

Nutrition Education and Counselling: An Essential Consideration to Optimise Maternal Nutrition and Pregnancy Outcomes In Kenya.

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ABSTRACT:- Several women in developing countries enter pregnancy at sub-optimal nutrient levels and also engage in strenuous physical activity. Multiple deficiencies are due to low dietary intake and poor bioavailability of micronutrients as well as minimal consumption of animal products. Studies have shown that very few women in developing countries consume food group servings and nutrients consistent with RDA and most continue with heavy physical activity throughout their pregnancies which further increases their energy requirements.

Infections also put on additional burden on the dietary needs of women by decreasing appetite and reducing nutrient absorption and their metabolic stress increase energy and nutrient needs. Thus, vulnerable groups are at risk of developing nutritional deficiencies without food support programmes. Malnourished women do not gain sufficient weight during pregnancy, are more likely to have miscarriages or stillbirths, give birth to preterm babies or deliver babies with low birth weight, have increased risk of maternal mortality, increased infections, anaemia, compromised immune functions, lethargy, lower productivity, increased risk of foetal and neonatal death, birth defects, cretinism and reduced IQ. A range of barriers acting at the individual, household and health service delivery levels continues to affect intervention coverage in Kenya inspite of much effort in addressing maternal and child health and nutrition. Much more effort is still needed in addressing maternal and child health and nutrition. Much more work is needed in order to upscale maternal and child nutrition interventions. Although not well spelt out in the maternal healthcare package, nutrition education is important as it endeavours to alter participants' dietary intakes by remodelling behavioural factors. Positive behaviour adjustments by participants in nutrition education and counselling interventions have been reported by several authors. Nutrition education intervention is therefore an essential consideration to optimise maternal nutrition and pregnancy outcomes. The government needs to incorporate nutrition education into the mainstream primary healthcare arrangement for pregnant women.

Key Words: Nutrition Education and Counselling, Maternal Nutrition, Pregnancy Outcomes

I. INTRODUCTION

Many women in developing countries maintain pregnancy on dietary intake lower than those recommended by international agencies (Shrimpton & Sadahha, 2011). Studies carried out in Kenya much earlier found that pregnant women consumed an average of 1442 kilo calories per day while those conducted more recently in the region of study found women to consume an average of 1450 kilocalories per day (Odiwuor, et al, 2013). Recent studies show that deficiencies of several micronutrients are common among pregnant women in Africa particularly iron, vitamin A, zinc, folic acid, riboflavin and iodine.

The high prevalence of multiple deficiencies can be accounted for by low dietary intake, poor bio availability of micronutrients and minimal consumption of animal products and fortified foods (Schultink, 2013). A study by Fowler, Evers and Campbell (2012) on inadequate dietary intakes among pregnant women found only a total of 3.5% of women to have consumed the recommended number of servings for all four food groups; 15.3% did not consume the minimum number of servings of foods for any of the four food groups. Women with a first pregnancy were less likely to consume the recommended number of servings from all four foods. The study concluded that very few pregnant women consumed food group servings consistent with RDA and recommended that strategies to improve dietary behaviours must focus on the establishment of healthy eating behaviours among women of reproductive age.

A study by Hartini (2004) on food habits, dietary intake and nutritional status during economic crisis among pregnant women found that before the crisis, more than 80% of pregnant women had inadequate energy and 40% had inadequate protein and vitamin A intake. All women had inadequate calcium and iron intake. The food intake consisted of rice, nuts, pulses and vegetables, indicating that it was mainly plant-based food. Rural poor women with access to rice fields increased their rice intake and decreased their intake of non-rice staple foods. Intake of nuts, pulses and vegetables increased for most groups. Nuts and pulses were an important supplier of calcium and iron, and vegetables were an important source of vitamin A.

The study concluded that before the crisis, energy and nutrient intake of pregnant women were inadequate. The food pattern of the women was predominately plant based. Rural poor women with access to rice fields had a higher rice intake than other groups throughout the crisis. Urban poor and rural poor, landless women experienced a decreased intake of most nutrients in the transition period but an increased intake during the crisis, reflecting government intervention and support from relatives and neighbours. The latter, however, is not sustainable. Thus, vulnerable groups are at risk of developing nutritional deficiencies without food support programmes.

Factors impacting pregnant women's Nutrition

Physical Activity Levels in Pregnancy

Women in Africa carry out physically demanding activities requiring high levels of energy. In Buchi, more than 80% of pregnant women continued to do heavy work even in the last trimester and in Cross River almost half of pregnant women continued with heavy workload (Nigeria Information & Planning Systems (NIPS), 2013).

Strenuous work especially when involving long hours of standing and walking seems to increase the risk of preterm delivery. A study by Marilia, Ismail, Askworth & Morris (2013) on influence of agricultural work on birth weight in Brazil found mean birth weight of infants born to women who worked in agriculture during 9 months of pregnancy to be 190 grams lower than that of the non exposed group. They concluded that working throughout pregnancy significantly reduces birth weight in low income populations.

Another study by Snijder, et al (2012) found no consistent significant associations between physically demanding work nor working hours in relation to small for gestational age, low birth weight, or preterm delivery. Women exposed to long periods of standing had lower growth rates and lower foetal head circumference (HC). Compared with women working less than 25 hours a week, women working 25 to 39 hours a week and more than 40 hours a week had lower growth rates for both foetal weight and HC, resulting in a difference of 148 – 198 grams in birth weight. They concluded that long standing and long working hours per week during pregnancy seemed to negatively influence intrauterine growth.

For a study done in Homabay and Migori Counties of Kenya, participants observed that in practice, most women continue to work in the fields, carry water, collect firewood, etc. throughout their pregnancies, and many only stop performing these tasks when labour begins (FCI, 2013). Occupational Med (2006) states that from the examination of studies dealing with exposures of women to occupational risks, it appears that at present the evidence is sufficient to warrant the maximum protection of pregnant women to several well documented occupational risks such as heavy physical work and irregular work. In general, heavy work duties should be avoided and enough rest periods assured especially in late pregnancy.

Health Factors of Pregnant Women in Developing Countries

Infections put on additional burden on the dietary needs of women. Many infections decrease appetite, gastrointestinal infections reduce nutrient absorption and the metabolic stress of illness increase energy and nutrient needs. According to reports from several authors, the major infections affecting maternal nutrition in Africa are hookworm, Malaria and HIV. Pregnant women living in places where malaria is prevalent are four times more likely than other adults to get malaria and twice as likely to die of the disease (FCI, 2013).

Once infected, pregnant women risk anaemia, premature delivery and stillbirth. Their babies are likely to be of low birth weight, which makes them unlikely to survive their first year of life. For this reason, steps are taken to protect pregnant women by distributing insecticide-treated mosquito nets and intermittent preventive treatment. In a Nyanza Indicator Cluster Survey, nearly 70% of mothers who delivered a child during the two year period preceding the survey received medicine to prevent malaria during pregnancy (KNBS, 2013). The prevention and treatment of malaria and other infections, management of anaemia and other nutrient deficiencies during pregnancy can significantly improve foetal outcomes and improve maternal health.

Implications of Pregnancy on the Woman

In most developing countries, women spend a large proportion of their reproductive years pregnant, lactating or pregnant and lactating. Women in Africa are pregnant or lactating on an average of 30 to 48 percent of the time between the ages 15 and 45 years. If a woman does not consume enough food to meet energy

requirements during pregnancy, her body makes up the deficit by depleting energy stores (Black & Victoria, 2013). Frequent births and short interval between births may not provide a woman with sufficient time to replenish lost energy stores before she begins another reproductive cycle. If energy intake is not adequate after delivery her body uses fat stores to support lactation. Short recuperative intervals after pregnancy and lactation can result in reduced fat stores for women of marginal nutritional status and deplete micronutrient stores (Black & Victoria, 2013).

Short birth intervals may also be associated with high rates of anaemia. Large amounts of iron are lost during pregnancy due to tissue synthesis in the mother, placenta and fetus and at delivery due to maternal blood loss, which totals 600 mg in addition to basal iron loss. Extending birth intervals between births allows a woman more time to replenish her iron stores. Birth intervals of 36 months or more help to ensure child survival and allow mothers time to replenish their nutritional stores (Linkage, 2001). The actual length of birth intervals in many African countries is often much shorter as shown in an analysis of Demographic Health Survey data where over half the birth intervals were less than 36 months and approximately a quarter were under 24 months (Linkage, 2001).

Consequences of Maternal Malnutrition

Human eating behaviour depends on both biological and cultural factors. Both perceptions and food taboos often influence food intake during pregnancy. According to several authors, a well-nourished woman, gaining 12.5 kg and giving birth to an infant weighing 3.5 kg, is estimated to require 80 000 kcal in addition to her non pregnancy energy balance. Hence, the mother requires extra energy and extra intake of nutrients. For some women, a reduction in physical activity covers part of this extra cost of pregnancy, but for many women this is not the case. Consequently, an increased intake of 300 kcal/day during the second and third trimesters is recommended for pregnant women. Deficiencies in calcium, iron, zinc, folate, thiamine, riboflavin, vitamins A, D, B6 and B12 are very frequent and increase the predisposal to adverse pregnancy outcomes (Becquecy, Martin & Perel, 2010). The consequences of maternal malnutrition are summarized in Table 1.

Table 1: Consequences of Maternal Malnutrition

| For Maternal Health | For Infant Health |
|---|---|
| <ul style="list-style-type: none"> • Increased risk of maternal mortality • Increased infections • Anaemia • Compromised immune functions • Lethargy • Lower productivity | <ul style="list-style-type: none"> • Increased risk of foetal and neonatal death • Intrauterine growth retardation, low birth weight, preterm birth. • Compromised immune functions • Birth defects • Cretinism and reduced IQ |

Source: Linkage (2001)

Pregnancy Outcomes

In well nourished women, optimal weight gain and outcomes of pregnancy can be attained over a wide range of nutrient intakes. Many women sustain a pregnancy with a successful outcome on less than the recommended energy intake. This reflects different adaptive strategies that may be used to meet the additional energy demands of pregnancy e.g. increased nutrient intakes, efficient use of nutrients and reductions in Basal Metabolic Rate, diet induced thermogenesis, physical activity and growth in new tissues/fat deposition in maternal stores (MoH, Wellington, 2008).

However there is a limit to the physiological capacity of the body to adjust nutrient metabolism, and foetal growth and development may be compromised. In undernourished women, nutrients are preferably partitioned to the mother effectively protecting nutrient stores from foetal demand, so that foetal growth is compromised to a greater extent than maternal growth (MoH, Wellington, 2008). Malnourished women (short or underweight or anaemic) do not gain sufficient weight during pregnancy, are more likely to have miscarriages or stillbirths or to deliver babies with intrauterine growth retardation (IUGR) or low birth weight which in turn are linked to increased risk of perinatal and infant mortality (Xiao, et al, 2017). Birth weight is a good indicator of mother's health and nutritional status.

In Developing Countries low birth weight is majorly from mothers with poor health and nutrition. Challenges of measuring low birth exist in Developing Countries because more than half of infants are not weighed. Due to this, data for low birth weight may be a biased sample of all births (KNBS, 2013). In Kenya 25 % of neonatal deaths (within the first 28 days) are due to prematurity (Ojina, 2019). In Migori County preterm births are among the highest in Kenya. Prematurity is a major contributor to neonatal mortality. In a study in Homabay and Migori districts, participants perceived obstetric complications as an increasing problem in their

communities. They reported that rates of miscarriages and stillborn births were “increasing,” and that maternal deaths had “almost doubled” judging by the more “frequent deaths and burials” occurring in the community. Haemorrhage was mentioned more frequently than others and identified as the leading cause of maternal morbidity and mortality. Obstructed labour and ruptured uterus, retained placenta, and abortion (miscarriage) were also mentioned, as were medical problems aggravated by pregnancy, such as anaemia or malaria. Further, participants cited a range of socio-economic and gender issues that contributed to poor overall health, and linked these to maternal complications (FCI, 2013). Adverse outcomes such as low birth weight and prematurity can be reduced through a combination of interventions to improve women’s nutritional status and prevent infections during pregnancy (KNBS, 2013).

Strategies to improve Maternal Nutrition and Health

Adequate Food Intake during Pregnancy

Maintaining energy and nutrient balance has important implications for the nutrition and health status of women throughout their life cycle but especially so during pregnancy and lactation, when nutritional demands are increased (linkage 2001). Nutrition programmes can encourage pregnant women to increase food intake to meet their additional needs. Counselling on appropriate diet and the need to adopt appropriate nutritional behaviours and practices is essential. Some of the actions are illustrated in table 2.

Actions to ensure Adequate Food Intake during Pregnancy

Table 2: Health Sector and Maternal Actions to ensure adequate Food Intake

| Essential Health Sector Actions | Maternal Actions |
|---|--|
| Encourage increased food intake during pregnancy | Eat at least one extra serving of staple food per day during pregnancy |
| Monitor weight gain in pregnancy | Gain at least one kilogram per month during the 2 nd and 3 rd trimester of pregnancy |
| Counsel about reducing Energy Expenditure | Rest more during pregnancy |

Source: Linkage (2001)

Educational Messages: Communication for Behaviour and Social Change

Communication for behaviour and social change based on formative research on the barriers to the facilitators of good nutrition can promote behaviour change in communities, raise awareness about nutrition services and stimulate shifts in social norms in order to improve the enabling environment for good nutrition in communities (Schultink, 2013). The Nutrition Communication Project has addressed maternal nutrition in several country programmes.

In Burkina Faso the project developed a counselling handout and flip chart for health workers. Women who reported exposure to the flip charts and health worker counselling showed higher levels of knowledge on the dietary needs of pregnant women. However, behaviour was unchanged because the message did not address women’s underlying fears of obstructed labour (NCP, 1995). The Bangladesh integrated nutrition project included a community based nutrition component to bring about sustainable changes in feeding and eating behaviours of pregnant and lactating women.

An evaluation found that 84% of mothers in the project areas compared with 52% in the control areas were aware of the additional needs for food during pregnancy. More women (56%) in the project areas reported eating additional food during pregnancy than in the control areas (22%). The mean weight of women during pregnancy was higher in the project areas than in the control areas 8.4 kg versus 7.8 kg. Pregnant women were also encouraged to rest, 64% of women in the project areas compared with 35% in the control areas reported resting more during pregnancy (NCP, 1995). A programme among women in Thailand found that a message to measure weight gain in pregnancy was useful in encouraging women to eat more (Roesel, Schaffer, Durongdej & Tokmoh, 1990).

Actions for adequate Micronutrient Intake during Pregnancy

Actions for diet diversification and micronutrient supplementation can be introduced. Iron and other micronutrients can be supplied through multiple micronutrient supplements provided by UNICEF/WHO (2004). To counsel on diet diversification, women should be counselled on ways to increase consumption of fruits, vegetables, animal products and fortified foods. Increased daily consumption of green leafy and yellow/orange fruits and vegetables will improve the status of many micronutrients such as vitamin A, C, folic acid, zinc and Iron.

Diets in most poor settings are not diversified. An Indonesian study on dietary intake among pregnant women found that energy, vitamin A, calcium or iron intakes were lower than the Indonesian recommended

allowances (Hartini, 2004). Overall, more than 40% of the pregnant women had inadequate protein, vitamin A, or calcium intakes and all women had inadequate iron intakes. With regard to socioeconomic groups, there was a tendency towards a higher intake of carbohydrates, vitamin A, calcium and iron among urban women as compared to rural pregnant women; this was significant.

Before crisis, a positive significant correlation ($p < 0.05$) between the intake of rice and pulses plus vegetables was found, that is, the more rice a woman consumed the more pulses she also consumed. A different pattern was found regarding rice and animal foods. In this case, the correlation was negative: the more rice the less animal foods (Hartini, 2004). The food intake of the women was predominately plant-based in all three periods. Concurrently, the women tended to decrease their already low consumption of animal foods.

Supplementation Programmes

Several Research projects and small-scale programmes for pregnant women have shown positive outcomes from supplementation. Iron supplementation during pregnancy improved iron status and reduced anaemia in pregnancy in various studies. Zinc supplementation during pregnancy increased infant length at birth in a study in Kenya, and improved maternal and neonatal development of infants in Peru. Calcium supplementation during pregnancy (of women with low baseline calcium intakes) reduced risks of high blood pressure and pre-eclampsia in randomized control studies (Evenson, et al, 2014). Vitamin A/beta carotene supplementation lowered maternal mortality by nearly half (Taddese & Ayele, 2013; West et al, 1999) and decreased illness rates in late pregnancy (>28 weeks gestation) in a randomized control study in Nepal (Christian et al, 2000).

Monitor Weight Gain and Counselling on reduced Energy Expenditure

Adequate weight gain is required for optimal pregnancy outcome and it is one of the best predictors of birth weight. There are some groups of women who may require extra support and advice about weight gain and energy intake in pregnancy such as women who are under weight before pregnancy and those with a current or previous history of an eating disorder or restrained eating (MoH, Wellington, 2008). Counselling women to add weight can be a useful tool if appropriate messages and counselling techniques are used as well as improving women's nutritional status to increase birth weight. Reduction in physical work can help meet energy needs (Evenson, et al, 2014). Women should be advised to rest more as soon as pregnancy is detected and the message passed to other members of the family. According to MoH, Wellington (2008), pregnant women should do regular moderate intensity physical activity for a total of 30 minutes on most if not all days of the week. This should be supported with an appropriate energy intake to help achieve the recommended weight gain. Several authors suggest that work adjustments in pregnancy may be effective in reducing the risk of later adverse pregnancy outcomes.

According to Lindholm (2013) elimination of physically loading work conditions such as long hours in difficult posture, whole body vibration and cumulative index composed of nine work conditions was found to reduce risk of adverse pregnancy outcomes. Work adjustments may also present a means to reduce sickness presence among pregnant women. He continues to state that higher rates of sickness have been observed in work entailing long working days, night or shift work and physically demanding tasks.

Educational Nutrition Interventions in Improving Maternal Outcomes

Educational interventions encompass a broad range of activities that combine education and other activities such as counselling and supportive interventions. It is a collection of instructive methodologies accompanied by environmental supports designed to facilitate voluntary adoption of food choices and other food and nutrition related behaviours conducive to health and wellbeing. It may be delivered individually or tailored to groups (Aguayo & Menon, 2016). Women who are short, thin, anaemic or gain inadequate weight during pregnancy are more likely to suffer adverse birth outcomes including low birth weight and preterm delivery (Christian, et al, 2013).

The centrality of maternal and neonatal health among others is critical to achieving Universal Health Coverage (UHC) (Schultink, et al, 2018). One approach towards achieving UHC must be promotive and preventive based interventions. Schultink, et al (2018) recommends improving nutrition of women who become pregnant among other actions to achieve UHC. Nutrition education (NE) programmes have been effective in positive behaviour modification measured in terms of eating patterns and health quality. NE programmes are important as they endeavour to alter participants' intakes by remodelling behavioural factors, food choices, cooking skills, inspiration and reinforce the change effects (Dunnam & Jeevon, 2015; Bhargava & Hays, 2015).

There is need to expose women to health topics and encourage them to participate in health promotion programmes so as to promote healthy eating habits therefore achieve optimal nutrition. Positive behaviour adjustments by participants in nutrition education and counselling interventions have been reported by several

authors. Dean, Lassi, Imam and Bhutta (2014) discussed that preconception nutrition specific interventions increased folic acid and multivitamin supplementation. A preconception counselling resulted into more women being initiated into folic acid supplementation prior to pregnancy (Elsinga, et al, 2008). Rao (2014) demonstrated an improvement in Hb level through a nutrition awareness programme.

An educational intervention programme in Belgium found that nutritional counselling during pregnancy could improve dietary intake in terms of decreased saturated fat intake, increased protein, calcium and vegetable intake (Guelinckx, Derlieger, Millie & Vansat, 2010). A study on the effect of behavioural counselling on patients' consumption of fruits and vegetables in adults from a low income setting found that at post intervention, fruit and vegetable intake increased by 1.5 and 0.9 portions per day in the behavioural and nutrition groups. An increase in the number of participants eating 5 or more portions a day was reported in both groups (42 % and 27 %). Other intervention studies also reported an increase in the intake of fruits and vegetables after a nutrition education program among women of reproductive age (Steptoe, et al, 2003).

A prospective cohort study reported that women who became pregnant during the first 3 months of the study period for those who intended a pregnancy were to some extent more inclined to follow recommendations as compared to those not planning a pregnancy. Approximately the same numbers of women from both groups were found to take fruits, vegetables and folic acid as recommended (Blossner & De Onis, 2005). A study by Lui, et al (2009) demonstrated the positive influence of change in nutrition and health knowledge as well as enhancement of dietary behaviours in general.

Another study by Lui, et al (2009) found women in the intervention group to exhibit significantly higher improvements in overall dietary behaviours e.g. consumption of fruits, vegetables, soya bean and its products as well as nutrition and health knowledge than the control group. Significantly more women in the intervention group gave up the traditional taboos; health and nutrition education intervention enabled women take away some of the unhealthy traditional postpartum practices and decrease the prevalence of postpartum health problems. They concluded that the intervention has potential for adaptation and development to large scale implementation.

A nutrition education conducted at community level hospitals and area health centres contributed to positive health behaviour modifications (Dunnam & Jeevon, 2015). The nutrition focused maternal nutrition counselling program in Bangladesh significantly increased the proportion of pregnant women who received information on eating five food groups during pregnancy but not the proportion who received information on consuming additional amounts of food during pregnancy. Women in the intervention group consumed 1.6 more food groups, had higher increases in the proportion consuming high nutritional value foods such as pulses and consumed greater quantities of food than women in the comparison group (Nguyen, et al, 2017).

Mbithe, Kimiywe, Waudu & Orodho (2008) found that nutrition education resulted in a significant improvement in nutrition knowledge and practices in rural and urban schools and that lack of nutrition education should be addressed in tackling malnutrition. Results of a review of 33 studies found nutrition counselling to be associated with significantly greater gestation weight gain and significantly reduced risk of anaemia in late pregnancy. Subgroup analyses by settings showed that significantly greater weight gain was associated with high income countries and that nutrition education and counselling was associated with a greater mean birth weight and had greater effect combined with nutrition support.

Nutrition education and counselling significantly improved mean birth weight and significantly reduced risk of preterm birth. The study concluded that nutrition education and counselling during pregnancy could reduce the risk of anaemia, increase gestational weight gain and improve birth weight (Giward & Olude, 2012). Kafatos, Vlachon and Codrington (1989) demonstrated that nutrition counselling was associated with improvements in dietary intake and maternal weight ($p \leq 0.05$), mean birth weight was significantly higher in the intervention group as well as incidence of low birth weight (4.5 % and 3.9 %). Prematurity rate was marginally lower in the intervention group ($p \leq 0.04$).

Nutrition education intervention is therefore an essential consideration to optimise maternal nutrition and pregnancy outcomes. Moreover, it can easily be integrated or combined with other nutrition interventions.

Situation of improving Maternal Nutrition in Kenya

Kenya continues to demonstrate a high level of leadership in improving nutrition for its most vulnerable groups including pregnant women. Several policy and legal frameworks promote reproductive, maternal and child health. These include Kenya Constitution (2010), Kenya Health Policy (2014 – 2030), Kenya RMNCAH Investment Framework (2016), National Reproductive Health Policy (2007), Adolescent Sexual and Reproductive Health Policy (2015) e.t.c. However much more action and financing are needed particularly for women and girls. The objectives of Kenya Nutrition Action Plan 2012 – 2017 includes improving the nutrition status of women of reproductive age which entails nutrition education on consumption of healthy foods and strengthening iron and folate supplementation during pregnancy (Kimani, 2014).

Lancet/WHO/UNICEF has described high impact cost effective interventions for maternal and child health and these have been aligned to Kenya Essential Package for Health which defines interventions to be provided to achieve Universal Health Coverage (UHC) (GOK, 2016). Interventions for maternal nutrition include supplements of iron, folate, multiple micronutrients, calcium and balanced energy and protein. These can improve maternal and birth outcomes but few have been assessed at sufficient scale according to Unicef (2014). Many of these interventions are provided at the ANC whose WHO's intervention content include anti-tetanus prevention and treatment of malaria, management of anaemia, treatment of sexually transmitted infections, entry point for HIV prevention and care and encouragement to deliver in a health facility under the care of a skilled midwife (KNBS, 2013). Nutrition Education and counselling has not been brought out strongly in this healthcare package for pregnant women.

In spite of much government action in terms of improving maternal and child health, coverage of health interventions is sub-optimal. The greatest challenge is that it is usually not easy to reach women early in their pregnancies. About a third of women in developing countries do not have access to good quality health services during pregnancy and child birth, especially poor and uneducated women who live in the rural areas. A review of several of these programmes revealed that the causes of poor programme performance were low accessibility and utilization of ante natal care, insufficient supply and distribution of supplements, inadequate training and motivation of health workers, insufficient and inappropriate counselling of mothers, lack of motivation of mothers and failure of effective screening and referral procedures (Kimani, 2014).

Although Kenya has made considerable progress towards achieving the World Health Assembly Nutrition Targets by 2025, there is need to put more effort to curtail the heavy burden of malnutrition which is still high according to Kimani (2014). Moreover a range of barriers acting at the individual (maternal education, knowledge, decision making authority) household (wealth, family support to women) and health service delivery levels (quality of counselling and supply of supplements) affects intervention coverage during pregnancy (Dunne et al, 2015). Maternal and child nutrition interventions need to be up scaled and obstacles removed to ensure success of intervention programmes.

Addressing the nutritional needs of pregnant women is now entrenched within the Sustainable Development Goals (SDG), by scaling up efforts to achieve this target; progress will also be accelerated on the targets on maternal and child mortality and health according to Kimani (2014). In improving maternal and newborn nutrition, the government of Kenya's policy is to promote actions to ensure knowledge on adequate and nutritious diet and recommends integration of nutrition education programs for mothers into other maternal initiatives such as safe motherhood, baby friendly initiative, beyond zero initiative e.t.c., promote workload reduction technologies and increase income generating activities (MOH, 2013).

Improving nutrition will require enhancing knowledge, awareness and practices of pregnant women. Presently the education systems do not transfer adequate nutrition knowledge aimed at influencing long life dietary practices, therefore nutrition education and awareness need to be strengthened (GOK, 2011). Improving knowledge, attitudes and practices on optimal nutrition is good but continued commitment by government, development partners and civil society is critical to the outlined national nutrition action plan (Kimani, 2014). There are suggestions that for these issues to be addressed to bring success there is need for increased awareness of all stakeholders, provide quality service and a quality product and ensure availability of supplies. Effort needs to be made to ensure quality service in delivering a quality product to the subjects and ensuring improved client-provider relationship to enhance success of educational and counselling nutrition interventions.

II. CONCLUSION

Several women in developing countries enter pregnancy at sub-optimal nutrient levels and also engage in strenuous physical activity. Multiple deficiencies are due to low dietary intake and poor bioavailability of micronutrients as well as minimal consumption of animal products. Studies have shown that very few women in developing countries consume food group servings and nutrients consistent with RDA and most continue with heavy physical activity throughout their pregnancies which further increases their energy requirements. Infections also put on additional burden on the dietary needs of women by decreasing appetite and reducing nutrient absorption and their metabolic stress increase energy and nutrient needs. Thus, vulnerable groups are at risk of developing nutritional deficiencies without food support programmes. Malnourished women do not gain sufficient weight during pregnancy, are more likely to have miscarriages or stillbirths, give birth to preterm babies or deliver babies with low birth weight, have increased risk of maternal mortality, increased infections, anaemia, compromised immune functions, lethargy, lower productivity, increased risk of foetal and neonatal death, birth defects, cretinism and reduced IQ.

There is need for adequate food consumption and improving dietary diversity for pregnant women by producing nutrient dense foods, increasing the nutritional content of foods through bio fortification and post-harvest fortification, improving storage and preservation of foods to cover 'lean' seasons, and educating women

about nutrition and diet. In several settings these types of interventions have been shown to improve dietary patterns and intake of specific micronutrients either directly or by increasing household income.

Available evidence is sufficient to warrant the maximum protection of pregnant women to strenuous physical activity. In general, heavy work duties should be avoided and enough rest periods assured especially in late pregnancy. The prevention and treatment of malaria and other infections, management of anaemia and other nutrient deficiencies during pregnancy can significantly improve foetal outcomes and improve maternal health. Adverse outcomes such as low birth weight can be reduced through a combination of interventions including nutrition education and counselling interventions to improve women's nutritional status and prevent infections during pregnancy.

Although Kenya has put in much effort in addressing maternal and child health, nutrition indicators are still sub-optimal. A range of barriers acting at the individual, household and health service delivery levels continues to affect intervention coverage. Much more work is needed in order to upscale maternal and child nutrition interventions. Although not well spelt out in the maternal healthcare package, nutrition education is important as it endeavours to alter participants' dietary intakes by remodelling behavioural factors. Positive behaviour adjustments by participants in nutrition education and counselling interventions have been reported by several authors. Nutrition education and counselling intervention is therefore an essential consideration to optimise maternal nutrition and pregnancy outcomes. The government and the health sector need to incorporate nutrition education into the mainstream primary healthcare arrangement for pregnant women.

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