



GLOBAL JOURNAL OF MEDICAL RESEARCH: L
NUTRITION & FOOD SCIENCE
Volume 17 Issue 1 Version 1.0 Year 2017
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Vulnerability of Urban Poor Women and Children to the Triple Burden of Malnutrition: A Scoping Review of the Sub-Saharan Africa Environment

By Collins Mukanya Mudogo

University of Nairobi

Abstract- Research in sub-Saharan Africa (SSA) show a rapidly increasing trend in co-existence of hunger, micronutrients deficiency as well as overweight/obesity. The paper, vulnerability of urban poor women and children to the triple burden of malnutrition aims at exploring the situation of poor urban women and children in regard to the triple burden of malnutrition in SSA. 65 sources of information were retrieved for review. Many socio-economic and systemic factors appear to put poor urban women and children in SSA slums at a greater risk of the triple burden of malnutrition. The triple burden of malnutrition has devouring effects on the growth and development of women and children. Evidence suggests high prevalence of the existence and effects of the three tier complexity of malnutrition (hunger, micronutrients deficiency and over nutrition) among urban poor women and children in SSA.

Keywords: *nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity.*

GJMR-L Classification: *NLMC Code: QU 145.5*



Strictly as per the compliance and regulations of:



Vulnerability of Urban Poor Women and Children to the Triple Burden of Malnutrition: A Scoping Review of the Sub-Saharan Africa Environment

Collins Mukanya Mudogo

Abstract- Research in sub-Saharan Africa (SSA) show a rapidly increasing trend in co-existence of hunger, micronutrients deficiency as well as overweight/obesity. The paper, vulnerability of urban poor women and children to the triple burden of malnutrition aims at exploring the situation of poor urban women and children in regard to the triple burden of malnutrition in SSA. 65 sources of information were retrieved for review. Many socio-economic and systemic factors appear to put poor urban women and children in SSA slums at a greater risk of the triple burden of malnutrition. The triple burden of malnutrition has devouring effects on the growth and development of women and children. Evidence suggests high prevalence of the existence and effects of the three tier complexity of malnutrition (hunger, micronutrients deficiency and over nutrition) among urban poor women and children in SSA.

Keywords: nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity.

1. INTRODUCTION

In conceptualizing nutrition health, it is important to think beyond just the aspects of food intake, absorption and metabolism, hence consider the balance between what is eaten vis-a-vis what the body requires(1). It is only then that the two hazardous concepts of over- and under- nutrition make sense. Food security is based on four main processes. These include: food availability; food access; food utilization; and food stability (2)(3). However in many low to middle income countries, little attention is usually paid on the quality of food available or rather accessed.

In its African regional nutritional strategy (2005-2015), the African Union notes with concern that malnutrition is one of the most important health and social challenges facing Africa and one of the leading causes of deaths among children below five years(1). Overtaken by events, it is evident that Africa is far from what was then target 1.C of the millennium development goals which sought to halve the proportion of people who suffer from hunger by 2015(4). Thus, the Sustainable Development Goal 2 on zero hunger continue to envision an end to hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030(5).

Author : Mudfish Consultancy, Nairobi Kenya.
e-mail: collinsmukanya@gmail.com

The 20th century's rapid growth of cities in SSA came with a mixed bag of advantages and detriments. Whereas urbanization has continued to generate and attract investments, higher incomes, basic facilities, stronger institutions and economic opportunities to inhabitants, the urban expansion and related benefits continue to be uneven. As a consequence, millions of the urban poor in slums are marginalized in an effort to confront the day to day challenges and deprivations of their rights. Whereas efforts in humanitarian and food security sectors have focused on rural drier regions in many SSA countries, it is appearing that the urban poor are unrecognizably faced with both acute and chronic food insecurity (6).

Estimates suggest that by 2020, 75% of all urban dwellers across the world will be from the low and middle income countries of Africa, Asia and Latin America. Worryingly it is also estimated that by 2020, 40-45 % of the poor in Africa and Asia will be concentrated in towns and cities(7). Since the 1990s, trends have shown that poverty, hunger and malnutrition were on the increase in SSA(4)(2). Studies show that SSA is home to some of the most food insecure populations in the world. This is attributed to factors including poor policies, inequality, poor infrastructure, limited resources, coupled with conflict, diseases and poor access to health services(3)(7).

Findings from many studies show that women in resource poor countries are at risk of inadequate intakes of multiple micronutrients. Findings in a review of studies published between 1988 and 2008 show that in most studies that were reviewed, intakes of folate, iron and zinc were very low in Africa, Asia and Latin America. For instance, folate intake was found to be predominantly below the estimated average requirement in most studies among non-pregnant women (82%). According to the review, the mean/median intakes of iron were more often below estimated average requirements in studies among non-pregnant women (93%) compared with studies among pregnant women (78%)(8). Beyond the processes of availability, access and utilization, the issue of high quality diet has become a major challenge among majority of populations in SSA. Diets in many parts of SSA have been found to be largely composed of cereal or root staple foods but little of vitamins rich animal products and vegetables(3).

For example a national assessment of the level of anemia, iron, vitamin A, and zinc in Kenya revealed notably high prevalence rates of these micronutrients deficiencies among Kenyan children based on environmental and many other socio-economic factors(9).

The imbalance in micronutrient content in foods, nutrition transition, poor eating habits and change in lifestyle in urban settings across SSA has led to an alarming upsurge in risk factors to, and related chronic diseases such as over weight/obesity, diabetes, cancer, hypertension, liver diseases and cardiovascular diseases (CVDs). Apparently the prevalence of risk factors for chronic diseases such as CVDs is high among urban populations compared with rural populations (10)(11)(12). Statistics from many developing countries including Kenya are showing a contradictory, yet worrying and confusing fourfold increase in: urban population; urban poor; urban food poverty and over-nutrition (overweight/obesity).

Worryingly, women represent 49% of the urban poor. Implying that if the urban poor are at risk of hunger, micronutrients deficiency and overweight, then within that population, women are the majority(13).

II. AIM OF THE PAPER

Hitherto, there exists isolated data and unsystematic information on the triple burden of malnutrition in SSA. The aim of this scoping review is to map available evidence on nutritional status in SSA within a three dimensional perspective of hunger, micronutrients deficiency and over nutrition. The paper focuses on the state of urban poor women and children

in SSA within the spectrum of hunger, micronutrients deficiency and over nutrition.

III. METHODS

The paper is built on a desktop review of literature on hunger, micronutrient deficiency and over nutrition. More than 630 documents were obtained via various scientific online databases including PubMed, Medline, Cochrane, Popline, and google scholar. The search was done by two researchers using key words such as nutrition, nutrition in women, nutritional health, hunger, micronutrients deficiency, maternal and child nutrition health, overweight and obesity. Only literature that focuses on nutrition status in SSA and further to women and children in urban poor settings were included. This resulted to 65 documents being considered relevant. The documents were stored in a Mendeley library specifically created for the purpose of coming up with an annotated bibliography and drafting the paper. The reviewed literature includes published articles in peer reviewed journals, research reports, national and regional policy documents, and presentations from conferences, meetings and events in SSA.

IV. LIMITATIONS OF THE PAPER

The paper uses existing literature. However a lot of the existing literature focuses mainly on either one or two components of the triple paradox of malnutrition. This situation limited the desired vigorous level of analysis of available data and information within similar settings and populations from which the available evidence was collected.

V. RESULTS

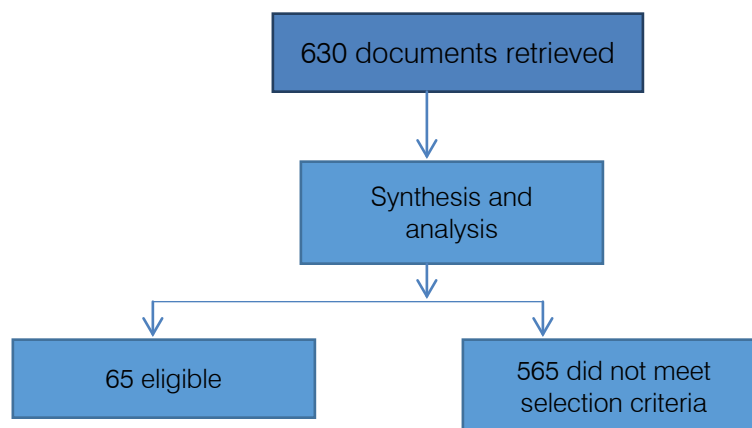


Figure 1: Retrieval and culling of documents during literature review and analysis

Only 65 documents out 630 retrieved met the inclusion criteria. This is only about 10.3%.

a) State of hunger in urban cities of SSA

The rising, volatile food prices and food insecurity commonly referred to as the food crisis is a global phenomenon. There has been an alarming

increase in both international and local prices of basic foodstuffs particularly since 2003. For example in March 2008, Food Agriculture Organization's food index showed that food prices for cereals, dairy products,

meat sugar and oils had increased by 57% compared with their level in March 2007(14). The surging food prices is of particular concern to the urban poor in SSA given that the poor spend large portions of their household income on food(15). In Kenya, major increase in food prices began being experienced in 2006 and has tremendously continued to increase year in, year out. The Kenyan food prices increasing trend as is the case in many other countries in SSA, does not waver even during seasons when world food prices are on a decline(16)(17).

In its African regional nutritional strategy (2005-2015), the African Union notes with concern that malnutrition is one of the most important health and social challenges facing Africa and one of the leading causes of deaths among children below five years (1). It is evident that Africa is far from what was then target 1.C of the millennium development goals which sought to halve the proportion of people who suffer from hunger by 2015 (4). Thus, the Sustainable Development Goal 2 on zero hunger continue to envision an end to hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030 (5).

b) Factors contributing to urban hunger in SSA

Most of the factors that contribute to urban hunger result from the reality of overdependence on food purchasing as the main system of food in urban settings(18). As it was noted in the 1980s, during the green revolution, a decrease in food purchasing power has the potential to lead to food emergencies and famines(2)(19)(6). Most of the inhabitants in urban cities in SSA live in rented houses and do not own any land. This implies that urban agriculture is never an option to the majority of the urban inhabitants. On the other hand, as buildings and infrastructure continue to be developed alongside a rapidly bulging urban population, agricultural land in most urban cities is dwindling to almost unavailable. In many urban cities, relationships are organized on economic and/or political basis thus social systems through which food donations and borrowing were thriving in traditional African society have faded away. Time constraints in urban settings also stimulate the habit of ready to eat non-home prepared foods(20). However the increase in food prices and sometimes unavailability of high quality foods in urban markets make access to food through purchasing a real problem. An underlying factor to limited power to food purchasing is poverty. With notable economic development in the last one to two decades, SSA has the largest population of the poor, accounting to about 30% of the most poor in the world (18).

c) Urban Women and children as the most at risk of hunger

Many countries in SSA continue to experience high rates of unemployment and underemployment. In

many SSA countries, women suffer more from unemployment than men. In addition, the available job opportunities in the vast of urban cities in SSA are manual job which are unfavorable to women who might be lacking the knowledge and skills required for the hardly available white collar better paying jobs. Research in SSA show higher rates of unemployment and underemployment among women than national rates (21)(22). Low income, low assets, lack of opportunities and social exclusion put women and their children on the vicious circle of poverty. Poverty then results in hunger, lack of shelter, illiteracy, and poor access to health care. Women in SSA are highly predisposed to both contingent and structural poverty(23).

On the flip side, majority of the few urban women who are employed, work outside their homes. This implies that caring for children and optimal feeding practices become difficult(7).

Whereas single motherhood has rapidly grown in most urban centers in SSA, it is also emerging that the erosion of the African family gender roles between men and women, coupled with hard economic times are slowly leading to men figureheads faced with the challenge of providing for their wives and families. Thus women are single handedly left with the double burden of taking care of selves and their children (24). A study on health effects of single motherhood on children in SSA revealed that compared with children whose mothers were in union, children of single mothers who were not widows were more likely to be stunted. Fewer economic resources and limited parental care were also significantly associated with higher odds of stunting in single mother households. The study concluded that single motherhood was a risk factor for children's nutritional status and chances of survival before five years(25). Research show that improving income among women can greatly improve household community food security (26). Several demographic and health factors of mothers are associable with different indicators of nutritional status among their children. In one study, increasing maternal education attainment and Body Mass Index (BMI) were significantly linked with decreasing stunting among their children. On the other hand children of mothers who had not worked in the last four weeks had significantly lower proportions of stunting. However these same children were assessed with significantly high proportions of wasting, overweight and obesity(27).

d) Effects of hunger in women and children

Worsening food insecurity in urban settings in many countries in SSA is one of the leading direct and indirect causes of morbidity and mortality among women and children. The nature, extent and duration of coping strategies to food insecurity in urban settings by women determine the magnitude and severity of their

suffering and their children (18). Studies in many countries including Kenya, Ethiopia, Swaziland, Brazil, and Nigeria indicate that hunger is a key factor in pushing women into sex work. The two pathways in relation to entry into sex work as a result of hunger are that one, men who have means takes advantage of desperate women so that while they, men provide support in terms of money and food to women, women reciprocate with sex. Two, hungry women are forced to aggressively go out to sell sex in search for food or majorly money for food lest they and their children die of hunger(28)(29)(30). As indicated above, depending on the severity of the hunger, food insecurity has been proven to not only lead women into sex work but also increase their chances of engaging in unprotected sex (31).

Considered as a key indicator of childhood undernutrition, stunted linear growth is highly prevalent in most low to middle income countries in SSA. This has been found to have damaging consequences on development and health of children in many developing countries. Globally, statistics show that there has been a decreasing trend in the number of stunted children (253 million in 1978, 178 million in 2005 and 165 million in 2011). However the slow reduction rate of (2.1% per year) has been a concern to partners. Globally, 8% of children under 5 were in 2011 considered as wasted. Considering 2010 as the baseline year, the World Health Assembly (WHA) called for a 40% reduction in the number of stunted children by 2025(32).

e) *Micronutrients deficiency among urban poor women and children in SSA*

Using the concept of hidden hunger, which is associated with micronutrient deficiencies, the Food and Agricultural Organization (FAO) estimates that 850 million people across the world are hungry. FAO states that malnutrition is purported to affect up to a half of the world's population(33). Iron deficiency is the most prevalent single nutrient deficiency affecting an estimated 2 billion people worldwide. Iron deficiency and anemia are known to be most prevalent in developing countries. Although Iron deficiency can occur at any stage in a life cycle(34), the most vulnerable groups include women and children. Globally 469 million women of reproductive ages are anemic with at least 50% resulting from dietary iron deficiency(35). In South Africa studies have reported iron deficiency in 7-29% of pregnant women, 57% in pregnant teenage girls, 21% in infants and 26% in non-pregnant teenage girls(36).

In many SSA countries, under nutrition is associated with wide spread micronutrient deficiencies (3,13,14,27,37,38). Kenya's nutritional profile indicates that iron and Vitamin A deficiencies are the most prevalent in the country. For example, just over half (55%) of pregnant women experience iron deficiency

anemia compared to 47.9% of non-pregnant women. Approximately 40% of women experience vitamin A deficiency. 17% of pregnant women in Kenya are Vitamin A deficient with about 52% of mothers being zinc deficient. Although there is a dearth of information, iodine deficiency disorders are still prevalent in Kenya (39)(40).

Studies conducted at antenatal clinics in many developing countries paint a picture of a population that is severely malnourished in terms of essential minerals and vitamins (3,8,16,28,41-45). This situation is worsened in the event of HIV positive prospective mothers. One study in Mombasa Kenya conducted in a prevention from mother to child antenatal clinic revealed that throughout the study period, the overall prevalence of anemia (Hb < 11 g / dl) at the first antenatal clinic (ANC) visit remained stable: 84.2% in 2004, 86.6% in 2005 and 84.1% in 2006. Even though the study displayed marked differences between urban and rural populations [about four in five rural women (7461 / 9441; 79.0%) and two in three (2822 / 4248; 66.4%) urban women had a Haemoglobin between 7 and 11 g / dl (P < 0.001). An additional 10.2% of rural and 9.8% of urban women were severely anemic (Hb < 7 g / dl)](46). It is important to note that with rapid increase in food prices since 2004 in Kenya the figures could have worsened in both populations by now(47)(48).

f) *Effects of micronutrients deficiency on women and children*

Micronutrients deficiency is known to have staggering consequences for human health and well-being as well as hampering economic productivity. In women of reproductive ages micronutrients deficiency lead to increased pregnancy complications and maternal mortality(49)(50)(51).

It is evident that essential minerals' and vitamins' deficiencies have wide spread adverse effects on child survival and development. Deficiencies of vitamin A and zinc inhibit child survival and health. Attaining Developmental potential in many children in SSA is curtailed by deficiencies in iron and iodine coupled with stunting (32).

g) *Over nutrition among women and children in SSA*

Women and children within settings of high vulnerability to food security are more likely to rely on street based high energy dense foods which predispose them to obesity. Moreover access to low quality food limited in dietary diversity may lead to obesity, conditions typical of the urban poor women and children in SSA (52,53).

Overweight and Obesity (O/O) are modifiable risk factors for the development of non-communicable diseases (NCDs). With the current increasing rates in O/O of about 5% per year across SSA, there are high predictions of accompanying increase in NCDs and diabetes mellitus 2. Across SSA, the prevalence of

overweight/obesity appear to be most visible among populations in urban settings. Factors such as dependence on ready and fast foods, reduced physical activity, and poverty, predispose urban populations to O/O more than their rural counterparts (10,20,27,38, 54,55). A study in Kenya showed that O/O are usually more prevalent in women specifically in the 25 to 40 age range. This is mainly attributable to the retention of gestational weight gain and also the outcome of numerous lifestyle factors such poor diets, inactive lifestyles, urbanization and adoption of diets that veer away from traditional menus(56).

By 2003, already almost one-quarter of women in Kenya were overweight or obese(56). Seemingly a positive trend was observed with advancing age. Prevalence of O/O were much higher in the urban sector (38%) compared with the rural sector (18%)(57). In 2009 the Kenya Demographic Health Survey (KDHS) indicated that the national prevalence of overweight and obesity was 23%. Across the country, urban areas had higher prevalence rates compared with the rural areas (58).

Although there is a dearth of information on childhood overweight/obesity in SSA, the little available research show that child overweight/obesity SSA is on the increase. This situation is associated with factors such sex of the child, age of the child, mother's Body Mass Index and work status of the mother (59).

h) Effects of over nutrition in women and children

Overweight/ obesity causes poor health, negatively affects quality of life and shortens the quantity of life. Uniquely in women, obesity causes conditions such as osteoarthritis, birth defects, breast and endometrial cancers, cardiovascular and gall bladder diseases, infertility, gynecological complications, urinary stress incontinence, stigma and discrimination(56). Childhood overweight is associated with negative health and psychological effects as evidenced in overweight children. Although preventable, childhood overweight leads to lifetime health problems which are expensive and painful to manage(59).

i) Policies, services and programs

Global and national agrarian policies have been reported to have significant social and economic consequences in SSA. For instance whereas there has been rapid increase urbanization and inequalities in land ownership, SSA countries still have high levels of participation in the agricultural sector. However this has not improved access to resources and better diets among urban poor women and children in SSA(26).

The conception of the idea of food for development was significantly marked by the formation of World Food Programme (WFP) in 1963. This provided an understanding of food as necessity for development and of course development as necessity for food security. In the 1990s concrete plans were put in place

to ensure reduction in hunger and malnutrition. The human right approach to adequate food security was reaffirmed. However few committed national governments have taken up more proactive roles(2). Many countries in SSA lack policies and implementing frameworks for targeted and holistic nutrition interventions. In addition there is limited capacity and expertise in SSA to handle emerging nutritional challenges.

VI. DISCUSSION

Many countries in SSA have found themselves in the mix-up of hunger, micronutrients deficiency and overweight unawares. The petite available relevant literature review indicates that there is limited knowledge and information on malnutrition focusing on malnutrition among the urban poor. There is need for rigorous research in this area. Studies show that the possible co-existence of the three conditions in an individual, household or community has dire health and developmental effects(54). The co-occurrence of overweight/obese mothers and undernourished children in the same household is now considered an important common phenomenon in many countries in SSA including Kenya. This has been associated with an increase in consumption of high energy dense foods with reduced physical activity. Contrary, the high energy dense foods are those that are of low nutrient content hence do not provide enough quality nutrients to children and women(60). For instance, many studies in SSA have proven the significantly high level of co-existence between iron deficiency (a result of dietary deficiency or hunger) and overweight in study populations. Evidence suggest that iron deficiency and overweight do not only co-exist but interact with adverse consequences. Consistent study findings indicate that overweight individuals at all ages have a significantly high likelihood of having higher rates of iron deficiency compared with their normal weight counterparts(61)(62). Whereas hunger and micronutrient deficiency continue to devour poor women in urban slums and informal settlements, studies continue to show that these women have higher rates of overweight than their male and female counterparts in both similar urban settings and even rural areas(10).It is estimated that 53% of deaths associated with infectious diseases among children in developing countries, majority of which are in SSA, are associated with poor nutrition(55).Whereas the effects of the triple burden of malnutrition are glaringly hazardous, many governments, partners in development and individuals in SSA have not awoken to the realization that the future survival and health of urban poor women in SSA is more than ever before jeopardized. There remains poor or no policies and programs to address the whole spectrum of malnutrition and individuals, particularly the urban poor women and their children



continue to survive on risky strategies that increase their exposure to even worse health conditions. There is need for urgent interventions that can address the highly prevalent poor diets and poor eating habits such as dependence on fast foods and street food which have bad future impacts on the health of the current poor urban dwellers, particularly women and children. Even though consumer choices for food are determined by prices in urban slums in SSA, education programs would play a critical role given that taste and nutrition influence food choices (63)(64).

VII. RECOMMENDATIONS

Given that food security is a human right, policies and programs need to adopt the three dimensional definition and perspective in addressing the challenges of food and nutrition insecurity. This would provide holistic long term solutions to the nutritional and health challenges in SSA. Providing a hungry child with food that does not contain necessary micronutrients is not enough, just like providing a hungry pregnant woman with an iron supplement or tablet without food may not be enough. Concerted efforts are required to ensure preventive mechanisms are put in place to deter chronic diseases as a result of preventable lifestyle risky behaviors including food choices and eating habits. The World Bank generally states that the cost of inaction towards preventable conditions and diseases related to diet and lifestyle is clear and unacceptable (65).

Governments and partners in SSA need to conduct assessment of nutritional status to determine the level of hunger, micronutrient deficiency and over nutrition among women and children. This will go a long way in informing planning and implementation of policies, services and programs.

Moreover SSA need to make serious assessments of the current burden and risk factors to lifestyle diseases. Whereas studies have shown that there is a glaring increase in chronic diseases and associated risk factors, governments in many developing countries have not taken any meaningful steps in attempting to address or prevent risk factors to chronic diseases among its populations. It is important for Government and partners in SSA to think prevention since treatment of the of chronic diseases would be more expensive particularly given that health systems in developing countries are still grappling with infectious diseases.

Programmatically, there is need for continued concerted efforts in social and economic empowerment of women to enhance healthy food and nutrition security. Research shows that an empowered woman can contribute to an empowered household and community.

VIII. CONCLUSION

Although the available data is haphazard and limited, it shows a concentration of the three tier complexity of malnutrition among urban poor women and children in SSA. The vulnerability of women is buttressed by the unfavorable urban social and economic systems in SSA. Operating within very limited policies and programs that are not strategic, concerted efforts seem to be more focused on micronutrients deficiency and hunger and only during emergencies with limited or no focused attention on over nutrition.

ACKNOWLEDGEMENTS

Funding

Not applicable

Author's Contribution

CM was involved in conceptualizing of the study, literature search, documents review, and development of the annotated bibliography, analysis of data and overall drafting of the paper. GP was involved in conception of study design and review for intellectual content. JM did further literature review and reviewed the paper.

Competing interests

The authors declare that they have no competing interests.

Abbreviations:

CVDs-Cardiovascular Diseases;
FAO- Food Agricultural Organization;
NCDs-Non-Communicable Diseases;
SSA-Sub-Saharan Africa;
WFP-World Food Programme

REFERENCES RÉFÉRENCES REFERENCIAS

1. African Union. African regional nutritional strategy 2005-2015. 2005 p. 1–28.
2. Gross R, Schoeneberger H, Pfeifer H, Preuss H. The four dimensions of food and nutrition security: definitions and concepts. *Nutr Food Secur*. 2000; 1–17.
3. Fanzo J. The nutrition challenge in Sub-Saharan Africa. Working paper 2012 p. 1–70.
4. United Nations System Standing Committee on Nutrition. Supplements on the 11th annual ECOWAS nutrition forum. Food and nutrition security in West-Africa: Opportunities and challenges. 2010.
5. United Nations Development Programme. Sustainable Development Goals. 2015.
6. Mohiddin L, Phelps L, Walters T. Urban malnutrition: a review of food security and nutrition among the urban poor. 2012;(October).
7. United Nations System Standing Committee on Nutrition. UNSCN Statement: nutrition security of urban populations. 2012.

8. Torheim L, Ferguson E, Penrose K, Arimond M. Women in resource-poor settings are at risk of inadequate intakes of multiple micronutrients 1-4. *J Nutr.* 2010; (September): 2051–8.
9. Bwibo N, Neumann C. Animal source foods to improve micronutrient nutrition and human function in developing Countries. The need for animal source foods by Kenyan children. 2003; 1933(5): 3936–40.
10. Ettarh R, Van de Vijve S, Oti S, Kyobutungi C. Overweight, obesity, and perception of body image among slum residents in Nairobi, Kenya, 2008 – 2009. *Prev Chronic Dis.* 2013; 10(4): 1–9.
11. Steyn N, Mchiza Z, Hill J, Davids Y, venter I, Hinrichsen E, et al. Nutritional contribution of street foods to the diet of people in developing countries : a systematic review. *Public Health Nutr.* 2013; February(4).
12. Naicker N, Mathee A, Teare J. Food insecurity in households in informal settlements in urban South Africa. *Issues Public Heal.* 2015;105(4):268–70.
13. Amuyunzu-Nyamongo M. Experiences and lessons learned from influencing the social determinants to reduce child under-nutrition in Kenya. 2011.
14. Claxton M. Culture, Food, and Identity: Sixth in a Series on culture and development.
15. Alonso EB. The impact of culture , religion and traditional knowledge on food and nutrition security in developing countries. 2015.
16. Webb-Girard A, Cherobon A, Mbugua S, Kamau-Mbuthia E, Amin A, Sellen DW. Food insecurity is associated with attitudes towards exclusive breastfeeding among women in urban Kenya. *Matern Child Nutr.* 2012;272(Unicef 2008):199–214.
17. Emongor RA. Food price crisis and food insecurity in kenya. 2008.
18. Kimani-Murage E.W, Schofield L, Wekesah F, Mohamed S, Mberu B, Ettarh R, et al. Vulnerability to food insecurity in urban slums : experiences from Nairobi , Kenya. *J Urban Heal.* 2014;August:30.
19. Lopriore C, Muehlhoff E. Food security and nutrition trends in West Africa - challenges and the way forward. :1–24.
20. Hooftman DAP, Foeken D.W.J. Determinants of non-home-prepared food consumption in two low-income areas in Nairobi. *Nutr Ina.* 2003;3(March 2016).
21. Oldewage-theron WH, Kruger R, Egal AA. Socio-economic variables and nutrient adequacy of women in the Vaal Region of South Africa. 2016; 0244 (March).
22. Harper C, Jones N, McKay A. Including children in Policy responses to economic crises. In: UNICEF/ODI 2009. 2009. p. 7–128.
23. McFerson HM. Poverty among women in Sub-Saharan Africa : a review of selected issues. *J Int Womens Stud.* 2010;11(4):50–72.
24. United Nations. Men in families and family policy in a changing world. 2011.
25. Ntoimo LFC, Odimegwu COO. Health effects of single motherhood on children in sub-Saharan Africa : a cross-sectional study. *BMC Public Health.* 2014; 14(1): 1–13.
26. Loewenson R, Nolen LB, Wamala S. Globalisation and women ' s health in Sub-Saharan Africa : Would paying attention to women ' s occupational roles improve nutritional outcomes ? 2010; 38(November 2009): 6–17.
27. Kimani-Murage EW, Muthuri SK, Oti SO, Mutua MK, Van de Vijver S, Kyobutungi C. Evidence of a Double Burden of Malnutrition in Urban Poor Settings in Nairobi, Kenya. *PLoS One [Internet].* 2015; 10(6): e0129943. Available from: <http://dx.plos.org/10.1371/journal.pone.0129943>
28. Fielding-Miller R, Mnisi Z, Adams D, Baral S, Kennedy C. "There is hunger in my community" : a qualitative study of food security as a cyclical force in sex work in Swaziland. *BMC Public Health.* 2014;14(79):1–10.
29. Oyefara JL. Food insecurity, HIV / AIDS pandemic and sexual behaviour of female commercial sex workers in Lagos metropolis, Nigeria. *SAHARA- J J Soc Asp HIV/AIDS.* 2007; 4(2): 626–35.
30. Moret W. Economic strengthening for Female Sex Workers : a review of the literature. 2014.
31. Tsai AC, Hung KJ, Weiser SD. Is food insecurity associated with HIV risk? Cross- sectional evidence from sexually active women in Brazil. *Plos Med.* 2012; 9(4).
32. The Lancet. Maternal and Child Nutrition. 2015;
33. Henson S, Humphrey J. The influence of agro-food policies and programmes on the availability, affordability, safety and acceptability of food. In: Second International Conference on Nutrition. 2013. p. 13–5.
34. World Health Organization. Iron deficiency anaemia Assessment, prevention, and control: a guide for programme managers. 2001.
35. Oldewage-Theron WH, Egal AA, Grobler C. Is overweight and obesity associated with iron status in low-income men and women ? A case study from Qwa, South Africa. *Integr Food, Nutr Metab.* 2014; 1(2): 1–6.
36. Aderibigbe OR. Associations between indices of iron status, anthropometric and biological markers of cardiovascular disease risk. North-West University; 2011.
37. Rohner F, Northrop-clewes C, Tschannen AB, Erhardt JG, Bui M, Bosso PE, et al. Prevalence and public health relevance of micronutrient deficiencies and undernutrition in pre-school children and ^ te d ' Ivoire , West Africa women of reproductive age in Co. *Public Health Nutr.* 2016;17(9):2016–28.





38. Dixon J, Omwega AM, Friel S, Burns C, Donati K, Carlisle R. The Health Equity Dimensions of Urban Food Systems. *Urban Health*. 2007; 84(1): 118–29.
39. Kenya: Situation analysis for Transform Nutrition. 2011; 2–5.
40. Muthoni MN. Dietary diversity, dietary iron intake and iron status among pregnant women in Embu county, Kenya [Internet]. 2014. Available from: <http://ir-library.ku.ac.ke/handle/123456789/10757>
41. Torheim LE, Ferguson EL, Penrose K, Arimond M. Women in Resource-Poor Settings Are at Risk of Inadequate Intakes of Multiple Micronutrients 1 – 4. 2010; 2051–8.
42. Sherwin JC, Reacher MH, Dean WH, Ngondi J. Transactions of the Royal Society of Tropical Medicine and Hygiene Epidemiology of vitamin A deficiency and xerophthalmia in at-risk populations. *Trans R Soc Trop Med Hyg* [Internet]. Royal Society of Tropical Medicine and Hygiene; 2012; 106(4): 205–14. Available from: <http://dx.doi.org/10.1016/j.trstmh.2012.01.004>
43. Steyn NP, Wolmarans P, Nel JH, Bourne LT. National fortification of staple foods can make a significant contribution to micronutrient intake of South African adults. 2007; 11(3): 307–13.
44. MQSUN Report. Addressing undernutrition in the context of urbanisation in low-and middle -income countries. 2015.
45. Kimani-Murage EW. Exploring the paradox: double burden of malnutrition in rural South Africa. 2013.
46. Delva W, Yard E, Lutchers S, et al. A Safe motherhood project in Kenya: assessment of antenatal attendance, service provision and implications for PMTCT. *Trop Med Int Health* [Internet]. 2010; 15(5): 584–91. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20230571>
47. World Health Organization. Intersectoral collaboration on child nutrition in informal settlements in Mombasa: a Kenyan case study. 2013.
48. Ndungi FN. The prevalence of overweight, obesity, diagnosed diabetes mellitus and hypertension in the Swahili community of Old town and Kisauni districts in Mombasa.
49. Children's Investment Fund Foundation. Child growth = sustainable economic growth: why we should invest in nutrition? [Internet]. 2013. Available from: <http://nutrition4growth.org/Growing Economies Policy Brief - Final May 2013.pdf>
50. Stoltzfus RJ, Dreyfuss ML. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia.
51. World Health Organization, Food and Agricultural Organization of the United Nations. Guidelines on food fortification with micronutrients edited by Lindsay Allen, Bruno de Benoist, Omar Dary and Richard Hurrell. 2006;
52. Eckhardt CL. Micronutrient malnutrition, obesity, and chronic disease in countries undergoing the nutrition transition: Potential links and program / policy implications. 2006.
53. Martorell R, Stein AD, Schroeder DG. Symposium: Obesity in developing Countries: Biological and ecological factors. Early nutrition and later adiposity. In: *Journal of Nutrition*. 2001. p. 874–80.
54. Popkin B, Shu Wen Ng. The nutrition transition in High and Low-Income Countries: What are the policy lessons? In: *International Association of Agricultural Economics Conference*. 2006.
55. Crush J, Frayne B, Milla M. Rapid urbanization and the nutrition transition in Southern Africa. *Urban food Secur*. 2011;(7).
56. Mbochi RW, Kuria E, Kimiywe J, et al. Predictors of overweight and obesity in adult women in Nairobi Province, Kenya. *BMC Public Health* [Internet]. BMC Public Health; 2012; 12(1): 823. Available from: BMC Public Health
57. United States Agency for International Development (USAID). Kenya: Nutrition Profile. 2015.
58. Kenya National Bureau of Statistics. Kenya demographic and health survey: key indicators. 2008.
59. Davison K.K., Birch L.L. Childhood overweight: a contextual model and recommendations for future research. *PMC*. 2008; 2(3): 159–71.
60. Kimani-Murage EW, Muthuri SK, Oti SO, Mutua MK. Evidence of a Double Burden of Malnutrition in Urban Poor Settings in Nairobi, Kenya. 2015; 1–18.
61. Baumgartner J, Smuts CM, Aeberli I, Malan L, Tjalsma H, Zimmermann MB. Overweight impairs efficacy of iron supplementation in iron-deficient South African children: a randomized controlled intervention. *Int J Obes* [Internet]. Nature Publishing Group; 2012; 37(1): 24–30. Available from: <http://dx.doi.org/10.1038/ijo.2012.145>
62. Bougle D, Brouard J. Iron in child obesity. relationships with inflammation and metabolic risk factors. *Nutrients*. 2013; 5(19 June): 2222–30.
63. Dominguez-Salas P. Designing practical ways to help the urban poor make choices that improve their nutrition. 29 July 2015. 2015.
64. Dominguez-Salas P, Alarcon P, Alonso S, Colverson K, Cornelsen L, Ferguson E, et al. Leveraging food-based recommendations for women and children in Nairobi slums with animal source foods.
65. World Health Organization. a Vital Investment. *World Health* [Internet]. 2005; 202. Available from: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Preventing+Chronic+Diseases:+A+Vital+Investment#3>.