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# *Call to Action: Continuum of Care for Females of Reproductive Age to Prevent Obesity and Ensure Better Health Outcomes of Offspring Through Nutrition*

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**Abstract:** The health and nutritional status of women of reproductive age has tremendous impact on the health of future populations; therefore, special attention should be paid to promoting women's health, especially a healthy weight at this critical time period. The purpose of the paper is to provide information on the nutritional needs of women at various stages of the reproductive age spectrum, including preconception/interconception and during pregnancy to achieve and maintain a healthy weight. The Socio-Ecological Model (SEM) is presented to help

practitioners understand the importance of intervening where women of reproductive age live, work, and frequent.

**Key words:** continuum of care, nutrition, preconception care, obesity, optimal health, socio-ecological model

## ***Introduction***

### **THE IMPORTANCE OF CONTINUUM OF CARE FOR FEMALE OF REPRODUCTIVE AGE**

Over the past 4 decades dramatic changes in the United States have led to an obesity

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epidemic, which threatens the overall health of the population.<sup>1</sup> At present, over a third of women of reproductive age are obese (OB) and almost a quarter are overweight (OW).<sup>2</sup> Non-Hispanic black and Mexican-American women are most at-risk for OW and obesity.<sup>2</sup> The risk for increased adiposity continues to rise for minority women and those of low socioeconomic status.<sup>3</sup>

The continuum of care for females is inextricably linked to the health and well-being of newborns and children. Research shows that if a newborn girl is born large-for-gestational age then the likelihood of her as a child, adolescent, and adult becoming OW/OB is significant, which means the probability of her having an OB infant is increased.<sup>4</sup> World Health Organization (WHO) and the Partnership for Maternal, Newborn & Child Health (PMNCH) show this relationship as cyclical.<sup>5</sup> Because so many women of child-bearing age are OW/OB, this has serious consequences on the health of their offspring. As such, the health and nutritional status of women during their reproductive period has tremendous impact on the health of future populations; therefore, special attention should be paid to promoting women's health at this critical time period (Fig. 1).

The continuum of care for females of reproductive age spans the ages of 15 to 49 years.<sup>6</sup> It is important to recognize this care is both a function of *time* and *place*.<sup>5</sup> In

other words, interventions such as nutritional counseling need to occur throughout this age span and in different places where these women frequent and live, including clinics, home/households, and communities, to create a comprehensive system of care and to have an impact on OW/OB. This means linking care, including outreach services, within the home or household (eg, availability of healthy foods with high nutritional value), communities (eg, access to affordable produce at farmers' markets), and within the health facilities (eg, hospitals, primary and referral care), to assure the health of women and her offspring. The environment influences and supports (or not) health behaviors and medical risk factors, such as eating healthfully, which impact a female's health and her pregnancy outcomes. Much like we can no longer concentrate care for a female at any given age or stage, we cannot focus care in any one place (Fig. 2).

**THE IMPORTANCE OF NUTRITION INTERVENTION IN THE PRECONCEPTION PERIOD FOR OPTIMAL HEALTH**

For years the standard of care regarding nutrition counseling for a woman of child-bearing age was to intervene when the woman became pregnant. At the first OB visit (which is often at least 6 wk gestation), often the woman is told how much weight should be gained throughout the



**FIGURE 1.** Continuum of care.



**FIGURE 2.** Continuum of care (place).

pregnancy. However, little guidance is provided by the practitioner to the pregnant woman regarding specific caloric and food intake. With our current obesity epidemic and the aforementioned cycle of obesity between mother and child, the call to action is to start these nutrition and health behavior interventions in the preconception period.<sup>7</sup>

Preconception care is defined as a set of interventions starting in adolescence intended to identify and reduce risks to a female's health through prevention and management of health conditions and improve pregnancy outcomes. Almost 30 years ago, the Institute of Medicine (IOM) advocated for women to receive preconception risk reduction counseling and health education.<sup>8</sup> In 2006, the Centers for Disease Control and Prevention (CDC) issued a call to action focused on preconception health.<sup>8</sup> This was the first national push to integrate preconception health into the health care system. *Healthy People 2000* set a national target for 60% of primary care physicians to deliver preconception care.<sup>9</sup> Furthering this goal, *Healthy People 2020* emphasizes that elements of preconception care should be integrated in *every* primary care

visit for females of reproductive age.<sup>9</sup> As a result, if we are to have an impact on women's health and the health of their children, we need to intervene earlier.

Despite these recommendations and calls to action from various governmental and advocacy organizations, in a Central Pennsylvania Women's Health Study (CePAWHS) over 30% of the sample of women aged 18 to 45 years ( $n = 1325$ ) reported did not receive routine physical examinations and screening services, and over 50% received little or no health counseling.<sup>10</sup> When it comes to delivering health counseling by practitioners, such as discussing nutrition recommendations, there are barriers including not knowing the current nutrition guidelines for women of a certain age, body mass index (BMI) not being measured and calculated on consistent basis, a lack of a procedure to deliver nutrition counseling, and lack of time during the visit to accommodate all these important issues and procedures. Further, preconception care should be designed as a process of care which meets the individual woman's needs and it is not a one-size-fits-all intervention. As mentioned before, the continuum of care model addresses care across time and across places and spaces: how can a practitioner not only ensure she is providing accurate and sound nutritional counseling to meet a woman's needs in a standardized way *and* the counseling addresses ways the woman can successfully implement lifestyle behavior changes, which considers where she lives, works, where she goes to school, as well as who she lives with and surrounded by (friends, family, peers, etc.)?

The purpose of this paper was to provide information on the nutritional needs of women at various stages of the reproductive age spectrum, including preconception/interconception and during pregnancy to achieve and maintain optimal health, including a healthy weight. Further, the Social Ecological Model (SEM) is

presented to help practitioners understand the importance of intervening across the places and spaces where women of reproductive age live, work, and frequent to support the continuum of care model and, therefore, guarantee women will be more successful in achieving their optimal health through proper nutrition.

## ***Important Nutritional Components for Women of Reproductive Age***

### **PRECONCEPTION NUTRITIONAL COMPONENTS**

The Academy of Nutrition and Dietetics (formerly known as American Dietetic Association) recommends the Nutrition Care Process to ensure that high-quality nutrition care is provided to the patient.<sup>11,12</sup> This systematic approach consists of 4 distinct, interrelated steps and is presented here in relation to the OB/GYN practitioner:

- *Nutrition assessment:* Although the registered dietitian collects a myriad of information such as food-related or nutrition-related history, biomedical information (eg, blood pressure, blood cholesterol, blood glucose, etc.), anthropometric data such as BMI, and any other client history and physical findings, the OB/GYN practitioner should at the minimum measure height and weight to calculate BMI. OW is defined as a BMI of 25 to 29 kg/m<sup>2</sup> (85th percentile), and OB is 30 kg/m<sup>2</sup> (95th percentile).
- *Diagnosis:* A specific diagnosis should be made based on the BMI of 85th or 95th percentile for BMI.
- *Intervention:* The nutrition intervention involves recommending specific caloric intake and menu plans to alleviate the signs and symptoms of the diagnosis (eg, OW or OB).
- *Monitoring/evaluation:* The final step of monitoring and evaluation is used to

determine if the patient has achieved or is moving toward accomplishing the planned goals.

Specific nutritional recommendations for the OW/OB woman include<sup>12–14</sup>:

- The first recommendation is a reduction of 500 to 1000 kcal/d to achieve a 1 to 2 pound weight loss per week. The practitioner should recommend a reduced-energy (between 1200 and 1800 kcal depending on what the patient is currently consuming, height and weight, age, etc.) (for a weight loss calculator, go to <http://caloriecount.about.com/tools/calories-goal>), low-fat (< 30% of calories from fat), nutrient-rich, high fiber (> 25 g) diet. Structured reduced-energy, low-fat meal plans showing a women what to eat, how much to consume, and when to eat can be a helpful resource to ensure compliance.

Other nutrition recommendations include<sup>15</sup>:

- Women of child-bearing age should consume an adequate amount of 400 µg of synthetic folic acid daily, or by consuming foods high in folic acid. There are some food in which folic acid is found naturally such as green leafy vegetables, citrus fruits, beans and legumes, and whole grains. At present, many foods are enriched with folic acid including breakfast cereals, breads, flours, pastas, and white rice.
- Women of reproductive age should eat foods high in heme iron, such as 3 ounces of beef or chicken liver, cooked beef or cooked turkey, iron-fortified foods (including breakfast cereals), or nonheme iron including cooked beans, tofu, or broccoli, with an enhancer of iron absorption such as vitamin C-rich foods including strawberries, citrus fruits, or dark green leafy vegetables.

It has been acknowledged that providing nutritional counseling and follow-up to the OW/OB woman can be challenging. Further, there is no guarantee the woman

will go home and implement the nutrition plan. However, research shows as little as a 5% reduction in weight was associated with improved fertility<sup>13</sup> and as little as a 10% decrease in weight has been linked to improvement in blood pressure, cholesterol, and diabetes.<sup>12</sup>

### **INTERCONCEPTION NUTRITIONAL COMPONENTS**

The CDC recommends that every woman of reproductive age receives interconception care. During the interconception period, the nutritional components for women are the same as for preconception (see above). Further, the goal should counsel the woman on how to lose the weight gained during pregnancy and to continue lose weight until the woman is of normal weight.

### **PREGNANCY NUTRITIONAL COMPONENTS**

The ideal is for the OW/OB woman to lose weight before pregnancy as there is evidence that OW/OB woman gain between 2 and 6 times more weight above the IOM recommendations than normal weight women.<sup>16</sup> In addition, research shows normal weight women who gained weight within the IOM recommendations incurred approximately \$2500 less costs compared with women who exceeded the IOM recommendations. A cost saving of approximately \$6500 was realized for OB women who gained within the IOM recommendations compared with OB women who did not.<sup>17</sup> Therefore, it is imperative that the practitioner provides nutritional counseling in order for the woman to achieve optimal weight gain during gestation. The 2009 IOM guidelines recommend a total weight gain of 15 to 25 pounds (range, 6.8 to 11.3 kg) for OW women (BMI, 25 to 29.9) and 11 to 20 pounds (range, 5.0 to 9.1 kg) for all OB women (BMI  $\geq$  30). (For an online BMI calculator, see <http://www.nhlbi.nih.gov/guidelines/obesity/BMI/bmicalc.htm>.)<sup>18</sup>

Although there continues to be a myth about eating for 2 when a woman is pregnant, the additional energy recommendation for a healthful birth outcome is approximately 340 kcal/d in the second trimester and 452 kcal/d.<sup>13</sup> Examples of snacks which contain about 300 kcal are a small whole-wheat bagel with a tablespoon of peanut butter, or low-fat 8-ounce yogurt with fresh fruit, or a 3-egg omelet with vegetables. Women should take a prenatal vitamin and mineral supplement and continue eating a diet rich in folic acid, iron, and fiber.

### ***Nutrition and Lifestyle Interventions for Women of Reproductive Age***

Research shows that a women's health knowledge alone or a doctor's recommendation are not enough to change behaviors, such as healthy eating, and, therefore, more comprehensive and innovative programs are needed for women to adopt a healthy lifestyle throughout their reproductive years. It is important to understand that women's health-related behaviors, including those leading to a woman's weight status, are influenced by many factors. As mentioned above, some sex-based health determinants for a woman of reproductive age's health include ethnicity, education, socioeconomic status, marital status, and coping skills such as enlisting social support. Therefore, this makes developing successful weight reduction and prevention programs for women of reproductive age challenging. Successful interventions consider the various levels of the SEM (Fig. 3). For instance, most of us know weight reduction or healthy weight promotion requires lifestyle behavior changes, such as eating a variety of nutrient-rich, low caloric foods such as lean meats, nonfat or low-fat dairy products, whole grains, fruits and vegetables, as well as engaging in physical activity. However, a person's knowledge is only

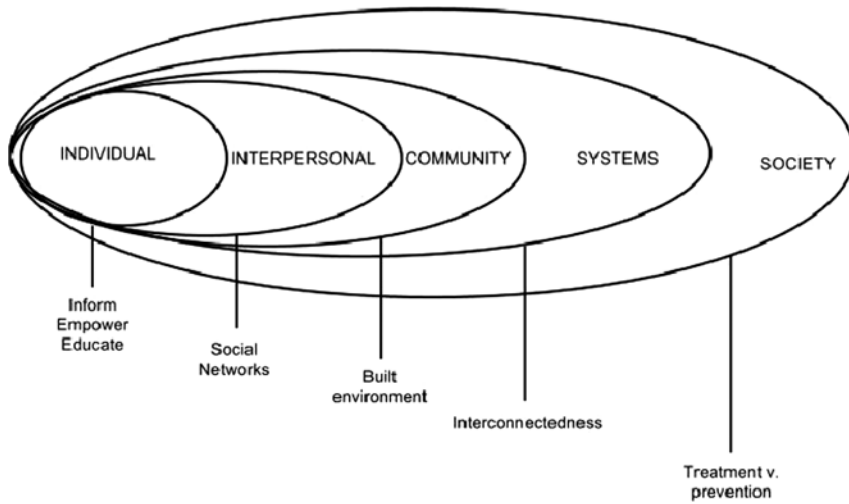


FIGURE 3. Social Ecological Model.

a small and the first step to making these lifestyle behavior changes. What if a woman knows she should eat more fruits and vegetables, yet the nearest grocery store is 4 miles away and she does not have transportation to the store? In addition, the small market near her house does not have a large selection of produce, and the fruits and vegetables which are available are expensive. In a case like this, which is quite common for women most at-risk for obesity, knowledge is not enough to support behavior change. Although there has been a push to intervene on women of pre-conception age to improve health, including promoting normal weight status and prevention of OW and obesity, there has been little guidance of how to actually intervene. Table 1 provides important considerations for lifestyle interventions for successful weight control.<sup>19</sup>

The Nutrition and Physical Activity Program to Prevent and Other Chronic Diseases at CDC uses a 5-level strategy to develop effective prevention and reduction programs.<sup>20</sup> These 5 levels of the SEM are the individual (ie, education), interpersonal (ie, social networks), community (ie, built environment), systems

(ie, interconnectedness of places), and society (ie, political values of treatment vs. prevention). Below are examples of the kinds of interventions which can be carried out with OW or OB women of pre-conception age using SEM. Although the

TABLE 1. Variables Associated With Successful Weight Control

|                                    | Low-calorie<br>Low-fat Diet Meal<br>Replacements/Structured<br>Meal Plan   |
|------------------------------------|--|
| <b>Dietary</b>                     |  |
| Physical activity                  | High physical activity goals (60 to 90 min/d)<br>Short (~ 10 min) bouts of physical activity<br>Exercise equipment in the home |
| Behavioral                         | Daily self-weighing of body weight<br>Daily monitoring of food intake<br>Goal setting  |
| Psychosocial                       | Stimulus control<br>Social support<br>Relapse prevention/<br>cognitive strategies  |
| Continued patient-provider contact | Monthly or more frequent visits  |

call to action by *Healthy People 2020* and CDC is for all women of child-bearing age get health education, additional emphasis should be on those women most at-risk for being OW and OB, such as non-Hispanic black and Native Americans, women with less than a high school degree, and unmarried women.<sup>3</sup>

### INDIVIDUAL SPHERE

This is where a practitioner can inform, empower and, educate an OW or OB woman to make lifestyle behavior changes. Practitioners face barriers to deliver behavioral treatment, such as limited medical insurance coverage, lack of time and training in behavioral methods, the need to handle cooccurring medical conditions, and lack of interest on the part of the woman. Despite these hurdles, research shows physician's recommendation to lose weight resulted in a 3-fold increase in patient's attempts to address their weight.<sup>16</sup> The first recommendation is that BMI should be calculated and recorded at every clinic visit. The rate of screening for obesity is low in clinical practices; therefore, obesity and OW are underreported. If the woman is found to be OW (85th percentile) or OB (95th percentile), this is the beginning of the lifestyle behavior change and nutrition intervention. Below are the key recommendations from various government organizations and panels on how physicians and other health practitioners can best address being OW or OB with the women during the preconception period within the clinical setting:

- (1) Be sensitive to the terms used when describing excess weight. Use *weight*, *heaviness*, *BMI*, and *excess weight*. Avoid *fatness*, *excess fat*, *obesity*, and *large size*.
- (2) Make specific calorie recommendations (eg, 1200 to 1800 kcal/d), as well as progressive physical activity goals leading to the ultimate aim of 60 to 90 minutes of activity per day.

Remember to help the patient make Specific, Measurable, Achievable, Results-focused, Time bound goals (SMART). For instance, good SMART goals are, "I will drink water instead of soda this week" or "I will walk five out of the seven days for at least 30 minutes." SMART goals allow the patient to make small, measurable, and achievable goals so a modest weight loss goal of between 7% and 10% of body weight can be accomplished. Patients should monitor their daily food intake, physical activity, and weight on a daily basis. There are free mobile apps, journals, and other journals or logs to help patients keep track.

- (3) Practitioners should refer OW or OB patients to other health care professionals, such as dietitians, psychologists, and exercise physiologists, or commercial weight loss programs for further support and guidance.
- (4) Practitioners should continue to meet with patients to discuss weight and behavior changes on a regular basis. Lifestyle behavior changes made by the patient require time and support from the practitioner and the other allied health professionals. Practitioners can support weight loss efforts by reviewing behavior changes and health complications at *every* office visit. Achievement of eating and physical activity goals should be praised, and setbacks should be met with empathy so that the patient feels encouraged and supported to continue her weight control efforts.

Resources to support the physician or practitioner in being able to consult the aforementioned ways include prompts to follow a procedure (eg, measure height and weight, discuss nutrition and/physical activity goals, etc.). United States Department of Agriculture has a Web site, <http://www.choosemyplate.gov>, which contains free resources and tools including meal



and menu plans, tracking tools for eating and physical activity, tips and suggestions on how to achieve weight loss goals, as well as other resources.

### **INTERPERSONAL SPHERE**

As mentioned before social support and access to available social support networks are imperative to facilitating and maintaining healthy behavior changes and lifestyle for women of preconception age. Although a physician may feel this interpersonal sphere is beyond his or her expertise and beyond the clinic walls, practitioners can in fact be supportive of the OW woman finding ways to surround herself with supportive friends and family members. For instance, a physician can recommend joining a walking club or starting one with friends and family. Other ways a physician can support the interpersonal sphere include linking the woman with support groups, role playing ways the woman can ask parents, spouses/significant others, and friends to help in supporting eating and physical activity goals, and helping to find mentors, perhaps patients who have been successful at losing weight and would be willing to support the OW woman in her weight loss journey.

### **COMMUNITY SPHERE**

The community sphere refers to the places where the woman lives and works, in other words the built environment. The built environment includes land use, zoning, modes of transportation, and available physical activity options. As mentioned before, the built environment, such as the lack of a grocery store within walking distance with a variety of affordable fruits and vegetables, can be a barrier to healthy lifestyles by limiting access to nutritious foods and physical activity opportunities, recreation, and social interaction. Communities with a high degree of connectivity between neighborhoods, and neighbors, are more likely to have a

positive effect on health behaviors. Again, a physician may feel this is beyond the scope of practice; however, imagine suggesting to a patient to make a goal of increasing consumption of fruits and vegetables and whole grains. In fact, at-risk women for obesity, such as Native American and non-Hispanic black women, are usually in communities which are not conducive to healthy lifestyles such as having a high density of fast-food restaurants and liquor stores. The practitioner should be sensitive to the community OW and OB women live in and provide a list of community resources to help with supporting weight loss such as weight loss groups, where the woman can apply for federally funded nutrition assistance programs such as SNAP-Ed or other community-based organizations such as food distribution sites where the women can get donated food (at present, there is a push to ensure the food is nutritious including fresh fruits and vegetables), free or reduced cost physical activities within the woman's community, available farmer's markets, etc. This list should be updated routinely as these resources are subject to change.

### **SYSTEMS SPHERE**

At the beginning of this paper there was a mention of continuum of care for women of reproductive age is a function of both *time* and *place*, which included household (individual and interpersonal sphere), the community, and the clinic. Much like the importance of connectivity among neighborhoods in a community to positively impact health behaviors of its members, the connectedness among sectors is important to scalable and sustainable interventions. The public health system requires an intersectoral approach. For too long we have pointed the finger at public *or* the private sectors as being ultimately responsible for the obesity epidemic and not doing enough to solve the crisis. In truth, the 2 sectors must partner

and work together for an interconnected systems approach to address the obesity epidemic. Therefore, clinics and the health care sector must partner with other public entities including businesses and industries, as well as the public sector of local, state, and federal government agencies and other public institutions such as public universities. The public domain is responsible for creating top-down mandates and provides funding for research and interventions. The private sector influences advertising, supply prices, and health care practices. The nonprofit sector can mobilize and conduct large-scale obesity prevention programs. What is needed in the fight against the obesity epidemic and improved access to good nutrition are successful policy interventions, which means the cooperation between the public, private, and nonprofit sectors for political feasibility.

## **SOCIETY SPHERE**

Our obesogenic environment, and the resulting obesity epidemic, reflects our values. The US government has not regulated industries (sugary sweetened beverage industry) or government agencies, such as USDA, with funding commodity crops including corn, soybean, wheat, etc., which led to our obesogenic society. Further, we have focused on treating OW and OB individuals rather than using societal level approaches to concentrate on prevention. These approaches take years and years to implement and can be politically contentious, such as the Affordable Care Act has and continues to be; societal level interventions are the only way to counteract the powerful forces in our environment. Continuum of care and the SEM are necessary methodologies to move the health care system toward prevention and away from treatment.

## **Conclusions and Provider Recommendations**

The health and nutritional status of women during their reproductive period has tremendous impact on the health of future populations; therefore, special attention should be paid to promoting women's health, especially a healthy weight at this critical time period. The continuum of care model focuses on time and place. Therefore, nutrition interventions need to occur throughout this age span and in different places where these women frequent and live, including clinics, home/households, and communities, in order to create a comprehensive system of care and to have an impact on OW/OB. It is recommended the OB/GYN and other practitioners of women's health intervene at every visit, including measuring weight and calculating BMI. On the basis of the BMI, a diagnosis of OW and obesity should be made and discussed with the patient. Specific nutrition recommendations should be made, such as ways and menu plans to decrease caloric intake by 500 to 1000 kcal/d, with consideration of where the woman is in terms of the reproductive age spectrum. Although measuring BMI and providing nutrition counseling are good first steps to improving the health and weight status of women, to continue to support weight loss the SEM should be used in order for the woman to be able to navigate the people she interacts with, the places where she lives and works, and the community she resides in. Without a deeper understanding of where the individual lives, health behavior changes cannot be maintained to make optimal health and weight throughout a women's lifespan a reality.

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