoker, "11-20 ppm" indicating an average smoker, and "20+ ppm", indicating a heavy smoker. Due to sample size restrictions, the first two categories were collapsed into "0-10 ppm". Descriptive data regarding tobacco use behaviors at baseline and follow-up are available in Table 3.4. Additionally, analysis of covariance (ANCOVA) was used to test whether a difference between baseline and follow-up was found, holding into account other variables of interest. The results of the ANCOVA are presented in the results section.

3.3.1.4. Covariates: Demographic Variables

Demographic data from the baseline and 3 month follow-up surveys were used as covariates and included age, gender, race/ethnicity, and educational status. Previous individual-level research has shown that demographic variables of age, gender, and race/ethnicity are related to tobacco use (Tyas & Pederson, 1998). Demographic variables included age, which is a continuous measure. The study group was limited to adults 18 and over. Gender is included in the model, as research shows women are less likely to smoke than men; therefore I hypothesized that fewer women would report current smoking than men (CDPH, 2013). Women were set as the referent group in multivariate analyses. Race/ethnicity is included to study potential differences between groups regarding smoking behaviors. The original categories include: Non-Hispanic White (White), Hispanic, African American, Asian, Native Hawaiian/PI and Native American/American Indian, Mixed/Multiethnic, and Other. However, due to a small sample size of some of the categories, the variable was collapsed for multivariate analyses: White, African American, Hispanic, and other. Although this is not ideal, aggregating race/ethnicity data was the only way to make meaningful comparisons between the categories for which we did have a large enough sample size. For comparison purposes, the reference group was set to Whites. Educational attainment refers to the highest level achieved and was categorized as follows: "less than high school", "high school", "some college or

junior college" and "college graduate or postgraduate" Again, due to sample size issues, the last two categories of education were collapsed into "More than high school". The reference category for multivariate analyses was "less than high school". Descriptive results for demographic variables can be found in Table 3.3.

3.4. Analyses

3.4.1. Aim 1

Data for Aim 1 were analyzed using a variety of methods using Stata (Stata Corp, 2013). First, descriptive statistics were used to describe the demographic characteristics of the intervention study sample at baseline and follow-up; results can be found in Table 3.3. We did not expect the sample characteristics to be different between 0 and 3 months since the same participants were followed, unless there was a proportionally higher rate of drop out by a certain demographic characteristic. In order to test this, t-tests were conducted for demographic variables; results are not presented as there were no significant differences in demographics at baseline and follow-up. Tobacco use descriptive data were also assessed, and included cigar use in the last 24 hours in addition to the main outcome measures described earlier. Data for tobacco use behaviors are available in Table 3.4. To address simple pre intervention-post intervention effects, a Fisher's exact test was used for the ordinal outcomes of average number of cigarettes smoked daily, and expired CO level. A paired Student's t test was used to ascertain differences at baseline and follow-up for the mean number of reported cigarettes smoked in the last 24 hours. These results are also found in Table 3.4. In addition, an ANCOVA was used to test whether a difference between baseline and follow-up for the ordinal outcomes of average number of cigarettes smoked daily, and expired CO level, , taking into account other demographic variables of interest. Other more complex analyses were attempted, but were not appropriate due to the small sample size at follow-up.

3.4.2. Aim 2

Content analyses of the focus groups with staff and the MLDs were conducted with Dedoose 4.12.4 (Dedoose, 2014) using an inductive qualitative methods approach for Aim 2. As opposed to a

deductive approach, where themes and categories are pre-determined to test a theory, an inductive approach attempts to gather a deeper understanding through an exploration of the discussion, to inform theory (Bogdan & Biklen, 1982). Both methods can use guided interviews; however, using the inductive approach, we sought to gather information from the participants by allowing conversations to veer away from the theory-derived discussion guide. This allowed participants to feel equally invested in guiding the conversations, allowing participants' experiences to shine through. This aspect of qualitative research is fundamental to understanding the context and reality of the participants in the conversations (Charmaz, 2006).

Qualitative analyses for Aim 2 were based on grounded theory, which sets out to find theory based on a systematic analysis of data (Glaser & Strauss, 2009). Descriptive characteristics of Coalition, UCLA, and shelter staff participating in MLDs are found in Table 3.5. A total of nineteen sessions were recorded and transcribed verbatim. These transcripts, along with notes from 6 other sessions were uploaded to (Dedoose, 2014). Using grounded theory, initial themes were determined after multiple back and forth discussions with CBPR partners from the Coalition. Excerpts of interest were underlined and potential themes were further discussed with CBPR partners from the Coalition. Excerpts then were marked with one or more descriptive codes related to relevant themes and key words mentioned in the excerpts. Using Dedoose, themes, categories, and codes were created using line-by-line coding of the data. Codes were used to mark passages for each MLD. Through an iterative process, codes were created as each transcript was reviewed. Once general codes were created, frequent codes that emerged were grouped into categories and themes. Codes were condensed and refined through the process, allowing dimensions of emerging categories to group together. Although the initial topic of the MLDs was the intervention and its usefulness to the shelters, other themes emerged, widening our knowledge of what is required to successfully implement a tobacco reduction/cessation program for the homeless in transitional shelters. Results of the themes, categories, and codes that emerged are found in Figures 3.1-3.4. A conceptual model was created based on the themes and categories that emerged through the analyses and is presented in Figure 3.5.

3.5. Results

3.5.1. Aim 1: Quantitative Results

3.3.1.5. Sample characteristics

Table 3.3 shows the demographic characteristics of the intervention study sample at baseline and follow-up. The baseline sample included demographic data on 254 participants in the SRP from a total sample of 268 participants. Due to missing data, we did not have demographic information for 14 participants at baseline. At follow-up, there were only 117 total participants who were successfully followed up (43.6% of the initial sample), of whom demographic data were available for 105 participants. Of the data available, the mean age at baseline was 41.6, with a range from 18-71 years of age. African Americans were the largest group comprising 39.4% of the sample at baseline, followed by Whites at 29.1% and Hispanic/Latinos at 21.3%. At baseline, 58.7% of the sample were male and 41.3% were female. In regards to education, 23.1% had less than a high school education, 35.1% were high school graduates, and 35.1% had some college or junior college education. Only 6.8% of the sample had a college graduate or post graduate degree at baseline, which was expected. Of the participants left at follow-up, the demographic data did not differ significantly from the baseline distribution, indicating that there was no one particular group that dropped out at a higher rate than others in relation to age, race/ethnicity, gender, or educational attainment. In addition, participants were asked whether they had been diagnosed with asthma. At baseline, 23.9% of the participants had reported being diagnosed with asthma by a physician; rates remained similar at 24.8% at follow-up.

Table 3.3—Sample Characteristics of Participants in a Smoking Reduction Program at Transitional Homeless Shelters in Los Angeles County

	Baseline	Follow-up
Characteristic	**Mean± SD or %***	**Mean± SD or %***
Demographics		
Age	*(N=250)*	*(N=106)*
(mean) (SD) *(range =18-71)*	41.6 (12.1)	42.3 (12.7)
Race/Ethnicity	*(N=254)*	*(N=105)*
African American/Black %	39.4%	40.6%
Hispanic/Latino %	21.3%	19.1%
Asian %	1.6%	3.8%
White %	29.1%	29.5%
American Indian/Alaska Native %	1.2%	0%
Mixed/Multiethnic %	5.5%	4.8%
Other	2.0%	1.9%
Gender	*(N=252)*	*(N=105)*
Female %	41.3%	47.6%
Male %	58.7%	52.4%
Educational Attainment	*(N= 251)*	*(N=106)*
Less than high school %	23.1%	24.5%
High school graduate %	35.1%	30.2%
Some college or junior college %	35.1%	42.5%
College graduate or postgraduate %	6.8%	2.8%

*Mean and standard deviation reported for age, which is a continuous variable.

Tobacco use descriptive data were also assessed, and included cigar use in the last 24 hours in addition to the main outcome measures. Data for tobacco use behaviors are available in Table 3.4.

Table 3.4—Tobacco Use Behaviors of participants in a Smoking Reduction Program at Transitional Homeless Shelters in Los Angeles County

Characteristic	Baseline	Follow-up	t-test* or fishers exact** p-value
Smoking Behaviors	**Mean± SD or %***		
Average number of cigarettes smoked daily	***(n=255)***	***(n=106)***	***p<0.001***
Did not smoke in the past 30 days %	2.4%	5.7%	
1–5 cigarettes per day %	21.6%	43.4%	
6–10 cigarettes per day %	31.4%	37.7%	
11–20 cigarettes per day %	36.1%	11.3%	
More than 20 cigarettes per day %	8.6%	1.9%	
Number of cigarettes smoked daily in the last 30 days *(range = 0-40)*	***(n=267)***	***(n=117)***	***p<0.01***
(mean) (SD)	10.7 (7.1)	7.2 (10.2)	
Expired carbon monoxide level [parts per million (ppm)]	***(n=266)***	***(n=113)***	***p<0.01***
1 TO 6 ppm(typical non-smoker inhaling L.A. air)	6.1%	15.9%	
7-10 ppm (light smoker)	7.5%	10.6%	
3= 11-20 ppm(average smoker)	23.3%	41.6%	
20+ppm (heavy smoker)	63.2%	31.9%	
Number of cigars smoked in the past 24 hours *(range = 0-40)*	***(n=265)***	***(n=116)***	*p=0.078*
(mean) (SD)	1.91 (5.71)	0.97 (3.7)	

**t-test is used for continuous variables. A Fisher's exact test was used for categorical variables. Significant results are bolded.

3.3.1.6. Bivariate and Multivariate Analyses

Results from the t-tests for the outcome of the number of cigarettes smoked daily in the last 30 days shows significant differences between baseline and follow-up, as shown in Table 3.4. The same does not hold true for the number of cigars smoked in the past 24 hours. In order to address simple pre intervention-post intervention effects for categorical variables, a Fisher's exact test was used for the ordinal outcomes of average number of cigarettes smoked daily, and expired CO level. Results for the average number of cigarettes smoked daily and expired CO level show statistically significant differences in the number of cigarettes reported from baseline to follow-up and the expired CO level from baseline to follow-up ($p<0.05$), as displayed in Table 3.4. With the size of the sample, this result should be considered suggestive rather than conclusive. In addition, this result may be confounded by selection bias,

because 153 participants were missing at follow-up, 93 of whom were in the heavy smoker category at baseline. Results for the ANCOVA for ordinal outcomes of average number of cigarettes smoked daily ($F=3.44$; $p<0.0005$), and expired CO level ($F=2.29$; $p<0.019$), while accounting for demographic variables of age, race/ethnicity, gender, and educational attainment show statistically significant differences between pretest and posttest , though again with the sample size, these results are suggestive rather than conclusive.

3.5.2. Aim 2: Qualitative Results

The results from the self-reported and biomarker outcomes data suggest that while the intervention shows some promise in reducing tobacco use, there still remains much in terms of our lack of understanding about intervention delivery in transitional homeless shelters. To address that gap, Aim 2 focuses on qualitative data and analysis to ascertain what residents, staff, and others observed in terms of the SRP intervention and how it could be improved. Although we did not gather demographic data aside from gender of the shelter staff and residents, we do have shelter level data, as well as information on Coalition partner gender and race/ethnicity. Key demographic characteristics can be found in Table 3.5.

Table 3.5—Descriptive characteristics of Coalition, UCLA, and Shelter Staff participating in MLDs

Shelter	Number of Coalition Staff*	Number of UCLA Staff	Gender of UCLA Staff	Number of Shelter Staff	Gender of Shelter Staff	Number of Additional Shelter Participants	Gender of Additional Shelter Participants	
1	1	1	Male	2	Male			Men and women; formerly incarcerated; substance abusers
2	1	1	Male	2	Male			Men and women, mentally ill
3	2	1	Female	3	2 male, 1 female	1	Male (Resident)	Men; substance abusers, mentally ill
4	2	1	Female	1	Male			Men and women; substance abusers
5	1	1	Female	1	Female	6	Male (All Residents)	Men only, Veterans; mentally ill; substance abusers
6	1	1	Male	2	1 male, 1 female			Men and women; formerly incarcerated; substance abusers
7	1	1	Male	2	Female			Men only; Veterans, formerly incarcerated; substance abusers
8	2	1	Male	1	Female			Women and children, mentally ill; substance abusers
9	1	1	Female	1	Female			Men; formerly incarcerated, mentally ill; substance abusers
10	2	1	Male	1	Female			Women and children, Veterans, formerly incarcerated, mentally ill; substance abusers
11	1	1	Male	2	Female			Women and children, mentally ill
12	1	1	Female	2	Female			Men, women, families; mentally ill; substance abusers
13	3	1	Female	1	Female			Men only, Veterans; mentally ill; substance abusers
14	2	1	Male	1	Male			Men only, Veterans; mentally ill; substance abusers
15	2	1	Male	2	Female			Men, women, families; substance abusers, mentally ill
16	2	1	Male	2	Female			Men, women, families; substance abusers, mentally ill
17	2	1	Female	2	Female			Men, women, families; substance abusers
18	2	1	Female	2	1 male, 1 female	3	2 Male, 1 Female (All staff)	Men and women; substance abusers
19	2	1	Male	2	Male			Men and women; substance abusers, mentally ill, formerly incarcerated
20	2	1	Male	2	1 male, 1 female	3	N/A	Men and women; mentally ill; substance abusers
21	2	1	Female	2	1 male, 1 female			Men and women; mentally ill
22	1	2	Male	2	Male			Men and women; Veterans
23	1	1	Male	2	1 male, 1 female			Men and women; families
24	2	1	Male	4	2 male, 2 female			Men and women; formerly incarcerated, mentally ill
25	2	1	Male	4	3 male, 1 female			Men and women, mentally ill; substance abusers
26	2	1	Male	4	2 male, 2 female			Women only, mentally ill; substance abusers

*All coalition staff were female, and thus not separated out into another column.

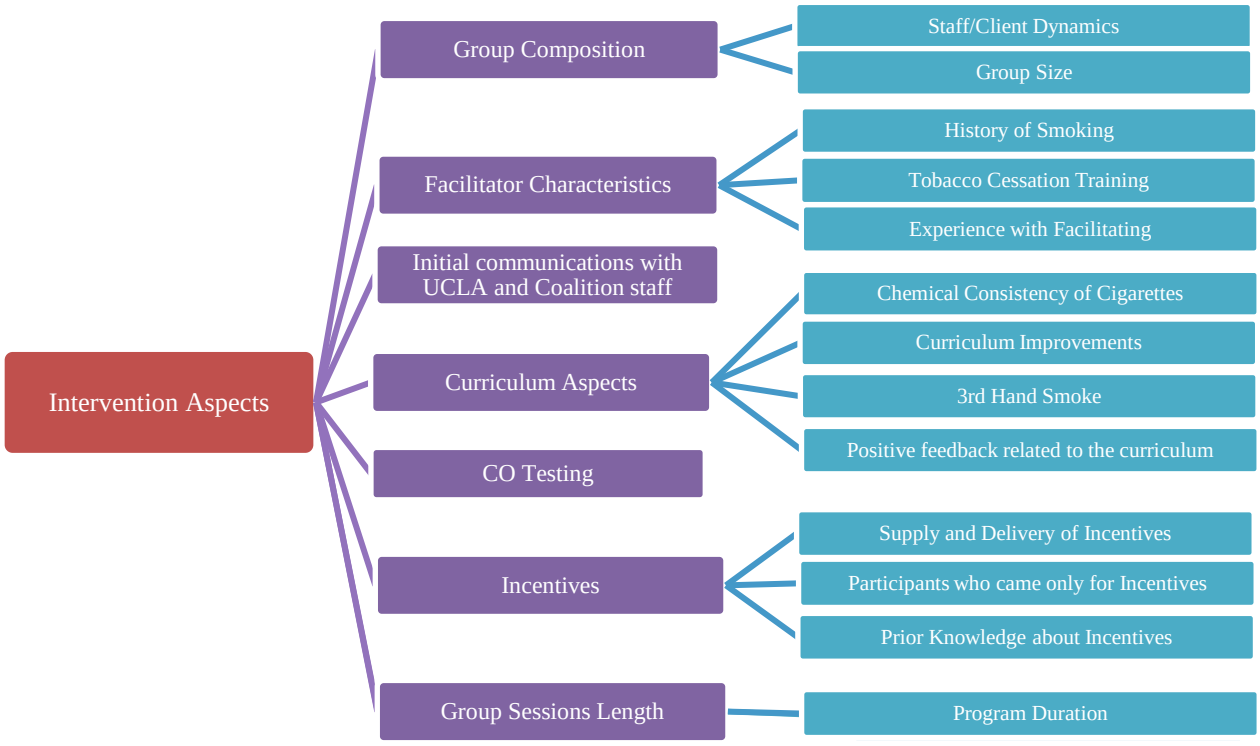
The main interviewers from the Coalition were two women; one is an African American woman, and the other is a White woman. All additional coalition staff were also women; two of whom were formerly homeless African American women, along with one White woman who was the Co-PI from the Coalition. From the UCLA team, we had one White male (also a co-PI), one Hispanic/Latino male, and two Asian American females (including myself). Shelter staff and residents varied in terms of their gender, and information about their ethnicity and age were not collected. Shelters varied in terms of the type of clients that they served, including veterans, mentally ill, substance abusers, men only, women only, families, or some combination. Depending on the interview, one to four shelter staff were present. In addition, at four sessions, shelter residents also participated (n=1, n=6, n=3, n=3 additional). Although the MLDs were originally designed to be a one-on-one interview, our Coalition CBPR partners decided that it would be helpful to have Coalition staff at each of the visits, since they were familiar with the community. In addition, shelter staff would invite other staff members and/or residents to join the conversation, creating focus groups in some cases, rather than guided interviews. Characteristics of the interviewers and participants shaped the experience and results of the analyses.

Through an iterative process, coding yielded a total 64 unique codes that were used to mark a total of 408 excerpts from the 25 interviews, which were tagged for analyses in Dedoose. As expected, the most common topic discussed during the MLDs was intervention aspects, as that was the foundation of our relationship with the shelters and the purpose for the guided interviews. Because all of our interactions pertained to the intervention, it comes as no surprise that this was the most discussed topic. Although we expected the conversation to primarily revolve around the intervention, some interesting discussions arose regarding other salient factors that likely more proximally impact tobacco use reduction/cessation in transitional homeless shelters in LA County. Based on these codes, and the frequency of the codes being applied to the excerpts, four main themes arose from the MLDs: 1) Intervention aspects (249 excerpts), 2) Resources (67 excerpts), 3) Social support (59 excerpts), and 4) Individual barriers (33 excerpts). Each of these themes was further broken into smaller domains and categories, which are discussed in detail in the next section.

3.3.1.7. Major themes

Theme 1: Intervention Aspects

The first major theme that emerged refers to the intervention aspects. Figure 3.1 lists the domains and subtopics for the theme of intervention aspects. **Figure 3.1: Theme 1: Intervention Aspects***



*Red boxes refer to themes, purple boxes refer to categories, and blue boxes refer to codes.

Intervention Aspects: Group Composition

Participants in an intervention need to feel comfortable about sharing their experiences and journey of tobacco use reduction/cessation. Group composition was an important factor in how comfortable participants felt, and it seemed as though the experience varied for the shelters. Current group sizes of 10 or so participants were considered to be optimal by most sites.

> "Because then it made it more comfortable and there's more, you know, attentive." (Shelter site 22)

However, some sites pointed out that larger groups may be a good starting point due to drop outs. This is helpful advice for future interventions seeking follow-up data, which this study struggled to obtain.

> "I think, actually, I've had groups 'cause if we start a group at 10 and we lose a few people and it ends up with only 5 or 6 people, that's a really, like small group and it's hard to have the people participate. I mean more people, you have the quicker conversation's going to go, the more feedback and what not so. If I start my group with 12 or 14 and then we lose a few, it ends up like I think in between 12 and 10 is a really good number for our group" (Shelter site 10)

Most shelter participants reported that staff and residents should be separated into separate reduction groups, and not included together in the same intervention group, which the SRP allowed. A male facilitator at a shelter primarily serving men, with a target population of substance abusers and mentally ill individuals, felt that it would be difficult to include both staff and residents in the same intervention group.

> "There's some staff that want to stop smoking, wants to come to a smoking class but they don't want to come with clients and they made that real clear. And some of the clients did not want in the smoking class with staff." (Shelter site 4)

Although most sites that mentioned group composition as a factor agreed with this previous statement, one site serving men and women, with a target population of substance abusers, reported the benefit having staff involved in the sessions.

> "One thing I think that has helped a lot, at least for [us, name removed] and over there, when the clients and the residents was with us. I feel like we didn't look like case managers anymore, we looked more human." (Shelter site 18)

Intervention Aspects: Facilitator Characteristics

Credibility for the residents was discussed in the context of facilitator characteristics. The facilitators were trained by UCLA and LA County, but were told to add their own modifications as they saw fit. Facilitators were required to be nonsmokers during the training, and ideally to have led group sessions in some other capacity. In addition, facilitators also needed to attend the two-day peer-to-peer training to learn about tobacco cessation. However, individual facilitator characteristics can make a difference in the implementation of the intervention. As a male facilitator at a shelter for men, targeting substance abusers and mentally ill residents, explained:

> "I'll put them in scenarios to see, so I can, and I'll be the person because I'm asking the question to see how they will deal with it. I'll position myself as a participant to see how they will deal with that, once I've asked them the question." (Shelter site 4)

By allowing the facilitator to be at the same level as the participants, credibility was established, allowing the facilitator to engage participants in the intervention. One of the criteria for becoming a facilitator was being current nonsmokers but ideally being former smokers as well. Our rationale for that was residents attempting to quit would have a role model, and they were likely to mirror the behaviors of the facilitator. A facilitator who had ideally been through the process of successfully quitting was beneficial to participants' self-efficacy, and their belief in the program. Several facilitators reported that mentioning their past smoking history improved their ability to motivate the participants.

> "I, myself was a smoker as well so I tried to use that as you know, an encouragement." (Shelter site 13)

Having participants relate to the facilitator was important. Even in cases where the facilitator was still a smoker, participants were accepting, as they felt that the facilitator was going through the process with them, and understood their struggles. Other facilitators, who did not have a smoking history, tried to engage the participants by focusing on the curriculum.

> "How can you tell me something you don't even smoke? You don't know what I'm going through. How do you do address that?' Well, maybe not. But I have the information that can guide you." (Shelter site 4)

Intervention Aspects: Curriculum Aspects

Although focusing on the information provided in the curriculum was beneficial, several shelters informed us that the curriculum was not ideal, as it was initially conceived for a mentally ill population, and modifications were not made prior to implementing it in transitional homeless shelters.

> "I think, honestly I think I feel like 80% was pretty good. The problem that I think that wasn't and I thought maybe a little bit unrealistic for the population is that these guys in this particular population, are coming from homelessness and so in regards to saying their choice of foods, you know, they don't get to go shop. They had to take, pick and choose what they get here if they get to pick and choose, you know? I mean they can have food, you know, we don't really have very much for sweets but as far as the foods that's here. That's what they cook, that's what you get.
>
> Yeah. I also kind of wonder to as far as, oh the saving of the money too is for you know, the material about that. I mean the guys thought about the money that they could save but at the same token, I don't think their minds were very focus or in tune to what it is that they actually could do with it. So that material like saying 'OK, you can buy this or buy that.' really wasn't too realistic for this particular population and I think the alternatives

too to as what to do in a stressful situations you know, the 'deep breathing', I forget there's something else.

Yeah. 'Going to the gym.' I mean you know, we do have a gym here but you know, I don't know, I think it's a bigger motivation for them if you gotta pay to go versus being it just right there and it's free, you know. I don't know if they're really as motivated. So like I said, I think about 80% of the material was pretty useful and it was a percentage of it that would stand out, what's kind of like, I thought unrealistic for this particular population." (Shelter Site 14)

Future interventions need to work with community partners and shelters prior to implementation in order to tailor materials. For example, one worksheet in session 5 discussed alternative coping strategies such as "Do needlework", or "Go to a movie". These are both suggestions that are not pertinent for residents living in transitional homeless shelters. This sentiment for making modifications was echoed throughout the conversations.

"I think it could have been more specific to their needs and to like things that they're actually going through. It would have been more beneficial. Since it is a population that smokes a lot." (Shelter Site 6)

Intervention Aspects: CO Testing

An aspect of the SRP that was not discussed in the curriculum until week 2 was the expired CO testing that occurred weekly, measuring expired CO level at the beginning of each session. This aspect of the intervention was created to provide immediate feedback to participants about their expired CO level. Each shelter was provided with a CO monitor that lit up from green, to yellow, to red, to flashing red, to designate the categories of non-smoker, light smoker, average smoker, and heavy smoker, respectively. This immediate feedback on a weekly basis was a well-liked aspect of the intervention, as it prompted behavior change, but many shelter staff suggested bringing it up earlier in the curriculum.

"Once they got in here, the CO2 monitor was a good thing. Once we started implementing that at the beginning of the group, I think that was something they used kind of as a competition amongst each other to see whose numbers can get less from the week before and it was just, it was interesting in the beginning to think that the guys were a little bit embarrassed or they kind of taking it as a joke but then as a few people actually started taking it seriously and talking honestly about the reasons for quitting or reducing and I think they began to take it more seriously." (Shelter Site 22)

Intervention Aspects: Program Duration

The length of the 8-week program was not deemed to be sufficient in length by 12 of the sites, several who suggested that the program be ongoing.

> "Beyond the 8 weeks. I think that it should be a curriculum. It takes people more than 8 weeks to get their habits out and I think it'll take them longer than 8 weeks to get rid of it and I think that what we should really look at is how long it takes the nicotine to leave the body." (Shelter Site 23)

Several shelters referenced the need for this intervention to go beyond the 8 week program.

Intervention Aspects: Incentives

Incentives were an important aspect of the intervention, as participants received $10 for attendance each week in the form of a gift card. Thirteen different shelters discussed an added value of incentives, 4 shelters discussed that the incentives were of neutral value, and three discussed how the incentives were not necessary, as participants at these sites did not attend for the purpose of tobacco reduction/cessation, but rather to receive incentives.

> "The incentive really gets them started for sure, that's no doubt about it." (Shelter site 14)

> "There was one guy who says he goes on in the class 'because I want the incentive, I am not going to stop smoking,' so I said OK and then we kept on another week, and he goes ' I am down to 2 cigarettes a day' and 'I don't want to do that but I'm glad I did.' He was very adamant. He just, he was doing the class because he wanted the money and but he actually got something out of it. You know, and so it worked. I think it worked itself out for him." (Shelter site 24)

Several shelters did not provide the incentives in the beginning, or did not inform participants that an incentive was being provided until after they had committed to participating. Many shelters felt that incentives were not necessary for recruitment. Others felt that incentives were helpful for recruitment, and that they would get an additional benefit of information once they were in the room.

> "I think that if the group is done without incentives then you know the people are definitely there because they want to be there so I wouldn't do it. I wouldn't have incentives. I know for the purpose of study, you probably need it 'cause you need to get people there to follow through but if I was just going to do it again, I wouldn't [use] incentives so I know people that were coming really want to stop." (Shelter site 3)

> "It was good and I can see how that worked where it brought them in and maybe they wanted to get the incentive, but for me, it didn't matter because they were still getting the

> information. You know, it's once you plant something like this, even if you're not ready to smoke, you still get the information and it's worth every penny." (Shelter site 5)

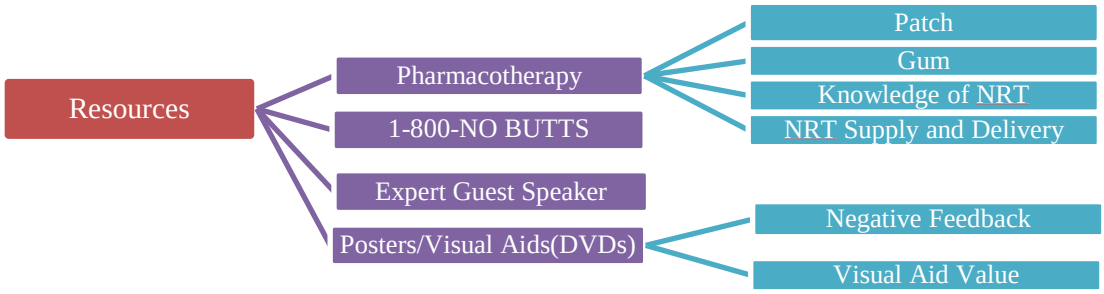
It appears that incentives for this population may increase the number of participants in the SRP, but more research is needed to determine whether these incentives are effective at increasing participation by those who are seriously contemplating reducing their smoking. Although shelter staff believed that incentives may have increased participation in the SRP, more research is needed to determine how many people attended because of incentives, and of those how many people reduced their smoking. Perhaps, participants did benefit from the SRP, regardless of their initial motivation to join being the incentives. However, perhaps incentives for this population were borderline coercive, since $10 may be a substantial amount for them. Researchers need to be mindful of the ethical implications, of incentives by population group. A possible future study could address this issue by obtaining the advice of the staff first, and then offering incentives to some shelters weekly, as was done in the SRP, and then comparing it to a group that did not received incentives, as well as a group that received non-monetary incentives, such as the NRT since the state programs require follow up phone calls to report progress and need of further NRTs, which makes it difficult for this population to obtain these supportive items, as noted below. Differences in groups can provide researchers and shelter staff more insight into the importance of incentives for success of the SRP.

Aside from monetary incentives, several aspects influenced tobacco use reduction, such as access to pharmacotherapy in the form of nicotine replacement therapy (NRTs). Similar to expired CO testing, the importance of NRTs was not discussed in the curriculum until the 4th week. A reorganization of the curriculum is needed so issues that participants are exposed to are introduced earlier on in the sessions, thus keeping the attention and possibly enhancing the retention of study participants.

Theme 2: Resources

The second major theme that emerged referred to resources related to implementing smoking reduction programs. Figure 3.2 lists the domains and subtopics of the theme of resources.

Figure 3.2: Theme 2: Resources*



*Red boxes refer to themes, purple boxes refer to categories, and blue boxes refer to codes.

Resources: Nicotine Replacement Therapy (NRTs)

Resources, such as access to nicotine replacement therapy, were deemed essential. The curriculum mentions various pharmacotherapy tools, but it is important to have access to them in order to have the program be effective. As a resource, NRTs were generally well received, with ten shelters discussing NRTs as an effective aspect of the SRP.

> "I think the most useful part of that was the patches. I think that was probably the most useful part. Even more so than the curriculum because that allowed us to have dialogue as to how they were working, were they being consistent in their use, when they had the urge to smoke while they had the patch, what was that about?" (Shelter site 24)

However, a concern of access to NRTs and proper utilization arose. In addition, there were issues with the patch in regards to nightmares and improper dosing.

> "Due to some participants experiencing bad reactions to the NRT patches in the form of nightmares and rashes, consider offering a wider-range of NRT types moving forward." (Shelter site 20)

> "The patches weren't as effective only because there was like irritation to some of the girls who were really trying to do it." (Shelter site 11)

The gum was generally well-received by several sites, which suggests that in future interventions the possibility of focusing on the gum versus the patch should be explored. However, this is not always appropriate to all groups, as homeless individuals often have poor dental health. For example, one site pointed out personal barriers that the homeless residents of transitional shelters may face.

> "Most of our participants seem to like the patch better and that might be and I'm just, from my experience of working with some of our clients, might be [due] to dental issues that are related to some of our participants here, not a whole lot of our participants have a whole set of gum teeth to chew gum so that might be part of it." (Shelter site 25)

MLD discussions pointed to the need for prescribing the right dose of NRT, as well as access to NRTs. One resource mentioned by Coalition staff to shelters was the Smoker's helpline 1-800-NO BUTTS. Eight shelters were able to contact the smokers helpline to access free NRT for the participants after the completion of the SRP trial with UCLA and the Coalition. Staff at these sites were able to overcome barriers of participants not having a phone number to call from by assisting them in making the calls.

> "We start off the group and they were still offering through 1800 No Butts so I just instructed the clients that they need to come up the office to use the phone, they could." (Shelter site 10)

In order for the SRP to be sustained, a mechanism for accruing NRT is essential, and resources at the state level are needed to be able to distribute NRTs to the homeless population in a fair manner; however, it is unlikely that the state is even aware of barriers related to the fact that many homeless individuals may not even have a phone number with which to call the smokers helpline. This is yet another example of a systematic way in which this population is overlooked, and thus lacking resources otherwise available to other residents of the state.

Resources: Program Sustainability

While the general consensus among those who participated in the MLDs was that the SRP was beneficial, access to resources may affect the continuation of smoking reduction/cessation programs after the initial SRP program is complete.

> "I think, it went well. Some people did reduce. And actually from that information I have two guys at sober living that are now on the patch, that didn't even go into- They didn't go through the class, but because of the information that we gave them and them seeing the posters, they were like okay, so we called the 1-800-NO-BUTTS and put them on the patch. So that worked out well. Yeah. There's a lot of guys who want to do the class again but obviously they want the incentives and we're not gonna- we can't come out of pocket for it. But there are guys asking for us to run the class again. So we probably will. But they have to understand there's not gonna be that extra piece." (Shelter site 9)

> "Well they said they decreased in the amount that they were smoking. That because of the class, they didn't smoke as much, or they didn't smoke as often. Or they was really conscious of not going out and taking a smoke break every hour, they would go every 3 hours. So you know that was a change." (Shelter site 26)

Resources: Visual Aids

As an addition to the SRP, UCLA was given access to posters produced by the Tobacco Control Department at the Los Angeles County Public Health Department. The first poster shows a cigarette with pictures of hidden chemicals coming out of it. The second poster is a cigarette shaped like a needle, with the tagline "Are you a nicotine addict". A copy of the posters are available in Appendix 3.2.

> "The other thing that the clients really liked were the posters. I think we should have more at training 'cause we have 8 houses and the clients wanted to put them up in the houses. It's like reminders." (Shelter site 19)

Although the first poster was well received, the second poster featuring a cigarette shaped into a needle had to be taken down at several organizations, as it was a trigger for substance abusers. Nonetheless, 17 shelters mentioned the usefulness of visual aids for this population, and highlighted a need for more tailored materials for the homeless.

> "Videos would be good. Something they can see." (Shelter site 6)

> "I think what it would help us to improve this is that you know, our participants are more visual than writing or reading. I think we can have like a DVD, something that we can show pictures how your lungs were when you were healthy, when you start smoking to years and years. I think that would even help more what part of your body would get damaged if you keep smoking. That's what I think that it would be more attractive to you to get that because by reading or listening, they can- defensive in that but I think that we have something that they can visualize that I think that would even help them more." (Shelter site 25)

> "I think even introducing some sort of like videos to the program or something. Something to watch. Testimonials of 'I've struggled, I've quit and this is you know, what I'm doing now.' You know some interactive videos of the chemicals because it's one thing for us to read it and discuss it. But it's another thing to have a video showing 'Wow look it, this is really what it does' and pictures. It's one thing to have the information black and white and people 'Okay' but to see it visually would be impactful." (Shelter site 9)

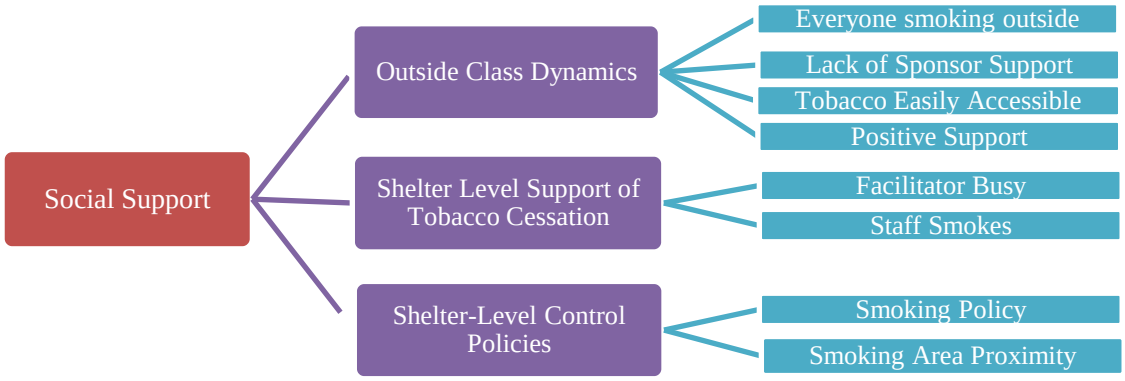
The need for additional resources highlights that the program needs to be further tailored to meet the needs of homeless individuals living in shelters. Transitional shelters provide several resources to help individuals integrate back into society, such as classes to improve skills and increase their ability to find

employment and permanent housing, thus providing social support for this change. However, social support for tobacco use behavior change may not be integrated into the shelter culture.

Theme 3: Social Support

Social support was the third theme that emerged from the MLD discussions. Although the focus of the conversation was on the smoking reduction intervention, several factors related to social support assisting or restricting tobacco use reduction/cessation were discussed including outside class dynamics, shelter level support, and shelter level tobacco policies. These domains for social support are shown in Figure 3.3.

Figure 3.3: Theme 3: Social Support*



*Red boxes refer to themes, purple boxes refer to categories, and blue boxes refer to codes.

Social Support: Outside Class Dynamics/Shelter Culture

Outside class dynamics had an impact on residents' ability to reduce smoking. For example, ten shelters brought up that everyone outside of the shelter was smoking, thus making the shelter environment not conducive to smoking reduction.

> "Well I think what's important to them was the group cohesion that started to happen but the barriers, that was the environment because if someone was smoking around them just you know, like a smoking area and people like to socialize in the smoking area. So it's kind of hard to quit when everybody around you is smoking all the time." (Shelter site 2)

> "Predominantly, everybody probably is smoking so I don't know how receptive the environment outside here was for them, you know, to be saying that because everybody smokes. But something I did observe is they start off, they were really motivated in the beginning, and it's like it waned off and then like a lot of them just gave up." (Shelter site 6)

As these quotes suggest, smoking is a part of the shelter culture, making tobacco use reduction or cessation difficult for participants. In addition, engaging in tobacco use reduction may even lead to social isolation, as the facilitator from Shelter site 14 suggests in this quote:

> "When the guys are around each other, and yet they smoke cigarettes. That's what they do. It's just that this being I guess a higher nicotine intake population, it certainly does influence the other people around them." (Shelter site 14)

Residents have complained about their social environment promoting smoking.

> "A lot of our clients have complained about the difficulty of not being able to get away from it." (Shelter site 19)

Social Support: Availability and Accessibility of Tobacco

Another interesting related element that arose from the MLDs is the availability and accessibility of tobacco. Discussions with shelter staff and residents highlighted residents' informal access to tobacco that is not always captured in formal assessments.

> "Even right here, there's a guy that stands out here and he has every kind of cigarette you can imagine, you can buy a pack or you can buy one….So whatever you need, just like a little dealer. Deals in cigarettes but yeah, it's very very common and someone will sell lighters right next to them." (Shelter site 24)

> "If you all hung out here for 2 more hours, you'd barely be able to get down the street because the wares are lying out. You want a pack? You want a single? You want a group of 3? (Shelter site 25)

The staff member at Shelter Site 25 continued by suggesting that current methods of combatting the negative aspects of the social environment are not working.

> "You have to become as entrepreneurial about smoking cessation as we are entrepreneurial about providing products. That energy, that activism, ideas, sitting and talking about things has to come up because the folks that are out here to make money, they're doing it." (Shelter site 25)

Theme 4: Individual Barriers

The final theme that emerged from the MLDs was related to individual barriers to smoking reduction/cessation. Figure 3.4 lists the different topics discussed within individual barriers.

Figure 3.4: Theme 4: Individual Barriers*

*Red boxes refer to themes, purple boxes refer to categories, and blue boxes refer to codes.

Residents face many personal barriers that can impede their success in quitting or reducing tobacco use. First, research shows that many homeless adults are dealing with mental health and substance abuse issues (Gelberg, Linn, & Leake, 1988). The MLDs with shelter staff and residents highlighted some of the individual barriers that not only affect participation in a tobacco use reduction program, but other aspects of their lives that may impede their ability to get a job or otherwise integrate back into society. For example, other commitments such as court dates can affect women who are attempting to gain custody of their children.

> "By the time they get into residential treatment facility, have had their kids taken away from them, don't have anywhere to go …don't have family support, have court cases and are court ordered here. I mean they have a lot of traumatic events that have happened because of their substance abuse so they can definitely see like 'OK, the judges are not working for me anymore.' but they don't see any of the harm like the smoking stuff, they don't see yet but to give them that and tell them 'You know, you have a greater chance of staying off the drugs and alcohol if you quit smoking.' is I think, a really helpful thing" (Shelter site 10)

For veterans, smoking becomes an important aspect of their lives. It becomes integrated into other aspects of their lives, making it difficult to quit smoking.

> "I have to say as far as this population, for me, I think the combination of them being men, the combination of them being veteran and the combination of them being substance abuser, they're very, very….,they have a lot of aggression and so if they have their mind fixed on something that they don't want to do or they don't like, they're not going to do it." (Shelter site 25)

Another discussion regarding individual barriers arose from a discussion about NRT.

> "The group offered patches, all of them took patches. They did really good for first couple weeks then I don't know what happened. They got frustrated." (Shelter site 21)

When prompted with "Frustrated with patches or groups?" by Coalition staff, the facilitator answered concisely:

> "Frustrated with daily lives." (Shelter site 21)

Another shelter staff member at the meeting added:

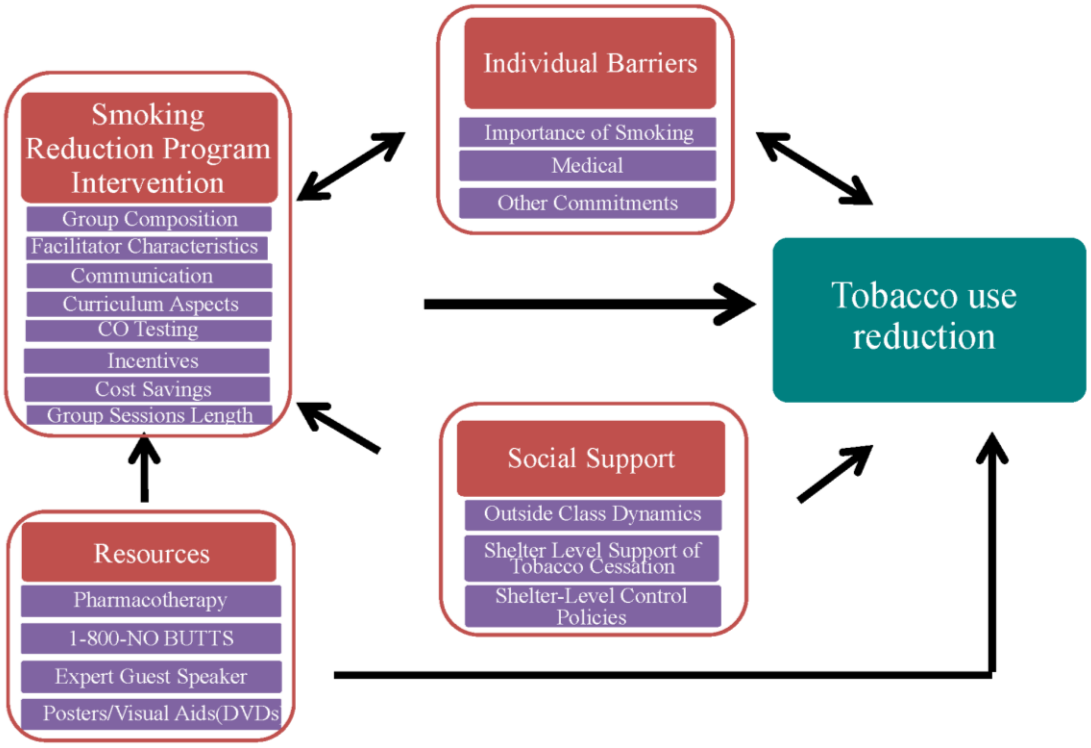
> "Smoking is immediate gratification. Our folks are static." (Shelter site 21)

This is the reality that we are living in when attempting to implement a smoking reduction/cessation program for the homeless in transitional shelters. The residents may have access to resources, and the intervention program itself. However, individual barriers can impact whether they are open to or are even in a place to begin such a behavior change, let alone sustain the desirable behavior change for the long-term. Many factors aside from the intervention are related to tobacco use reduction/cessation.

3.3.1.8. Conceptual Model

Based on the themes, domains and subcategories obtained through inductive coding of the 25 MLDs, a conceptual model of the SRP was developed that aimed to capture the nature and perceived benefit of the smoking reduction program intervention and tobacco use reduction within transitional homeless shelters. Figure 3.5 shows the SRP program providers' conceptual model developed through inductive analyses of the MLD data.

Figure 3.5: SRP Conceptual Model



As depicted in Figure 3.5, the conceptual model shows the main one-directional relationship between the smoking reduction program intervention and tobacco use. The different domains of the intervention are listed underneath, and include the bulk of what comprises the intervention itself, including facilitator characteristics, curriculum and incentives. The domain of resources has a direct causal relationship to both the intervention and tobacco use reduction, thus serving as an effect modifier. It is likely that the effectiveness of the intervention on reducing tobacco use in transitional homeless shelters in LA County would increase if resources such as access to pharmacotherapy and additional visual aids were increased. Social support is a similar effect modifier, affecting both the intervention and tobacco use reduction. The lack of social support, as seen by many of the shelters, can reduce the effectiveness of the intervention, and decrease the long-term success of any short-term tobacco use reduction. Finally, individual barriers such as the antecedent factors that resulted in their homelessness such as family commitments, and the personal importance of smoking as a way to cope with overwhelming circumstances, would likely reduce the impact of the intervention on tobacco use. It is

likely that tobacco use reduction could address some personal barriers, such as increasing the amount of extra money available to put towards other commitments such as money towards transportation for a job interview or court hearing. This would be a beneficial outcome of tobacco use reduction on other aspects of residents' lives, and perhaps could be used as an internal incentive for behavior change.

3.6. Discussion

The living situation for homeless populations varies greatly, as some are living on the streets or staying with friends or family, whereas others are sheltered in emergency and transitional shelters (Burt, 2006; HUD, 2011), but those living in shelters are more easily recruited into intervention programs. However, the impact of these interventions on tobacco use reduction/cessation remains unknown. This study is one of the first attempts to increase understanding of what elements would make an intervention effective for homeless smokers living in transitional homeless shelters, and why such a program may or may not be effective.

Results from the quantitative analysis showed that reductions in the average number of cigarettes smoked daily and expired CO level occurred between baseline and follow-up. Aim 1 did not answer whether the intervention was effective for all participants, however, but the analysis did show that there were no intervention effects on any demographic subgroup.

There were several limitations with the analysis for Aim 1, including the study design and sample size issues. First, the study design only used a pretest-posttest design, where data were measured at baseline and 3 months following an intervention. There was insufficient data to compare across sites and had little generalizability, as there was no comparison group for the 26 shelters in the study. The study design would have been stronger if data had been collected at demographically matched shelters in LA County not receiving the intervention, or receiving it on a time-delay. However, due to the restrictions from the funding source, we were not able to collect such data. We cannot determine whether the changes that we did see between pretest and posttest are due to temporal changes across shelters, or to the impact of the intervention itself. Another limitation is that only 43.6% of the sample were successfully followed

up at 3 months' time. The changes seen in smoking between baseline and follow-up may simply reflect the fact that the people who were never going to quit dropped out early. Furthermore, the small sample size lacked power for complex analyses including interactions or the inclusion of other smoking- related behaviors or influences such as regularly being exposed to a smoker in the same room. Future studies can address these limitations by having a control group, having a larger sample at baseline, and having a more effective strategy for follow-up in hard to reach participants such as homeless adults. The prevalence of smoking is high in this population, and more research is needed to better understand tobacco use reduction/cessation among residents and staff of transitional homeless shelters. This study, as noted, is the first to illuminate some of the challenges in reducing tobacco use in this population.

Another limitation is that since expired carbon monoxide measures were collected for all participants, air pollution, captured through several time points, should have been included in the quantitative analyses. Air pollution can have an impact on health outcomes, which can be aggravated by tobacco use. Air pollution is known to be related to the onset of asthma in children, as well as adults who have never smoked (Künzli et al., 2009; Salam, Islam, & Gilliland, 2008). Unfortunately, given the small sample size in this study, this was not possible, and should be considered for future studies.

3.6.1. Recommendations for Future Interventions

Homeless populations face many potential barriers to tobacco use reduction, as they are deprived of many social interactions, and the culture of the shelters promotes smoking as a means to socially engage with one another (Stead et al., 2001). Qualitative data yielded several suggestions for improving a tobacco cessation/reduction program for residents in transitional homeless shelters in LA County, and identified several aspects that did not work for this population, such as the importance of smoking for socialization and coping, barriers to quitting created by compounded stressors such as court dates and loss of children, a need for social support from staff and peers. Future studies need to modify and tailor the existing intervention to incorporate these factors.

Suggestions were made in the MLDs to make the curriculum more relevant to the participants. Since the P2P program was originally designed for people dealing with mental illnesses, the program, though relevant to many homeless adults who also deal with mental illness, would benefit from tailoring for this specific population and potentially subpopulations within this group. For example, as seen in Table 3.1, topics ranged from information about healthy behaviors and tobacco harmfulness to coping mechanisms for cravings and stress. All elements in theory seem to be relevant and helpful for tobacco use reduction/cessation for this population. However, based on MLDs with facilitators and other shelter staff and residents, it seems that the actual worksheets and activities were not always relevant for this population. Therefore, the content and order of the worksheets needs to be made more relevant to the population of focus.

First, the SRP intervention includes weekly expired CO testing and NRT distribution, which were generally well received, as discussed in the results. However, they are not a formal part of the P2P program as designed by Chad Morris, and therefore, the curriculum did not account for these elements (Morris CD et al., 2009). Feedback from the MLDs suggests that expired CO testing was helpful for participants by providing immediate feedback and a sense of accomplishment for those who reduced their CO levels. In addition, NRT, when properly distributed, was very well received and assisted participants in reducing their tobacco use. However, the concept of carbon monoxide is not introduced in the curriculum until session 2, and NRTs are not discussed until session 4. Both of these elements need to be introduced formally in session 1, so participants are clear about the purpose of the CO testing and NRT. In addition, trust needs to be built among the residents and especially with vulnerable population whose lives have often been filled with challenging interpersonal relationship. By testing something (CO levels) and offering medications such as the patch and gum, without fully educating the participants, mistrust can occur, and ultimately affect the intervention outcomes. Therefore, future interventions should reorganize the curriculum to introduce these concepts in the first session. In addition, session 2 (Truth about Tobacco) should be moved to the beginning of the curriculum, followed by session 4 (Coping with Cravings) discussing NRTs, and then followed by sessions 1 (Healthy Behaviors), 3 (Changing

Behaviors), 5 (Managing Stress), and 6 (Planning Ahead). The topic of the health benefits of quitting smoking should be moved to session 1. Reordering the curriculum would allow topics regarding tobacco use to be discussed first, followed by coping mechanisms, and finally, general behavior change and stress management. This progression would allow participants to become more familiar with the concept of tobacco use reduction, share some of the challenges, and then introduce behavior changes that would be more relevant in their lives.

All six sessions in the SRP intervention refer to important concepts for tobacco use reduction/cessation. However, as noted, not all topics and exercises are relevant for the homeless population. The session "Healthy Behaviors" discusses tips on increasing exercise and improving food choices. Although these are excellent ideas, and research shows that people engaging in multiple change behaviors are more effective at quitting smoking, the execution of these may not be easily available and access to having these choices to change behaviors may need to be addressed at the level of the shelter, not the individual level. As mentioned in one of the MLDs, even if participants wanted to change what they ate, they do not often have a choice, as they must eat what is provided, and they are likely to be lacking resources to purchase their own healthy food. If this is a part of the curriculum, the shelter needs to have access to fruits throughout the day, for example, but this may not be feasible given the current level of shelter resources. Another change that should be made is in the "Changing Behaviors" session. This section refers to coping strategies for activities to replace smoking. Among the suggestions, recommendations include: "Take a long walk", "Take a hot bath or shower", "Do needlework" and "Go to a movie". Although these are appropriate suggestions for the general population, they may not apply to residents living in transitional homeless shelters. If residents are not able to leave the facility during certain hours, they may not be able to take a long walk. Further, the likelihood of being able to take a hot bath is slim, given the shared facilities that residents must use. Additionally, activities such as needlework and going to the movies are also not realistic for this population, who are extremely pressed for money. Another worksheet in the "Changing Behaviors" section suggests ways to apply the money used from quitting smoking towards other activities such as "Go on a trip", "Take guitar lessons" and "Have a party

for my friends". Again, these suggestions simply are not relevant for this population. Furthermore, these suggestions may do harm in making residents feel frustrated, and might also undermine their belief in the intervention's effectiveness if it clearly does not apply to them.

In the session "Managing Stress", general coping strategies and deep breathing exercises are used. This may be a start to the process of dealing with stress, but as we found out from the MLDs, and in our conceptual model, individual barriers are the source of stress for many participants. This session should really focus on identifying solutions for stresses that residents living in transitional homeless shelters face and integrated more fully into the rehabilitation program of the shelters themselves regarding job training and social support. Although they have temporary housing for 6 months to 2 years, this situation is still temporary, with the ultimate goal being a move to permanent housing, which requires a stable job. Therefore, this session should incorporate dealing with the types of stressors that these residents face, and helping them find alternative coping mechanisms aside from cigarettes. Similarly, the "Planning Ahead" session should not only focus on strategies on how to say "no" to peers and setting a quit date, but also how to deal with not smoking when they hopefully make their transition away from transitional housing to more permanent housing. Prior to the implementation of future interventions in transitional homeless shelters, the curriculum should be reviewed in detail with shelter residents and staff, as well as potential facilitators and CBPR partners and pilot tested for relevancy and acceptability.

One lesson learned from the CBPR partnership during this process was that partners need to be involved in all aspects of the project, including the research elements in true CBPR philosophy (Israel et al., 1998; Kagawa-Singer, 2000; Minkler et al., 2003). Future interventions need to leverage the strengths of CBPR partners, such as engaging them in the partnership in the conception of the project and integrating their input regarding the curriculum prior to implementation. They should also be involved in determining what the "objectives" and goals would be realistic, and what elements to measure to show effectiveness.

In the SRP intervention, some of our CBPR partners were previously homeless and assisted with the recruitment of the participating shelters; however, they were not involved directly in the data collection aspects of the program. This discontinuity with who was contacting the shelter led to subsequent misunderstandings, which were expressed during the MLD conversations. By training the CBPR partners on collecting expired CO levels, and other "research" elements, we could have 1) avoided the miscommunication between shelters and UCLA staff, 2) had more continuity in the SRP, and 3) learned ahead of time what was relevant for this target population. Although this was an evidence based program, we clearly found a lot to customize, which could have been addressed earlier on in the implementation had all CBPR partners been included in the research process as well as community elements of the programs. Future interventions should maximize the resourcefulness of CBPR partners, as they are more likely to know the community, and especially one that is understudied and underserved like the homeless population.

In addition to the suggested changes to the existing curriculum, several additional strategies for improvement were also identified, such as a need for social support from staff and peers, and the need for additional posters and visual aids to better fit the circumstances of this population. Given the lack of relevant resources for this population, it would be extremely helpful to have visual aids that speak to this population. In addition, participants and facilitators mentioned the importance of having a space to talk to one another about their smoking addiction; an official intervention component needs to be added that is essentially a support group for participants, and can even be an extra hour during the week, or a booster session after the intervention is complete. As reflected in the MLDs, often the best part of the group was when residents had a chance to actually talk to one another; this is a population who lacks social support, and the social support provided from these sessions can spill over to other aspects of their lives. Future interventions should incorporate these suggestions in modifying the programs to meet the specific needs of this community with the goal to increase program effectiveness.

3.6.2. Conclusion

For this population, the importance of focusing on a more proximal goal of smoking reduction, rather than the more distal goal of cessation needs to be stressed. The changes recommended to the curriculum and program itself are important in improving its effectiveness for the homeless living in transitional shelters. Staff believed that there was a benefit to tobacco use reduction that reflects the Transtheoretical Model (Prochaska & Velicer, 1997).

> "There is residual benefit. Even if you go back, so you know, to that extend, the program is still helpful even if they go back and it's probably the reason why we focused on smoking reduction rather than smoking cessation. Cause it's a process and we don't want people to think that they're a failure just because they relapsed even though ultimately that's what we want for them. As long as they're thinking about strategies to reduce their smoking, we're happy that it's having a positive impact." (Shelter site 7)

Future interventions need to acknowledge the difficulty of respectfully reaching this population. Incentives may be useful for recruitment, but retention is also important. If incentives get them in the door, then it is necessary to provide some intrinsic value to keep them in the intervention in a way that is beneficial to them, rather than taking away a coping mechanism used to deal with the unique stresses in their daily lives. A replacement is needed for the needs filled by smoking tobacco in order for the tobacco use reduction to be sustained. Ultimately, smoking reduction can improve the quality of their lives, but this long-term goal may not seem realistic without more tobacco control resources put at their disposal in the short term.

This qualitative analysis is limited by researcher reflexivity, which essentially means that my experiences can impact the outcome of the analyses if not made more open to confirmability, which is also limited by the fact that the qualitative data were only coded by one person (myself). Ideally, multiple coders would be involved in the analyses, to help determine the reliability of the measures. More specifically, testing for inter-rater reliability was not possible because there was only one rater; this omission needs to be addressed in future research. Although data were coded by one reviewer, initial themes were determined after multiple back and forth discussions with CBPR partners from the Coalition. Excerpts of interest were underlined and potential themes were further discussed with CBPR partners

from the Coalition and shelter staff, who agreed with the assessments and added valuable nuanced interpretations. This process supports the confirmability of the data, thus, minimizing the issue of having only one coder for deduce (Bernard, 2011, 2012). Therefore, I am confident that the themes extracted accurately reflect the SRP program providers' views about the status of the SRP intervention at their site.

Another limitation is that the qualitative portion was not fully anticipated and therefore evolved over time. In part, the idea for MLDs arose out of the CBPR approach, so theories of qualitative research could not be implemented fully in the short amount of time available. However, we were aware of this, so we took as many measures possible to ensure relevant data by developing an interview discussion guide with our Coalition partners. For the analysis, we transcribed as many recordings that were available and had thorough notes taken at other sessions. All notes and transcriptions were uploaded into the software program Dedoose (Dedoose, 2014)which resulted in greater fidelity to what was actually stated in the MLDs for the analysis. The themes were extracted and confirmed with community members as well. .

More research is needed to examine tobacco use reduction and effective intervention strategies for residents in transitional homeless shelters. Collaboration with the shelters to improve the smoking reduction curriculum prior to implementing interventions is essential in the future. Future interventions should also test suggestions made during the MLDs, such as adding more visual aids, as this population has low educational attainment compared to the general population (based on quantitative results). Qualitative results indicating that more relevant visual aids are needed should be shared with groups such as the Tobacco Education Clearinghouse of California (tecc.org) to create more appropriate and meaningful materials. For example, a poster of a cigarette shaped as a needle (in Appendix 3.2) had mixed reviews, partially because it was so impactful for the substance abuse subgroup of homeless individuals living in transitional shelters. Since they were actively making a change to reduce substance use, it was very impactful for the substance abuse subgroup of homeless individuals living in transitional shelters. This poster reminded them that cigarettes were just as addictive and harmful to their daily lives. On the other hand, it also served as a reminder for active users, making it more difficult to resist other drugs; posters in those cases were taken down. This strong reaction is an example of how visual aids,

when appropriate for the population, can have a lasting impact. In addition, the qualitative results should inform future studies, such as improving measurement tools for the built environmental assessments. Based on the MLDs, we see that informal access to tobacco use needs to be measured, as we found inadvertently that established licensed retailers were not the main source of tobacco as has been assumed in previous studies with other populations such as students in schools (McCarthy et al., 2009). Further addressing previously un-captured elements such as the sale of single cigarettes by unlicensed vendors warrants future research. Results from the qualitative data also inform future potential interventions in transitional homeless shelters by enabling us to better understand tobacco use reduction in the context of the site's existing unique social support avenues and individual barriers in this particularly vulnerable population.

3.7. References

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Appendix 3.1: Interview Guide

1.0 OPEN THE DIALOG

1.1 Conduct Introductions:

1.1.1 With the UCLA/LACEHH team

1.1.2 With the shelter team (i.e. group facilitator/s, shelter management, and group participant/s invited at the discretion of each site)

1.2 Express Appreciation:

1.2.1 For agreeing to participate in the project cReducing Tobacco Use in Transitional Shelters."

1.2.2 For fulfilling their program commitment to convene a smoking reduction support group for a minimum of 8 sessions.

1.2.3 For contributing to further research and learning by completing various surveys.

1.2.4 For taking the time to meet together today so that we might continue to learn together from our shared experience of this smoking-reduction program.

1.3 Review Purpose of Dialog:

1.3.1 We hope this dialog will provide insights about the kinds of supports needed for persons to reduce or quit their smoking within this setting.

1.3.2 We hope this dialog will provide insights about the kinds of barriers encountered by persons who seek to reduce or quit their smoking within this setting.

1.3.3 We hope this collaborative assessment will be helpful to you and to others who might wish to conduct a similar smoking reduction program in the future within this setting.

1.4 Agree on Boundaries

1.4.1 We want to assure you that what is discussed here will not be recorded with any identifying names.

1.4.2 We want to assure you that we would like to honor your time and contain this dialog to no more than 1 hour.

1.4.3 Since this is a report we are writing together, we would like permission to record and/or take notes of our discussion

2.0 ENGAGE IN REFLECTION

2.1 Invite General Feedback

2.1.1 What have been some highlights of the program for you personally?

2.1.2 How has the group experience been for you and others who participated?

2.1.2a What does preliminary CO data say? Invite dialog participants to share impressions of the results.

2.1.3 Based on careful listening to general reactions, identify one program topic (*) that would most appropriately serve as an opening (or other reflection within this setting)

2.2 Pursue Focused Reflection

2.2.1 Invite the site team to describe their experience of the one program topic (*) most evident through careful listening to general feedback shared in section 2.1 above.

2.2.2 Ask clarifying questions in order to more clearly understand the experience of this one program topic.

2.2.3 Based on careful listening to focused reflection upon one program topic, identify next logical program topics to discuss in sequence according to the flow of the dialog within this setting.

2.2.4 Follow-up on any program topic not yet covered during section 2.2.3 above.

3.0 INTERPRET MEANINGFUL INSIGHTS

3.1 Interpret Supports Needed

3.1.1 Based on careful listening during sections 2.1 and 2.2 above, identify and construct a list of supports needed.

3.1.2 For each support identified, clarify why this support is helpful and needed.

3.1.3 Invite suggestions for sustaining and/or improving the supports named.

3.2 Interpret Barriers Encountered

3.2.1 Based on listening carefully during sections 2.1 and 2.2 above, identify and construct a list of barriers encountered.

3.2.2 For each barrier named, probe the sources of this barrier.

3.2.3 Invite suggestions for overcoming each of the barriers named.

3.3 Invite Additional Insights

3.3.1 If you could redesign the program based on your experience and observations: t

What would you keep?

What would you change?

4.0 CONFIRM NEXT STEPS

4.1 Collect Any Outstanding Paperwork

4.2. Confirm Plan to Collect 3-Month CO Data

4.3 Set Date to Conduct Neighborhood Audit

4.4 Project Date for 6-month Assessment

4.5 Explain Purpose of Town Hall Meeting

(*) SAMPLE PROGRAM TOPICS

The 3-months follow-up reports developed through a careful process of collaborative assessment by means of **"Mutual Learning Dialogues** [MLDs] , will incorporate, but not be limited to, the following topics:

- Group Enrollment
- Incentives
- CO Monitoring
  - NRTs
- Curriculum
- Handouts
- Group Dynamics
- Group Leadership
- Environmental Barriers
- Paperwork Logistics
- Local Site Support
- Outside Site Support
- Shelter/Project Relationships

Appendix 3.2 Copy of Visual Aids distributed to shelters

CHAPTER 4:

Clarifying policy and built environment measures important for explaining tobacco use behavior in transitional homeless shelters: Are we capturing what's most important? (Study 3)

4.1 Abstract

Objective: This study seeks to examine conventional measures of tobacco use that may not be appropriate for populations living and working in transitional homeless shelters which are designed to focus on assisting homeless individuals to integrate back into society and provide supportive services, such as job placement, skills building, and access to health and mental health services. In doing so, the study seeks to clarify what differentiates the needs of the homeless population compared to the general population to identify appropriate measures and indicators for tobacco use behaviors in transitional homeless shelters. These measures and indicators include elements in the micro built environment, meso built environment, and policies at the micro and meso level.

Background: The literature to date does not include any studies that have examined the influence of the meso and micro built or policy environments on tobacco use among the homeless population. Features of the built environment and policies at the local city-level and shelter-level likely influence smoking rates of residents of transitional homeless shelters; however, this relationship cannot be testing without first measuring these elements. Aims of this research are to examine the relationship of the micro and meso built and policy environments of transitional shelters at the shelter and neighborhood/city-level and further develop relevant measures of tobacco use behaviors for this population.

Data and Methods: Data consisted of environmental audits, policy surveys, and guided interviews and focus groups with shelter staff and residents of 26 randomly selected shelters in Los Angeles County that participated in a smoking reduction program. Stata (Stata Corp, 2013) was used for descriptive statistics assessing the importance of micro and meso built environments for explaining tobacco use behaviors. Geographic Information Systems (ESRI 13) was used for exploratory descriptive spatial analyses of the

policy environment.

Results: Descriptive data show a range of possible micro and meso built and policy environment elements important for explaining tobacco use among residents in transitional homeless shelters in Los Angeles County. However, given that the relationship to tobacco use cannot be fully tested quantitatively with the limited sample size, qualitative data provide insight as to whether these measures accurately assess the experience of residents of transitional homeless shelters. Mutual learning dialogue (MLD) data show that important measures may have been missing from conventional measures of tobacco use related to informal avenues of cigarette attainment and social support.

Conclusion: This analysis identified potential measures of the built and policy environments important for explaining tobacco use in transitional homeless shelters that should be tested using a larger sample. . The findings of this study can potentially inform new measures to be tested in future studies. Qualitative analyses improved our understanding of how to optimize data collection to capture element staff at these facilities and homeless residents deemed relevant, and indicates promising direction for future research in this area.

4.2 Introduction

No literature currently exists that examines the influence of the built or policy environments on tobacco use among homeless individuals. Research on other populations has shown a link between the density of tobacco retailers and tobacco use by residents or students near the tobacco retailers (McCarthy (Leatherdale & Strath, 2007; McCarthy et al., 2009). Given this literature, it would seem likely that features of the built environment should be related to tobacco use among the homeless population as well. In addition, exposure to tobacco control signage in the shelters or to smoking policies at the shelter-level may also be related to tobacco use by residents and staff of the shelter. However, data on these potential measures have not been collected in the past to test potential relationships to tobacco.

This study aims to increase understanding of measures of the built and policy environments that may be related to tobacco use behaviors. These behaviors are ultimately related to preventable chronic diseases, such as cancer and heart disease, that disproportionately impact vulnerable populations (G. Moore, Gerdtz, & Manias, 2007). Specifically, this study aims to increase our understanding of elements in the micro and meso built environment levels and micro and meso level policies that may influence tobacco use and tobacco use reduction among residents and staff of transitional homeless shelters. A secondary goal is to identify general measures and indicators that have not been used in existing research, such as elements of the social environment. This study also seeks to develop a deeper understanding of the challenges and barriers involved in working with homeless populations to create meaningful change that benefits those living in transitional shelters. Based on working with this population in depth, several elements not captured through quantitative surveys and audits came to light; this paper suggests strategies to improve measures of such elements for future intervention efforts involving this population.

4.2.1 Tobacco Use Prevalence and Homeless Individuals

A growing research base, and the results reported in Study 1, indicates that homeless populations experience disproportionality high rates of tobacco use, with rates ranging from 69-80% among the general homeless population (Travis P Baggett & Rigotti, 2010; Connor, Cook, Herbert, Neal, &

Williams, 2002; Okuyemi et al., 2013; Tsai & Rosenheck, 2012). Notably, homeless individuals recognize the negative consequences of smoking including the dangers to their health, appearance, and the high cost of smoking (Butler et al., 2002; Porter, Houston, Anderson, & Maryman, 2011). Given the high rates of smoking prevalence relative to California (11.6%) and Los Angeles County (13.1) rates, more information is needed for researchers to understand tobacco use in this population (CDPH, 2013; LACDPH, 2010).

Very little data have been captured on tobacco use specifically at transitional homeless shelters, Transitional shelters are focused on assisting homeless individuals to integrate back into society and provide supportive services, such as job placement, skills building, and access to health and mental health services (Henry, Cortes, Morris, Khadduri, & Culhane, 2013). Transitional shelters themselves differ in their target population and services offered, but generally offer housing from 6 to 24 months, with goals to assist residents to moving into more permanent housing (Henry et al., 2013; LAHSA, 2011). Three recent intervention trials addressed tobacco use in various settings included transitional shelters (Goldade et al., 2013; Goldade et al., 2011; Shelley, Cantrell, Warn, & Wong, 2010), but little information was captured beyond demographic characteristics of participants. Transitional shelters are a potentially optimal location for interventions for homeless populations, as residents generally reside there for 6 months to two years, allowing time to introduce changes to the built and policy environment related to tobacco. However, whether efforts should be focused on built and policy environment factors rather than individual factors remains unknown. Results from Chapter 2 indicate no significant differences in the demographic characteristics assessed between current smokers and nonsmokers, raising the question of whether other meso and micro level correlates may be influencing the high tobacco use prevalence rates observed among those living and working in transitional homeless shelters. This study addresses potential measures of the social, built, and policy environment, and how to best capture what is most relevant for the homeless population living in transitional shelters regarding their ability to reduce tobacco use.

4.2.2 Neighborhood Influences on Health

Researchers have argued that residents in disadvantaged areas have higher mortality rates due to socioeconomic status and other social determinants of health (Lynch, Smith, Kaplan, & House, 2000; Subramanian, Chen, Rehkopf, Waterman, & Krieger, 2005). For example, those living in disadvantaged neighborhoods are less likely to have access to proper health care, housing, education and other resources needed to maintain a healthy lifestyle (Stead, MacAskill, MacKintosh, Reece, & Eadie, 2001). The built environment is an aspect of the neighborhood that may influence health status. Resource poor environments may include negative influences of the built environment including greater number of advertisements and retailers promoting unhealthy habits related to physical activity and easy access to unhealthy foods (Humpel, Owen, & Leslie, 2002; Li, Harmer, Cardinal, Bosworth, & Johnson-Shelton, 2009).

4.2.3 Built environment and Health

The built environment refers to aspects of the environment that are modified by humans, such as housing, schools and workplaces, and provides a venue for intervention development (Glanz & Kegler, 2005; Hynes & Lopez, 2009). Individual behaviors are shaped by the built environment. For example, the road network influences the routes taken to school, and the proximity of health clinics influences the number of health care visits. Limited research exists on the relationship between the built environment and tobacco use prevention. However, the application of ecological models to the prediction of other behaviors may be transferrable to tobacco use-related behaviors.

Literature regarding the effects of neighborhood and the built environment on a range of health-related outcomes has been growing steadily in the past few years (Diez Roux, 2001; Hynes & Lopez, 2009). Most of this research has been focused on physical activity and nutrition (Handy, Boarnet, Ewing, & Killingsworth, 2002; Hillier et al., 2009; Humpel et al., 2002; Walton, Pearce, & Day, 2009). This research indicates that individuals are more physically active in neighborhoods where there is greater access to recreational facilities, varied land use, high street network connectivity (Humpel et al., 2002;

Randall & Baetz, 2001). This research also indicates that greater consumption of fruits and vegetable co-varies with increased proximity to supermarkets , even among low-income residents (Rose & Richards, 2004). Conversely, exposure to fast food establishments negatively impacts healthy practices (Humpel et al., 2002; Li et al., 2009). For example, the lack of availability of healthy foods is associated with higher obesity rates for both adults and youth (Morland, Diez Roux, & Wing, 2006; Powell, Auld, Chaloupka, O'Malley, & Johnston, 2007). However, more research is needed in this area, as other researchers have not found an association with neighborhood food environments and obesity-related behaviors (An & Sturm, 2012; Sturm & Cohen, 2009). Lessons learned from research focused on the environmental influences on food choice behavior may be applicable to the tobacco control area.

4.2.4 Built Environment and Tobacco

Similar to research on how food choices are influenced by food environments, tobacco use behavior can be influenced by tobacco retailer environments. Experimentation with tobacco use amongst teens has been found to be significantly associated with the presence of tobacco retailers (McCarthy et al., 2009). The limited research in tobacco control suggests that presence of tobacco retailers near homes and schools may influence adolescent tobacco use by making cigarettes easier to obtain (Henriksen et al., 2008; Leatherdale & Strath, 2007; McCarthy et al., 2009; Novak, Reardon, Raudenbush, & Buka, 2006). Hence shelter residents and staff may similarly be influenced by the density of retailers near the shelter site. The built environment may similarly shape health behaviors tied to tobacco use among the homeless as well.

4.2.5 Meso and Micro Built Environment

The micro-environment refers to elements of the built environment that are modifiable and include small-scale local features (Gebel, A Bauman , N Owen , S Foster , & Giles-Corti, 2009). Micro built environment elements can refer to aspects of micro-scale urban design, such as having a smoking patio on shelter grounds. Since we know from operant learning behavior that cues in the environment can influence behaviors, we are extending the class of micro level built environment characteristics to include

other elements at the shelter-level including the presence of no-smoking signs (with more and larger signage presumably associated with lower rates of tobacco use), and the number of cigarette butts found on the premises (with more butts presumably associated with higher rates of tobacco use) (Sallis, Owen, & Fisher, 2008).

Neighborhood level built environment variables such as the number of and distance to tobacco retailers are more commonly used to measure the built environment (Leatherdale 2007). For this study, I refer to these factors as the meso built environment. Research on how the built environment has an impact on health outcomes is still evolving. Chandola and researchers found that residential location matters in addition to household composition (Chandola, Clarke, Wiggins, & Bartley, 2005). This suggests that the composition of residents in group living situations, such as transitional homeless shelters, can affect tobacco use related behaviors.

4.2.6 Policy and Tobacco

Policies are an important aspect of tobacco control and may influence tobacco use behaviors. In research involving adolescents, policies that advocate for the licensing of tobacco retailers and conditioning retention of the license help restrict tobacco sales to minors (Romley, Cohen, Ringel, & Sturm, 2007). Tobacco control activists have begun exploring other ways to prevent underage adolescents from purchasing tobacco. The Institute of Medicine recently called for states to limit the number of tobacco retail outlets for the express purpose of reducing tobacco use through reduced access (Bonnie, 2007). Reduced access through policy changes may also have an effect on tobacco use patterns by homeless adults, who, similar to adolescents, are also price-sensitive.

4.2.7 Meso Level Policy

Ease of access to tobacco through proximity of tobacco retailers to residences appears to influence tobacco use by making cigarettes easier to procure. Therefore, policy activists have started to organize communities to work together to adopt zoning restrictions and conditional use permits that limit sales of tobacco products near schools (McCarthy et al., 2009). Such an approach might help to reduce

access to tobacco products by residents of shelters as well, but whether this strategy would actually reduce smoking by homeless residents is unknown.

Los Angeles County's Tobacco Control and Prevention Program within the Department of Public Health has led efforts nationally to reduce tobacco use through the implementation of local policies. In 2004, the program was restructured to focus on expanding policies such as those related to tobacco retail licensing, and promoting comprehensive smoke-free areas outdoor and in multiunit housing (Weber (Weber et al., 2012). These meso level policies are aimed at improving the health of all residents within these cities; however, it is unclear as to whether these policies are having any impact on residents living in transitional homeless shelters.

4.2.8 Micro Level Policy

Micro level policy refers to policies at the level of organizations and establishments. Researchers found that people working in settings where worksite smoke-free policies were implemented or maintained between 1993 and 2001 were almost two times more likely to quit smoking than people not working in such settings (Bauer, Hyland, Li, Steger, & Cummings, 2005). Although a link between the implementation of tobacco-free policies and smoking reduction has been established, the mechanisms by which this association occurs is still not clear.

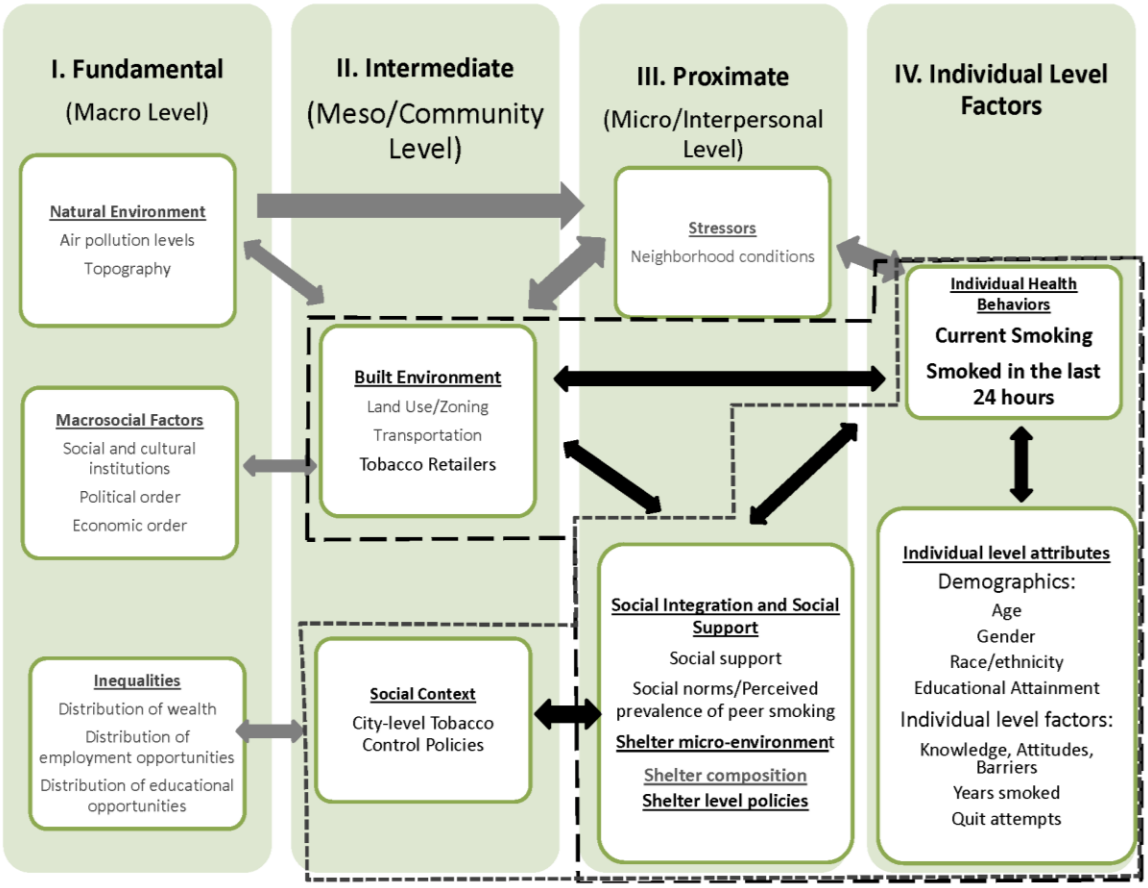
To clarify the mechanisms by which such policies influence cigarette use among youth, Lipperman-Kreda and Grube used structural equation modeling and showed that the perceived enforcement of school policies was positively related to perceived community norms, and that personal beliefs mediated the relationship between perceived enforcement and current smoking (Lipperman (Lipperman-Kreda & Grube, 2009) . School level policies were also found to mediate the relationship between community norms and smoking beliefs, thus leading to a complex picture of the influence of policies on tobacco use (Lipperman-Kreda & Grube, 2009). Other research has corroborated the effects of school level policies and their association with smoking behaviors among students, thus providing more

evidence that this effect may in fact be seen in other populations aside from students (L. Moore, Roberts, & Tudor-Smith, 2001).

4.2.9 Conceptual Model

The purpose of collecting information on the built environment and policy environment is to clarify and describe the factors that may be related to tobacco use. These pathways are explained through the conceptual model in Figure 4.1.

Figure 4.1: Conceptual model highlighting research Aim 1.



Based on the full conceptual model, the elements most directly related to the built environment and tobacco use prevalence at shelters in the study are displayed in black in Figure 4.1. The pathways of interest and available variables are listed in black font. For built environments, only variables related to

pathways in black dotted lines in the conceptual model in Figure 4.1 are assessed. Variables related to pathways explored for the policy environment are dotted in gray.

4.2.10 Study Purpose and Hypotheses.

The purpose of this study is to extend previous research on tobacco use beyond the individual-level. There is one main aim for this study: to increase scholarly and practitioner understanding of the built and policy environments surrounding transitional homeless shelters by identifying potential micro and meso built and policy environment measures associated with tobacco use among residents and staff.

4.2.10.1 Built Environmental Measures

The built environment may influence tobacco use among those living and working in transitional homeless shelters. The first part of this study addresses the micro and meso built environments.

Aim 1, Part 1 is to: Examine elements of the micro built environment in transitional shelters that constitute the immediate area of exposure within the shelter facility both indoor and outdoor at the shelter site.

This aim focuses on the micro elements found at the shelter site to which residents are exposed daily. Elements of the micro built environment can include no smoking signs, ashtrays, and the number of cigarette butts found on shelter grounds.

Aim 1, Part 2 is to: Describe and analyze the characteristics of the meso built environment that may be related to tobacco use of residents and staff in 26 transitional homeless shelters. Examples include tobacco retailers and advertisements promoting tobacco use within a walkable distance of the shelters.

This aim focuses on the meso built environment, which encompasses the neighborhood area surrounding the shelter itself. The meso built environment factor for this analysis is limited to tobacco retailers.

4.2.10.2 Shelter and City-Level Policy Measures

As stated by Boone- Heinonen in reference to multilevel conceptual models, "While each level can be influenced by any other level, public policy can potentially influence all levels and is arguably the ultimate goal of most neighborhood health research" (Boone-Heinonen et al., 2011). To clarify the potential effects of policies on tobacco use, I chose to isolate this relationship from other factors including the built environment, as shown in Figure 4.1, that indicates that local smoking policies and shelter-level policies are related to the built environment, either directly or through mediating factors.

Aim 1, Parts 3 and 4, shift the focus from the built environment to the policy environment. The focus for Aim 1, Parts 3 and 4, is to clarify the influence of tobacco control policies on rates of tobacco use among residents in transitional homeless shelters in Los Angeles County.

Aim 1, Part 3 is to: Examine shelter-level tobacco control policies to assess whether they are associated with tobacco use prevalence and smoking reduction rates for residents in transitional homeless shelters.

Aim 1, Part 4 is to: Examine the relationship between shelter-specific and community-level (macro) tobacco control policies on tobacco use prevalence and smoking reduction rates in transitional homeless shelters in Los Angeles County.

4.3 Methods

4.3.1 Data Sources

Five data sources were used to help us better understand the built and policy environments. First, survey data were used primarily to capture the micro and meso built and policy environments, as expected based on the literature for other populations. Second, qualitative data were used to help us understand whether these measures accurately reflected the experiences of those living in transitional shelters. A summary of these sources are presented in Table 4.1 and are described further in this section.

Table 4.1—Summary of Data Sources for Study 3

Dataset	Source	Aim	Variables	Variable examples	Dataset Type, N
Built Environment Related Sources					
Environmental Audit Survey	Shelter Tobacco Reduction Program	1	Micro built environment	Ex: density of signage, bulletin board notices, no/smoking areas, ashtrays, and concentration of cigarette butts on shelter grounds.	Cross-sectional, N=26
Neighborhood environmental audit assessment (GPS Data)	Shelter Tobacco Reduction Program	2	Meso built environment	Density of tobacco retailer location	Cross-sectional, N=26
Policy Related Sources					
Shelter Policy Survey	Shelter Tobacco Reduction Program	3	Shelter-level tobacco use policies	Ex: outdoor and indoor smoking policies at the shelter site	Cross sectional at 2 time points (Baseline N=26 and 6 Months N=26)
LA County Tobacco Policies	LA County Tobacco Control Department	4	County and local city-level tobacco use policies	Ex Current outdoor smoking policies, tobacco retail licensing, and smoke-free housing policies	Cross-sectional, matched to shelters. N=26
Qualitative Data					
Mutual Learning Dialogues (Guided Interviews)	Shelter Tobacco Reduction Program		N/A	Topics included intervention implementation, individual barriers, social support, and	

4.3.1.1 Environmental Audit Survey

Information about micro built environment features was captured through an environmental audit form created for the Shelter Smoking Reduction Program (SRP). (This program is described in Chapter 1.) The micro-built environment of the shelter refers to elements of the immediate environment to which residents are exposed, both inside of the shelter and immediately outside on shelter grounds. An environmental audit of 26 shelters was conducted to examine the micro built environment of the shelter building and shelter outdoor areas. The instrument used to examine the tobacco use-related shelter

environment was modified from the Checklist of Health Promotion Environments at Worksites (CHEW) provided by the Centers for Disease Control and Prevention (CDC, 2010). Measures regarding the location and density of signage, billboard notices, no/smoking areas, ashtrays, and concentration of cigarette butts on shelter grounds were captured in the modified instrument based on the CHEW assessment tool. The theoretically most important elements of the micro built environment were collected by implementing the audit tool at all 26 sites. Many tobacco-specific micro built environment elements have not been addressed before in the literature, so these measures are not validated. A copy of the audit form is found in Appendix 4.1.

4.3.1.2 Neighborhood environmental audit assessment (GPS Data)

To assess the meso built environment, GPS data were collected through the use of a Juno Trimble GPS device, and elements of the meso built environment including tobacco retailer location were collected in a 1000 foot circular buffer around shelters. This area represents an easily walkable range for shelter residents who may not have access to other means of transportation, and has been used in previous research (McCarthy et al., 2009). Other elements, such as the number and size of tobacco advertisements were also captured, but not addressed in this analysis. To properly capture the number of formal and informal tobacco retailers, I walked around a 1000 foot radius with a colleague, then drove around the same area, and then walked through the neighborhood again, and marked missing meso elements. Only formal store fronts were marked initially, unless shelter residents or others residing or working in the neighborhood specifically referenced an informal vendor. Therefore, most of the vendors marked were formal tobacco retailers, as little knowledge was known regarding informal vendors prior to our debriefing discussions with the staff and residents, and thus not included in the study design, Prior to the assessment, the area to be covered was reviewed with shelter staff, and they offered advice on where to go in the neighborhood; oftentimes, they would accompany me in my assessments.

4.3.1.3 Shelter Policy Survey

For Aim 1, Part 3, a telephone survey (Shelter Policy Survey) was conducted with shelter executives at each of the 26 shelters to document what current tobacco control policies were in place that could have influenced tobacco use at two time points: 0/baseline and 6 months following the initial survey. The shelter policy survey included questions on the shelter's policies. These policies included indoor smoking policies, outdoor smoking policies, and policies regarding enforcement of existing tobacco control policies at the shelter. The data are treated as cross-sectional for purposes of analyses, and are hence forth referred to as Policy Survey 1 and Policy Survey 2. Appendix 4.3 shows a copy of the final survey questionnaire for Policy Survey 2.

4.3.1.4 LA County Tobacco Policies

For Aim 1, Part 4, city-level policy data were obtained through the LA County Department of Public Health, Tobacco Control and Prevention Program. Community-level or local smoking policies in LA County vary by city and jurisdiction. Many tobacco use policies are implemented at the city-level, such as restriction of tobacco retailers in an area. Other policies, such as restriction on outdoor smoking in restaurants, are implemented at the County level. In order to understand what policies are in place, Aim 1, Part 4 addresses meso policies at the city-level.

4.3.1.5 Random Sample Survey for SRP

Tobacco use prevalence estimates were determined using data from the random sample surveys collected at baseline and six months after the start of the SRP. Since this study primarily assesses measures using descriptives of the built and policy environment, tobacco use data were not used to address relationships to potential predictor variables, but were used to provide some context about local tobacco use prevalence. More information regarding specific measures in the random sample survey can be found in Chapter 2.

All quantitative data were matched by shelter in Stata and merged into one large data set for analysis. Human subjects approval for use of all data was obtained from the UCLA Institutional Review Board (IRB).

4.3.1.6 Mutual Learning Dialogues

Mutual Learning Dialogues (MLDs), a term created by our community partners, were based on the well-established methodology of guided interviews (Bernard, 2012; Rossman & Rallis, 2011). MLDs were conducted at the 3-month follow-up with key staff at each site to get a better understanding of what aspects of the program were effective in program implementation, and ultimately to identify which aspects were effective in reducing tobacco use among participants as well as which aspects they identified needed improvement. Semi-structured interviews are more flexible than structured interviews, but still allow topics of interest to be discussed (Britten, 1995). The interview discussion guide was created in collaboration with our community partners and the sessions were led by our CBPR partners (the interviews were previously described in Chapter 3, and is shown in Appendix 3.1).

Mutual Learning Dialogues were conducted from October 2011 through March 2012 at the shelter sites. Participants in the MLDs included UCLA research staff, a community partner, shelter administrative or counseling staff, and often, shelter clients. Questions were asked in one-hour sessions based on responses from the shelter staff and residents regarding a range of topics from the curriculum itself to the use of nicotine replacement therapy (NRTs) to implementation of the program and barriers encountered. The questions asked were based on responses from each of the shelter representatives, and therefore were not the same across sites. Twenty-five interviews were conducted representing the 26 sites in the SRP, using the interview guide as reference (input about two sites was collected simultaneously, since the site director was the same for both). MLDs were recorded at 19 if the 25 interviews, but only detailed interview notes were recorded at 4 MLDs and because of issues with recorders and not obtaining permission in advance. The remaining two interviews had notes in the form of summaries. Detailed notes at these two sites were not available due to miscommunication between Coalition and UCLA staff.

Descriptions of the participant demographics are available in Chapter 3. The UCLA Institutional Review Board reviewed and approved these protocols.

4.3.2 Measures

Specific variables examined for the built and policy environment are described in further detail in this section. The majority of the variables that were operationalized for use in the Smoking Reduction Program are described in Chapter 1. Any additional data sources are mentioned under each specific variable. All of the variables are listed in order based on the conceptual model in Figure 4.1, going down each column. Therefore, variables related to the meso built and policy environments are mentioned prior to the micro built and policy environment variables.

4.3.2.1 Intermediate (Meso/Community-Level) Factors

Built Environment.

As shown in Figure 4.1, the meso built environment is a construct at the meso or community-level and serves as the main independent variable predicting tobacco use behaviors in this study for Aim 1, Part 2. The density of tobacco retailers collected through the neighborhood environmental audit assessment tool is used as the indicator of the meso built environment surrounding the shelters. These data were geocoded and matched at the shelter-level for analyses. A count of the number of tobacco retailers within 1000 feet of the shelter was spatially matched, and data were extracted and analyzed in Stata (Stata Corp, 2013). This count measure was used to describe the meso built environment. Descriptive results for all built environment variables are found in Table 4.2.

City-Level Tobacco Policies.

Local city and county-level tobacco use policies play an important role in reducing the ease of obtaining cigarettes for the general population. Studies regarding the enforcement of laws preventing youth alcohol access show a decrease in use of alcohol by youth (Grube & Nygaard, 2001). Similarly, the enforcement of existing policies to restrict minors from purchasing cigarettes may reduce the ease of

obtaining cigarettes. Research has also shown a positive association between decreased sales to minors due to the Synar Amendment, which restricts sales to minors under 18, and youth tobacco use (Chaloupka & Pacula, 1998). Homeless populations may be similarly influenced by policies that increase the cost of cigarettes. Information about local tobacco use policies were obtained from staff at the LA County Tobacco Control and Prevention Program, and were matched at the city-level using TIGER Shapefiles (Census, 2013). Shelters were geocoded and geographically matched to city-level policies, depending on which policies fall under the jurisdiction of shelter boundaries. Policy-level data that were matched included: smoke-free multiunit housing, comprehensive policies, outdoor policies, smoke-free parks policies, and smoke-free beaches. A summative variable was created. The number of city-level policies were mapped alongside shelter-level tobacco use rates from a random sample survey (discussed in Chapter 2) and displayed in Figure 4.2 for descriptive purposes.

In addition, an exploratory variable was created using hot spot analyses in ArcGIS 10.1 (described further in the analysis section). A binary variable of whether or not shelters were in cold spots of policy (lacking policies) at the city-level in LA County was created and used as another policy measure to understand the policy environment. Descriptive results regarding these meso policy variables are found in Table 4.4. A descriptive distribution of hot spots and cold spots of local policies are displayed for descriptive purposes in Appendix 4.2.

4.3.2.2 Proximate (Micro/Interpersonal Level) Factors

Shelter micro environment.

The micro built environment variables were derived from the environmental audit assessment and include: the concentration of cigarette butts, the number of no smoking signs, number of ashtrays, bulletin board notices promoting smoking reduction, and whether the shelter distributed cigarettes to residents. Descriptive results for all built environment variables are found in Table 4.2.

Shelter policy environment: shelter-level policies.

Shelter-level policies (micro-level) may provide insight into differences of smoking prevalence and tobacco use reduction between the different shelter sites. Various indoor areas, outdoor areas, and enforcement of policies were assessed at the shelter-level with available data from the Shelter Policy Survey.

4.3.3 Statistical Analyses

4.3.3.1 Descriptive analyses.

Prior to quantitative descriptive statistical analyses, data were inspected to identify missing data, outliers, and other influential features. Stata (Stata Corp, 2013) was used for descriptive calculations. Descriptive data for micro and meso built environment features can be found in Table 4.2. Descriptive data for shelter-level (micro) policies are presented in Table 4.3. Finally, descriptive level data for local city-level policies and hot /cold spot analyses can be found in Table 4.4. Bivariate analyses with predictors for smoking outcomes were assessed at the individual-level using data from a random sample survey, which is further described in Chapter 2. Results are not displayed, as they are available in Chapter 2. Similarly, multilevel random intercept models were conducted to evaluate the impact of the micro and meso built and policy environments on tobacco use prevalence of residents and staff at each of the shelters. However, due to the small sample size and lack of shelter variability on current smoking status (ICC=0.026), these analyses are not reported here (an example of how the variables were not related, in part due to the low ICC, can be found in Appendix 4.4), and warrant future research. This study focuses on the descriptive data used to measure the built and policy environments.

Geographic information systems (GIS) related data were spatially analyzed using ArcGIS 10.1 (ESRI, Redlands, CA). ArcGIS was used to spatially join data to individual-level survey data. Data were projected to "NAD_1983_StatePlane_California_V_FIPS_0405_Feet" and the geographic coordinate system used was "GCS_North_American_1983". Shelters were geocoded using GIS to connect neighborhood-level policy and built environment data. All data were geocoded, and maps were created to visually analyze the immediate meso built and policy environment surrounding the shelters based on GPS

data and County policy data. Data from GPS data captured the number of formal and informal tobacco vendors within 1000 feet of shelters, as residents are likely to travel by foot within a 1000 foot radius on open shelter sites. The relationship between retailers near shelters and homeless tobacco use was addressed in Aim 1, Part 2.

City-level policy data were spatially analyzed using ArcGIS, and spatial autocorrelation and hot spot analyses were conducted to ascertain whether any shelters were located in high or low policy areas. Spatial statistical techniques specifically allow for location, distance, and area, to be accounted for mathematically in analyses, (Scott & Janikas, 2010). Policy data were joined at the city-level, and a count of the number of policies by city was created. Data from the number of policies at the city-level are spatially presented in Figure 4.2.

Hot spot analysis identifies spatial clusters that are significantly higher or lower than in neighboring locations, in this case, cities, with respect to the number of tobacco control policies they have passed. To conduct hotspot analyses, the Moran's I statistic was first calculated using ArcGIS to test whether spatial autocorrelation existed. The null hypotheses for the test is that the Moran's I statistic is equal to zero. The null hypothesis should be rejected to have spatial autocorrelation of the distribution of policies; spatial autocorrelation is required to conduct hot spot analyses. I tested the spatial autocorrelation of city-level policies using Moran's I statistic in ArcGIS, and found a z-score of 4.48, $p<0.001$, signifying that city policies are indeed clustered and the chances of this clustered pattern being random is less than 1%. Therefore, I conducted a hot spot analysis to identify the shelters that were located in areas of low or high cluster city policies. Results of the hot spot analysis showing descriptive data of the location of shelters and hot spots are displayed in Appendix 4.2.

4.3.3.2 Qualitative Analyses.

Content analyses of the MLDs were conducted with Dedoose 4.12.4 (Dedoose, 2014), qualitative analyses software, using an inductive qualitative methods approach based on grounded theory (Glaser & Strauss, 2009). A total of nineteen sessions were recorded and transcribed verbatim. These transcripts, along with notes from 6 other sessions were uploaded to Dedoose (Dedoose, 2014). Using grounded

theory, initial themes were determined after multiple back and forth discussions with CBPR partners from the Coalition. Excerpts of interest were underlined and potential themes were further discussed with CBPR partners from the Coalition. Excerpts then were marked with one or more descriptive codes related to relevant themes and key words mentioned in the excerpts. Using Dedoose, themes, categories, and codes were created by line-by-line coding of the data. Codes were used to mark passages for each MLD. Through an iterative process, codes were created as each transcript was reviewed. Results from this process specific to a tobacco control intervention are described in greater detail in Chapter 3.

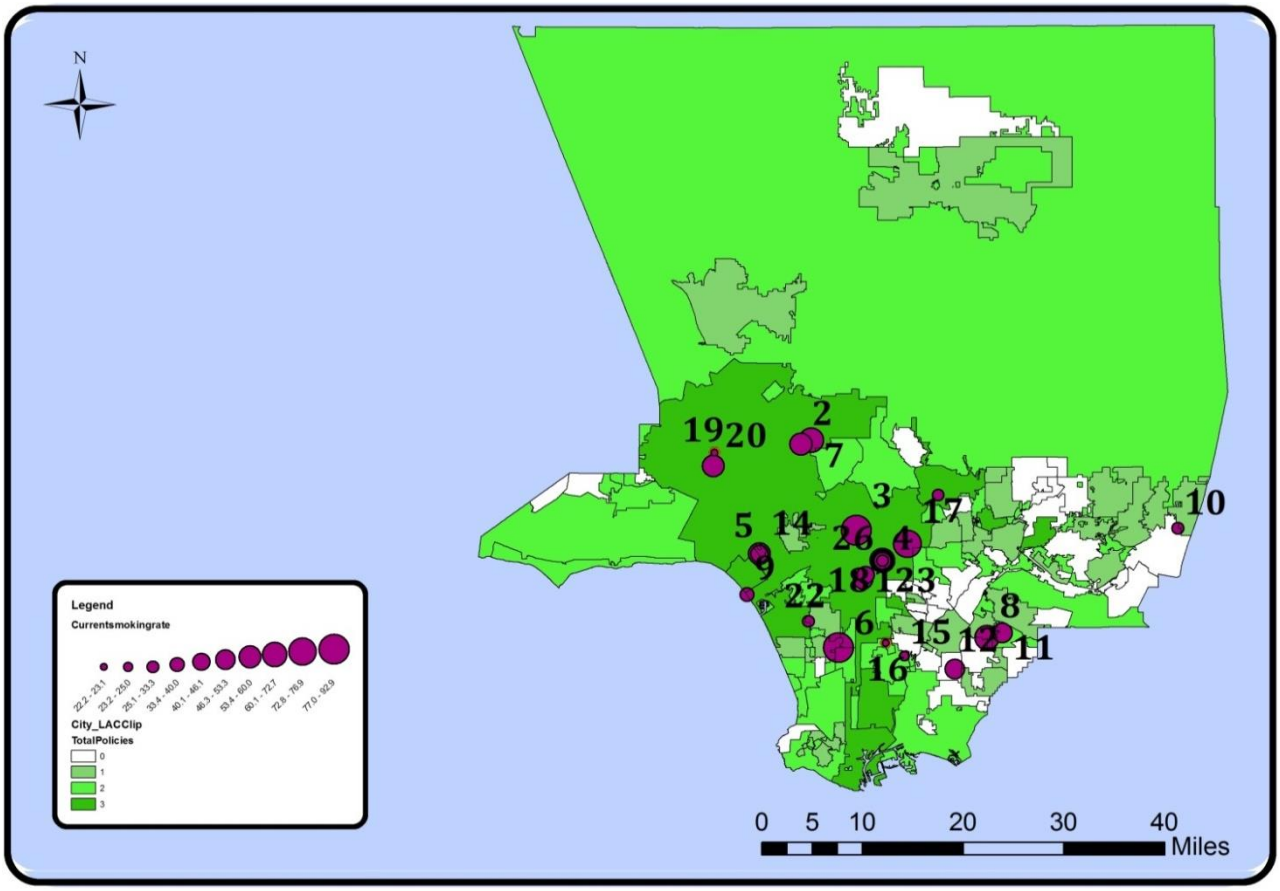
The qualitative data analyses identified frequent codes related to social support, policy, and built environment variables that were further analyzed to identify measures focused on built, social, and policy environments. In addition, field notes from the micro built environment environmental audits were used to further evaluate the measures. Although the initial topic of the MLDs was the intervention and its usefulness to the shelters, other themes emerged, including better questions to ask to determine the potential impact of the social, built and policy environments.

4.4 Results

4.4.1 Quantitative Built and Policy Environment Data

Data from the random sample survey can be found in Chapter 2, and show a current smoking rate of 65.3%, and 62.9% for women and 66.4% for men at the 26 transitional homeless shelters. Current smoking rates among the residents and staff (65.3 %) are higher than the general LA County rates of 13.1%, and even compared to the lowest income federal policy level (FPL) group of LA County (14.6%) (LACDPH, 2012). Random sample survey data at the shelter-level are presented graphically alongside a descriptive map of the number of city-level policies per city in LA County in Figure 4.2.

Figure 4.2: Map of Current smoking rates at the 26 shelters and number of policies at the city-level. *



* Shelters are represented in purple. The larger size of the purple circle, the higher the current smoking prevalence. The darker the shade of green, the greater number of city-level policies are in place. Numbers represent the shelter site number.

Table 4.2 presents data representing the micro and meso built environment for Aim 1, Parts 1 and 2. For the micro built environment, 92.3% of the shelters in the study had at least one sign indoors restricting tobacco use, with an average of 7.11 signs per shelter. In addition, 88.5% had a sign outdoors restricting tobacco use. Approximately a fourth (26.9%) of the shelters had a bulletin board message about smoking cessation or smoke-free policies at the shelter. Perhaps not surprisingly given that high rates of smoking prevalence at the shelters, 23.1% of shelters indicated cigarettes were sold or distributed on the premises. Although 32% of shelters had 0-10 cigarette butts on premise grounds, 48% of shelters had more than 50 cigarette butts on premise grounds. Moreover, most shelters did not officially allow

smoking in rooms, yet 16% of shelters had ashtrays in resident rooms. The average number of ashtrays at each shelter was 8.34, with a range of 1-22 total ashtrays in public spaces. In regards to meso built environment features, 69.2% had at least 1 informal or formal retailer within 1000 feet, ranging from 0 to 10 retailers.

Table 4.2—Micro and Meso Built Environment Factors of Randomly Selected Transitional Homeless Shelters in Los Angeles County (N=26)

Built Environment Elements	**N**	**Mean± SD or %***	**Range**
Micro Built Environment Elements			
Have at least one sign indoors restricting tobacco use	26	92.3%	
Number of signs indoors restricting tobacco use	26	7.11 (8.05)	0-30
Have at least one sign outdoors restricting tobacco use	26	88.5%	
Number of signs outdoors restricting tobacco use	26	2.85 (2.36)	0-8
Have bulletin board notices about smoking cessation programs or smoke-free policies	26	26.9%	
Number of bulletin boards notices about smoking cessation programs or smoke-free policies	26	0.53 (1.14)	0-5
Evidence of shelter selling or distributing cigarettes (%yes)	26	23.1%	
Number of cigarette butts on premises	25		
0-10		32.0 %	
11-20		12.0%	
21-50		8.00%	
More than 50		48.0%	
Ashtrays in resident rooms combined (%yes)	25	16.0%	
Number of ashtrays in public spaces on shelter grounds	26	8.34 (5.98)	1-22
Number of entrances/exits on premises	26	13.89 (6.81)	4-26
Meso Built Environment Element			
Have a tobacco retailer within 1000 feet of shelter	26	69.2%	0-10

Table 4.3 presents data regarding micro-level tobacco related policies for Aim 1, Part 3 for both Policy Survey 1 and Policy Survey 2. The sum of these policies for each survey was used for as a proxy for shelter support of tobacco control policies and was used as one way to explore micro level policies. All shelters at both survey time points did not allow smoking in common indoor areas, in accordance with California state law restricting smoking in the workplace (ALA, 2014). The average number of policies in Policy Survey 1 was 10.6, and the average number of policies in Policy Survey 2 was 13.2.

In Policy Survey 1, 42.3% of shelters offered regular management training for staff about tobacco control policies; the percentage increased to 76% in Policy Survey 2, indicating a shift in policies at the shelter-level. It should be noted that when the N is not 26 in Policy Survey 1, it means that an earlier version of the policy interview was used. Additional questions were added to this instrument as interviews occurred to capture policies that had been inadvertently omitted in the initial draft of the policy interview survey. These findings need to be further evaluated, but could indicate a shift in cultural norms towards increasing the awareness at the shelter-level of tobacco related issues post implementation of the SRP. In other words, smoking reduction programs focused on shelter tobacco use policy change may yield benefits to everyone residing and working in shelters through social norm change at the shelter-level.

Table 4.3— Micro-level Tobacco Related Policies of 26 Transitional Homeless Shelters in Los Angeles County

	Policy Survey 1		Policy Survey 2	
Policies at the Shelter-level	**N***	**%yes**	**N**	**%yes**
Indoor policies				
1. The facility's printed rules and regulations include a section about the facility's smoke-free policies and practices.	26	80.8%	26	96.2%
2. Smoking is not permitted in indoor common areas such as the cafeteria, career center, laundry	26	100%	26	100%
Current tobacco control policy				
3. A no-smoking sign will be visible at the entrance to all residential buildings, indicating a smoke-	26	50.0%	23	88.5%
4. Smoking is not permitted in private indoor areas such as apartments because the cigarette smoke from an apartment can affect neighboring apartments.	25	96.2%	26	92.3%
5. The facility offers regular on-site support groups to help residents and staff who want to quit their tobacco use habit.	22	54.6%	25	96.2%
Outdoor policies				
6. Smoking is not permitted near entrances of residential buildings nor within 20 feet of apartment windows so that nonsmoking residents can live smoke-free.	26	76.9%	26	96.2%
7. Smoking is not permitted in courtyards or other common areas within the facility and intended for	25	60.0%	26	57.7%
8. If smoking is permitted in courtyards or other common areas, only a small area is designated for	20	60.0%	21	66.7%
Policies to counter the industry's tobacco promotion efforts				
9. Residents are not permitted to wear paraphernalia (e.g., hat, t-shirt, etc.) associated with tobacco	25	48.0%	26	57.7%
10. No activity at the facility will permit tobacco advertising or promotion.	26	100%	26	84.6%
11. The facility will not accept sponsorship of any facility activities by a company that sells tobacco products (e.g., Altria, RJ Reynolds, US Tobacco, etc.)	22	81.8%	25	80.0%
Enforcement policies				
12. Violations of the facility's smoke-free policies will result in mandatory participation in the facility's tobacco use reduction program.	22	4.6%	26	7.7%
13. Violations of the facility's smoke-free policies will result first in a warning, than in increasing sanctions after the 1st, 2nd and 3rd violations and the possibility of expulsion after the 4th violation.	26	73.1%	26	84.6%
Staff-specific policies				
14. Does your facility provide incentives to staff for quitting smoking?	26	19.2%	26	11.5%
15. Does the facility provide regular management training to staff about its tobacco control policies (e.g., in-service training)?	26	42.3%	25	76.0%
16. One management practice is to have staff ask all newly enrolled residents at intake whether they smoke cigarettes, and if they do, to ask if they would like help quitting.	0	N/A*	24	45.8%
17. Staff are not permitted to smoke in agency vehicles.	15	93.3%	26	96.2%
18. Staff are not permitted to smoke in designated smoking areas with clients; if they must smoke, it should be away from clients.	15	66.7%	26	96.2%
19. Applicants for jobs with the agency either must be non-smokers at the time of hiring or agree to participate in a smoking cessation program as a condition of employment	14	0	25	4.0%
20. Other policies	26	7.7%	26	15.4%

* Question was not asked in the baseline survey; it was added after the intervention was started based on conversations with facilitators.

Table 4.4 presents descriptive data for Aim 4 related to the meso policy environment. Each shelter was geocoded and spatially matched to the city-level, which was matched to city-level policy data. There is a potential for a city to have a combination of multiple policies (i.e. outdoor and multiunit housing policies). Of the shelters in the survey, 57.7% were located in cities with outdoor tobacco restriction policies, 88.5% were in cities with smoke free parks policies, and 73.1% were in cities with restrictions at beaches. Furthermore, 7.7% were located in cities that had multiunit housing restrictions for tobacco use and comprehensive outdoor tobacco use restrictions. Relatively few cities had multiunit housing policies (n=11 cities) and comprehensive outdoor tobacco control policies in LA County (n=14 cities). There were five different types of policies that were analyzed and a sum variable was created as the main predictor for Aim 1, Part 4; however, the maximum number of city policies at each shelter was three, with 61.5% of shelters located in cities with three policies, 7.7% of shelters were in cities with no tobacco related policies at the city-level. Based on the GIS hot spot analyses, 15.4% of shelters were located in cold spots; in other words, the shelters were in areas lacking policies compared to surrounding cities, thus potentially increasing the exposure to tobacco use and increasing the perceived social acceptance of tobacco use.

Table 4.4—Meso tobacco related policies at the city-level gecocoded and matched to shelter sites (N=26)

	%*
Shelters in cities or counties with the following policies:	
Multiunit Housing	7.7%
Outdoor	57.7%
Parks	88.5%
Beaches	73.1%
Comprehensive	7.7%
Total Sum of City Policies:-shelter distribution	
0	7.7%
1	11.5%
2	19.2 %
3	61.5 %
4	0%
5	0%
Shelters in cold spots (GIS Hotspot Analyses)	15.4%

No multivariate analyses with tobacco use outcomes are presented because variability with respect to tobacco use at the shelter-level was low, as presented in Chapter 2 (ICC= 0.026 for current smoking). This suggests that the measures used did not capture the full variability that might exist among these shelters.

These results therefore motivate the question as to whether existing measures for these constructs were appropriate. The qualitative data presented provide us with insight into these measures about possible modifications for future studies.

4.4.2 Qualitative Data Related to Built Environment and Policy Measures

After conducting the environmental audit at the shelter, and neighborhood assessment in the field, along with the shelter policy surveys, we spoke to staff and residents at the 26 transitional homeless shelters to elicit feedback on what they saw as important in regards to a targeted intervention for their staff and residents. Although we expected suggestions regarding modifications to the SRP curriculum and pharmacotherapy distribution, what we learned from the MLDs was highly relevant and went well beyond direct intervention topics. Residents and staff spoke of their experiences with tobacco use and control. Their comments shed light on the importance, or in many cases, the lack of importance of both the built environment measures that were collected or the degree to which existing shelter-level tobacco control policies were enforced or shelter-level policies observed. They identified personal barriers as paramount to tobacco use reduction.

4.4.3 Built Environment, Accrual of Cigarettes, and Social Support

The built environment was measured quantitatively using the environmental audit and neighborhood assessment. For the meso level data from the neighborhood assessment, I was primarily interested in measuring the effects of the built environment on tobacco use behavior as licensed tobacco retailers have been a vehicle for obtaining cigarettes, both for adolescents and adults in the general population (Leatherdale & Strath, 2007; McCarthy et al., 2009). Based on existing literature with non-homeless populations, this seemed like a good factor to operationalize the meso built environment. However, the MLD data and observational field notes from environment audits and assessments point to a

very different method of obtaining cigarettes. In contrast to most of the general population who purchase packs of cigarettes at licensed retailers, this population, in part due to their limited funds, acquired cigarettes from other sources. Primarily, it seems that many residents of transitional shelters obtained one cigarette ("singles") at a time, rather than purchasing a full pack. Oftentimes, staff facilitators even encouraged participants in tobacco use reduction groups to "borrow" or "bum" a cigarette from a peer. As stated by a facilitator at a shelter in downtown Los Angeles:

> "Right and I always tell them if you relapse, don't go buy a pack of cigarettes, just bum one. And so they're like 'OK' They're buying quarter cigarettes. 'I only bought a single cigarette' I didn't tell you to buy a cigarette, I told you bum one." (Shelter site 26)

In fact, buying singles for this population is quite common, and going to a storefront may not even be necessary, as several informal vendors appear in the evening hours near shelters selling single cigarettes.

> "I can't go in every neighborhood in LA and find that because in other neighborhoods, the storefronts well ok I know here come in and they're like whatever the cost is for a pack but in our neighborhood, it's like 'OK. I know that my population they might, they get one but I also know that they'll come back and get that one every day'." (Shelter site 25)

This daily behavior encourages the continuation of smoking, even if it is only one cigarette at a time. In addition to this information from shelter staff regarding singles, field notes from the neighborhood assessment confirmed similar informal venues for selling cigarettes. For example, at one site, I had a male counterpart assist and ask for a single, and he was able to purchase 2 singles for fifty cents. At a later time, I went to the same store, but perhaps because I did not look like a typical female smoker from the area, ,I was denied the sale of singles. It seemed that the storefront knew the normal clientele, likely many of the men at the nearby shelter, who were likely to purchase singles on a daily basis rather than a pack. At another site, there were few traditional storefront retailers, so the same male counterpart asked where the nearest place to purchase cigarettes was inside a billiards store. The answer was: "We have some here. What do you need?" This proprietor was not a traditional vendor and definitely not licensed to sell cigarettes. However, it is informal locations such as street vendors, retailers selling singles, and informal retailers who appear to be providing cigarettes to these individuals. In addition, the

environmental audit yielded data indicating that almost a quarter of shelters actually provided cigarettes for residents, either by purchasing them from a pool of cash collected by residents or by selling them or distributing them on site. Therefore it is not surprising that the built environment in the way that we measured it through documenting the presence of licensed vendors may not be relevant to tobacco use at the shelter-level because the residents of transitional shelters are actually obtaining their cigarettes from informal, unlicensed sources.

Mutual Learning Dialogue data showed that important measures may have been missing in the audits related to informal means of cigarette attainment and also sources of social interaction and support. For the micro built environment at the shelter-level, measures such as the number of signs restricting tobacco use and bulletin board notices regarding smoking cessation or smoke free policies were taken from the CDC's "Checklist of Health promotion Environments At Worksites" (CHEW) audit form for worksites (CDC, 2010). Additional exploratory measures were added including the number of ashtrays and cigarette butts on the ground, as we believed they would reflect the level of smoking at the shelter as well as the social culture regarding cigarettes. However, given the high rates of smoking, these variables were not as useful in explaining tobacco use or tobacco use reduction; rather the MLD data yielded more insight about why the prevalence rates were so high. The high number of ashtrays found at most shelters was really a necessary consequence of the high rates of smoking. The ashtrays may have also resulted from having too many residents throwing cigarette butts on the ground on shelter premises. Regardless of the number of cigarette butts and ashtrays, it seems that the outdoor areas in which they were located were more telling of tobacco use behaviors. As one facilitator noted, once they sit outside, they give in to sharing cigarettes from other smokers ("having a hit") (Shelter site 17), indicating the need to understand the perceived social support obtained by smoking with peers at the shelter.

A staff member at a shelter in downtown Los Angeles pointed out that there was no escape from smoking socially, as they were bound to be confronted when they stepped out for breaks.

> "Walking outside and trying not to smoke but being in an environment where it's promoted pretty much in the sense, once they walk out, it's there. It's live, in living color.

> And then going to meetings, everyone, the camaraderie is out [at] the meeting, they're drinking coffee, they're smoking cigarettes, they're laughing, and they're talking so that's another- right the social. And that's what a lot of the participants said. It wasn't so much the environmental but it was more of the social interactions with people and with different things that they did that really made them want to smoke." (Shelter site 26)

Another staff member at a shelter for men primarily dealing with substance abuse pointed out that even those attempting to quit smoking have a large barrier of going outside, as everyone around them is smoking.

> "Yeah, I mean we have smoke breaks every hour on half hour and for anyone that's trying to quit smoking like we don't force anyone to stop when they're upon entry here. We just don't allow the smoking to go within 20 feet of the entrance. So that right there is a huge barrier for anyone who's trying to quit because the only time they can go outside for a break is during the smoke break so they pour right back into the environment and that was the hardest thing." (Shelter site 7)

Areas with cigarette butts and ashtrays are in turn places for obtaining social support through socializing with other residents.

> "The barriers, that was the environment because if someone was smoking around them just you know, like a smoking area and people like to socialize in the smoking area. So it's kind of hard to quit when everybody around you is smoking all the time. So I think that was the biggest barrier." (Shelter site 2)

Although smoking provides social support for most residents, on the flip side, some residents would benefit from having smoke-free areas outdoors, as they complained about not having an alternative.

> "A lot of our clients have complained about the difficulty of not being able to get away from it. The way the program works is there's 6 people in each house. So a client was lucky if there was one other person in the house that was also in the group and working on quitting and most of the people in the house are smoking like chimneys in the backyard." (Shelter site 19)

One group facilitator pointed out that even though some residents were in a smoking reduction program, the difficulty of having outdoor spaces to smoke being the same place for breaks inhibited some residents from quitting.

> "Everybody goes directly to smoke, so they feel out of place. [Coalition member: 'OK, by not smoking?'] By not smoking. So a few women I noticed, lost their motivation towards

> the end of the group session, they kind of quit and they said 'I'll just try when I finish this treatment cause I can't do it here.'

Shelter residents and staff indicated that there is a need to restrict tobacco use in some areas where ashtrays and cigarette butts are found; however, these restrictions need to be mindful of the actual needs of the residents. Residents of transitional shelters have very little personal space. Thus, policy recommendations, though beneficial, may also do harm, if the transitional shelter is negatively impacted.

4.4.4 Policy environment and Social Support

Outdoor areas of shelters are important places for social interactions, which would make them problematic places to designate as smoke-free, much less good places to enforce the policies if they already existed. In fact, even staff would like access to the smoking areas, as oftentimes, they are equally as addicted as residents, and need a place to smoke.

> "I've had staff approach me about wanting to have access to smoking cessation." (Shelter site 25)

If shelter staff members are also using outdoor areas to smoke, then they are adding to the latent shelter culture supportive of smoking. These elements of the built and policy environment that were related to social support and the need for a space to socialize for both residents and staff were not assessed in the environmental audits or shelter policy surveys of this study, but should be included in future studies.

Shelter staff further acknowledged that even having a smoke-free campus was not feasible nor easily enforceable, given that staff also smoked. Furthermore, the consensus was that enforcing the smoke free policies in these outdoor common areas was not worth the effort given the many other challenges that the shelters had to deal with.

> "Our primary care clinic is a smoke-free campus so you can only smoke on public property. Our youth facility is non-smoking. This is our next target in terms of making this meaning getting rid of the canopy or we can leave canopy but getting rid of the ashtrays and all that. [Coalition member: 'You should make this one smoke-free.'] It's tough 'cause we have patients and we have 5 staff here that smoke so..." (Shelter site 19)

> "Our creating this area for smoking was to give the residents a place to do so they weren't just all over the place but we've tossed around the idea eliminating smoking, having a

> smoke-free shelter but the reality is that with all the other things that we need to address in getting people on the housing things such a primary focus to run around to check if people are smoking or not and having to do some sort of disciplinary action for people who did is just more time, effort, energy than we have to put into it." (Shelter site 2)

> "It's not ideal and we'd rather not have people smoke at all but I just don't see it being enforceable. We have a zero tolerance here for drugs and alcohol yet people still use drugs and they bring alcohol in so… Not to any extent that they smoke but it's just those it's a different population to be alert and they try to put those types of restrictions, I just don't see it as being enforceable." (Shelter site 2)

Although some sites admit that they did not see a way in which to make some areas smoke-free, but were interested in trying, other sites were honest about the notion that being a treatment facility, they did not want to make the shelter smoke-free.

> "We're a treatment facility, we don't want to quit smoking 'cause a matter of fact, we may start smoking when we get here and that's the reality of that too or more. And you know, as crazy as that sounds, that's the reality of it." (Shelter site 5)

Researchers and practitioners need to understand the reality of shelters and residents and staff living at the facilities. If residents are dealing with other personal barriers, such as substance abuse, research needs to focus on these individual barriers and how they relate to tobacco use rather than monolithic top-down policies. However, on the flip side, if shelters provide resources to assist residents in quitting smoking, then shelter-level policies may have an effect on reducing tobacco use.

Although there may be staff and resident interest in changing shelter tobacco control policies, such as those for designated outdoor smoking areas, efforts to change the policies that govern these areas meet multiple barriers. Some shelters discussed the limited funds available for shelters to run, and that it was a shelter-level barrier to changing policy to move designated smoking areas:

> "As funds allow, relocate smoking area to parking lot, away from outdoor tables where residents frequently congregate." (Shelter site 3)

This is a realistic and feasible suggestion, as having a visible marked non-smoking area would encourage residents to socialize without smoking; however, until smoking is not an issue at the shelters, a space needs to be created for smokers, which would require additional funds for many shelters. When asked what would help to reduce the smoking rates observed at the shelters, a staff member replied:

> "Maybe a little stricter smoking rules? It would to tell everybody to go out of this shelter to smoke because there's a neighborhood. We have to respect the neighborhood. We can't have everybody standing on the street smoking cigarettes. So, that would be difficult. I don't know what can exactly be done now, here, 'cause there's already a designated smoking area that everyone's supposed to smoke in and people do not follow rules sometimes, and we try to stay on top of that, but besides the designated smoking area, I don't know what else can really be done. Because you're not allowed to smoke in rooms but there is a smoking area and people tend to congregate there. Talk or whatever. So I think that's the, the barrier." (Shelter site 2).

This quote by the shelter staff of a transitional shelter in a more residential area than prevails in downtown LA points to the problem that residents need to stay on shelter premises to smoke, so that they would not disturb the neighborhood. By not allowing spaces on the premises for smoking, residents may enter neighborhoods where groups congregating to smoke may jeopardize the transitional shelter's standing in the community. However, smoking restrictions may not even work for this population, as there are individual-level issues that residents and staff face, that are not captured in the environmental audits and policy surveys. Furthermore, some policies do exist regarding where to smoke, but these cannot always be enforced because there are other issues that need attention. Micro shelter-level policies may be in effect, but enforcement of these policies is more important than the mere presence of these policies. Even though the policy survey asked about whether the policy was enforced, the level of enforcement was not indicated. Shelter executives may believe that a policy is enforced if signs are posted, for example. However, from the experiences of shelter staff and residents who work daily on the shelter premises, enforcement of shelter-level policies is lacking in many areas. Future shelter surveys should include a qualitative component asking residents about existing policies, and ways in which they believe that policies can exist and be enforced, without taking away their social support. Clearly, residents are also facing other challenges in their lives, and these factors may be more pressing than tobacco use cessation.

4.4.5 Additional Measures and Conceptual Model Changes

Based on the MLDs and field notes, appropriate measures regarding the built and policy environments was more complex than existing measures currently used to assess tobacco use behaviors in

the general population. Aside from the issues of cigarette procurement and policy enforcement, several individual barriers were mentioned during the MLDs. Individual-level barriers were captured in the random sample survey and more details regarding the measures can be found in Chapter 2. However, MLD data further underscored the importance of individual-level issues being important for this population, perhaps more than the built and policy environments. When asked about these barriers, shelter staff acknowledged that their experience is different, and more difficult, given their homelessness and low income status.

> "There's all types of barriers and stressors and different challenges that they must encounter in result of living here in the confinements of this organization, the building. It's not as if they can go home and close their door and cook a steak and a baked potato and kick their feet up on their lounging chair and their ottoman with their remote in their hand. So there are challenges that cause stressors and more stressors to occur." (Shelter site 26).

> "Just the area. Especially downtowns. The area, lack of money, poverty. I mean, you know, just like addiction that those things hit the…unfortunately, the poorest of the poor tend to be the population we work with." (Shelter site 25)

When residents are dealing with larger issues related to housing and poverty, smoking ends up being seen as an important way to optimize their quality of life. Individual-level measures need to account for these factors, by asking how long they have been homeless, and what barriers they believe they face with daily living, and not just barriers to quitting smoking. In addition, many individuals have personal barriers including mental health and substance abuse issues.

> "I definitely feel that there's a cross addiction between or correlation between cigarettes and other addictions. Definitely. Especially amongst our population." (Shelter site 25)

> "…the chances of them staying sober from off the cocaine was greater if they also quit smoking. To present that kind of information to the clients also very helpful 'cause maybe they come in and they can see what our life has become completely unmanageable like writing off their lives. Like most of them, by the time they get into residential treatment facility, have had their kids taken away from them, don't have anywhere to go, don't how many are homeless, don't have family support, have court cases and are court ordered here. I mean they have a lot of traumatic events that have happened because of their substance abuse so they can definitely see like 'OK, the judges are not working for me anymore.' but they don't see any of the harm like the smoking stuff. They don't see yet but to give them that and tell them 'You know, you have a greater chance of staying off the drugs and alcohol if you quit smoking.' is I think, a really helpful thing…" (Shelter site 10)

When residents are dealing with trauma, they may not see the value of giving up smoking, even though it may help them with substance abuse. The struggle with substance abuse is very real, and a difficult process, and needs to be measured at the individual-level and accounted for in the conceptual model. Likewise, questions related to personal barriers needs to be addressed in order for us to understand the root cause of the high prevalence of smoking.

4.5 Discussion

This is the first study of its kind to address the effects of both the built and policy environment on tobacco smoking behaviors among staff and residents living in transitional shelters (Leatherdale & Strath, 2007; McCarthy et al., 2009), and the first study to address both built environment and policy level factors that may be related to tobacco use in any venue, let alone among an underserved population such as homeless populations. The added ecologic dimensions of this study expand the conceptual boundaries to include factors at the micro and meso levels, rather than focusing only on individual-level attributes alone (Travis P Baggett & Rigotti, 2010; Okuyemi et al., 2013).

This study also uses innovative, implicit measures of the micro built environment, which have not been examined in relation to tobacco use in the past, including the number of cigarette butts and ashtrays on shelter premises. Additionally, application of emerging methodology, including hotspot analyses using GIS, was explored, providing a different perspective to examine the potential impact of local tobacco control policies. Lastly, and importantly, the insights provided by the residents and staff in the MLDs enabled us to explore novel measures of social support, the built environment, and the policy environment from their lived reality.

Findings from this research suggest that the built and policy environments, especially at the meso level as currently measured may not be the most important factors, for improving our understanding of tobacco use among residents and staff of homeless shelters. Using our limited set of measures, factors at the micro environmental level did not seem to be associated with tobacco use. The data indicate that smoking appears to serve meaningful social purposes that outweigh the effects of the micro built

environment features such as the number of no smoking signs. In other words, by reducing the availability of smoking spaces in the micro built environment of transitional homeless shelters, we may be taking away a vital aspect of social support. The relatively strong influence of smoking peers is corroborated by our quantitative data (not presented) that suggested that being in the same room as a smoker every day of the week was found to be positively associated with current smoking for all micro and meso built environment features. However, more measures of social support and individual barriers are needed in future research to explore this connection in greater depth.

Measures of the social environment should also be included in the built and policy environments. Changes should be made to the conceptual model to reflect what was learned from the MLDs regarding social support and individual factors. Suggestions of additions to the conceptual model include personal barriers, such as family and court dates in the individual attributes, and how tobacco use is likely part of social support. Smoking reduction programs might then benefit from strategies designed to include information about how smoking reduction may be a reinforcing element to substance abuse treatment. More emphasis in the curriculum could also be made on developing more positive social skills and positive use of silence, so that cigarette use is not a prop to fill uncomfortable silences.

Future research and conceptual models should include more individual-level barriers that the literature has previously identified as being important. For example, the limited literature on smoking prevalence among homeless individuals acknowledges the interaction (influence?) of substance abuse and mental illness on tobacco use (T. P. Baggett et al., 2012; Okuyemi et al., 2013). Inclusion of measures for these practices would strengthen the analysis, since these variables seem to be stronger indicators of tobacco use than measures of the built and policy environments. The measures in our study on the built and policy environments appear to be too distal, as they do not seem to capture the real issues related to tobacco use faced by the homeless population. More individual-level and social support measures, in combination with built and policy environment measures, need to be captured to get a full picture of tobacco use among homeless residents of transitional shelters. Existing literature has focused on demographics and has included only limited information on the intrapersonal level of social support such

as whether people closest to them would be helpful in quitting. Such peer behavior modeling has been shown to be extremely powerful (Arnsten, Reid, Bierer, & Rigotti, 2004; Okuyemi et al., 2013). Questions regarding how and in which circumstances the shelter environment is supportive of smoking should also be asked. In Chapter 2, I used proxy measures such as the "number of days residents were in the same room with someone who was smoking cigarettes". This gives a general idea of the social culture, but does not inform us of the shelter-level support for quitting or reducing cigarettes. Questions regarding the intersection of social networking and tobacco use would add this potentially influential dimension. Individual barriers not directly related to smoking, but indicated through the MLDs as important factors, include life stressors such as court dates, and family custody hearings; therefore, assessment of personal stressors are needed in future evaluations.

It is unlikely that city-level tobacco policies are affecting tobacco use in this population due to the more pressing and numerous personal issues. These meso level factors were not even discussed by the shelter staff and residents during visits and MLDs, supporting the finding that city-level policies are not reaching our most underserved populations. For this population, efforts, perhaps, should be focused more on individual-level barriers and less on the meso policy level, . There is a chance that shelter-level policies may have an effect on tobacco use, especially for those who may partake in smoking casually, such as those who responded to having smoked in the past 24 hours. Perhaps the SRP and just the act of administering our surveys and assessments functioned as an intervention resulting in increasing, changing, or enforcing certain tobacco control policies already in existence . However, we do not know if changes were sustainable. More research is needed to address the impact of shelter-level policies on tobacco use.

4.5.1 Limitations

There are several limitations associated with this study. First, all of the quantitative data are cross-sectional, indicating that the directionality of associations with tobacco use cannot be assessed. This is important to understand, especially when addressing micro shelter-level factors.

Second, the survey and audit data are from different sources and from different time points. Although data from the Shelter Policy Survey data were collected at two time points, data measuring the micro and meso built environment were only collected at one time point. Ideally, micro and meso built environment data should have been collected at at least two time points; however, due to limited resources and the CBPR nature of the research, this was not possible. Additionally, error may have been introduced when doing comparisons between baseline and 3 months follow-up inasmuch as the Shelter Policy Survey 1 and 2 data were not necessarily obtained from the sample of people. Differences in responses at time 1 versus time 2 could therefore be attributable to the different composition of respondents at time 1 and time 2. .

Third, not all of the variables of interest from the conceptual model were available to be included in the analyses. For example, data not being available pertains to alcohol dependence at the individual-level. This is an important behavior that is tied closely to tobacco use. It is estimated that approximately 88% of alcoholics also smoke regularly (Batel, Pessione, Maitre, & Rueff, 1995), which can impede tobacco use cessation, as rates of smoking cessation are lower among smokers who have a history of alcohol dependence (DiFranza & Guerrera, 1990). In this study, we not able to ask questions regarding alcohol dependence, illicit drug use and mental health status due to IRB constraints. These variables were mentioned, however, in the qualitative data as important individual-level barriers. Therefore, future studies explore ways to include these factors, since they have been shown to be important in peer-reviewed literature as well as by residents and staff themselves through the qualitative data.

Fourth, little research exists on the micro and meso built environment related to tobacco use behaviors in transitional homeless shelters. Based on the negative findings from traditional measures, we need a better understanding of what constitutes the micro and meso environments for unique populations. Hence, the additional data yielded from the qualitative data provided more insight than survey or audit data. This research highlights elements related to the micro environment including the number of signs restricting tobacco and the number of cigarette butts on shelter premises as the main independent predictor variable. Although the number of signs is unlikely to change on a daily basis, it is likely that the

number of cigarette butts would change daily, or even multiple times during the day based on the frequency of cleaning or even frequency of law enforcement checks in the area. During environmental audits, I observed some sites that had tasks for residents throughout the day to clean up cigarette butts multiple times during the day, whereas other sites did not have any specific plans to clean them off the ground. The sites that had multiple cleanings were concerned about the litter caused by the cigarette butts, and describe differences in shelter culture that were otherwise not captured in our quantitative data. However, we did not have a way to know about the need to collect these data prior to our observations. Therefore, future research should account for daily differences by measuring the number of cigarette butts at multiple time points, and asking shelter staff and residents about not only smoking but also cleaning and other regular shelter practices concerning tobacco use and cleanup.

Fifth, in regards to the meso built environment, only the number of retailers within a 1000 foot of shelters was captured. Initially, only actual physical locations of licensed tobacco sales were sought as a measure of a tobacco retailer. As we learned from the MLDs, unlicensed sources needed to be captured if we were to understand where residents obtain their cigarettes. Conversations with shelter staff and residents indicated a need to account for more informal, unlicensed, sources, such as individuals without a license to sell tobacco products nevertheless selling single cigarettes to residents, both on and off shelter premises. This was accounted for when available in the measurement, but again, it was only captured at one time point, and only when it presented itself. Informal, mobile vendors may only be available at certain times, and this would not have then been captured in the meso built environment assessment, leading to a false assessment of tobacco availability. Future studies should employ trained former homeless individuals to identify vendors of singles in neighborhoods surrounding the shelters in order to better understand the informal cigarette market, or conduct observational ethnographic studies that involve more time spent at the sites. Future research should also link data from the California Board of Equalization listing of registered tobacco retailers to shelter site addresses, and see if there are any differences with the data that we collected to capture the built environment.

Finally, another limitation is that only variables of interest were included that were consistent with the original, conceptual model based on the literature. However, measures would have been more insightful if qualitative formative research had been done prior to the environmental audits and policy surveys. Future studies should also incorporate other factors related to the built environment and neighborhood characteristics, such as street lighting and crime data, which can give a better understanding of the meso environment.

4.5.2 Conclusion

The original research question asked: Are elements of the built and policy environment related to tobacco use at the shelter level among those living and working in transitional homeless shelters? Results indicate that the policy environment regarding tobacco and homelessness is a complex one. Meso policies at the city-level were found to be unrelated to individual-level tobacco use in transitional shelters. This result suggests the need to clarify the lived experience of homeless populations, who encounter the policy environment more frequently through incarceration or forced mobility rather than health promotion. The tobacco industry has been known to target their marketing efforts to homeless populations (Apollonio & Malone, 2005). Thus, future analyses should examine whether licensed and unlicensed retailers are more clustered in areas surrounding homeless shelters. In addition, more research is needed on the black market regarding informal vendors that supports the tobacco habit of these individuals at the lowest income levels to continue smoking.

Further analyses are also needed to address the possible influence of the type of tobacco control policies in force on staff and resident smoking patterns. It may be that some policies are stronger and more effective, and that the mere number of policies is only weakly related to tobacco use. Asking the shelter staff and residents which policies, if any, they believe to be effective would be the first step in ascertaining the importance of policies for this population. These further analyses would improve our understanding of how the policy environment may be related to tobacco use.

Policies may help change norms and encourage smokers to reduce or quit smoking. However, the push for tobacco policies at the shelter-level should be approached cautiously. Smoking prevalence

among the homeless is high, but may be one of their primary ways of coping with the many challenges that they face. Simply introducing policies may set the norms, however enforcing appropriate policies may be more important in creating a change in individual-level smoking behaviors. The enforcement of policies needs to be approached in a manner that is respectful of shelter staff and residents, and allows alternatives for smokers to change behaviors by replacing them with more positive influences that may ultimately benefit their lives. If a city tobacco control policy governing tobacco use in multiunit housing, for example had the unintended consequence of leading to the eviction of low-income, tobacco-addicted residents, such a policy could inadvertently accelerate a return of the homeless to the streets, and their chances of making positive changes and integrating back into society would thereby diminish. Therefore, future efforts to reduce tobacco use should take into account shelter-level policies, but should also involve shelter staff and residents in creating these policies using a bottom up approach so that all stakeholders would feel heard. Community Based Participatory Research approaches using qualitative methods would likely yield identification of heretofore unidentified factors that impact smoking behavior.

Based on the quantitative and qualitative results showing that the built environment and meso policy environment are not important factors related to tobacco use among residents and staff of homeless shelters, the conditions that contribute to homelessness itself appear to be more closely associated with smoking prevalence than possible environmental influences. What is currently captured to measure the built and policy environments is not sufficient to capture the factors that support or reduce smoking for this population, and, because smoking prevalence rates are so high in this population, tobacco control resources need to be invested in identifying effective approaches to helping homeless populations overcome the barriers to quitting and abstaining long-term from smoking cigarettes. Current, mainstream approaches do not seem to apply to the homeless population. Our qualitative data highlighted the fact that we are missing a key factor related to the informal cigarette market that is available in the shadows of our society. By continuing to miss these key local informal factors, and only focusing on established measures, such as formal retailers, we are missing relevant factors impacting the homeless population.

The homeless population has several pressing emotional and practical needs that also are impacted by shelter-level policies and the built environment, which can affect many seemingly unrelated facets of their lives, including child custody and court dates. In addition, the built environment of where they potentially could live after transitioning from shelters may be limited, if they have a previous criminal record. Place makes a difference for everyone, but we are relatively blind to what is possible in their world compared to the general population. A better handle on the holistic nature of the circumstances and burdens faced by the homeless population regarding tobacco control can improve our approach for meeting their needs through policy and programmatic changes. More research is needed to better understand how tobacco control policies and other built environmental influences might, in fact, make a difference in this population.

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Appendix 4.1: Environmental Audit Form

Environmental Audit for Transitional Shelters

Observer Name_____ Date_____

Shelter Name_____ Shelter Address_____ Name of Shelter Contact_____	Number of Beds_____ Number of Residents_____ Number of Employees_____ Number of Buildings for Program_____

Building number or name: _____

Indoor Observations:

1. Number of entrances (not emergency) to building
   Tally: _____ Total No. = _____

2. Number of emergency (not accessible) entrances to building
   Tally: _____ Total No. = _____

3: Number of signs* about smoking restrictions throughout building **inside** (not on or around doors)
   Tally: _____ Total No. = _____

4: Number of signs* about smoking restrictions **on or around entrance doors**
   Tally: _____ Total No. = _____

5. What size are the signs?
   a. Smaller than 8.5 x 5.5 inches:
      - Tally: _____ Total No. = _____
   b. 8.5 x 5.5 inches
      - Tally: _____ Total No. = _____
   c. Larger than 8.5 x 5.5 inches
      - Tally: _____ Total No. = _____

6. Number of notices on bulletin boards about smoking cessation programs or smoke-free policies
   Tally: _____ Total No. = _____

7. Number of signs/posters about smoking (**anti-smoking messages**)
   Tally: _____ Total No. = _____

8. Number of signs/posters about smoking that are signs that **we provided (do not count these in #7)**
   Tally: _____ Total No. = _____

9. Number of signs/posters about smoking (**pro-smoking** messages)
   Tally: _____ Total No. = _____

10. Are the signs visible? Yes _____No_____

Comments: _____
_____

11. Does the facility have notices on bulletin boards about smoking cessation programs offered onsite?
    _____Yes
    _____No
12. Are there ashtrays or cigarette butts in the common rooms?
    _____Yes *(go to 13.)*
    _____No *(go to 14.)*
    _____N/A (No common rooms in this building) *(go to 14.)*
13. If yes, in which rooms are there ashtrays? _____

14. Can you smell tobacco smoke in the common rooms?
_____Yes
_____No

15. Can you see people smoking in the common rooms?
_____Yes
_____No
_____N/A (No common rooms in this building)

16. Is there any evidence that people smoke in the common rooms? (i.e. cigarette ashes, dirty ashtrays, cigarette butts)
_____Yes
_____ No
_____N/A (No common rooms in this building)

17. To your knowledge, are there ashtrays or cigarette butts in any of the residents' rooms?
_____Yes
_____No
_____N/A (No residents in this building)

18. Can you smell tobacco smoke in any of the residents' rooms?
_____Yes
_____ No
_____N/A (No residents in this building)

19. Are the staff offices nonsmoking?
_____Yes
_____No

20. Are there ashtrays or cigarette butts in any of the staff office rooms?
_____Yes
_____No

21. Can you smell tobacco smoke in any of the staff office rooms?
_____Yes
_____No

22. Number of cigarette vending machines in the building
Tally: _____ Total No. = _____

23. Does the organization sell or distribute cigarettes?
_____Yes
_____No

Comments_____
_____

*******If more than one building, complete above portion for each building. (Repeat questions 1-23 from on new sheet).***
Outdoor Observations:

Grounds:

23. Number of entrances to outdoor grounds
Tally: _____ Total No. = _____

24. Number of emergency exits (not accessible) from outdoor grounds
Tally: _____ Total No. = _____

25: Number of signs about smoking restrictions **throughout** outdoor grounds
Tally: _____ Total No. = _____

26. Number of signs about smoking restrictions on or around **ground entrances**
Tally: _____ Total No. = _____
27. What size are the signs?

a. Smaller than 8.5 x 5.5 inches:
   - Tally: _____ Total No. = _____

b. 8.5 x 5.5 inches
   - Tally: _____ Total No. = _____

c. Larger than 8.5 x 5.5 inches
   - Tally: _____ Total No. = _____

28. Number of notices on bulletin board about smoking cessation programs or smoking policies
Tally: _____ Total No. = _____

29. Number of signs/posters about smoking (**anti-smoking messages**)
Tally: _____ Total No. = _____

30. Number of signs/posters about smoking that are signs that **we provided (do not count these in #29)**
Tally: _____ Total No. = _____

31. Number of signs/posters about smoking (**pro-smoking** messages)
Tally: _____ Total No. = _____

32. Are the signs visible? Yes _____No_____

33. Can you smell tobacco smoke within 20 feet of the building entrances?
_____Yes
_____No

34. Can you see people smoking in the outdoor grounds area?
_____Yes
_____No

35. Is there any evidence that people smoke in the outdoor grounds area? *(i.e. ash, ashtrays, cig.butts)
_____Yes
_____No

36. Number of cigarette butts on ground
a. 0
b. 1-10
c. 11-20
d. 21-50
e. more than 50

39. Are there ashtrays or cigarette butts within 20 feet of the building entrances?
_____Yes
_____No

40. Number of ashtrays (total)
Tally: _____ Total No. = _____

41. Where are the ashtrays located? _____
_____
_____

Comments:_____
_____
_____

**Smoking signs are categorized according to their location: in or around entrances, on bulletin boards, or elsewhere. If there is a bin or ashtray outdoors with a sign that says something like "smokers please," this can be interpreted as a prompt not to take the cigarette inside. Thus, a bin with a sign can be counted as a restriction near an entrance. If there is a bin or ashtray with no sign, it is not counted. Source: http://www.cdc.gov/nccdphp/dnpao/hwi/programdesign/environmental_audits.htm; survey.

Building number or name: _____

Indoor Observations:

1. Number of entrances (not emergency) to building
   Tally: _____ Total No. = _____

2. Number of emergency (not accessible) entrances to building
   Tally: _____ Total No. = _____

3: Number of signs* about smoking restrictions throughout building **inside** (not on or around doors)
   Tally: _____ Total No. = _____

4: Number of signs* about smoking restrictions **on or around entrance doors**
   Tally: _____ Total No. = _____

5. What size are the signs?
   a. Smaller than 8.5 x 5.5 inches:
      - Tally: _____ Total No. = _____
   b. 8.5 x 5.5 inches
      - Tally: _____ Total No. = _____
   c. Larger than 8.5 x 5.5 inches
      - Tally: _____ Total No. = _____

6. Number of notices on bulletin boards about smoking cessation programs or smoke-free policies
   Tally: _____ Total No. = _____

7. Number of signs/posters about smoking (**anti-smoking messages**)
   Tally: _____ Total No. = _____

8. Number of signs/posters about smoking that are signs that **we provided (do not count these in #7)**
   Tally: _____ Total No. = _____

9. Number of signs/posters about smoking (**pro-smoking** messages)
   Tally: _____ Total No. = _____

10. Are the signs visible? Yes _____No_____

Comments: _____
_____

11. Does the facility have notices on bulletin boards about smoking cessation programs offered onsite?
    _____Yes
    _____No

12. Are there ashtrays or cigarette butts in the common rooms?
    _____Yes *(go to 13.)*
    _____No *(go to 14.)*
    _____N/A (No common rooms in this building) *(go to 14.)*

13. If yes, in which rooms are there ashtrays? _____

14. Can you smell tobacco smoke in the common rooms?
    _____Yes
    _____No

15. Can you see people smoking in the common rooms?
    _____Yes

_____No
_____N/A (No common rooms in this building)

16. Is there any evidence that people smoke in the common rooms? *(i.e. cigarette ashes, dirty ashtrays, cigarette butts)
_____Yes
_____ No
_____N/A (No common rooms in this building)

17. To your knowledge, are there ashtrays or cigarette butts in any of the residents' rooms?
_____Yes
_____No
_____N/A (No residents in this building)

18. Can you smell tobacco smoke in any of the residents' rooms?
_____Yes
_____No
_____N/A (No residents in this building)

19. Are the staff offices nonsmoking?
_____Yes
_____No
_____N/A (No staff offices in this building)

20. Are there ashtrays or cigarette butts in any of the staff office rooms?
_____Yes
_____No
_____N/A (No staff offices in this building)

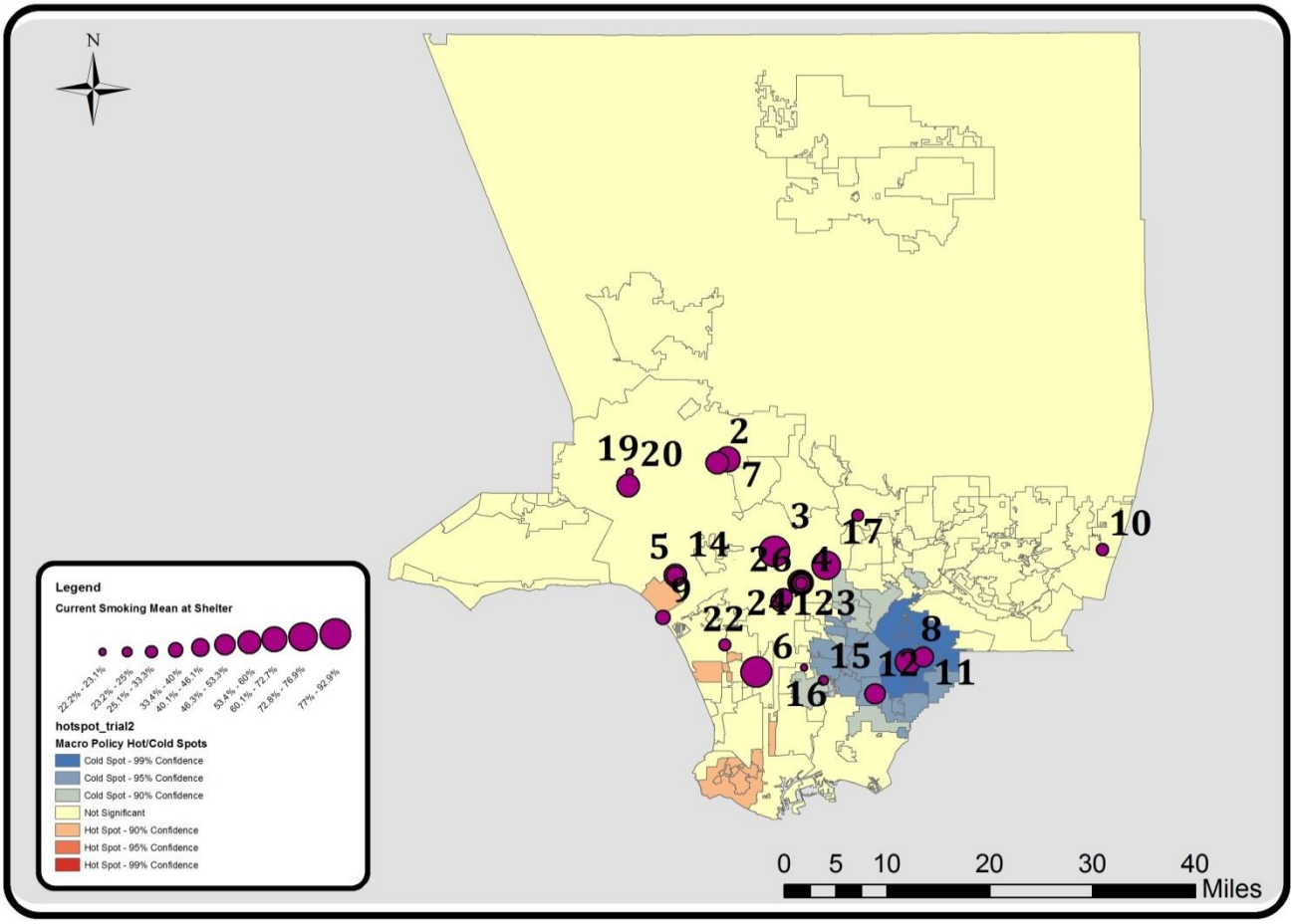
21. Can you smell tobacco smoke in any of the staff office rooms?
_____Yes
_____No
_____N/A (No staff offices in this building)

22. Number of cigarette vending machines in the building
Tally: _____ Total No. = _____

23. Does the organization sell or distribute cigarettes?
_____Yes
_____No

Comments_____
_____

Appendix Figure 4.2: Distribution of shelters among hot /cold spots in LA County at the city-level for city-level policies.



*Larger circle represent a greater current smoking prevalence at the shelter-level. Cities are shaded varying shades of red or blue, or yellow. Red areas represent areas with a large number of policies in relation to the surrounding areas. Blue areas represent areas that are in cold spots, lacking policies in relation to neighboring areas. Yellow areas are not statistically significantly different from surrounding areas.

The Getis-Ord Gi* score represents the z-score for each city, detailing the statistical significance of clustering. Cities with positive Gi* scores represent hot spot clusters with greater policies than neighboring cities, cities with Gi* score not statistically significant are neutral, and cities with negative Gi* scores were considered cold spots. In this study, we are more interested in areas that are in cold spots, lacking city-level policies.

Appendix 4.3: Policy Survey 2

Tobacco control policies follow-up inventory

Date: _____

Interviewer(s): _____

Interviewee(s):_____

Job title: _____

Facility(ies): _____

Appendix 4.3: Policy Survey 2

Are there written policies? (Get copy if there are written policies)

☐Yes ☐No If yes, then get copy? Yes___ No____

Are there constraints by funders or landlords that stipulate tobacco control policies? If yes, who are the funders and can we get a written copy of those stipulations?

☐Yes ☐No If yes, then get copy? Yes___ No____
Funders:_____

Review current tobacco control policies. Examples listed below.

How strong is enforcement of these policies? Options for each policy are: Strong, Average, Weak

Current tobacco control policies in place at this facility:

Current tobacco control policy	Currently in force?	If yes, current enforcement	If no, consider adoption?	If yes, will beef up enforcement?
Indoor policies				
1. The facility's printed rules and regulations include a section about the facility's smoke-free policies and practices.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No

2. Smoking is not permitted in indoor common areas such as the cafeteria, career center, laundry room, etc.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Current tobacco control policy	**Currently in force?**	**If yes, current enforcement**	**If no, consider adoption?**	**If yes, will beef up enforcement?**
3. A no-smoking sign will be visible at the entrance to all residential buildings, indicating a smoke-free building.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
4. Smoking is not permitted in private indoor areas such as apartments because the cigarette smoke from an apartment can affect neighboring apartments.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No .	☐Yes ☐No
5. The facility offers regular on-site support groups to help residents and staff who want to quit their tobacco use habit.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Outdoor policies				
6. Smoking is not permitted near entrances of residential buildings nor within 20 feet of apartment windows so that nonsmoking residents can live smoke-free.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
7. Smoking is not permitted in courtyards or other common areas within the facility and intended for use by all.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
8. If smoking is permitted in courtyards or other common areas, only a small area is designated for smokers	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Policies to counter the industry's tobacco promotion efforts				
9. Residents are not permitted to wear paraphernalia (e.g., hat, t-shirt, etc.) associated with tobacco products.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐	☐Yes ☐No
10. No activity at the facility will permit tobacco advertising or promotion.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No

11. The facility will not accept sponsorship of any facility activities by a company that sells tobacco products (e.g., Altria, RJ Reynolds, US Tobacco, etc.)	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Enforcement policies				
12. Violations of the facility's smoke-free policies will result in mandatory participation in the facility's tobacco use reduction program.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
13. Violations of the facility's smoke-free policies will result first in a warning, than in increasing sanctions after the 1st, 2nd and 3rd violations and the possibility of expulsion after the 4th violation.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Current tobacco control policy	**Currently in force?**	**If yes, current enforcement**	**If no, consider adoption?**	**If yes, will beef up enforcement?**
Staff-specific policies				
14. Does your facility provide incentives to staff for quitting smoking? Incentives could include: improved benefit allowances, (discounted health insurance, increased disability payments, additional life insurance), added vacation "well days" off, direct cash payments, bonuses, prizes, awards, etc.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
15. Does the facility provide regular management training to staff about its tobacco control policies (e.g., in-service training)?	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
16. One management practice is to have staff ask all newly enrolled residents at intake whether they smoke cigarettes, and if they do, to ask if they would like help quitting.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No

17. Staff are not permitted to smoke in agency vehicles.	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
18. Staff are not permitted to smoke in designated smoking areas with clients; if they must smoke, it should be away from clients.	☐Yes ☐No	**1.Strong** 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
19. Applicants for jobs with the agency either must be non-smokers at the time of hiring or agree to participate in a smoking cessation program as a condition of employment	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
Other tobacco control policies not enumerated above				
20. Other #1 (Describe):	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No
21. Other #2 (Describe):	☐Yes ☐No	1.Strong 2.Average 3.Weak	☐Yes ☐No	☐Yes ☐No

Are there any other tobacco control policies or practices that you currently have or would consider adopting or strengthening in the near future?

Thank you!

Appendix Table 4.4—Multivariate Associations of Aim 1, Parts 1-4 on Current Smoking Behaviors of Randomly Sampled Residents and Staff of Transitional Homeless Shelters in Relationship in Los Angeles County‡

	OR (95% CI)					
	Aim 1		Aim 2	Aim 3	Aim 4	
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
	(N=199)	(N=194)	(N=199)	(N=199)	(N=199)	(N=199)
Aim 1: Micro Built Environment Elements						
Number of signs restricting tobacco use	1.04 (0.99, 1.10)					
Number of cigarette butts on premises *(Ref= 0-10 cigarette butts)*						
11-20 cigarette butts		1.78 (0.42, 7.59)				
21-50 cigarette butts		3.13 (0.5, 19.54)				
More than 50 cigarette butts		2.21 (0.76, 6.46)				
Aim 2: meso Built Environment Element						
Have a tobacco retailer within 1000 feet of shelter			1.03 (0.88, 1.20)			
Aim 3: Micro Policy Environment Element						
Number of shelter-level policies				1.06 (0.93, 1.21)		
Aim 4: meso Policy Environment Elements						
Total Sum of City Policies					1.1 (0.64, 1.89)	
Shelters in cold spots (GIS Hotspot Analyses)						1.48 (0.33, 6.69)
Individual-level Categorical Variables						
Demographics						
Race/Ethnicity (Ref=White)						
African American/Black	0.27 (0.06, 1.1)	0.34 (0.08, 1.37)	0.37 (0.1, 1.4)	0.41 (0.1, 1.59)	0.36 (0.09, 1.37)	0.38 (0.1, 1.47)
Hispanic/Latino	**0.09 (0.02, 0.42)*** **	**0.10 (0.02, 0.46)*** **	**0.12 (0.03, 0.49)*** **	**0.12 (0.03, 0.51)*** **	**0.11 (0.03, 0.48)*** **	**0.12 (0.03, 0.53)***
Other	0.46 (0.08, 2.49)	0.52 (0.10, 2.73)	0.60 (0.12, 3.11)	0.71 (0.13, 3.82)	0.60 (0.12, 3.09)	0.63 (0.12, 3.31)
Gender (Ref=Female)						
Male	1.19 (0.46, 3.02)	1.80 (0.66, 4.88)	1.34 (0.54, 3.34)	1.34 (0.53, 3.36)	1.24 (0.44, 3.48)	1.53 (0.55, 4.23)
Educational Attainment *(Ref= Less than high school)*						
High school graduate	1.67 (0.49, 5.69)	1.42 (0.4, 5.12)	1.6 (0.47, 5.39)	1.51 (0.44, 5.14)	1.67 (0.48, 5.82)	1.51 (0.44, 5.14)

Some college or junior college	0.85 (0.26, 2.77)	0.79 (0.22, 2.75)	0.78 (0.24, 2.51)	0.7 (0.21, 2.26)	0.79 (0.25, 2.55)	0.7 (0.21, 2.26)
College graduate or postgraduate	0.74 (0.17, 3.15)	0.58 (0.13, 2.59)	0.61 (0.15, 2.48)	0.55 (0.13, 2.32)	0.61 (0.15, 2.48)	0.55 (0.13, 2.32)
Sum of different types of quit attempts	1.47 (0.86, 2.49)	1.47 (0.85, 2.55)	1.43 (0.86, 2.38)	1.42 (0.86, 2.35)	1.45 (0.86, 2.44)	1.42 (0.86, 2.35)
Years in total smoked regularly (Ref=Not greater than 10 years)						
Greater than 10 years	**4.23 (1.6, 11.16)*** **	**4.18 (1.53, 11.43)***	**4.2 (1.61, 10.98)*** **	**3.99 (1.52, 10.45)***	**4.16 (1.59, 10.89)*** **	**3.99 (1.52, 10.45)***
Self-efficacy: Belief can quit on own	**0.15 (0.05, 0.43)*** **	**0.15 (0.05, 0.43)***	**0.18 (0.06, 0.48)*** **	**0.19 (0.07, 0.52)*** **	**0.18 (0.06, 0.48)*** **	**0.19 (0.07, 0.52)*** **
In the same room with someone who was smoking everyday	**4.19 (1.32, 13.29)****	**4.42 (1.39, 14.04)***	**4.58 (1.45, 14.51)***	**4.74 (1.47, 15.24)***	**4.48 (1.4, 14.33)***	**4.74 (1.47, 15.24)***
Attitudes towards outdoor smoking restrictions *(Reference=Agree, Strongly*	2.19 (0.89, 5.38)	2.03 (0.82, 5.03)	1.94 (0.8, 4.71)	1.98 (0.81, 4.83)	2.00 (0.82, 4.86)	1.98 (0.81, 4.83)
Money Barrier to Quitting *(Reference= Agree, Strongly Agree)*^^	**0.20 (0.08, 0.5)*** **	**0.23 (0.09, 0.57)*** **	**0.24 (0.1, 0.59)***	**0.23 (0.1, 0.56)*** **	**0.23 (0.1, 0.56)*** **	**0.23 (0.10, 0.56)*** **
Individual-level Continuous Variables						
Age	**0.94 (0.9, 0.98)****	**0.95 (0.91, 0.99)***	**0.95 (0.91, 0.99)***	**0.95 (0.91, 0.99)***	**0.95 (0.91, 0.99)***	**0.95 (0.91, 0.99)***
Knowledge of Tobacco Harmfulness Factor	1.73 (0.99, 3.02)	**1.89 (1.06, 3.38)***	1.73 (1.00, 2.98)	1.72 (0.98, 3.00)	1.71 (0.98, 2.98)	1.72 (0.98, 3)
Knowledge of Tobacco Quit Methods	1.27 (0.77, 2.10)	1.12 (0.66, 1.91)	1.22 (0.74, 2.02)	1.24 (0.75, 2.04)	1.24 (0.75, 2.05)	1.24 (0.75, 2.04)
Constant	85.6	46.2	64.6		53.2	31.8
Conditional Interclass correlation†	2.16 e-21	6.32e-14	4.26e-12	9.22e-12	1.81e-11	1.50e-11
Log Likelihood	-72.9	-70.8	-74.0	-73.7	-74.0	-73.9

‡Tobacco data are from a random sample survey conducted at the shelters. More information can be found in Chapter 2.

Statistically significant results are bolded with an asterisk: *p<0.05; **p<0.01; ***p<0.001.

Model 1 used: number of signs restricting tobacco use as the main independent predictor variable**.**
Model 2 used: number of cigarette butts on premises as the main independent predictor variable**.**
Model 3 used: number of tobacco retailers within 1000 feet as the main independent predictor variable**.**
Model 4 used: number of shelter-level policies as the main independent predictor variable**.**
Model 5 used: number of city-level policies as the main independent predictor variable.
Model 6 used: the presence of the shelter in a cold spot of local policies s as the main independent predictor variable.

Each model included the following covariates: race/ethnicity, gender, educational attainment, age, sum of different types of quit attempts, years in total smoked regularly , self-efficacy, being in the same room with someone who was smoking every day, attitudes towards outdoor smoking restrictions, money barrier to quitting, knowledge of tobacco harmfulness factor score, and knowledge of tobacco quit methods factor score

^ **Attitudes towards outdoor smoking restrictions refers to response from: "**Smoking should not be allowed in outdoor areas smoking (strongly agree, agree=1, disagree, strongly disagree=0)", which was dichotomized (Reference: Agree, Strongly Agree).
^^ **Money Barriers refers to response from: "**I don't have money to buy medicine to help me quit smoking" (strongly agree, agree=1, disagree, strongly disagree=0)", which was dichotomized (Reference: Agree, Strongly Agree)
†Conditional interclass correlation should go towards zero as more variables are added to the model to explain differences between shelters.

Chapter 5:

Conclusion of Dissertation Findings

5.1 Conclusion Summary

This chapter summarizes the findings from three interrelated studies. These studies 1) Examine tobacco use prevalence in the context of individual and shelter-level factors in 26 randomly selected transitional homeless shelters in Los Angeles (LA) County (Chapter 2); 2) Evaluate the effects of a tobacco reduction/cessation program on the smoking status of residents in 26 transitional homeless shelters in LA County (Chapter 3); and 3) Assess theoretically based variables related to a more relevant representation of the micro and meso built and policy environments of transitional homeless shelters (Chapter 4). A variety of methods were used in the analyses, including multivariate analyses, GIS spatial statistics, and inductive qualitative data analyses.

5.1.1 Individual-level characteristics related to tobacco use and reduction

Findings from each of the papers yielded new insights into characteristics at the individual-level that may be related to both tobacco use and smoking reduction among residents of transitional homeless shelters. Based on national surveillance data, tobacco use disproportionally affects vulnerable populations, such as homeless populations (Baggett & Rigotti, 2010). In California, homeless individuals remain one of the most underserved populations, and experience disproportionality high rates of tobacco use; our data show that 65.3% of those who are homeless and living in transitional shelters are current smokers, compared to a prevalence rate of about 11.3% for adult California residents overall (CDPH, 2013).

Despite the health disparities faced by the homeless population, they are often overlooked and underserved in regards to resources related to tobacco use reduction (Marr, DeVerteuil, & Snow, 2009; Plumb, 2000). Chapter 2 constitutes the first study that we know of that addresses tobacco use among staff and residents at transitional homeless shelters. Using traditional measures, the findings yielded null

results regarding demographic characteristics and their relationship to tobacco use, with the exception of Latinos being at lower risk. Likewise, for those participating in the tobacco use reduction intervention, no significant differences were found by demographic characteristics in individuals who changed their tobacco use behaviors between baseline and 3 months follow-up, as reported in Chapter 3. In Chapter 4, when built or policy environment-related variables were added to the models, results for demographic correlations to smoking prevalence remained non-significant. These null results highlight that factors that seem to protect the general population from being current smokers, such as being a woman, do not hold true for these residents of transitional homeless shelters in Los Angeles County (USDHHS, 2004).

Initially, our results seemed somewhat surprising, given that data at the national and local level for the general population indicate that African American and Latinos are more likely than Whites and Asians to smoke (CDC, 2010; LACDPH, 2012). However, research using surveillance data at the national level by Baggett and Rigotti yielded similar results to ours regarding race/ethnicity as a (non)predictor of smoking status among the homeless population (Baggett & Rigotti, 2010). Unlike our research, however, their data were not restricted to residents in transitional homeless shelters. Consistent with existing literature, we did find that Hispanic/Latina women were less likely to smoke (Pérez-Stable et al., 2001). Hispanic/Latina women may have protective factors that help them from becoming current smokers or having smoked in the past 24 hours, however, once they start smoking, their ability to quit is no better than that of other racial/ethnic subgroups (CDC, 1998). The null results in Chapters 2 and 3 suggest that other, unmeasured factors likely explain the variance in smoking status for this population, and highlight the need for improving how we measure the social, built and policy environments. The qualitative data-based findings presented in Chapter 4 corroborate this conclusion and provides potentially more viable measures relevant to the population of focus in this study.

Chapter 2 noted a few individual-level factors were related to tobacco use. For example, exposure to a smoker in the same room was related to current smoking rates, as would be predicted based on socio-ecological models, where social context is an integral part of the meso-community level determinants of behavior (Schulz & Northridge, 2004). Having smoked for greater than 10 years was another individual-

level correlate that was related to being a current smoker, as expected based on findings from general population studies(Wetter et al., 2004). Similarly, self-efficacy for being able to quit on one's own was also expected based on research with general population samples, because high self-efficacy is likely among those who have already quit (Etter, Bergman, Humair, & Perneger, 2000; Prochaska, DiClemente, Velicer, Ginpil, & Norcross, 1985). Aside from these few factors, however, most other individual-level correlates were not related to tobacco use or tobacco use reduction. Given the null results from the quantitative portions of all three papers regarding all other individual-level correlates, it seems that the conditions that contribute to homelessness, such as psychiatric diagnoses and comorbid illicit drug use or the emotional conditions that foster such behavior, likely exert a much greater influence on tobacco use prevalence for this population than traditional demographic factors such as race/ethnicity, gender, and educational status. These inferences notwithstanding, it needs to be acknowledged that additional covariates might have been shown to explain significant variance in smoking status had the tests not been underpowered.

5.1.2 Shelter and neighborhood factors related to tobacco use and reduction

Chapters 2 and 3 build on previous literature by examining individual-level smoking prevalence in the context of transitional homeless shelter demographics, shelter-level policies, and shelter-level micro built environment features. Previous research has examined individual-level factors and shelter characteristics separately, but no study has combined the two levels of influence (Arangua, McCarthy, Moskowitz, Gelberg, & Kuo, 2007; Baggett & Rigotti, 2010; Okuyemi et al., 2013). In Chapter 2, models addressing only shelter-level characteristics yielded significant higher odds of current smoking status for shelters targeting mentally ill homeless individuals, as we expected based on literature regarding mental illness and tobacco use (Schroeder & Morris, 2010). Results from Chapter 2 also show that shelters targeting substance abusers had a lower odds of having smoked in the past 24 hours. This is contrary to what would be expected in the literature, but matches what was found in bivariate analyses (Degenhardt & Hall, 2001). These significant results highlight the need to include individual-level factors related to

mental illness and substance abuse in future research involving residents of transitional shelters for the homeless.

In Chapters 3 and 4, we find that smoking reduction is difficult among this population for several reasons, including the lack of social support, as smoking appears to play an essential social role in the daily social lives of residents and some staff. Several shelter staff are quoted, saying how everyone smoked outdoors of the facility and that was how residents elicited support from one another. These predictable, daily social breaks appeared to help them cope with challenges that they all faced related to their condition of homelessness. It could be that the null results reported in Chapter 4 related to variations in the micro built environment are attributable to these factors of social support were not measured, and therefore not tested, in our models. Other overlooked and heretofore unrecognized variables are discussed later in this chapter, but clearly, future studies should evaluate in more detail with whom, when and how often residents and staff smoke alone or in groups through both quantitative and qualitative data.

Chapter 4 describes the first study of its kind to address both the effects of the micro (shelter-level) and meso (city-level) built and policy environments on smoking prevalence of residents of transitional homeless shelters in Los Angeles County. From Chapter 4, the environmental audit of shelter premises (micro-level built environment) identified several shelters that had a high number of cigarette butts scattered on the premises, and some shelters even distributed cigarettes to residents, which supports the notion that the culture of some shelters may promote smoking. Based on the qualitative results of Chapter 4, it could be that smoking is so prevalent among residents living in transitional homeless shelters, that micro built environment features such as the number of no smoking signs do not significantly influence tobacco use. We did not find significant results related to these micro-level built environment factors, but more research with better measures is needed to fully test the significance of these local cultural factors.

In Chapter 4, we measured the meso-level (city-level) built environment using a GPS device to mark licensed tobacco retailers. However, fieldwork and findings from Mutual Learning Dialogue (MLD) data in Chapter 4 suggest that there are informal tobacco vendors who sell singles or illegal packs at

nontraditional venues, which may be missed in neighborhood assessments without the further insights of shelter staff and residents. The null results regarding meso (city-level) built environment and policy environment factors lead us to conclude that these may not be the most relevant and revealing factors to focus on when trying to understand tobacco use and smoking reduction among residents of transitional homeless shelters, as currently measured. Findings from the studies reported in Chapters 3 and 4 imply that future research needs to address shelter-level policies and other shelter-level characteristics as they affect residents' perceived social support, which in turn could influence residents' tobacco use prevalence and smoking reduction.

Qualitative findings from Chapters 3 and 4 accounting for shelter demographics all suggest that individual-level characteristics may be more important in predicting smoking status for this population than shelter-level demographic or built or policy environmental factors. Insights gained from the staff and residents in Chapters 3 and 4 highlight the potential importance of the uniqueness of the shelter culture itself and its residents that warrant further investigation on r tobacco use of staff and residents.

5.1.3 Smoking reduction and cessation among residents of transitional homeless shelters in Los Angeles County

Chapter 3 sheds light on the high prevalence rates observed among residents of transitional shelters that were reported in Chapter 2 by addressing tobacco behavior change based on the implementation of a shelter-level intervention in transitional homeless shelters in Los Angeles County. Through the use of mixed methods in Chapters 3, we see that smoking reduction was somewhat effective for our study sample, with the large caveat that only about 43% of those measured at baseline were followed up at 3 months' time. We learned from Chapter 2 that prevalence rates were high; however Chapters 3 and 4 deepened our understanding of why rates are so high and what intervention aspects might be effective. Results reported in Chapters 3 and 4 highlight the necessity of collaborating more closely with the shelter staff to modify the smoking reduction curriculum to residents' psychosocial needs prior to implementing the intervention in this population. Suggestions from the qualitative analyses in Chapter 3 include the addition of more visual aids, as this population has lower educational attainment

levels compared to the general population. Qualitative results also indicate that more relevant visual aids should be shared with groups that develop and disseminate tobacco use-related materials, such as the Tobacco Education Clearinghouse of California. Findings from Chapter 4 also inform future pursuit of questions posed in Chapters 2 and 3, which would have benefited from questions at the individual-level related to more appropriate measures to include in the models or analyses that were not available from the existing data set, such as measures of where, how and from whom smokers obtained their tobacco.

Even though the intervention effect cannot be rigorously tested because of the lack of a control group, qualitative feedback in Chapter 3 indicates that the smoking reduction program made a positive impact and was appreciated by shelter staff. Future research needs to include a comparison group, varied start points, and a larger sample size to reduce the threats to validity involving observed intervention effects. Despite the caveats, we see potential in continuing smoking reduction/cessation efforts that have a more encompassing approach to addressing the exigencies of the lives of the residents, which would be possible if more resources were provided for this seriously underserved population.

5.2 Deductive Study limitations

5.2.1 Sample size and study design issues

Although this research is novel and innovative, findings should be interpreted cautiously due to four major methodological and theoretical/conceptual limitations.

The first issue that affects all three studies in Chapters 2-4 is the study sample size. In both the cross-sectional data used in Chapters 2 and 4, and the panel data in Chapter 3, the sample size is fairly small, which resulted in potentially underpowered analyses. Perhaps there were effects that were not detected because of a lack of statistical significance. Complex statistical methodology is not applicable given the small sample sizes. As it was, several categories within variables had to be collapsed in order to glean meaningful insights from significant associations, but in so doing, we lost valuable information. Future studies with larger samples will permit more sensitive tests of the effects that were not possible to test here. Relatedly, for Chapter 3, a limitation of the available data in understanding the efficacy of the

intervention is the high level of dropout from the intervention between baseline and 3 month follow-up. The rates of tobacco use change are based on the same participants at baseline and three month follow-up, but the high dropout rate of participants in the tobacco reduction program indicates that other variables not controlled for may influence the feasibility and success of the smoking reduction intervention program. For example, participants who are highly motivated to quit may be more likely to stay in the program. Alternatively, participants who have outlived their available time at the shelter may have had to move away, but may have also quit smoking, and are not represented in the quantitative survey data. Follow-up of reasons for dropout would have clarified the likely causes of the smoking reductions we observed. This is where the qualitative data are even more important, in improving our understanding of the reasons for the dropouts, and determining more effective ways to reach out to the large number of homeless smokers who want to quit and are willing to accept support in their efforts to quit.

Second, in addition to a loss at follow-up and small starting sample sizes, quantitative data in Chapters 2 and 4 were missing data at random. The use of listwise deletion in multivariate analyses as the way of dealing with cases that were missing led to a reduction in statistical power. We tried to deal with the missing values by imputing data, but the models simply did not converge when estimated with the imputed data. Better-resourced data collection and more exhaustive checking of each survey questionnaire after completion would have yielded a more complete data set, which would have allowed us to better analyze the variables of interest, without the observed reduction of statistical power. One of the concerns with missing data is non-response bias. The results may be biased with non-response from respondents who are preoccupied with individual issues, such as court dates and child custody, as found in Chapter 3. Similarly, the smoking results could be underestimated due to a significant lost-to-follow-up of respondents who were more likely to smoke. All of these caveats involving non-response bias reduce the generalizability of the results from the quantitative aim of Chapter 3 to shelters outside of Los Angeles County.

The third limitation for all of the papers is that, as noted, there was no no-treatment or other-treatment control group for each of the categories of sites. Observed changes might have occurred even in

the absence of intervention. Without a contemporaneous no-treatment control group, it is difficult to know whether the change was specific to those exposed to the smoking reduction program or part of a broader secular trend.

Fourth, a major limitation for Chapter 3 is that measures of ambient carbon monoxide and other air pollutants from multiple time points should have been included in the quantitative analyses to use as a comparison baseline. Air pollution can have an impact on health outcomes, which can be aggravated by tobacco use. Air pollution is known to be related to the onset of asthma in children, as well as adults who have never smoked (Künzli et al., 2009; Salam, Islam, & Gilliland, 2008). Unfortunately, given the small sample size in this study, testing this possibility was not possible, but should be considered for future studies.

5.2.2 Causality

First, the data for Chapters 2 and 4 are cross-sectional, indicating that the directionality of associations cannot be assessed. For example, we cannot differentiate whether residents exposed to smokers in the same room everyday leads to a greater likelihood of being a current smoker, or whether being in the presence of a large group of current smokers influences the frequency with which staff and residents are exposed to someone smoking in the same room with them. Either causal scenario is plausible, and it may be that being exposed can lead to more smoking, which can lead to more exposure, reflecting a bidirectional effect. With cross-sectional data, it is not possible to discern the direction of the relationship. Whether the smoking behavior came prior or after the micro shelter-level policies in Chapter 4, for example, is unclear. Since either direction is technically possible, we cannot say that one causes the other.

5.2.3 Omitted variables from the conceptual model

This dissertation also has several theoretical and conceptual limitations. In order to better understand smoking prevalence in this population, it would be ideal if all measures of the conceptual

model were available for analysis. For example, macro level factors such the distribution of wealth and employment opportunities contribute to health disparities (Mistry et al., 2011). Unfortunately, available data did not allow for analyses of employment opportunities related to individuals at the shelter site. In addition, the distribution of educational opportunities would also be difficult to assess. The distribution of wealth is available at the census tract level, and could have served as a proxy measure for inequalities, had the sample size been larger. This can be done in future research to assess the impact of macro inequalities on tobacco use behaviors.

As mentioned in Chapter 4, more appropriate measures to include in the models or analyses are not available from the existing data set such as measures of where, how and from whom smokers obtained their tobacco. Hence, not all of the different variables were available to better inform the relationships between the built environment and tobacco use, tobacco control policies and tobacco use, and tobacco use reduction among residents of transitional homeless shelters. We do not have any indicators of conflicts and relationships that may increase or decrease tobacco use rates despite the larger environmental influences. For example, for Chapter 3, we do not have any indicators of the degree of social integration and perceived social support that the participants in the random sample survey and the intervention experience. The relationships between tobacco use and individual- and shelter-level variables were discussed in depth in Chapter 2. However, these relationships cannot be completely understood in the absence of other critical measures, as Chapters 3 and 4 reported finding that perceived social support at the shelter-level seems to influence both the smoking reduction program and tobacco use reduction rates. However, the individual-level data did not fully capture perceived social support; more specific questions at the individual-level are needed.

Another important variable missing from all three empirical chapters regarding smoking prevalence and reduction rates is alcohol dependence at the individual-level, as it is closely related to tobacco use. Approximately 88% of alcoholics also smoke regularly (Batel, Pessione, Maitre, & Rueff, 1995), which can impede tobacco use reduction and cessation, as rates of smoking cessation are lower among smokers who have a history of alcohol dependence (DiFranza & Guerrera, 1990). Therefore,

understanding alcohol dependence as an individual-level risk is especially important for understanding tobacco use and smoking reduction in this population.

Since shelter-level results show a relationship of shelters targeting mentally ill homeless individuals and homeless individuals with substance abuse issues, it would have been ideal to assess mental health status and substance abuse behaviors at the individual-level for Chapters 2-4. In this study, we were limited in our ability to ask certain questions regarding alcohol dependence, illicit drug use and mental health status due to IRB constraints.

In regards to outcome measures, other forms of tobacco use such as cigar and cigarillo use also need to be measured to gain a better understanding of tobacco use prevalence. However, to keep respondent burden to a tolerable level, these measures were not included in the data collection in Chapters 2 and 4. In addition, questions regarding loose tobacco, and chewing tobacco should also have been included, as they may be cheaper alternatives to cigarettes, and therefore more desirable for our population. Prevalence use rates of alternative tobacco products among homeless populations are relatively unknown. Notably however, despite all of the limitations related to missing or unobserved data, this type of research has not been done before. Therefore, even descriptive data and incomplete models are significant contributions to the literature, and offer ways to inform future research, policies and programs.

5.2.4 Measurements of the built environment

Little research exists on the micro and meso built environment related to tobacco use behaviors of residents of transitional homeless shelters. Qualitative data in Chapter 4 highlight that we need a better understanding of what constitutes the micro and meso environments for these residents.

Chapter 4 uses traditional elements related to the micro environment including the number of signs restricting tobacco and the number of cigarette butts on premises as the main indicators of interest. Although the number of signs is unlikely to change on a daily basis, it is likely that the number of cigarette butts would change daily, or even multiple times during the day based on the frequency of

cleaning. A onetime measure was not sufficient to capture the impact of the micro built environment on smoking behaviors. Therefore, future research should account for differences over the day and different days of the week by measuring the number of cigarette butts at multiple time points as a proxy for the amount of smoking at the shelter-level.

In regards to the meso built environment, only the number of licensed retailers within a 1000 foot of shelters was captured. Conversations with shelter staff and residents through field notes and MLDs indicated a need to account for informal sources of tobacco, such as individuals without a license to sell tobacco products selling single cigarettes to residents. This was accounted for in the measurement, but again, it was only captured at one time point. Perhaps vendors are only available at a certain hour, or only when non-regulars are in or around the facility, and this would not have then been captured in the meso built environment assessment, leading to a false assessment of tobacco availability. Future research should also link data from the California Board of Equalization listing of registered tobacco retailers to shelter site addresses to see if there are any differences with the data that we collected to capture the built environment. Importantly, a comparison of informal and formal vendors would yield more valid insight into the true environment of cigarette procurement for this homeless population.

5.2.5 Qualitative data Limitations

The first limitation is that the qualitative portion was not part of the initial design, and therefore evolved over time. In part, because this study strategy arose after the evaluation process was designed and implementation begun, theories and methods of qualitative research designs could not be rigorously implemented in the short amount of time available. However, we were aware of this and tried to ensure reliable data by developing rigorous inductive strategies in collaboration with our Coalition partners. More research at shelters is needed to confirm some of the themes extracted in Chapter 3, and further discussed in Chapter 4. This limitation points out that the CBPR partnership was essential in highlighting the need to include such an approach and methods in order to ask more appropriate questions.

The second limitation of the qualitative data analyses in Chapters 3 and 4 is researcher reflexivity, which essentially means that my experiences, as the researcher, can impact the outcome of the analyses if not made more open to confirmability (the analogous validity check in deductive research) (Bernard, 2011). I was the sole coder of the qualitative data. Ideally, multiple coders would improve reliability of the coding and interpretation. More specifically, no inter-rater reliability could be calculated. However, initial themes were determined after multiple collaborative discussions of the data with CBPR partners from the Coalition. Excerpts of interest were underlined and emerging themes were further discussed with CBPR partners from the Coalition and shelter staff, who agreed with the assessments. This process supports the confirmability of the data, thus, minimizing the issue of having only one coder, and improving my confidence in the quality of the analyses.

5.3 Conclusion

The potential influence of the social, built, and policy environments on the smoking status of residents of transitional homeless shelters has not been previously addressed. Notably, we found that most individual-level demographic factors that indicate differences in tobacco use in traditional research were not related to tobacco use among residents of transitional homeless shelters. Part of the issue may be because of underpowered tests. However, what seems likely is that this is a unique population for which the traditional approaches and measures may not be valid. In Chapter 4 we showed that the built environment and policy environment were also not significantly associated with tobacco use among residents and staff of transitional homeless shelters as measured and conceptualized. We conclude that the high rates of smoking observed in residents of transitional shelters may be better explained by the conditions that contribute to homelessness than by possible environmental influences as conventionally measured.

The lack of significance of micro and meso-level built and policy environmental factors may point to the need to improve the measures and indicators used in this study. The environmental audit tool created for these assessments with post-analysis modifications is a contribution to the literature, and can

be used and built upon in future studies. As noted, this audit would need to be modified prior to future implementation to include informal vendors as described in Chapter 4. Innovative methodology could also be used to further explore meso built environment features such as through hotspot analyses using GIS, allowing us a different way to examine the potential impact of meso-level tobacco control policies on residents' smoking status.

More nuanced analyses of the policy environment are also needed in future research using the specific type of policies. These finer grained analyses would help us to better understand how the policy environment is or is not related to tobacco use by subgroups of transitional shelter residents. Policies may help change norms and encourage smokers to reduce or quit smoking in the general population. However, the push for policies at the shelter-level should be approached cautiously. Smoking prevalence among homeless populations is high, and this rate of smoking may reflect one of the primary coping mechanisms for the many barriers that they face in their lives, and may be a more positive coping behavior than some of the alternatives, resulting in more negative unintended consequences

The enforcement of policies needs to be approached in a manner that is respectful of shelter staff and residents, and promotes alternatives for smokers to change behaviors by replacing smoking behaviors with more positive influences that may ultimately benefit their lives. For example, if a city-level tobacco control policy governing tobacco use in multiunit housing has the unintended consequence of leading to the eviction of low-income, tobacco-addicted residents, such a policy could inadvertently accelerate a return to homelessness and the streets thereby diminish, and their chances of making positive changes and integrating back into society. Therefore, future efforts to reduce tobacco use should take into account shelter-level policies, and would be strongly advised to also involve shelter staff and residents in creating these policies using a bottom-up approach, to minimize the potential for unintended harm.

Because smoking prevalence rates are so high in this population, more tobacco control resources need to be invested in expanding knowledge about effective approaches to helping the homeless overcome the barriers to quitting and abstaining long-term from tobacco use. More research is needed to

better understand how tobacco control policies and other potential environmental influences might, in fact, make a positive difference the health behaviors of this population.

5.4 Future Directions

Future research needs to better measure elements of the built and policy environments relevant to this population, so they can be observed both separately, as well as their intersection with perceived social support and individual-level barriers as noted in the conceptual model in Figure 1.3 in Chapter 1. Only by addressing the overlapping context of these constructs can scholars, policy makers, and practitioners really understand the tobacco use experience of homeless individuals residing in transitional shelters. Such increased understanding is a prerequisite for developing more relevant and effective interventions for this population. Furthermore, future studies on the built and policy environments at the shelter-level should capture the informal and formal distribution of cigarettes by staff, as well as other routine practices of shelter smoking practices, and discover more direct measures of smoking behavior than counting cigarette butts.

Essential to future investigations and development of intervention studies is the requirement that this research be done with sensitivity and respectfully with the community, for the goal would not be to report potentially illicit behavior, which could jeopardize shelter funding from local and state agencies, but to support these residents as they strive to reintegrate into mainstream society. Lastly, research should address how tobacco use reduction efforts might reinforce substance abuse and mental health treatment, and whether incorporating tobacco use reduction/cessation efforts could have synergistic benefits involving other areas of well-being.

For this population, it is important to first focus on the goal of tobacco use reduction. The ultimate goal may be cessation but we, as yet, do not know clearly what purpose smoking serves in supporting their efforts to change their lives through these transition shelters. In addition, future interventions need to acknowledge why this population is difficult to reach. It is necessary to build the interventions in ways that are holistically beneficial to residents, rather than perceived as just taking away

a major coping strategy the residents may be using to deal with the stresses in their daily lives. A replacement coping mechanism is needed if tobacco use reduction is to be sustained.

Ultimately, smoking reduction can improve the quality of their lives, but this long-term goal may not seem realistic without more tobacco control resources at their disposal, such as NRT, or without ascertaining the perspective of the population group of focus on this issue. The staff at the Coalition creatively and wisely and accurately coined the term Mutual Learning Dialogues for the "focus groups". They understood that efforts such as this program are a two-way street and each party could learn from the other to work together. Asking the residents and staff what they feel would support their efforts to reduce or quit their use of tobacco would be an essential strategy to use in future efforts to reduce tobacco smoking behaviors in this transitional shelter population group, and likely most other under-served populations. .

5.5 References

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