Issues Pertaining to Maternal Nutrition in Urban Areas

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Adequate, balanced nutrition is considered to be the number one contributor to a positive outcome in pregnancy and labor (Frye 204). So, what happens when a woman expecting a baby doesn't have access to fresh fruits and vegetables, unprocessed options, or other nutrient-rich foods? In the following pages, this paper will examine these concerns and explore some creative ways to approach a solution. These issues are multi-faceted, and this paper should in no way be considered an authoritative look at the complexities of this topic. Instead, it should be taken as a brief look at some of the most common and easily addressed problems and several of their potential solutions.

Initially, a definition of adequate, balanced maternal nutrition needs to be established. The definition that will be used in the context of this paper is the one provided by the World Health Organization, which defines adequate, balanced nutrition as the intake of macronutrients (carbohydrates, proteins, and fats), vitamins, and minerals in relation to the body's needs. While broad principles can be applied throughout all contexts, these needs vary from woman-to-woman and from culture-to-culture. Therefore, there is not a one-size-fits-all solution, but instead a need for individualized care. The failure of a person's diet to meet their body's needs leads to malnutrition. While malnutrition can refer to a lack of food in quantity, in this paper it more often refers to a lack of food with nutrient density[1] and vitamin and mineral variety. It always refers to deficiencies in a person's diet that contribute to the needs of their bodies not being adequately met. Due to the fact that these needs vary from person to person, the treatment for malnutrition also varies from context-to-context, hence the need for individualized care.

[1] Nutrient density is a way of measuring foods that have high vitamin and mineral content in ratio to their non-beneficial nutrients, such as empty calories.

A wide range of topics exist on the relationship between nutrition and maternal health; however, this paper will only explore these effects on the population of mothers with no pre-existing, nutrition-related health issues: such as diabetes and chronic hypertension.

1. The effects of maternal nutrition of the fetus

What a pregnant woman does or does not eat has an incredible effect on her child's development, both while they are in the womb and in their early childhood as long as she is breastfeeding them, whether that be exclusively or supplementally. This effect is one that the medical professionals are only beginning to understand, however, it is one that is immensely important for the life of the child, even into their adulthood.

One of the most long lasting of these effects is on the fetal[2] genetics; in fact, nutrition is the largest environmental factor that can alter the fetal genetics, potentially resulting in a predisposition to metabolic, endocrine, and cardiovascular diseases in a child's adult life (Wu, et al). This occurs because maternal malnutrition reduces a mother's blood volume expansion and the placental-fetal blood flow, which then impacts the amount of oxygen and nutrients that are able to be passed to the fetus. The fetus adapts to this form of malnutrition by changing their metabolic rate and hormone production; and in the process, end up altering the structure and function of their body, as well as their sensitivity to stress hormones. This occurs due to the progressive rise of their cortisol levels while their blood is simultaneously redistributed to maintain the perfusion of their vital organs, specifically that of their brain. The result of this self-protection reaction is that blood is drawn away from other tissues, such as their muscles, kidneys,

[2] In this paper the word fetus is used to refer to an unborn human baby, while infant or newborn are used to refer to a human no longer in the womb. The use of the word fetus in no way reflects any views held on the status of life within the womb.

and liver. While these functions work together to protect the fetus from death, they also slow their rate of growth, leading to a metabolic predisposition to store fat and a low birth weight. This metabolic predisposition to store fat can lead to obesity in adulthood, which increases the risk of other diseases developing as time continues. Low birth weight is the leading cause of stunting, which is a form of growth failure that develops over a long period of time in children under five, who grow up with limited access to food and healthcare. This condition is often associated with poor skeletal development, delayed mental and motor development and poor school performance (Global Nutrition Report).

To combat these effects of maternal malnutrition, it is critical that the mother have adequate access to a broad range of vitamins and minerals during her pregnancy. Deficiencies in specific vitamins and minerals lead to specific issues with the fetus's development. For example, a maternal diet lacking in folic acid and B vitamins is linked to congenital defects, such as spina bifida, anencephaly, cleft palate, and congenital heart disease. Similarly, a maternal diet lacking in protein and zinc increases the risk of the fetus having gastroschisis, a birth defect in which the abdominal wall has a fissure or a gap (Sullivan, et al). This condition requires surgical repair either in-utero or directly after birth. If surgery isn't able to be performed, the baby will be unable to survive outside the womb.

2. **The effects of maternal nutrition on the mother's health**

While the maternal diet has a drastic effect on fetal and childhood development, it also greatly affects the mother's body function. In general, what a person eats affects how their body grows, heals, fights sickness, and produces energy. This is compounded in pregnancy by the demand on the woman's body to maintain her normal functions on top of providing nutrients and

oxygen for the fetus and filtering out the waste products from their metabolic function. Additionally, if a fetus is unable to receive adequate nutrition from the maternal intake, the mother's body will begin to sacrifice itself to try and provide for what the fetus needs.

Maternal nutritional deficiencies during pregnancy can hinder the blood volume expansion that occurs during the second trimester and increase the risk of gestational anemia, hypertension, and pre-eclampsia (Eshra). These conditions all lead to higher risks of postpartum hemorrhage. Postpartum hemorrhage, if not properly managed and contained, can lead to maternal death. Another factor linked to nutrition that pregnant women need to be especially conscious of is anemia. Globally, 50% of pregnant women are anemic (Nutrition of Woman and Adolescent Girls: Why It Matters). Gestational anemia is caused when the body is unable to increase the red blood cells in the proper ratio to the blood volume during pregnancy, due to a lack of iron and other vitamins. When iron levels are low, red blood cells are unable to carry adequate oxygen to the body's tissues. This results in a multitude of adverse symptoms to the mother, including fatigue, shortness of breath, lightheadedness, tachycardia, and overall weakness (Braunstein, Even, et al). Any of these symptoms by themselves are enough to affect a person's quality of life and their capability to perform necessary tasks in the day-to-day, but the effects are multiplied when compounded with the other physiological realities of pregnancy.

Malnutrition can also lead to problems when the mother is breastfeeding. The production of breastmilk is not significantly diminished in cases of moderate malnutrition, as the body draws on the mother's reserves to produce milk. However, the quality of the milk is affected when there is a deficiency of vitamins, specifically vitamin A, B, C, and D. This lack increases a baby's risk of neurological and skeletal development problems (Montreal Diet Dispensary).

Another major problem with poor maternal nutrition is the cyclical effect that occurs if the mother is carrying a baby girl. The adverse effects of inadequate nutrition, specifically the skeletal development problems, can lead to issues in that girl's pregnancy once she reaches her childbearing years. Obstructed labor is one of the top five causes of maternal mortality worldwide at an 8% rate, and it is largely due to cephalopelvic disproportion, in which the infant's head is too large to fit through the mother's bony pelvis (Institute of Medicine Committee on Improving Birth Outcomes).

Nicholas Kristoff detailed the scale of the issue in his video documentary, stating, "Half a million women die every year in childbirth. It's not biology that is killing them, we know how to save their lives. What's missing isn't some new medicine or technology, it's the will to save them." It's estimated that 90% of the five leading causes of maternal mortality[3] are entirely preventable, and three out of five can be linked to nutrition (UNICEF).

Maternal nutrition is a vital issue because women are the drivers of society. They work harder and longer than men and are more tenacious in general. They cook the majority of the family's meals, they clean the home, and they are the ones most responsible for raising the children. While raising their families, they impart not only knowledge, but also cultural values that can impact society. When their bodies suffer due to a lack of nutrition, their families suffer, the next generation suffers, and society overall suffers.

3. Obstacles to nutrition

[3] The top five causes are post-partum hemorrhage, infection, obstructed labor, preeclampsia, or unsafe abortion. The risk of PPH can be minimized through proper blood volume expansion, pre-eclampsia can often be avoided by maintaining enough protein and calories in the maternal diet, and types of obstructed labor can be prevented with a good diet during childhood.

The obstacles to adequate nutrition are as broad and varied as the effects of nutrition on pregnancy and cannot be looked at in full in the breadth of this paper. Therefore, this paper will discuss the nutritional obstacles that women in urban areas[4] living in low-income neighborhoods[5] may face.

Low-income neighborhoods in urban areas are more likely to have a convenience store or a small independent store, rather than a full-service supermarket or grocery store. This subset of small stores often has higher prices, lower quality, and less variety of food. Additionally, the food available is highly processed in order to be shelf stable, in contrast to the nutritionally dense food often found in higher income areas. This is compounded by the fact that people who live in these low-income areas may not have access to a personal vehicle, and therefore might not be able to travel the additional distance to a full-service grocery store. In most cases, public transportation is not a practical solution to this problem, as it is not likely to run close enough to their destination to make its use feasible; not to mention the difficulty of traveling on public transport with full shopping bags. Due to these factors, low-income families are reliant on what is available: nutrient depleted and expensive food. This positions families to be vulnerable not only to malnutrition, but also to price increases and economic instability which exacerbates the problem. ("Food Insecurity", IUFN).

There is also a correlation between education and malnutrition, as a low level of education is often correlated with a low level of income. Additionally, less educated persons might not know how to purchase and prepare balanced meals outside of what they've always known, let alone understand the importance of feeding their bodies. A woman in this category

[4] An urban area is a city of where one million or more people reside.
[5] A low income area is where 51% or more households have incomes at or below 80% of the area median income.

might feel as though she does not have the additional time it takes to prepare something that isn't pre-packaged, as she and her family have to spend more time working to make the same amount of money as someone with a higher level of education.

Access to food differs regionally, even in urban areas, not only due to what is available, but due to the effect culture has on food preferences and traditions which are then passed down from generation to generation. Some cultures regard specific foods as luxury or pedestrian, edible or inedible, or to be consumed by only males or only females (Culture and Its Influence on Nutrition and Oral Health). This last denotation is especially dangerous in the context of maternal nutrition in cultures where males are given priority over female. This is often most evident in African and Southeast Asian cultures, but also in some Central American cultures. These regions tend to traditionally hold to the practice of men being served the best portions, usually those higher in protein and more diverse in their mineral and vitamin content, before the women and children are allowed to eat whatever is left over. This clearly can lead to a diet lacking not only in quantity, but one that also lacks nutrient-dense food.

4. Methods to reduce maternal malnutrition

One of the most direct ways to influence the nutrition in a population is through education. Classes that focus on teaching women and girls how to prepare nutrient-rich foods available in their area contribute not only to a higher awareness of their dietary needs, but also assist in building confidence in balanced nutrition competency. Community education that addresses gender inequality, which is commonly prevalent among low-income communities, can increase a household's investment in a girl's health, education, and nutritional needs. Studies indicate that, when women have greater decision-making power in their families, their household

has better health overall. This indicates that women are more likely to invest in food and healthcare than the men, who typically invest in alcohol and pleasure (Nutrition of Women and Adolescent Girls: Why It Matters).

Distribution of multivitamins seems like an efficient, quick way to fix to micronutrient deficiencies, but research is conflicting on this topic. Some projects show that the use of multivitamins reduce the occurrence of anemia and birth defects related to vitamin deficiency (Dewey). However, a study in 2018 by an Australian pharmacist claims that the evidence on multivitamins improving health is weak and inconsistent, and in some cases, may even cause harm. Most argue that the best way to effectively treat a nutrient deficiency is to administer a supplement with that specific nutrient. Many widely distributed multivitamins and prenatal vitamins flood the body with unneeded, and thus unabsorbable, nutrients (Grzeskowiak). Therefore, while the supplementation of minerals and vitamins are an important part of prenatal care, they must be used correctly, on a case-to-case basis, and a mass distribution cannot independently solve maternal malnutrition.

Government funded assistance programs such as 'Women, Infants, and Children' combine aspects of these two methods by providing nutritional education, access to nutritious foods, breastfeeding support, and healthcare/social services to low-income families in America. Research performed by the Center on Budget and Policy Priorities has shown that women who participate in WIC give birth to healthier babies than those of mothers who are not participating in their program. These children go on to score higher on mental development assessments at two years than similar children whose mothers did not participate.

The use of roof-top gardens in urban areas is promising, but to get one up and running has a significant cost and labor investment. Because of this, a low-income population would

require loans and other forms of assistance in order to compile all the resources necessary for a sustainable project to be completed. Also, many buildings are not structurally sound enough to tolerate the addition weight of the soil, planters, and other equipment. This makes it necessary for every building to be assessed individually before a roof-top garden could even be started. This increases the time this type of project would take before it would produce enough food to be equal to the financial and labor investments.

Another interesting method to combat malnutrition in an urban area is the development of a community garden or food forest. Seattle has been particularly successful in this method with the development of the Beacon Food Forest. The Beacon Food Forest is a seven-acre woodland comprised of edible trees, perennials, annuals, and shrubs. Additionally, they have their own beehive on site. This gardening technique mimics a woodland ecosystem and combines aspects of native habitat rehabilitation with edible forest gardening. The project began as an all-volunteer project in 2009, broke ground on the first phase in 2012, and in 2018, is starting the construction of phase 2, which will double the size of the cultivated area. Their goal is to create a place not only to grow food and rehabilitate the local ecosystem to its prior productivity, but to also provide educational opportunities and a form of holistic community engagement. They aim to use slow and small solutions to gradually change the cultural understanding of food and permaculture and to take advantage of all the resources available in the area. Even though the Beacon Food Forest has not yet been completed through phase 3, it's been so successful that work on the Otakaro Orchard in Christchurch, New Zealand has already been begun, following the same principles and design (information gathered from Beacon Food Forest website).

5. Proposed solution

An analysis of these proposed solutions reveals that no one method will be successful by itself. Education is only effective if people then have access to the resources they need to succeed. Supplements should be allotted depending on individual need and not mass distributed. The construction of roof-top gardens requires a significant initial investment, both financially and in labor. Government assistance only works as long as a government identifies the need for maternal nutrition and has the capacity to operate and sustain a program. You need enough dedicated volunteers with long-term vision in order to implement the construction of a food forest, not to mention the appropriate land to do so. A combination of these researched ideas would allow a more comprehensive solution to this multifaceted problem.

If analysis shows that all of these methods work to some extent but aren't totally holistic by themselves, a potential approach would be to create a program that incorporates several of these methods simultaneously. To proceed in this manner, the first step would be to identify a group of women who are pregnant or of childbearing age in the region in question. It would be helpful for this initial group to be of a slightly higher economic status- people who would be willing and able to travel to areas with sufficient retail options to purchase the necessary resources to continue nutritional guidelines if they understood the importance. Begin educating this group by holding weekly or monthly meetings. These classes would incorporate not only why it's important to get adequate nutrition, but also how to prepare balanced meals within the specific context they live in. Depending on the region in which this project is executed, these classes could also include methods and training on how to use the space available to them in order to grow their own produce, even if it this limited to the amount of herbs and greens a participant could have in planters on their windowsill. The classes would also have to be

structured in a way that would help bring light to the value and dignity of women, as it takes an understanding of this reality to create a lasting change on the investment of maternal health.

Ideally, one would provide individualized counseling on how to incorporate the use of specific supplementation that a woman is lacking in her context, whether that be strictly nutritional advice or by helping her access vitamin supplementation in a capsule form. This could be in addition to supporting the mother through navigating whatever government nutrition assistance programs are available, or lacking that, directing her to local food banks and/or distribution sites.

As the first peer group begins to 'graduate' out of the education program, identify women with leadership capability and willingness to lead their own groups. Train and empower this next group to establish their own community group to host, as they are trained in the same educational classes initial group had participated in. Implement some sort of incentive in exchange for leading another peer group. Consider something like a discount on vitamin supplements or access to further resources for themselves and their dependents. Continue to multiply groups through the low-income area in question until saturation point is reached and there is a cultural shift. Within this cultural shift there will be a concentration of interested people that are willing to put in the work to start a community garden. This would include not only people to engage in the physical work of farming, but also people competent in administrative tasks who are willing to navigate the process of applying for grants and government assistance. This administrative group would also be responsible for finding an area where the community farm could be developed and expanded in increments as involvement increases and writing proposals to do so.

In contrast to the Beacon Food Forest model, where volunteers are allowed to take as much produce as they would like on the honor system, it would potentially be more optimal to

create a ‘buy-in’ model that would function similar to a community supported agriculture (CSA) program[6]. Creating a structure that works like a CSA program would ensure that the resources would be shared fairly between participating families depending on needs, and limit methods an individual could use to abuse the system. A participating family would have its level of credit based on the number of dependents they provide for. Potentially, the participants could earn additional credit based on the number of hours they have invested, whether through teaching classes, attending trainings, working in the garden itself, or performing administrative duties. If community members outside of the education and training program were interested in buying-in with currency instead of working for credit, this source of financing could eventually lower the amount of government involvement necessary for expansion as the project progresses.

6. Conclusion

Maternal nutrition directly affects maternal health, which in turn impacts the health of a society by affecting not only the physical wellbeing of the current generation, but that of future generations as well. It determines the direction a society will take as their children grow and develop to become cultural influencers that change the way the next generation approaches nutrition. Because this issue affects people of all generations, it is one that should be addressed not only by humanity in general, but also the governing bodies. A government is supposed to be put in place to serve humanity as a whole, and therefore should also be held to a standard where they invest in the nutrition of mothers, whether through assistance programs that operate in a similar way to WIC, or through education. While there are many obstacles and no perfect

[6] A CSA program involves an individual purchasing a share of a farms produce in their region, directly supporting the farmer without the involvement of a middle-man (aka a mass retailer). Participants get an allotment of produce on a weekly or bi-weekly basis, depending on what is seasonally available and how many people are participating in the program.

solutions, with educational opportunities, long term vision, and intentionality, changes can and will be made on a societal level to improve maternal nutrition and through it, improve the health of society as a whole.

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