


ORIGINAL ARTICLE

Program considerations for integration of nutrition and family planning: Beliefs around maternal diet and breastfeeding within the context of the nutrition transition in Egypt

Justine A. Kavle^{1,2,3}  | Sohair Mehanna⁴ | Ghada Khan³ | Mohamed Hassan⁴ |
Gulsen Saleh^{5,6} | Cyril Engmann^{7,8,9}

¹Maternal and Child Survival Program (MCSP), Washington, DC, USA

²Maternal, Newborn, Child Health and Nutrition, PATH, Washington, DC, USA

³Department of Prevention and Community Health, Milken Institute School of Public Health, George Washington University, Washington, DC, USA

⁴Social Research Center, American University in Cairo, Cairo, Egypt

⁵National Nutrition Institute of Egypt, Cairo, Egypt

⁶SMART Project Maternal and Child Health Integrated Program (MCHIP), Cairo, Egypt

⁷School of Public Health Global Health, University of Washington, Seattle, Washington, USA

⁸School of Medicine Pediatrics, University of Washington, Seattle, Washington, USA

⁹Maternal, Newborn, Child Health and Nutrition, PATH, Seattle, WA, USA

Correspondence

Justine A. Kavle, Maternal, Newborn, Child Health and Nutrition, PATH, 455 Massachusetts Ave NW, Washington, DC 20001, USA.
Email: jkavle@path.org

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Abstract

In Egypt, rising maternal overweight and obesity is consistent with the transition to westernized diets and a growing reliance on energy-dense, low nutrient foods. Although the first 1,000 days of life are the focus of many programmes designed to prevent many forms of malnutrition, little attention has been paid to maternal dietary practices and weight gain during pregnancy. This study used in-depth interviews with pregnant women ($N = 40$), lactating women ($N = 40$), and nonlactating women ($N = 40$) to gain an understanding of behaviours, perceptions, and cultural beliefs in relation to maternal dietary intake during pregnancy, lactation, and nonlactation; weight gain during pregnancy; birth spacing; and family planning. Study findings reveal that food choice was driven by affordability, favoured foods, or foods considered appropriate for a specific life stage (pregnant, lactating, and nonlactating). Knowledge of weight gain during pregnancy is limited, especially with regards to excessive weight gain during pregnancy. Diet is often modified during lactation to support breast milk production, and a normal diet resumed when breastfeeding ceases. Within the context of breastfeeding, the lactational amenorrhea method provides an opportunity to improve exclusive breastfeeding practices, maternal diet during lactation, and the transition to other family planning methods by 6 months postpartum. Health care providers should discuss limiting maternal consumption of low nutrient foods such as junk foods, soda, and teas during pregnancy and postpartum. Dietary counselling should accompany information on appropriate weight gain during pregnancy and exercise to prevent excessive weight gain, in the context of the nutrition transition.

KEYWORDS

breastfeeding, family planning, infant and child nutrition, maternal nutrition, nutrition transition, weight gain during pregnancy

1 | INTRODUCTION

Globally, the prevalence of overweight is increasing in nearly every country. In half of countries, a greater increase has been noted in rural versus urban areas (Jaacks, Kavle, Perry, & Nyaku, 2017). This translates to nearly two billion obese or overweight adults at enhanced risk of diabetes (International Food Policy Research Institute [IFPRI], 2015). To date, no country is on track to meet 2025 World Health Assembly targets related to no rise in obesity among adults and adolescents (IFPRI, 2015).

Recent experience in Egypt illustrates this emerging phenomenon (Jaacks et al., 2017). Egypt is in the midst of a nutrition transition as its population shifts away from traditional, nutrient-rich diets to diets characterized by energy-dense, low nutrient foods (Egyptian Cabinet's Information and Decision Support Center [IDSC] & World Food Programme [WFP], 2012; Breisinger et al., 2015; Jaacks et al., 2017; Musaiger, 2011). Increased food insecurity, political turmoil,

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several fuel and financial crises, and government subsidization of energy-dense foods, such as oil and bread, due to limited household purchasing power, have contributed to the country's deteriorating nutritional status (Egyptian Cabinet's IDSC & WFP, 2012; El-Zanaty & Way, 2009; Kennedy, Nantel, & Shetty, 2006; WFP, 2013). This is compounded by a limited understanding by a majority of the population of the value of nutritious foods and a lack of national programmes to inform the public about these issues (Kavle et al., 2014; Kavle, Mehanna, et al., 2015). Egypt faces the double burden of malnutrition, defined as the "dual burden of undernutrition and overnutrition occurring simultaneously within a population" (Shrimpton & Rokx, 2012). Obesity-related chronic disease leads to an estimated gross domestic product (GDP) loss of US \$1.3 billion each year (Abegunde, Mathers, Adam, Ortegón, & Strong, 2007). Nearly 75% of all adult Egyptian women are overweight (Yang & Huffman, 2013). Thirty-seven percent of women of reproductive age are overweight, and 48% are considered obese (Ministry of Health and Population Egypt, El-Zanaty and Associates, & ICF International, 2015).

Data from the 2008 Egypt Demographic and Health Survey provide confirmation of these food consumption patterns, especially among women (no data available in Demographic and Health Survey 2014). Maternal diet was characterized by low intake of fruits and vegetables and high intake of carbohydrates and fat, as about 90% of mothers consumed foods made from grains, roots, and tubers and foods made with oil, fat, or butter within the 24 hours prior to the survey (El-Zanaty & Way, 2009). Nearly one in five women recalled eating sugary foods during this time period. Similarly, nutrient-poor diets and consumption of low-nutritive, high fat "junk" foods has been documented as a feeding problem among Egyptian infants and young children, and evidence-based recommendations have recently been put forth to address this issue (Huffman, Piwoz, Vosti, & Dewey, 2014; Kavle, El-Zanaty, Landry, & Galloway, 2015; Kavle et al., 2014; Kavle, Mehanna, et al., 2015; Kavle et al., 2016).

Although many countries are concentrating programming efforts on the first 1,000 days from conception to the first 2 years of life, little attention has been paid to maternal nutrition and optimal weight gain during pregnancy, including drivers of maternal food choice during pregnancy and postpartum and the linkage to infant and young child feeding (IYCF) practices, particularly within the context of the nutrition transition. In low- and middle-income countries, few studies have explored gestational weight gain knowledge and beliefs and little information is known regarding weight gain patterns, especially within the context of the nutrition transition (Jaacks et al., 2017). In Egypt, messaging on appropriate weight gain during pregnancy has been largely overlooked in national policy and protocols guiding service delivery. Efforts to improve exclusive breastfeeding (EBF) practices can go hand-in-hand with counselling mothers on the lactational amenorrhea method (LAM), an effective family planning (FP) method based on EBF. Yet scant information exists on synergies between maternal, infant, and young child nutrition (MIYCN) and postpartum FP. In this study, we sought to (a) explore perceptions and beliefs that shape maternal dietary practices and food choice during pregnancy and postpartum, weight gain during pregnancy, and breastfeeding, including use of LAM and postpartum FP, and (b) provide insights, based on our findings, for integrated MIYCN and FP programming, within the context of the nutrition transition.

Key messages

- Food choice is driven by affordability, food preferences, and perceived appropriateness of food for consumption during pregnancy and lactation.
- Women have little understanding of appropriate weight gain during pregnancy, especially excessive weight gain, and are rarely counseled on its importance.
- Exclusive breastfeeding and birth spacing for at least 2 years is viewed as beneficial, yet lactational amenorrhea method is not well understood as a family planning method.
- Counseling mothers on maternal diet, the harms of low nutrient and processed foods, and how much weight to gain during pregnancy in relation to prepregnancy weight is critical, yet often missing from programmes.

2 | MATERIALS AND METHODS

2.1 | Study design and site

This study was implemented within the context of the Maternal and Child Health Integrated Program Egypt SMART project. The purpose of this multipart study was to examine factors related to child stunting, within the context of a documented rise in stunting in Lower Egypt in comparison to Upper Egypt (Kavle, Mehanna, et al., 2015; Kavle, El-Zanaty, et al., 2015).

The study was conceptualized using the World Health Organization (WHO) Framework on Childhood Stunting, which emphasizes the joint importance of maternal diet and care practices, alongside EBF practices in the first 6 months postpartum, continued breastfeeding until 2 years of age, complementary feeding, birth spacing, and postpartum FP, including LAM, to ensure that each child reaches his or her height potential (Kavle, Mehanna, et al., 2015; Stewart, Iannotti, Dewey, Michaelsen, & Onyango, 2013). We adapted the WHO conceptual framework as a structured contextual approach to explore behaviours, perceptions, and cultural beliefs regarding maternal diet, weight gain during pregnancy, birth spacing, LAM, and FP (e.g., beliefs and norms of mothers, motivations/drivers of food choices, and advice given by health providers and other caregivers, which underlie maternal dietary practices and child feeding practices in the first 2 years of life; see Figure 1). Italicized concepts are discussed in this paper.

Details on study sites and implementation have been previously published (Kavle, Mehanna, et al., 2015; Kavle, El-Zanaty, et al., 2015). We conducted in-depth interviews (IDIs) with 120 women (N = 40 pregnant, N = 40 lactating, and N = 40 nonlactating), selected using purposive sampling, in SMART project areas in Lower and Upper Egypt. The findings provided context to information collected on IYCF practices using Trials for Improved Practices (Kavle, Mehanna, et al., 2015). SMART project community health workers contacted mothers during routine home visits to obtain oral consent to conduct IDIs.

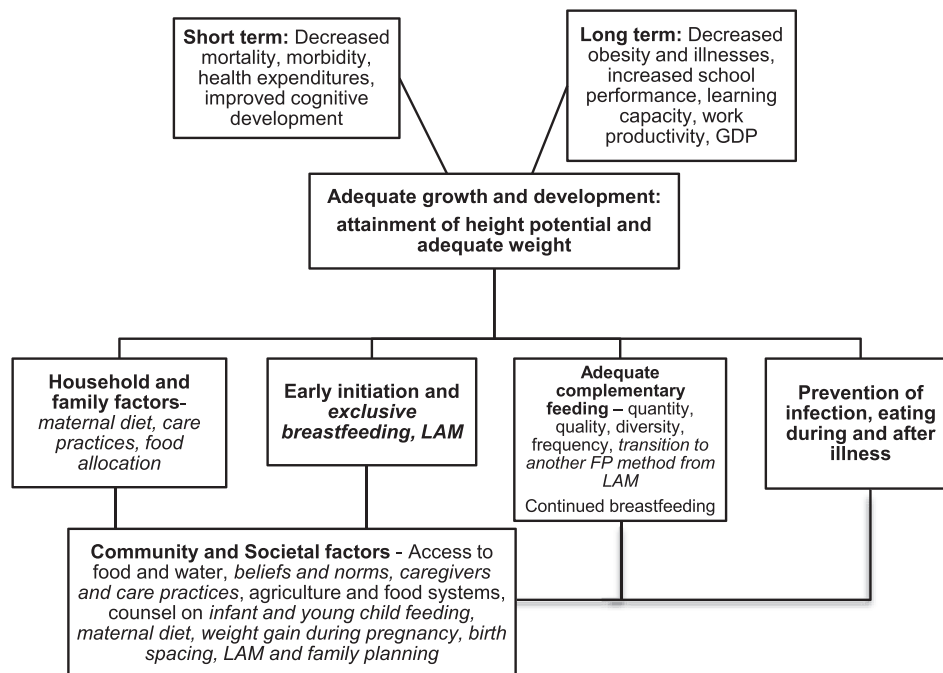


FIGURE 1 Adapted World Health Organization framework of factors associated with stunting (Kavle, Mehanna, et al., 2015; Stewart et al., 2013). LAM = lactational amenorrhea method; FP = family planning

IDIs were used to gather information on cultural beliefs and perceptions that influence maternal diet during pregnancy and postpartum, weight gain during pregnancy, birth spacing, and LAM. This study was conducted in a manner that was in compliance with consolidated criteria for reporting qualitative research (Tong, Sainsbury, & Craig, 2007).

In collaboration with local researchers, questionnaires were piloted in communities in Lower and Upper Egypt and adapted to the local cultural context. All questionnaires and oral consent forms were translated and administered in local Arabic. Arabic consent forms were then back-translated into English to confirm accuracy. Ethical approval was granted by The Egyptian Society for Health Care Development, the PATH Ethics Committee, and the American University of Cairo (AUC) Social Research Center.

2.2 | Analyses

The study team conducted preliminary analyses of IDIs and identified dominant themes based on the adapted WHO framework of this multipart study, aimed primarily at examining factors related to (Figure 1). The categories under which dominant themes were defined and explored included maternal diet during pregnancy and lactation,

birth spacing, IYCF in relation to LAM, and postpartum FP. IDIs included questions on cultural norms related to foods eaten during pregnancy, weight gain during pregnancy, foods eaten during breastfeeding and foods eaten for nonbreastfeeding mothers (defined as mothers who ceased breastfeeding prior to the recommended 2-year duration), and reasons for early breastfeeding cessation among previously lactating women with children less than 2 years of age, including LAM.

Findings from these preliminary analyses were used to develop an agreed-upon coding structure, which was the basis of our analyses. Qualitative analyses of transcripts were conducted using the NVIVO version 10.0 analytic program (NVIVO, QSR International Pty Ltd, 2012). The coding process allowed for the identification of additional themes that emerged during interviews. Trained transcribers audio-recorded all IDIs from pregnant, lactating, and nonlactating women, which were transcribed verbatim in Arabic. Trained interpreters translated transcripts from Arabic into English, which were checked against Arabic transcripts (SM and GK). Once coding was complete, two researchers (JAK and MH) looked independently at a subset of transcripts to verify the themes present in the framework and confirm additional emerging concepts. Transcripts were reviewed and triangulated with field data collection forms. Fieldwork took place in February–April 2013 in Lower and Upper Egypt.

TABLE 1 Characteristics of pregnant mother study participants in Upper and Lower Egypt

| Pregnant women | Age | | | Pregnancy trimester | | | Education ^a | | | | Employment | | |
|----------------------|-----|-------|-----|---------------------|-----|-----|------------------------|---------|-----------|----------------|-------------|------------------|--------------|
| | ≤19 | 20–39 | ≥40 | 1st | 2nd | 3rd | Illiterate | Primary | Secondary | Post-secondary | Not working | Unskilled labour | Professional |
| Lower Egypt (N = 20) | 10% | 90% | – | 10% | 60% | 30% | 5% | 10% | 50% | 35% | 90% | – | 10% |
| Upper Egypt (N = 20) | 15% | 85% | – | 5% | 65% | 30% | 30% | 10% | 50% | 10% | 100% | – | – |
| Total (N = 40) | 12% | 88% | – | 7% | 63% | 30% | 17% | 10% | 50% | 23% | 95% | – | 5% |

^aNote that categories of primary and secondary education indicate participation in these levels of education and do not necessarily indicate completion.

TABLE 2 Characteristics of study participants with children under age two in Upper and Lower Egypt

| | Age | | | Child age | | | Education | | | | Employment | | |
|--|------|-------|------|----------------|-----------------|---------|------------|---------|-----------|----------------|-------------|------------------|--------------|
| | ≤19 | 20–39 | ≥40 | 0–11.99 months | 12–23.99 months | Unknown | Illiterate | Primary | Secondary | Post-secondary | Not working | Unskilled labour | Professional |
| Women with children under 2 years | | | | | | | | | | | | | |
| Lactating mothers | | | | | | | | | | | | | |
| Lower Egypt (N = 20) | 5% | 95% | - | 65% | 20% | 15% | 10% | 20% | 50% | 20% | 85% | 10% | 5% |
| Upper Egypt (N = 20) | 5% | 90% | 5% | 75% | 15% | 10% | 10% | 10% | 65% | 15% | 80% | 10% | 10% |
| Total (N = 40) | 5% | 93% | 2% | 70% | 18% | 12% | 10% | 15% | 58% | 17% | 83% | 10% | 7% |
| Nonlactating mothers | | | | | | | | | | | | | |
| Lower Egypt (N = 20) | 5% | 95% | - | 0 | 95% | 5% | - | 10% | 70% | 20% | 80% | 10% | 10% |
| Upper Egypt (N = 20) | - | 95% | 5% | 45% | 55% | 0 | 15% | 15% | 65% | 5% | 75% | 20% | 5% |
| Total (N = 40) | 2.5% | 95% | 2.5% | 23% | 75% | 2% | 7% | 12% | 68% | 13% | 78% | 15% | 7% |

3 | RESULTS

3.1 | Characteristics of participants

Overall, maternal characteristics showed a similar distribution in Upper and Lower Egypt (see Tables 1 and 2). Maternal age ranged from 18 to 42 years of age. Few pregnant mothers (5%) were illiterate in Lower Egypt compared to Upper Egypt; most postpartum mothers had some formal education, which varied from primary to post-secondary education. Few mothers were formally employed outside the home.

In the study sample of pregnant women (N = 40), 62% were in the second trimester and 30% were in the third trimester. For women with children under the age of two (N = 80), 70% of lactating women had children who were <1 year of age, whereas 75% of nonlactating women had children between 12 and 23 months. Although nonlactating mothers were defined as mothers who were not currently breastfeeding at the time of the interview, almost all mothers had breastfed for some duration of time. Only five women breastfed for less than 6 months. Most mothers stopped breastfeeding by 12 months.

3.2 | Themes

The dominant themes that emerged from the IDIs were Nutrition and Diet Advice during Pregnancy and Lactation; Maternal Diet during Pregnancy; Iron and Folic Acid (IFA) Supplementation during Pregnancy; Cultural Perceptions of Foods Mothers Should Consume during Lactation; Cultural Perceptions of Appropriate Foods for Nonlactating Women; Knowledge and Use of LAM; and Optimal Birth Spacing and Perceived Effects of Poorly Spaced Births. In this study sample, there was little variation among women with various educational levels and those not employed formally outside the home. In some themes, differences were observed between Upper Egypt and Lower Egypt, which were discussed accordingly. All text in quotation marks indicates direct quotes by study participants.

3.3 | Sources of advice

Mothers most often reported trusting the advice from physicians (e.g., local medical doctors), who provide routine antenatal care, advice on the “best” foods to eat and which foods to avoid during pregnancy. Additional sources of advice were health care providers, family (e.g., husbands and mothers-in-law), community members (e.g., friends, neighbours, and elderly women), and media sources (e.g., internet and television).

3.4 | Maternal diet during pregnancy

3.4.1 | A diet low in carbohydrates and high in proteins, vitamins, and minerals is believed to be beneficial

When asked about their knowledge of foods that are good to eat during pregnancy, women described a prenatal diet that is high in proteins, essential vitamins, and minerals, and they recommend “good” and “beneficial” foods such as meat, fish, lentils, chicken, eggs, and

milk, as well as various fruits and vegetables. As one pregnant woman from Upper Egypt relayed:

"Useful food for pregnant woman is chicken, eggs, meat, milk, lentil, and also home [family] foods. Pregnant woman should eat fruits (guava). These foods are important because it strengthens the child's body."—Pregnant woman, 5 months, Upper Egypt

Pregnant women rarely mentioned grains (e.g., breads, rice, and pasta) and potatoes as essential for a healthy pregnancy. Carbohydrates, as a food group, were perceived as "not beneficial" and the cause of "bloating for the mother" and excessive weight gain; therefore, mothers believed they should restrict their intake.

3.4.2 | Personal preferences, food affordability, and limited income can restrict diet during pregnancy

For most pregnant women, diet was limited to the consumption of milk, cheese, eggs, some meats (either red meat or chicken), and fried or boiled potatoes, even though these were perceived to be "not beneficial." Women did not consistently indicate including vegetables or fruits in their diet. One woman explained:

"I usually eat food that is available in the house like beans, cheese, and fried or boiled potatoes ... because our income is limited."—Pregnant woman, 3 months, Upper Egypt

Poor economic conditions impacted the ability to afford certain foods, such as meat and fish and restricted consumption, regardless of the food's nutritional value:

"I do not eat much meat or fish because I do not have enough money to buy either of them."—Pregnant woman, 5 months, Upper Egypt

3.4.3 | Junk food, caffeinated beverages, and salty, pickled, and spicy foods are considered culturally taboo or "bad" to eat, yet are still consumed during pregnancy

Pregnant women recognized that junk food (e.g., processed foods such as lunch meat, soda, prepackaged potato chips, biscuits, and locally made potato chips sold by street vendors); salty foods; acidic foods (e.g., foods cooked with onions and tomatoes); and caffeinated beverages (e.g., tea, coffee) "cause great harm" to both mothers and their babies. They cited perceived adverse effects (e.g., "high blood pressure"), which could result from increased salt intake, and "deformation of unborn children," reflecting their misunderstanding of the consequences of consuming these foods.

Women also indicated that they chose to consume processed foods regardless of perceived consequences. As one woman explained:

"The salty food causes deformation of the child and gives the pregnant woman allergies ... I think sodas and lemon are not good for pregnant women. But I like these things and eat them. I have beans and tamaiya [falafel - fava bean patties] for breakfast with pickles and salty cheese (mish)."—Pregnant woman, 3 months, Lower Egypt

The perceived harms caused by junk foods were not enough to change women's food choices during pregnancy, as women chose to consume foods they favoured and preferred to eat during this period of time. Foods that contain preservatives and dark (caffeinated) sodas were frowned upon; however light-coloured sodas and store-bought juices were viewed as acceptable for consumption in large amounts.

"Foods which contain preservative are bad, example potato chips, cheese and luncheon meat. These types [of foods] have no benefit for the pregnant woman. My mother told me that. I have to drink soda daily. I also drink juices that I buy from the store about two to three times a week."—Pregnant woman, 4 months, Lower Egypt

Mothers were misinformed about the harmful effects of these taboo foods, including such effects as "chips cause worms for the fetus," salty foods create "a burning sensation when delivering the child," and junk food "causes cancer of the blood," as shown in Table 3. Mothers learned of these effects from family members, health workers, and media sources, which were viewed as trusted sources of health information.

3.5 | Weight gain during pregnancy

3.5.1 | Weight gain is perceived to be natural and related to carrying the fetus and not associated with nutrition, food consumption, health status, or activity patterns

All women indicated that when pregnant, they would inevitably gain weight due to the presence and growth of the infant, as "an additional person." Some women associated healthy weight gain and foetal growth with good nutrition and the amount of food consumed, but many misunderstood the connection between nutrition and weight gain. As one woman indicated:

"A pregnant woman gains extra weight because extra weight is being formed around him, the baby ... he is gaining weight so it will add on to her weight. It has nothing to do with her health or her nutrition, so there is no reason to keep the pregnant woman from gaining weight."—Pregnant woman, 4 months, Lower Egypt

3.5.2 | Pregnant women have little knowledge of optimal weight gain

Women relayed that they do not receive counselling on weight gain during pregnancy by health care providers and have little to no knowledge of the amount of weight to gain. When asked to estimate the amount of healthy weight gain, they based their estimates on their experiences with previous pregnancies. Those who discussed their knowledge of optimal weight gain during pregnancy had a wide range of responses from 2 to 50 kg. Some believed that excessive weight gain was acceptable, and others noted it may be "high," if it was 4–5 kg per week they did not mention any negative health consequences associated with such excesses.

TABLE 3 Perceived harms of taboo foods during pregnancy, according to currently pregnant, lactating, and nonlactating Egyptian women in Upper Egypt (N = 60) and Lower Egypt (N = 60)

| Taboo foods during pregnancy | Perceived harm | Mother | Child | Number of references to perceived harms, by site | |
|------------------------------|--|--------|-------|--|----------------------|
| | | | | Upper Egypt (N = 60) | Lower Egypt (N = 60) |
| Junk food | <ul style="list-style-type: none"> • "Causes cancer in the blood" • "Makes the bones fragile" • "Causes miscarriage" | ✓ | ✓ | 3 | 63 |
| Caffeinated beverages | <ul style="list-style-type: none"> • Cause "malformation" • "Destroy iron" and "cause anaemia" Act as a "stimulant" | ✓ | ✓ | 18 | 47 |
| Salty foods | <ul style="list-style-type: none"> • "Increase albumin in the blood" • Contribute to the "malformation of the child" • Create "swelling" and "oedema" • Cause "burning of the chest" • Cause "poisoning" • Cause "allergies" • "Form salty stones in the body" • Create a "burning sensation when delivering the child" • "Have no nutrition" | ✓ | ✓ | 68 | 67 |
| Acidic/spicy food | <ul style="list-style-type: none"> • "Causes colic" • "Causes haemorrhoids" • "Causes constipation" • Is "not nutritious" • "Causes heartburn" • Affects "the head" • "Makes the baby kick his mother's womb" | ✓ | ✓ | 60 | 55 |

Note. Check mark (✓) indicates that them was discussed in context of harms to mother and/or child.

"A pregnant woman should gain weight. I was 50 kilos before pregnancy and now I am 59 kilos which is appropriate, so it is normal to gain a kilo per month. I might have heard that on TV or from someone, but the doctor did not tell me. He doesn't weigh me unless I ask him."—Pregnant woman, 6 months, Lower Egypt

"I don't know how much the pregnant woman should gain, nobody told me. The woman should gain ½ a kilo per week all over the 9 months. Weight gain can be very high if the pregnant woman increases 4 to 5 kg per week."—Pregnant woman, 6 months, Lower Egypt

3.6 | Maternal diet during breastfeeding

During breastfeeding, mothers primarily consulted family and community members for information regarding which foods to eat, particularly to increase breast milk quantity. Some health care providers were also noted to provide advice. Mothers received varied and conflicting information regarding foods to eat during lactation, from vegetables to halawa, a sweet dish made of sesame paste, butter, and sugar, and other sugary foods.

"Lactating woman usually eats vegetables like arugula and drinks milk to increase the breast milk. The family is the one who usually advises the lactating woman about eating during breastfeeding."—Lactating mother, first-year postpartum, Upper Egypt

3.6.1 | Food consumption during lactation is associated with increased milk production

During breastfeeding, mothers related the quantity of foods consumed to the amount of breast milk produced. As one woman explained: "The

more I eat, the more milk I have. I eat more now that I breastfeed than I used to eat when I was pregnant."

In comparison to food consumption patterns during pregnancy, women thought lactating women should eat a greater quantity of food, as one woman explained:

"There is a difference in diet between a pregnant woman and a lactating one. The latter eats more because she produces the milk for the child/breastfeeding him."—Pregnant woman, 4 months, Lower Egypt

3.6.2 | Nutritious foods are associated with sufficient milk production, improved milk quality, and maternal and child well-being

Mothers consciously tried to improve their diet during lactation and favoured foods that increased the quality and quantity of breast milk, which were considered "good" to "increase the breast milk" and improve its "heaviness." Typical foods indicated for this purpose were milk, eggs, radishes, leafy greens (e.g., arugula, spinach, and molokhaia [Jew's mallow]), protein sources (e.g., legumes, fish, chicken, and meats), and some traditional foods, such as halawa and fenugreek tea. These foods were also viewed as "strength" and "energy-giving" to the mother and child's health.

3.6.3 | Consumption of "taboo" and "harmful" foods is restricted during lactation

Some foods are traditionally taboo to consume during lactation and are thought to decrease milk production, including "pickled," "very salty," and "very spicy" foods. Other foods have perceived ill effects on the infant's health. As relayed by one mother:

"Pickles and spicy food are bad for lactating women because they make the child colicky, ... and cauliflower, molokhaia, and mango [are bad] because they cause diarrhea to the child. Also heavy (stewed) foods cause diarrhea."—Lactating mother, first-year postpartum, Lower Egypt

Ill effects of these foods are believed to be transmitted to the child:

"What is bad for lactating women are potato chips, soda, and fast food. Sodas affect the bones, chips is not nutritive and fast food is greasy. All this is transmitted through the milk to the child and harms the child in the same way."—Lactating mother, second-year postpartum, Lower Egypt

3.7 | Maternal diet postpartum, when women stop breastfeeding

3.7.1 | Nonlactating mothers have no dietary restrictions and consume junk foods

In contrast to pregnancy and lactation, nonlactating mothers stated that "there is no food that a non-lactating woman shouldn't eat," "nobody tells her what to eat," and "she can eat anything she wants." Once she has stopped lactation, she is free to return to her "normal" diet. As one mother explains:

"The women who breastfeed their infants eat more during their period of breastfeeding than their period of pregnancy because of the nutrition of their embryo. During my period of breastfeeding I didn't eat any kind of beans as I was afraid to affect the health of [my child] Nour but after weaning [ceasing to breastfeed] her I began to eat the beans again. The woman who doesn't breastfeed eats her normal meal, the same quantity of food that she usually eats."—Nonlactating mother, first-year postpartum, Upper Egypt

Nonlactating mothers are believed, by some women, to be free from restrictions, even to indulge in eating junk food. As one mother explained:

"I like the potato chips very much, but my husband prevented me from eating it during the period of my pregnancy in order to protect me and protect the embryo from the preservatives that can affect our health, but now after giving birth to my infant I feel free to eat anything, even the chips."—Lactating mother, second year following the birth of the baby, Lower Egypt

However, some women were of the opinion that nonlactating women should eat foods that would build their nutrient stores for the next pregnancy, and mothers talked about foods rich in iron and calcium:

"She [non-lactating woman] must eat food rich with iron and calcium like vegetables to provide her with well nutrition and to be able to become pregnant again in good health."—Nonlactating mother, first-year postpartum, Upper Egypt

3.8 | Early cessation of breastfeeding after the first-year postpartum

Most nonlactating mothers breastfed their infants for at least 6 months and tended to stop breastfeeding after their first-year postpartum because children were considered to be "grown up" and "old enough to eat." Most mothers felt these actions would improve the child's appetite by decreasing his or her dependency on breast milk.

"I nursed him for 1 year and 7 months (19 months). The reason I stopped breastfeeding him is that I was advised to do so, as I did with his older brother. My mother-in-law was the one that recommended that based on the belief that this way the child would eat better."—Nonlactating mother, second-year postpartum, Lower Egypt

3.9 | Knowledge and use of LAM for women in the first 6 months postpartum

3.9.1 | "Clean" and not "natural" lactation is seen as a form of contraception; there is little awareness of LAM

When asked about the possibility of getting pregnant while lactating, mothers agreed that it was possible if they are "naturally" lactating. Here, "natural lactation is when the woman gets her period, and if she doesn't use a family planning method, she conceives." Other mothers relayed their knowledge of "clean" lactation, which is "breastfeeding without getting a period, and this way the woman doesn't conceive."

Mothers did not know about the operational definition of LAM and the three criteria for the correct use of LAM. The three LAM criteria are (a) menstrual bleeding has not resumed; (b) EBF on demand, day and night; and (c) the infant is under 6 months of age. Some mothers said that "LAM and breastfeeding is the same thing" or that "LAM is longer and healthier for the baby than breastfeeding." Other mothers thought LAM meant giving formula to the child instead of breastfeeding.

3.10 | Optimal birth spacing and perceived effects of poorly spaced births

3.10.1 | Prevention of pregnancy for at least 2 years is believed to be beneficial

The minimum 2-year period between pregnancies was viewed as the time when the mother "regains her strength," "rests after giving birth and breastfeeding her child," and "enables the mother to look well after her children." As one mother explained:

"If I get pregnant before three years I will become weak and unhealthy. I feel tired and dizzy all the time and I can't do my house work properly. Also the fetus will be affected because he will not have enough food to take from me. Also I won't be able to look well after my child and to nourish him properly."—Nonlactating mother, second-year postpartum, Lower Egypt.

4 | DISCUSSION

In this study, we sought to explore perceptions and beliefs that shape maternal diet and food choice during pregnancy, postpartum weight gain during pregnancy and breastfeeding, and postpartum FP, including LAM, and provide considerations for integrated maternal and infant nutrition and FP programming, within the context of the nutrition transition.

Our findings reveal a disconnect between maternal knowledge of “nutritious” versus “harmful” foods for pregnancy and the actual consumption of these foods during pregnancy. Food choice was largely driven by women's food preferences and perceived affordability of these foods, which tended to take precedence over any perceived harms of “taboo” foods on their health. Some pregnant women conveyed junk foods, caffeinated beverages, and salty, pickled, and spicy foods as not “healthy and/or nutritious” and culturally taboo during pregnancy, yet they still chose to consume these foods. Although processed foods are more expensive than locally available foods, these foods are within economic reach for most families who choose to consume these foods, based on recent evidence from Egypt (Kavle, Mehanna et al., 2015), which may have contributed to the nutrition transition. Inadequate dietary intake of energy, protein, and micronutrients during pregnancy can subsequently put infants and young children at increased risk of adult obesity, which would be of particular concern in Egypt, where prevalence of maternal overweight and obesity is high (Christian & Stewart, 2010; Ludwig, Rouse, & Currie, 2013).

Maternal obesity is a risk factor for complications during pregnancy and childbirth and development of gestational diabetes mellitus. It may also leave children of these mothers at higher risk of overweight in childhood, adolescence, and early adulthood (Black et al., 2013). Improving maternal nutrition and addressing food choice can reduce the risk of poor pregnancy outcomes, such as foetal growth restriction and small-for-gestational-age births. A recent study in 66,000 pregnant women conducted in Norway, women who adhered to a diet rich in vegetables, fruits, oils, and whole grains significantly reduced their risk of preterm delivery compared to women who consumed salty and sweet snacks, white bread, and processed meats (Englund-Ögge et al., 2014).

Our study findings also revealed that Egyptian mothers had little to no awareness of optimal weight gain during pregnancy and the relationship to food. In observations of health services during SMART project, providers seldom weigh women during pregnancy, and counselling is not given on weight gain during pregnancy.

Rapid weight gain during pregnancy may stem from the consumption of processed foods, such as sugary drinks (Rasmussen & Yaktine, 2009). Recent findings indicate that consumption of junk food (i.e., nonnutritive processed foods that are high in sugar and/or fat) during pregnancy in women who were overweight and obese prepregnancy predicted high infant birthweight (over 4 kg) in comparison to mothers who did not consume these foods (Wen, Simpson, Rissel, & Baur, 2013). Carrying too much weight during pregnancy may have adverse effects on the fetus, setting the stage for increased risk for obesity over the child's lifetime (Ludwig et al., 2013; Yang & Huffman, 2013), which is of particular concern in countries facing the

nutrition transition. Excessive pregnancy weight gain is associated with higher body weight in childhood, although only partially explained by birthweight, suggesting that child weight can influence later adult weight, including overweight and obesity (Stewart et al., 2013).

Following pregnancy, maternal diet, birth spacing, and postpartum FP are critical in the first 2 years of life to ensure that women have adequate nutrient stores to support subsequent pregnancies, to prevent or reduce existing nutrient deficiencies and anaemia, and to maintain a healthy weight for better health outcomes. Lactating Egyptian mothers eat more during lactation than during pregnancy and tend to rely on foods perceived to increase breast milk production. Women avoided foods thought to negatively affect both milk supply and the child's health, which can potentially limit the variety of foods eaten during breastfeeding. A systematic review reported that home and family interventions were effective in improving exclusive, continued, and any breastfeeding, with greater effectiveness reported for combined antenatal and postnatal interventions (Rollins et al., 2016). Integrating maternal nutrition and breastfeeding counselling throughout the 1,000-day period may aid in addressing concerns regarding milk supply in preparation for breastfeeding and during the postpartum period, when difficulties with breastfeeding may arise. Prevention of nutrient deficiencies during lactation requires mothers to have adequate stores of energy and nutrients that need to be maintained through a diversified diet and adequate energy intake (Institute of Medicine, 1992; Rasmussen & Yaktine, 2009).

Although Egyptian pregnant and lactating mothers restrict dietary intake to foods that are considered appropriate for their specific life stage, nonlactating mothers in Egypt believe that they are free from any restrictions and can consume any foods, including junk foods, as long as they are not breastfeeding. Nonlactating mothers tended to cease breastfeeding early, which mirrors data from the Middle East and North Africa that revealed only 32% of children 20–23 months of age were still breastfeeding (United Nations International Children's Emergency Fund, 2016). Continued breastfeeding is associated with improved child and maternal health, in terms of higher cognitive performance, reduced risk of child overweight and obesity, improved birth spacing, and protection against breast and ovarian cancer and type 2 diabetes (Victora et al., 2016). The first 2 years following the birth of a child present an opportunity for women to maintain good nutritional status and a healthy weight to avoid nutrient deficiencies and be well-prepared for their next possible pregnancy.

4.1 | Implications of study findings and considerations for programming

Pregnant, lactating, and nonlactating mothers should be counselled by health providers at the health facility and community levels during antenatal, postpartum, and child health visits to address nutritional needs for each life stage.

- Encourage mothers to incorporate adequate amounts of diverse foods in their diets, including animal-source food, lentils, fruits and vegetables, and grains in order to support a healthy maternal diet and optimal pregnancy and child growth outcomes (Institute of Medicine, 1992; Rasmussen & Yaktine, 2009; WHO, 2016).

- Emphasize moderation and advise mothers to avoid the restriction of beneficial foods. Health care providers and community-level discussions can raise mothers' understanding of the benefits and harms of specific foods and how to maintain a healthy diet in the event of economic constraints and pregnancy-induced food aversions.
- Discuss limiting or eliminating low-nutritive and processed foods, as well as sugary drinks and teas, which inhibit iron absorption and contributes to anaemia (Institute of Medicine, 1992; Rasmussen & Yaktine, 2009).
- Train health providers with the knowledge and skills to counsel mothers on maternal nutrition, weight gain during pregnancy, breastfeeding, LAM, and postpartum FP. Specifically, providers should be equipped to provide quality counselling on the following:
 - Counsel mothers that the same nutritious and diverse foods recommended for their consumption are also appropriate for feeding infants and young children 6–23 months old.
 - Counsel on adequate weight gain during pregnancy, as mothers need to gain enough weight to have a healthy pregnancy and to support breastfeeding. Women often do not understand how much weight they need to gain during pregnancy and are not counselled on weight gain in relation to their prepregnancy weight. For overweight and obese women, the perception of “eating for two” needs to be addressed in a nonjudgmental way and include exercise interventions to prevent excessive weight gain (WHO, 2016).
 - Counsel mothers on the importance and benefits of EBF, including reducing risk of child overweight, and contraceptive protection against pregnancy, when the three criteria for LAM use are followed. Include information for mothers on maintaining breast milk production, and identify and discuss with mothers' ways to resolve problems they face with EBF, including addressing commonly held misperceptions of breast milk insufficiency, and harmful practices such as prelacteal feeding and early introduction of foods and liquids prior to 6 months of age, which is common in Egypt and elsewhere.
 - Counsel mothers who choose to use LAM to get another FP method by 6 months postpartum to provide continued protection against pregnancy. Encourage birth spacing for at least 2 years. Also, use this opportunity to discuss with mothers the need to introduce complementary foods at 6 months of age to support healthy child growth and development.

Egyptian women recognized that prevention of pregnancy for at least 2 years is better for both maternal and child health. Short birth spacing intervals were thought to “make mothers weak” and incapable of tending to the needs of additional children. The continuation of breastfeeding is viewed as a motivation for birth spacing. Mothers also need to be counselled that optimal birth spacing can reduce the risk of poor pregnancy outcomes and child stunting in their communities (Conde-Agudelo, Belizán, Norton, & Rosas-Bermúdez, 2005;

Conde-Agudelo, Rosas-Bermudez, & Kafury-Goeta, 2006; Madarshahian & Hassanabadi, 2012; Rutstein, 2008). A 52-country analysis demonstrated that the likelihood of a child becoming stunted increases substantially with decreasing birth intervals (Rutstein, 2008). EBF can be reinforced through counselling about the dual benefits of LAM and EBF for mother and child and by teaching mothers that fulfilling the three LAM criteria is effective protection against pregnancy in the first 6 months postpartum. Encouraging mothers to get another FP method by 6 months postpartum can ensure continued protection against pregnancy, which can also be integrated with messages on introduction of complementary foods at 6 months of age, because early introduction of food and liquid prior to 6 months is a common cultural practice (Kavle, Mehanna, et. al., 2015).

4.2 | Strengths and limitations

The primary strength of this study was the robust data collection with rigorous quality assurance by the study team. In addition, the study collected in-depth qualitative data from 120 pregnant, lactating, and nonlactating women and attained saturation with regards to the breadth of beliefs and perceptions on topics present in this paper. Given the length and depth of interviews, it is possible that some information may not have been conveyed in translation from Arabic to English. Multiple expert Arabic translators reviewed the recordings and translations with local researchers, which minimized this limitation. Collection of in-depth dietary information through 24-hr recall or food frequency during pregnancy and lactation would have strengthened and aided in supporting our findings.

5 | CONCLUSION

Strengthening provider counselling and community-level strategies to address barriers and misperceptions related to MIYCN and FP requires an integrated and culturally tailored approach. Recent revised WHO antenatal care guidelines call for a minimum of eight contacts, which include antenatal care and community outreach programming. Health programmes should maximize these opportunities to strengthen the quality and content of MIYCN and FP counselling and service delivery across the antenatal and postnatal continuum.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

JAK led the study design, collection, analysis, interpretation of data, and writing of paper. SM, GS, and MH were involved in collection, analyses, interpretation of data, and writing of paper. GK contributed to analyses and writing of paper. CE contributed substantially to interpretation and writing of the manuscript and provided comments to drafts. All authors were involved in the decision to submit the paper for publication.

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