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Riang'a, R.M.

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CHAPTER NINE

Discussion and Conclusions

Discussion and Conclusions

This chapter discusses the main findings of this thesis according to the study questions presented in Chapter 3, reflecting upon the theoretical background presented in Chapter 2. Next, the main conclusions and recommendations for policy and practice are presented. The chapter ends with highlights on the strengths and limitations of this research and suggestions for further research.

9.1 Implementation fidelity of biomedical maternal nutrition intervention programmes, and challenges and motivations to implementation fidelity

Despite the proven efficacy of biomedical interventions in improving maternal nutrition and pregnancy outcomes, and the fact that these interventions are widely in place throughout the globe, coverage targets set for these interventions are reportedly low in some settings and thus malnutrition remains a major challenge. This undoubtedly raises questions about the implementation fidelity of these programmes. Sánchez et al. (2007), in their study on treatment effectiveness trials, established that lack of implementation fidelity can weaken outcomes, leading potentially useful interventions to appear ineffective. In this thesis we therefore identified maternal nutrition intervention programmes available in the study area and assessed implementation fidelity. After a field reconnaissance study and document analysis, the Maternal Infant and Young Child Nutrition (MIYCN) intervention programme was identified to be viable, and hence formed a case for our study. The MIYCN programme was selected because its coverage targets all pregnant women in the country irrespective of their nutritional status and is offered free of charge in all government health facilities. The research questions addressed were: *What is the level of implementation fidelity of biomedical maternal nutrition interventions? And What are the challenges to implementation fidelity of biomedical nutrition intervention strategies?*

The MIYCN programme is implemented as an ANC integrated programme in all government health facilities with an assumption that all pregnant women will turn up for the services. Although the overall coverage level was found to be high, the late initial access to the MIYCN interventions during pregnancy is likely to have a negative impact on implementation fidelity. MIYCN guidelines recommend that nutrition interventions are initiated around the time of conception or in the first trimester to enhance effectiveness¹. However, the findings indicate a large percentage of women (90%) did not seek ANC during their first trimester. This percentage is somewhat higher than the 80.2% of Kenya overall [1]. Late booking of ANC is

¹ Studies have established that micronutrient deficiency such as iron, folate and other minerals in the first trimester of pregnancy results in significant decrements in foetal growth and is generally more damaging to pregnancy outcome than deficiency in the second and third trimesters[52–54] hence need for strengthening nutrition interventions within the first trimester.

also a common trend in other parts of Africa [2–4]. There is thus a need to investigate the factors attributed to late initial booking to ANC services.

Similarly, the content of the MYICN programme is not exhaustively offered to those women who turn up for ANC. Partial provision was reported in all the intervention components. For those respondents who received the supplements (74% in the case of iron and 47% in the case of folic acid), only 18% and 15% of the respondents received 90 or more iron and folic acid pills respectively during their entire pregnancy, of which only 80% and 48% respectively understood the usefulness of the supplements. Despite the relatively low number of nutritional supplement pills distributed, not more than two-thirds of our respondents reported having completed taking the supplements that were issued to them. The side-effects of the pills were the main reason reported for low compliance with nutritional supplements in this study. This is in line with findings in other studies in African countries [5–7]. This could be due to the fact that less than half of the respondents reported having received counselling related to the supplements.

Considering the fact that nutritional supplementation does not cover all pregnant women and that compliance is relatively poor, this points to the compelling and vital role that nutritional counselling can play during ANC visits to promote locally available, affordable micro-nutrient rich food sources. However, only 28% of our study population reported receiving counselling on general diet. Only 16% of the respondents reported relying on nutritional knowledge acquired at the health facility. Most women (37%) reported relying on own knowledge on appropriate nutrition or knowledge acquired from older women relations or learned in school, while others combine the knowledge acquired from the multiple sources. Reliance on nutritional knowledge acquired from multiple sources is common in African countries [8,9], hence the need to gain insight into the nature of knowledge acquired from these multiple sources.

9.2 Ethno-medical conceptualization of pregnancy and implications on access to interventions

Late initial and low frequency of access to ANC services were established as one of the major factors affecting implementation fidelity of the MYICN intervention programme. Studies have established a correlation between early registration at ANC services and adherence to taking iron supplements among pregnant women in Senegal [10]. For this reason, we investigated the factors attributed to this late trend of initial access to ANC. In regard to this, our research question therefore was: *How do emic cultures perceive ANC and how do these perceptions influence early and frequency access to ANC services?*

No matter how natural the process of pregnancy seems, we found that the term “pregnancy” does not readily translate to the natural process of conception and childbirth. How it takes place, how it is viewed, and how it is valued is heavily dependent on the cultural and social

context. It was also established that a culture's conceptualization of birth helps community members make sense of pregnancy-related illnesses and adverse outcomes which in turn influence their remedy- and health-seeking behaviours that might be in line with or contrary to the expectations of biomedical interventions. Thus, when interventions assign limited and generalized cultural understanding and meanings to an identified ethnic group, they gloss over the intricate within-group diversity as well as the complex social and historical contexts within which those cultural meanings exist.

The community's cultural values and perceptions of pregnancy are important to examine because they may serve as a lens through which women's maternal health needs can be effectively met. Jordan, for instance, defines the conceptualization of birth in four cultures which she studies as follows: in the United States birth is conceptualized as a medical procedure; in Yucatan [a southern state in Mexico] it is considered stressful, but normal part of family life; in Holland (The Netherlands) it is regarded as a natural process; and in Sweden it is considered a highly personal and fulfilling achievement [14: page 48]. When pregnancy is perceived as a "medical condition", it propels subjects to seek medical diagnosis and treatment from the health facilities [12].

In this study, the Kalenjin community perceived pregnancy as a normal natural condition rather than a pathological one requiring medical care. Almost half (42%) of the respondents who seek biomedical interventions were motivated by unpleasant symptoms and those who did not seek earlier ANC did not see the need for care because they were not feeling unwell. The conceptualization of pregnancy as a normal condition that does not require biomedical care was also established in other regions worldwide, and was associated with late access to initial booking of biomedical ANC services [3,12–15] and this could affect health interventions and outcomes. However, this is a risky assumption because some dangerous health conditions such as anaemia and high blood pressure, which are common among pregnant women, are asymptomatic and might not be detected easily and discovered when it is too late for effective treatment [16].

We also found that, according to many respondents, not all observed symptoms and complications require biomedical care; a number of women believed they could detect some of their abnormalities based on their own subjective physical experiences and sensations such as numbness of the leg, without necessarily requiring biomedical examinations. Based on these subjective assessments, some symptoms were thought to require TBA care only or both TBA and biomedical care – 44% of the respondents reported having sought TBA services, including herbal medicine, intercession remedies, confirmation of foetal presentation and massage of the uterus.

Women using TBA services reported using medicinal herbs during pregnancy, whether or not experiencing pregnancy complications. These medicinal herbs, as reported by a herbalist, are important in protecting pregnant women from getting sick and from transmitting their sickness to the foetus, making the woman strong in order to have an easier birth, increasing

amount of blood volume, protecting the baby from childhood diseases, changing the sex of the foetus (mostly to male), increasing contractions during labour and protecting the woman from evil people and spiritual attacks. The use of medicinal herbs during pregnancy is extensive in Kenya and most other LMICs. A study by Maimbolwa, et al. [9] in Zambia established that TBAs advised women on the use of traditional medicine, to widen the birth canal and to precipitate labour as well as to examine the position of the baby [17]. Other cultures advise women to consume herbs during birth to widen the birth canal and precipitate the delivery [9,18]. The consumption of herbal medicine during pregnancy is also used for protection against evil spirits and witchcraft that might cause spontaneous abortion [19,20], treatment of pregnancy-related ailments, discomfort and complications, including threatened miscarriage and post-partum haemorrhage [19–21]. Other than the use of herbs for protection against evil spirits and witchcraft, most of the functions served by these medicinal herbs are exactly the same ailments that biomedical interventions address during ANC sessions. Some herbal plants have been confirmed to have antibacterial, anti-inflammatory, antimicrobial and antimalarial properties [22]. However, the safety and efficacy of many of these medicinal herbs, especially during pregnancy when the human body is vulnerable, still needs to be established.

The majority of the respondents without symptoms and complications and who use TBA services wanted to confirm the foetal presentation in the uterus. Breach or transverse presentation was of great concern to these women because they believe it may lead to a complicated delivery. The TBA was known to be able to manipulate the foetus into the head-down presentation by external version; a service they felt that is not provided by the nurses at the health facilities during ANC.

In our study community, pregnancy is also conceptualized as a social stigma and a serious crime, especially if it does not fit into “official” versions of reality. It was noted that some women (13%) delay starting ANC because they feared or felt ashamed to disclose their pregnancy when they conceive unexpectedly. This was mainly reported by unmarried women, women with a number of children, or those with close pregnancy intervals. Conceptualization of pregnancy as a social stigma due to unwanted or mistimed pregnancies makes women ashamed to disclose their status and this has been established to cause delayed and infrequent use of maternal intervention services [23–25] and this could affect health interventions and outcomes. As mentioned in Chapter 3, traditionally, among the Kalenjin community, sex and pregnancy before marriage was a serious crime, and although nowadays infanticide is not practised anymore, this is still strongly condemned. Similarly, among the Gusii Community of Kenya, a woman who is not a virgin on marriage receives less bride prize than a virgin, which is the reason they practised female genital mutilation (FGM), i.e. to safeguard a girl’s virginity [26].

Further, we found in this study that pregnancy in marriage is not just a woman’s affair, but rather a communal matter and an honour because it brings joy to particularly the husband’s family. For this reason, childless women are looked down upon. The pregnant woman

receives overwhelming care and support from the in-laws who ensure the protection of the pregnancy by providing the woman with care and advice on how to take the pregnancy to full term by observing taboos. Women reported being punished by midwives (being scolded and sometimes even beaten) during labour when they are unable to push out the baby and were seen to break a taboo. As a result, pregnant women often find that their lives are no longer their own once they are carrying a child, and a woman cannot make independent decisions regarding her pregnancy. In this condition, the woman is also left in a dilemma on whether to practise the beliefs or to face the consequences of losing her child, marriage, community support, or being punished during labour. Ngomane's findings in South Africa and Maimbolwa's in Zambia also established how women provided companionship to labouring daughters-in-law in maternity units and enquired periodically about them [9].

Husbands also symbolically share the burden of pregnancy with their wives by participating in the same taboos as pregnant women. They are not allowed to take part in some community activities and events just like their pregnant wives, meaning that preserving a pregnancy is a joint effort between husband and wife.

9.3 Ethno-medical conceptualization of adverse pregnancy outcomes and influence on care-seeking behaviours

According to Helman [16] and Clerk [27], a decision to seek treatment is dependent on a person's interpretation of illness, which guides people to take positive health action or seek treatment. We therefore investigated women's understanding of the adverse health outcomes associated with maternal malnutrition and the appropriate remedies and interventions that they adopt in addressing these anticipated adverse pregnancy outcomes. In this regard, our fourth study question was: *How do emic cultures conceptualize adverse pregnancy outcomes associated with maternal malnutrition and how do these cultural conceptualizations influence the women's health and nutritional care seeking behaviours.* In exploring how to answer this research question, a broad frame of traditional explanatory models of pregnancy complications emerged which influence women's care-seeking behaviours. This research question is answered in detail in Chapter 6, and here we discuss the main findings.

From the study findings, it featured prominently that pregnancy and childbirth is part of social transition or a rite of passage, representing both literally and symbolically a bridge from the social status of 'woman' to that of 'mother'. As with all social transitions, during the dangerous journey from one status to another, the individuals are considered vulnerable to external attacks that can emanate from either man, nature or supernatural powers hence must be protected from harm by observing certain taboos, rituals, beliefs and behaviour in order to preserve their pregnant state and give birth to healthy infants. Thus, any complications or misfortunes associated with birth are often perceived to be a result of the

woman's own behaviour, possibly because she has acted against a custom. Perceiving pregnancy complications as emanating from causes other than nutrition may make women fail to take interventions seriously. There are different customs practised by communities during pregnancy.

In cases where pregnancy is perceived as vulnerable to supernatural attacks, spirits and supernatural forces were blamed and consulted for any adverse pregnancy outcome and they are appealed to and propitiated to spare the woman. Among the Nandi people of Kenya, Hollis [28] also established that during pregnancy, a woman must undergo a purification ceremony after which she is assured of having a safe and easy birth.

It was also highlighted that a pregnant woman is perceived to be vulnerable to people. Certain persons in society are believed to have power of "evil eye" or "evil blood" that can cause a spontaneous abortion. It is believed that pregnant women can be protected from these powers by using medicinal herbs and restricting geographical movement. Wearing medicinal ornaments and herbs to protect the foetus from miscarriage was also established in other studies [20,29,30]. Ngomane, et.al, [29] in her study in Limpopo in South Africa pregnant women feared that having contact with other women at the clinic may subject them to "evil eyes" and jealous women who could harm the foetus and cause miscarriage, and this caused delayed attendance of ANC. Thus pregnancy is regarded as a secret event and the news is kept confidential until the ancestors and close relatives have been informed [29]. Since it is considered a taboo to share the news with friends, distant relatives and outsiders such as health officials, the news of pregnancy is kept confidential, causing a delay in the first attendance of ANC.

It was further found that a pregnant woman is considered vulnerable to natural causes hence pregnant women are expected to observe some taboos intended to safeguard the mother and foetus. Taboos associated with pregnancy are many, and primarily involve activities the woman should or should not engage in and food a pregnant woman should or should not eat.

It was established that a pregnant woman should not engage in "harmful activities" including heavy duties such as lifting heavy loads, bending for long periods, fetching water from an open bore hole, standing at the door way, stress, disputes, oversleeping and engaging in sexual activities with any man, including her partner. She should also abstain from eating some foods believed to cause adverse pregnancy outcomes such as such as eggs, meat, avocado, oily food and stones (Pica). On the other hand, a pregnant woman was not supposed to stay idle, but engage in light physical duties and appropriate diet believed to enhance a healthy birth outcome, such as eating green traditional vegetables, fermented milk, liver and *Ugali*. Other studies have also established beliefs that sexual relations outside marriage could damage the unborn child and cause problems during labour, such as prolonged or obstructed labour and/or death of the mother and baby [9,18], and if something went wrong during labour, they ask the woman in labour to confess her supposedly 'bad' behaviour. In other communities, rigorous activities such as lifting heavy objects or doing farm work during

pregnancy were also established to be harmful as this may lead to miscarriage or stillbirth [17]. However, some of these restrictions and recommendations are cultural adaptive mechanisms that are indirectly intended to control disease transmission and improve maternal health, though based on folk explanations, while others could be detrimental to human health.

9.4 Ethno-medical conceptualization of maternal nutrition during pregnancy: implications for nutritional behaviour of pregnant women

While answering study question three, it was found that among other reasons, pregnancy complications were thought to be caused by the wrong diet during pregnancy. Some foods were considered to jeopardize a pregnancy if consumed in excess, while others can endanger pregnancy if they are not eaten in sufficient quantity, while others should not be consumed at all. Thus, a pregnant woman is required to eat sparingly and selectively. Our fifth research question, which is answered in detail in Chapters 7 and 8, were: *How do food beliefs and practices influence nutritional behaviour intention of pregnant women? What local foodstuffs are traditionally recommended or restricted for consumption by pregnant women* and questions six, *What are the underlying reasons for food recommendations and restrictions during pregnancy?*

In both studies, women acknowledged that eating habits during pregnancy affect the health of the foetus and pregnancy outcome. To achieve a positive outcome, it is important to abide by certain food taboos and recommendations during pregnancy. Women adhered to the nutritional precautions as a concern for healthy pregnancy and birth outcome and this is the main reason established in literature on why pregnant women from other regions of the globe observe nutritional recommendations [31–33].

One of the most important nutritional recommendations adopted by the local women in our study aimed at keeping the foetus small. It is believed that large foetuses are difficult to deliver, resulting in episiotomy, prolonged and obstructed labour and possibly caesarean section (CS), increasing the chances of death of the mother or child. Eggs, oily food, meat, fresh milk, Moberiet and cooked potatoes during pregnancy are believed to make the foetus grow excessively big, hence these foods are restricted. Prescription of herbs was also mentioned as a remedy for regulating the size of the baby and to accelerate contractions during labour. In scientific studies, consumption of excessive protein- and energy-rich food can lead to excessive weight gain during pregnancy, which is associated with health complications an increased prevalence of CS and neonatal mortality [34–36]. The rate of caesarean delivery is positively associated with post-partum antibiotic treatment and severe maternal morbidity and mortality, even after adjustment for risk factors [37]. An increase in the rate of caesarean delivery is also associated with an increase in foetal mortality rates and higher numbers of babies admitted to intensive care for seven days or longer even after

adjustment for preterm delivery. Rates of preterm delivery and neonatal mortality rates are higher in cases of caesarean delivery compared to normal delivery [37]. Therefore, these women's fear of CS is scientifically justified, considering the fact that rural areas in Kenya are faced with infrastructural and institutional challenges that lead to delayed access and difficult emergency referral systems. However, in Kenya, despite the fact that many women are now becoming obese, only 3.6% of the babies have a birth weight over 4 kg [38]. Furthermore, babies with a low birth weight are also an indication for a CS [39], which means that attempts to keep the baby small to avoid CS section might actually work out to the contrary. It is also doubtful whether these women are aware that short stature due to nutritional deficiency is also associated with an increased prevalence of CS and neonatal mortality, particularly in the first days after birth, due to an increased rate of cephalopelvic disproportion/failure to progress during labour [37–39].

Another factor that is ethno-medically believed to facilitate easy labour and birth is to have “sufficient blood”. It is believed that fewer blood reserves make a woman weak. A woman with less blood is also believed to bleed excessively during labour, birth or after birth, which may necessitate a blood transfusion or cause death if she cannot access a health facility in time and get a willing blood donor. Anaemia is very common in pregnancy and is associated with maternal death. A study by Ties Boerma and Mati [3] in the coastal region of Kenya established that iron deficiency was among the leading causes of maternal death. Post-partum haemorrhage (PPH), which is associated with iron deficiency, is the single leading cause of maternal mortality and morbidity in many LMICs. More than half of all maternal deaths occur within 24 hours of delivery, mostly from excessive bleeding [45]. According to many respondents, the prominent way of ensuring enough blood is consuming plenty of traditional vegetables, liver, animal blood, fruits, milk, beans, red soil/stones and fish during the pregnancy period. These food recommendations are indeed iron rich. On the other hand, a woman should avoid eating soil and soft stones (pica) because they are believed to “suck” her blood (causing anaemia).

According to the respondents, easy labour and birth are also determined by the strength of the woman. They consider that a weak woman cannot push out the baby easily and that she can even faint or die in the process. Such a woman can only be helped by CS which is, as mentioned above, believed to be a risky endeavour. For a woman to have enough energy during birth, she is expected to consume food believed to give strength during her pregnancy. Such food includes *ugali* and porridge made from finger millet mixed with sorghum, and traditional vegetables, milk, traditional herbs and meat. Similarly, Towns [19] also established how Beninese and Ghanaian women consumed medicinal plants to strengthen them during pregnancy and that delivery would be facilitated through consuming these plants. Energy-giving starch-rich items were also regarded as good for the body among rural Nigerian mothers [47]. Most of the food believed to provide strength (*ugali*, porridge and potatoes) is indeed energy-giving. Milk and traditional vegetables, which are also associated with energy-giving, actually build the body and increase blood, which is vital in energy production and so highly recommended during the biomedical maternal nutrition intervention training and

counselling to reduce chronic energy deficiency and poor weight gain during pregnancy. Furthermore, it has been scientifically established that about 27% of the 12.5 kg total pregnancy weight gain is stored as maternal fat, presumably to provide an energy reserve during the last part of pregnancy when foetal growth requirements are highest and during birth when more energy is vital [41].

Evil spirits or supreme powers are also believed to interfere with good health outcomes by causing misfortune and complications during pregnancy, labour or birth. The death of an animal is sometimes believed to be caused by evil spirits, which are transferable to humans. Therefore, if a woman eats the meat of a dead animal killed by evil spirits, these spirits can cause a similar death or misfortune to the mother or child.

Some food was restricted because it is believed to cause sickness to the mother or to the child after birth including: neonatal death, skin rashes, colic pain, and nasal blockage or breathing difficulties in the infant and nausea feelings, vomiting, miscarriage, preterm birth and maternal death. Food believed to cause these illnesses to the child include those that are oily, sugary and salty. Eating soil, stones, mutton, sheep's head and vegetables grown on burned soil, oily food and salt are some of the food restrictions under this category. The belief that this food causes childhood illnesses may not be scientifically justified, however much of the food in this category such as sugar, salt and oil are associated with non-communicable diseases such as hypertension which is among the leading causes of adverse birth outcomes.

It is important to keep in mind that this study was conducted in a rural area in Kenya that is faced with institutional and infrastructural challenges. Most health facilities in the rural areas provide primary healthcare and are not equipped to conduct complicated deliveries such as obstructed labour, blood transfusion or surgery. Referral systems in case of an emergency are also poor, which is exacerbated by poor rural road access [40–42]. Hence women's perceived fears of complicated labour and delivery are highly justified.

9.5 Reflections on the theoretical framework

In this study, it was established that in contrast to the limited reach to biomedical maternal care interventions, traditional maternal health care remedies and practices during pregnancy are extensive among the Kalenjin women as in many other African countries. It is also highly unlikely that these traditional maternal beliefs and practices will fade away any time soon. Even after migration to urban areas and other countries, studies have shown that immigrants maintain their cultural beliefs and practices during pregnancy and childbirth, even if they are based on scientifically incorrect premises and may to some extent be detrimental to their health [43–46]. For the interventions to effectively address maternal malnutrition, programme designers and implementers need to not only understand ethno-medical beliefs and practices, but also why these are highly valued, and can stand the test of time even if they are based on scientifically incorrect assumptions and in some cases may be detrimental

to the health of pregnant women. This could be a good entry point in bringing change to intervention design.

In this regard, Dawkin's memetic theory of cultural evolution was adopted to obtain an understanding as to why ethno-medical care practices dominate people's attention and to find out why it has a great psychological appeal' (the survival value) over biomedical interventions. We argue that ethno-medical beliefs can be considered 'memes', and just like genes they replicate themselves over time. They are replicators in the sense they have a system of inheritance. Knowledge of these systems is passed on from generation to generation through several media of socialization such as parents, relatives, peers and local leaders among others. When the new generations grow up, they tend to imitate what they learned from these media. Different factors contribute to their survival value as presented in Figure 9.1 and briefly discussed below.



Figure 9.1 Framework of persistence of Ethno-medical maternal care interventions (own figure based on Dawkin's concepts)

Evolution and Transmission of ethno-medical interventions (copying fidelity)

Ethno-medical beliefs and practices are a way of life – a lifestyle with shared rules and rituals full of symbolic meaning for a social group. It is a group's way of making sense of the events in their life and appropriate copying mechanisms to adopt in order to survive, stay healthy

and well. These ethno-medical customs are very diverse and they include many ideas and beliefs about food to be eaten or avoided, medicinal herbs to use, meanings of some signs and symptoms of pregnancy, recommended and restricted activities, how to relate to evil/witch people in the society, ancestors and supernatural forces. These and many more human behaviours and products of behaviour form a complex informal system of adoption.

These ethno-medical customs thus comprise a complex pool of ideas, techniques, strategies and rules developed over many generations and are transmitted from one generation to another (cultural transmission). Each generation has to learn the basic survival techniques of pregnancy from the previous generation through the process of cultural transmission. Therefore, many of the strategies used by the women in our studies to cope with pregnancy complications are based on the knowledge and skills that they have learned over many years since they were children when they were growing up. For this reason, if a woman is abandoned by the group or leaves her group and joins another one, she would find it almost impossible to unlearn all these beliefs or learn new knowledge through trial-and-error learning within a short timeframe and apply it in her life – which explains why immigrants tend to carry and keep their cultural identities to new countries [43–46]. This also explains why these ethno-medical systems have survived over many generations and periods of time.

Appealing value of ethno-medical interventions

Some customs have direct intended benefit to the women which is scientifically verifiable, for example consumption of green leafy vegetables to increase blood volume (iron), eating starchy food to increase energy or avoiding bending for long hours to prevent lower abdominal pain.

Other ethno-medical interventions, though based on “irrational” scientifically unverifiable theories, also have unconscious or unintended, adaptive significance that is very attractive to the people in the society. For instance, the true significance of the taboo of not eating dead meat is to prevent contamination, especially if the animal died out of a dangerous contagious disease rather than the purported reason of “you will die like that animal”. In another instance, relating miscarriage to quarrelling or abuse by the husband is a way of preventing emotional stress, which is normally associated with pregnancy complications. And relating complications to “evil eye” or “witchcraft” is a way of controlling the geographical mobility of a pregnant woman that might expose her to contracting communicable diseases. A taboo against consuming excess salt because it will make the child’s skin crack is a way of restricting excessive salt intake, which could help in reducing the risk of hypertension and water retention in pregnant women and thus in reducing the complications of pregnancy and childbirth. However, these women do not justify these practices in medical terms. When a belief works as a metaphor for social problems, this positive biological feedback may have contributed towards the selective retention of these practices over a long period of time.

Ethno-medical customs do not always promote human well-being. Women do not inevitably make maximally adaptive responses or wise healthy choices. Some cultural interventions tend to have maladaptive effects, which are detrimental to women's health. In this study for instance, pregnant women are recommended to eat red soil (*pica*) because it is believed to have iron.

Variability/complexity, generalizability and change in ethno-medical customs (Copying fidelity)

Just like genes, ethno-medical customs evolve, that is, they undergo directed adaptive changes in response to environmental pressures and challenges through varied mechanisms. This means that what was applicable in the past might not be exactly the same as it is today. Furthermore, just as the genetic pool of populations contains varied genotypes, some which may prove over time to be more adaptive than others to the environmental changes, so the informal pool of ethno-medical customs contains considerable variations. One reason for variation is that each person learns and replicates what he or she is taught in imperfect ways. Especially young people reinterpret rules they have learned from their elders in terms of their own experiences and problems. This is made possible through the "human capacity for culture and learning". For instance, in this study, it was established that individuals who ever experienced previous pregnancy complications or had anaemia, booked their initial ANC earlier and report a higher compliance with nutritional supplements. With respect to the influence of own experience, some respondents mentioned that the effect of eggs is more severe at certain stages of pregnancy although the stages reported differed, varying from before 6–7 months to 6 months onwards.

Changes occur also through selective retention of new ideas and techniques that promote the effectiveness of the group or of the individual in dealing with problems, including the situation that threaten the intergeneration of the group and the self. These new ideas and techniques may be innovated within the group's ecological systems. For example, some respondents reported that if it is essential that a woman eats eggs (e.g. due to hospital recommendations or pregnancy "urges") she should mix them with other food such as chapati (flat round shallow fried substance made from wheat flour, salt, sugar and oil) or vegetables, for this is believed to neutralize the effect associated with eggs.

However, frequent adaptation extends beyond ecological systems of the group. In many cases they are borrowed from neighbouring groups, travellers, or biomedical intervention strategies. It usually involves adjustments and changes that tend to increase the group's security, maintain the community's physical and emotional health, and protect the individual and defend the ego.

Generalizability

People have at their disposal diverse sets of knowledge, skills and ideas of interpreting and adopting to the learned ethno-medical customs. Thus some behavioural adaptations to

ethno-medical customs are specific to the individual, regardless of cultural background, leading to a cultural complex pool of ideas, techniques, strategies and rules that keep on changing over generations, hence cannot be generalized to people of the same cultural group or in different generations. This makes it even more complex because biomedical interventions cannot design a unified intervention strategy to address different individuals in one community and in different generations.

Use of superstitious powers/ blind trust

Another factor that has been very effective in enforcing ethno-medical practices is the threat of using superstitious powers that cannot be measured or evaluated. This is an idea that enhances greater psychological indoctrination in people's minds. Some beliefs such as that stillbirth is believed to be caused by ancestral spirits or spirits of a dead animal, eating eggs will cause obstructed labour or social disputes can cause neonatal death, have a deep psychological impact such that no one would wish to face the consequences. These superstitious beliefs have been reinforced by another complex meme called faith. Expectant women blindly trust these taboos even in the presence of scientific evidence presented by nutritional education programmes. The blind faith secures its own perpetuation by the simple unconscious expedient of discouraging rational enquiry of these superstitions.

On the other hand, ethno-medical interventions are reinforced by different agents and mechanisms such as being punished by midwives during birth or losing a marriage for being childless. In other words, it is a practice into which a woman enters involuntarily and constrains her agency.

However, when environmental change or alteration occurs, e.g. through an intervention, we expect humans to respond rapidly and flexibly by changing their behaviour. Many change processes, however, tend to have long timeframes, often spanning one generation or more.

9.6 Limitations and strengths of the study

Data collected for study two were based on self-reported information collected from intervention participants using a checklist of the components of intervention protocols. In this case, participants were asked whether they received the identified components of the intervention. Data collected based on self-reports provides important clinical information regarding practicability of the intervention during dissemination, which is useful in designing future versions of the programme [47]. However, data based on self-reported measures may have potential limitations related to accuracy. Distortions in data may occur due to poor recollection by participants. In addition, participants may have biased feelings towards the implementer and give socially desired answers. This was countered by validating the responses with the recorded information in the clinic appointment cards and seeking clarifications from programme implementers on issues that were not clear.

The respondents who were interviewed were those who had sought care at health facilities. They might have different views from those who do not turn up for such care. Similarly, respondents were selected from rural Uasin Gishu County health facilities, and we do not know the extent to which respondents attending urban facilities might have different perceptions. However, the findings might not be any different given that access to health facilities for ANC in Kenya is quite high (97%)[1].

In the two studies various models were applied in interpreting research findings. Models sometimes are more general to the subject under study and might restrict and limit the researcher to specific elements of the model. I nevertheless still found these models to be applicable in these studies although I was not exclusively restricted to their variables, hence open questions and open coding were adopted.

Considering that I, the main researcher, am not from the Kalenjin community, I was aware that there are issues regarding language, culture and social norms which might make it difficult to obtain truly informed and voluntary consent [48] To counter this, I recruited research assistants from the local community who understand the local language and could help in translation and clarification of issues that could not be readily understood. The involvement of research assistants from the local community also created assurance, confidence and willingness to participate by the participants. On the other hand, doing a qualitative enquiry in a cultural group that is different from that of the investigator enhances validity of the findings because it controls cultural prejudices and potential influence on the study [49].

This thesis research adopted a mixed-methods approach. However, it was largely qualitative in nature because it was meant to study a specific phenomenon (ethno-medical maternal healthcare systems) in a specific ethnic group (the Kalenjin) of a focused locality (Uasin Gishu County) in a particular context. Hence generalizability of the research findings is not an expected attribute of the study [50]. However, the same criteria for validity, that is: triangulation, constant comparisons, proper audit and documentation, proper cross-checks during transcription, establishment of themes, sub-themes and coding of the findings, and use of multi-dimensional theory in analysis, were used in the evaluation of generalizability of the findings. By relating the research findings of this study with those established in the literature, it was revealed that similar principles and methods of ethno-medical maternal healthcare practices can be found in communities throughout Africa and other LMICs. A good example is the application of medical pluralism or use of different medical therapies in the prevention and treatment of maternal health complications, such as the use of medicinal herbs, beliefs on sorcery and witchcraft, reliance on TBAs and older women relations for care and advice and, behaviour and dietary restrictions during pregnancy, and some bits of biomedical knowledge.

There were also important differences established in these ethno-medical practices based on personal, ethnic, and regional features that create unique context-dependent expressions of

the art of ethno-medical practices and this makes generalizability of interventions impossible. One of these differences is that ethno-medical care practices tend to be highly location-specific in their use of cultural symbols and supporting paraphernalia, in their style of diagnosis, in recommendations regarding therapy and in their dosage of remedies. For instance, a belief that certain food if eaten during pregnancy will make the foetus big and consequently create difficulties during birth was commonly established in many cultures. However, the specific food believed to make the foetus too big vary within and across the cultures and countries, making generalizability difficult.

9.7 Conclusion on the main findings and policy recommendations

Although the government of Kenya tries to sponsor public health facilities by introducing free maternal healthcare services [51], it was found in this study and other studies in rural Kenya that these facilities experienced many infrastructural challenges that make access to these facilities for interventions difficult [40,42]. Even when access was possible, most women in this study and other parts of Kenya booked ANC appointments late (average gestational age of 23.4 weeks), and others made only one visit or sometimes no visits at all, limiting opportunities for quality nutrition intervention and care. The main reason for the delay in the decision on whether to seek maternal care identified in this study was a result of women's failure to recognize symptoms and maternal health problems as requiring biomedical interventions, and this failure stems from culturally informed perceptions of symptoms of maternal morbidity and pregnancy complications that differ significantly from biomedical implications. Hence, even if biomedical interventions were freely available and easily accessible, the prevailing social and cultural values and actual attendance patterns indicate that facility-based biomedical interventions are not the preferred choice for many pregnant women in Uasin Gishu County.

It was also noted that the women who do turn up for interventions do not receive the full package of intervention elements as outlined in the programme, due to stock shortage and shortage of staff. For instance, only 18% and 15% of the respondents received the minimum 90 or more IFAs as required during their entire period of pregnancy and not more than two-thirds of our sampled population reported having completed the supplements they were given. This is a clear reflection of inefficiency of biomedical care interventions in addressing maternal malnutrition.

Contrary to the limited reach to these biomedical care interventions, it was established that there is extensive use of ethno-medical care interventions among the Kalenjin and other communities in the LMICs. For instance, 44% of the respondents sought care from both hospital nurses and TBAs, and only 30% relied on nutritional knowledge provided at the health facilities. Others relied on nutritional knowledge acquired from several other sources. This is a clear indication that ethno-medical maternal healthcare practices, even if they rely on the resources of the past, remain vital to contemporary societies and coexist openly or

covertly alongside and complement the biomedical maternal healthcare interventions. It was also established that these ethno-medical interventions have some intended and unintended internal adoptive logic and consistency, which help women make sense of what has happened, why it has happened and the appropriate coping mechanisms to adopt in order to stay alive. Hence, introducing drastic change to these practices or breaking the traditional structures, new sets of ideas are created making women caught between conflicting values that not only subject them to social disorientation but also lead to inter-cultural conflicts between the two, making full adoption of nutritional interventions often complex and confusing.

The evidence of inefficiency of biomedical care interventions in addressing maternal malnutrition and the extensive reliance on ethno-medical care is a clear reflection of need for a more profound and refined intervention model for maternal nutritional healthcare. The question therefore is: what is this more profound intervention approach? Here I will provide some suggestions.

The intended ultimate goal of all ethno-medical maternal care interventions identified in the study was to protect the health of the mother and child, and ensure a successful pregnancy outcome, which are also the same ultimate goals for the biomedical maternal nutrition interventions. The main health concerns that these ethno-medical care interventions tend to address in order to ensure a successful pregnancy outcome were: fear of having complicated labour and maternal or foetal death, which is believed to arise due to having “less maternal blood”, “weak maternal body or lack of energy”, “expecting a big foetus”, and “maternal sickness”. These are the same concerns that are being addressed by bio-medical maternal nutrition interventions. The only difference is that ethno-medical care interventions advocate for maintaining small foetuses, whereas biomedical care interventions advocate for improving foetal birth weight. Another difference is that the two intervention approaches tend to use different strategies that either conflict, or are in line with one another. The commonly established strategies that complement each other include: promoting physical activity, diet (energy and iron rich food), using disease preventive medicine, reducing heavy duties and enhancing rest periods. Therefore, rather than paying little attention to or considering these ethno-medical practices to be inferior to the western medical system, or stereotyping them as “uncivilized irrational native superstitions”, I advise intervention programmes to establish and enhance strategies that can mutually and fruitfully complement these two interventions, leading to their integration.

1. It was established that, ethno-medical practices are considered to be important and have some intended or unintended adaptive significant value to the health, social or psychological wellbeing amongst its subjects that helps women make sense of what has happened, why it has happened and the appropriate coping mechanisms to adopt in order to stay alive. Hence introducing drastic change to these practices or breaking the traditional structures, make that women are caught between conflicting values that may not only subject them to social disorientation but also lead to inter-cultural

conflicts between the two, making full adoption of nutritional interventions often complex and confusing. Instead, intervention programmes should try to understand the holistic nature of ethno-medical approaches to health care and treatment/healing, identified which are harmful, beneficial or harmless to maternal health. For those that are harmless but have some importance in maintaining social order and harmony, interventions should probably pay little attention to them. For those that are beneficial to maternal health interventions could use those beliefs to their benefit. For those that are harmful, it is important to develop an alternative strategy that compliments the belief in addressing them. A very good illustrative approach to complementing the two interventions that I can recommend to maternal nutrition programmes are:

- a. One factor that is ethno-medically believed to promote successful pregnancy outcome is to have “sufficient blood” (preventing anaemia). The prominent way of ensuring enough blood that was identified in the study is: consuming plenty of green leafy vegetables (mostly traditional), liver, animal blood, fruits, milk, beans, red soil/stones and fish during the pregnancy period. On the other hand, a woman should avoid eating soil and soft stones (pica) because they are believed to “suck” her blood (causing anaemia). Anaemia is very common in pregnancy and indeed identified to be one of the leading causes of adverse pregnancy outcome such as maternal death and low birth-weight, hence one of the major problems being addressed by biomedical care interventions. Therefore, investing in improving the production of these traditional vegetables to ensure availability and abundance will be an appropriate approach to addressing anaemia and the challenges associated with iron supplementation. In addition, nutritionists need to investigate whether the cooking styles adopted by these women indeed retain iron and other essential nutrients found in these vegetables.
 - b. It was also established that protein rich foods such as meat, eggs and fresh milk are culturally restricted whereas fish, beans and fermented milk are recommended. In this case, interventions should rather advocate for the consumption of the alternative protein-rich food that is culturally recommended (e.g. fermented milk, fish and beans) and ensure their abundance, rather than advising women to eat restricted food. Along the same lines, instead of just advising women to eat eggs health workers could suggest modifications of eating eggs that were identified in the study area (such as frying eggs together with vegetables).
 - c. It is important to enhance traditional practices such as reducing heavy and risky workloads, enhancing physical activities, avoiding emotional stress, and receiving family support. This will not only reduce deprivation of nutritional reserves but will also improve health and wellness.
2. Some other constraints were mentioned in this study making it difficult to comply with nutritional advice. The greatest constraint reported was the gastro-intestinal discomforts that caused feelings of vomiting, nausea and acidic stomach and bad smell.

Shortage of greens during the dry seasons (e.g. in January), which makes these vegetables become costly, was also reported. Appropriate strategies to deal with nausea feelings and season-specific counselling are recommended.

3. Some harmful ethno-medical interventions and practices were identified in the study including punishment by midwives during labour for having a baby with white smear (a sign of having had sex during pregnancy), or divorce because of being childless due to still birth, and other superstitious psychological mechanisms reinforced by community members (e.g. women relations). These mechanisms are quite strong in the sense that pregnant women enter into these ethno-medical practices involuntarily and sometimes blindly. Hence, intervention programmes addressing pregnant women should not only target the pregnant women but also pay attention to the reinforcing agents. At the same time these agents are also the opportunities of bringing change to these interventions because they are not only accessible but also more trusted to pass messages to the pregnant women.
4. The ultimate fear underlying food restrictions during pregnancy identified in our study is fear of big babies. Therefore, use of terms such as “big babies” and “heavier babies” during nutritional training and counselling are likely to scare away women and lead to poor adoption of interventions. Instead, terms such as “strong woman”, “strong babies”, “healthy babies”, which are commonly used in a positive way by these women, can better be adopted by programme implementers.
5. These ethno-medical practices were established to contain considerable variations within and across cultures. For instance, there was no clear-cut idea on what foods are culturally recommended or restricted for consumption during pregnancy. Some foods mentioned as recommended for consumption were reported by others as restricted. Other food and practices were more recommended than others. Hence, unified intervention strategies to address all individuals in one community might not be effective. Instead, strategies need to be tailored towards each individual’s needs.
6. The study findings indicate that only 28% of the respondents reported to have received nutritional counselling on general diet. The nutritional training and counselling component of nutrition interventions needs strengthening. A health facility may not be the most appropriate place for this. Community outreach, using community health workers and elderly women, is likely to be more effective. This will not only promote the consumption of micronutrient-rich food sources available in the local environment but will also substitute the shortage of nutritional supplements that is commonly experienced in the health facilities in the study area and other regions of the country.

9.8 Recommendations for further research

Study two focused on adherence to the implementation of the core components of the national maternal nutrition intervention programme, particularly investigating the experiences of the programme recipients. It is also important for future studies to consider assessing the competences and perspectives of the practitioners in delivering these core components. We found indications of poor implementer competences in delivering these interventions. This could be noted from the contradicting dose prescription, mixed and incorrect responses on the usefulness of IFAs, and the practices that were mentioned by programme recipients of punishment of women during labour when midwives observed that a taboo had been violated.

Traditional herbs are widely consumed during pregnancy, not only in Uasin Gishu County but also in other parts of Africa. There is the need to study the chemical constituents of these herbs to learn how safe and relevant they are for human consumption, especially during pregnancy and for foetal development.

This study focused only on pregnancy-related beliefs up to the point of birth. Post-pregnancy beliefs were beyond the scope of this study and hence need follow-up research. Further exploration of views is necessary to explain some of the Kalenjin perceptions and practices during the post-partum period.

In this study the implications of the food beliefs during pregnancy on the actual nutritional status of Kalenjin women were beyond the scope of this thesis. Future studies could take an explicit nutritional focus using a combination of analysis of dietary intake such as food frequency questionnaire, food diary and 24-hour dietary recall to determine the actual nutrient intake as well as medical investigations such as BMI and relevant blood parameters etc. to assess the nutritional status of the women.

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