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Public Health Impacts of Famine in the Horn of Africa

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Abstract **Background**: In the Horn of Africa, the oral stories and written records show that famine has been periodically occurring in the region. In their daily prayers, when the Oromo elders say, give us peace, preclude us from extreme war, poverty, famine, and epidemic diseases, they are stating their longtime wishes and hopes. By that, on the one hand, they are acknowledging that famine is a longstanding public health problem, on the other, they are teaching the young generation the need to prevent war, poverty, famine, and diseases. In this paper, following the footstep of the blessing of Oromo elders, I want to synthesize knowledge and explore the intermingled relationships between famine, poverty, war, and diseases. **Objectives**: The primary objective of this paper is to explore the primary, secondary, and tertiary effects of famine on population health. **Methods**: Using knowledge synthesis methods, I conduct a systemic review, contextualize, and integrate different findings and interpret the results. **Results**: The public health impacts of famine are multifold. It is responsible for several infectious and chronic diseases, nutritional deficiency disorders, instability, environmental degradation, and poverty. Those problems manifest in the short term and long term, in the first generation, second and third generations. **Conclusion**: In the Horn of Africa, famine is a major public health problem. The people need to learn from the past and envision the need for transformative leadership and institutions that enable them to guarantee food security and improve public health conditions.

Keywords: *format, microsoft word template, style, insert, template*

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1. Introduction

To have the best possible health is the desire of all human beings. Attaining this longstanding aspiration requires granting the members of society food security. Food security is one of the essential social determinants of health [1]. Energy measured in calories, protein, fat, carbohydrate, water, vitamins, and minerals are the building blocks of our body [2]. They are essential to the growth and differentiation of organs, tissues, and cells; inadequate ingestion can lead to several nutrition deficiency disorders. Malnutrition is directly or indirectly responsible for half of all deaths worldwide. The ways in which malnutrition contributes to death includes repression of perinatal development of organs, tissues, and cells, suppression of immune cells, and exposure to infectious and chronic diseases [3,4]. Globally since 1990, life expectancy at birth has improved. Those improvements have primarily resulted from reductions in infant and child mortality. Although the total age-specific mortality rates are falling, the burden of malnutrition is still increasing. This major public health problem is more prevalent in Sub-Saharan Africa [5].

In the Horn of Africa, famine is a longstanding public health problem. The oral stories and written records show that famine has been periodically occurring in the region [6]. Ethiopian and Kenyan religious and community leaders [7] explained famine as the work of the "divine power." For example, in their daily prayers the Oromo elders say, give us peace (nagaa), preclude us from extreme war (waraana), poverty (deega), famine (beela) and epidemic diseases (dhukkuba). Policymakers explained it as a natural disaster, i.e., "drought," or "locusts." Both explanations imply they are helpless to prevent it.

Famine does not occur by accident. Famine is the manifestation of socio-cultural realities, and it is responsible for many public health problems [8]. As societies find solutions or failed to find solutions to their old problems, they often create others. The famines that have occurred in the past have played a significant role in the present poverty level and will do the same in the next famine. The current famine will have significant impacts on the famine that will strike decades from now. If societies focused inward on their problems and solutions, they can more effectively achieve their desired goals. In the Horn of Africa, unless the policymakers and the general public understand the spiral effects of famine, prevention is unattainable. This necessitates looking back and learning, and, based on past experiences planning for the future.

Food security is essential in disease prevention, treatment, and management and in all life courses. The relationships between food, nutrition, and health are complex and multi-faceted. Those relationships are profoundly affected by biological, environmental, socio-economic, cultural and behavioral factors [1]. Population growth, climate change, and pressure on natural resources and instability further increase those challenges [9]. Unmapped

and misunderstood systems make public health interventions impossible and ineffective. Achieving the highest possible degree of health requires evidence-based policies. This necessitates developing transformative leaderships and institutions.

In the Horn of Africa, famine is responsible for many public health problems. As far as the record goes, the history of famine started in the period from 1887 to 1910. This major famine affected all the Sub-Saharan African countries. The famine caused mass death and was known in Eritrea as "the stinky era," among Amharic speakers as "the awful epoch" and among the Oromo people as "the epoch of human eaters" and "cut-off epoch" [10]. The impacts of the famine were enormous, and all societies have kept the event in their collective memories. The 1887 to 1910 famine resulted from Rinderpest virus-cattle plague and colonial war [10].

The cattle plague resulted from the Rinderpest virus that started in 1887 when the Italian army stationed in Massawa--an Eritrean port brought infected cattle. When the Abyssinian army led by king Yohanis invaded the Italian military camp, they took the cattle to the highlands of the present state of Eritrea, and the virus spread among the local cattle. After that, the Rinderpest virus affected all Sub-Saharan African countries. Since then, it has moved from place to place killing cattle and contributed to the poverty level, diseases and mortality, and disability. After 120 years the virus was eradicated from Africa in 2010 [10]. The famine killed tens of millions of people. Millions were displaced, and this led to increased competition between communities. In many ways, this detrimental event changed the social history and ecology of the region.

In 1957-58, a famine occurred in the Tigray region in Ethiopia and caused the death of 250,000 people. In 1966, in Wallo province, the famine caused the death of 50,000 people [11]. The record shows that before the famine, the people of those regions had been protesting against the domination and exploitation of the Ethiopian king "Haile Selassie." To subdue their resistance, the king had developed policy that incapacitates people. The state policy intended to control people's aspiration for social justice created conditions to famine. This famine caused the deaths of 45 to 60 thousand people and the displacement of hundreds of thousands of people. Before society recovered, from 1972 to 74, famine occurred in Wallo and Tigray. This famine caused the deaths of 200 to 500 thousand people. The impacts of the 1972 to 1974 famine was felt in rest other regions. Hundreds of thousands of people were displaced and migrated to different regions. The Ethiopian king strove to hide the famine from the local and global community [6].

In 1980 to 81, famine occurred in Hararge and Bale provinces of Ethiopia. More than the previous famines, this was caused by the Ethiopian government's desire to weaken the Oromo national movement. This famine caused the displacement and the death of thousands of people. A few years later, from 1983 to 85, famine occurred in Tigray and Wallo. This famine resulted from the war led by the Tigray People Liberation Front (TPLF) force struggling to guarantee the autonomous status of the region a movement the Ethiopian government intended to suppress. This famine caused about a million deaths [11].

Famine and food insecurities result from what Sen described as un-freedom [8]. The identified causes of famine are human rights violations, low agricultural production, population growth, gender/ethnic/ inequality, unfair trade, conflict and corruption, climate change and natural disaster, and HIV/AIDS. The causes of famine include the famines that occured before that. If those causes are known, why do societies fail to apply the principle of public health protection, prevention of famine, promotion of food security, and create the knowledge that guarantees adequate food? Addressing these complex public health challenges requires complex thinking.

Famine is one of the oldest public health problems. For many public health problems, we have used vaccinations and medications by systematically looking at the issues. However, consecutive Horn of Africa leaders' have not learned from the past and made enough efforts to prevent famine. In Ethiopia alone, in 2016, over 15 million people were dependent on relief foods. Among them, 240 000 were pregnant mothers, and 1.2 million children were under five years of age. From 2017-18, over two million Oromo people were displaced from their homes and exposed to different types of nutritional deprivations. The Ethiopian government's policymakers pay no attention to the short and long term impacts of famine. Although the famines are caused by the default of the state plans, the policymakers are not keen on developing empowering policies [8]. Unmapped and misunderstood systems make public health intervention impossible or ineffective [12,13]. To bring about tangible changes, the spiral effects of famine in the Horn of Africa need to be discussed.

This paper is divided into six major parts. The first section gives the introduction and overview of the problem: in the second part, I discuss the objective of the research and research questions. In the third part, I cover the methodology of the research. The third part explores the biological impacts of famine. In the fifth part, I explore the social and environmental impacts of famine. In the last part, I discuss and conclude.

1.1. Learning Objectives

One of the essential goals of health promotion and disease prevention is identifying risk factors for diseases or protective factors. Tracing the social determinants of health and causes of diseases requires knowledge synthesis. Knowledge synthesis is combining evidence from multiple sources and summarizing them. Knowledge synthesis translates evidence into practice, and it is critical to advance evidence-based policies and practices. Synthesizing knowledge and understanding the long-term causation impacts enhances our understanding and informs policy solutions. The best available evidence on famine suggests it is the manifestation of deep-seated social problems. Initially, famine reveals itself as food insecurity and food inequality. If societies fail to prevent famine, inequality, and poverty widen. Public health policies and practices should be proactive and responsive, and they should be dependent on the current and contemporary knowledge and focus on continuous quality improvement. Having in mind that acute and chronic disease prevention and health promotion strategies are evidence-based, enhancing our knowledge in the area of public health impacts of famine

is a step forward in addressing them. The major objective of this paper is to explore the primary, secondary, and tertiary effects of famine on population health.

1.2. Research Questions

Well-built and focused research questions are a fundamental step in finding evidence-based answers. In this paper, the questions I ask are the following: a) what are the primary, secondary and tertiary effects of famine on population health in general and famine in particular?; b) what are the socio-political and environmental impacts of famine? What are the best ways to respond to this public health problem?

1.3. Definitions and Framework of Thinking

Theoretical framework introduce and describes the theory that explains why the topic is necessary to research. When the WHO defined public health as "the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society," [14] it is inferring that addressing public health problems require the efforts of organized society. The definition also implies that evidence-based social and scientific actions are necessarily addressing public health problems. Also, when the WHO defined health promotion as "the process of enabling people to increase control over, and to improve, their health," [14] the definition goes beyond focusing on individual behavior towards a wide range of social and environmental interventions. Public health nutrition policies (PHNP) are directed to promoting food security and preventing nutritional deficiencies. To offer the answers to the above research questions, I found that the PHNP framework of thinking provides the necessary tool to capture, analyze, and extract data, as well as advance critical action plans. The PHNP framework is vested on evidence-based knowledge that throughout the lifecycle, balanced foods are essential for optimal growth, development, and overall health [15]. The PHNP focuses on enabling social conditions and advancing people to identify their needs and finding solutions.

2. Methods and Materials

To prevent famine and promote food security one need to understand the short and long term impacts of hunger. Also, to make public health policies impactful, it needs to be evidence-based. To address those gaps, in this paper, I apply knowledge synthesis methods. For this project, I use primary data collected for my Ph.D. thesis and secondary data from literature reviews. For the secondary data, initially, I google-searched the terms famine, starvation, and "health". In a google search, when I entered those terms, 26,100,000 results were generated (0.49 seconds). There are too many to review, and also the google search has many limitations. To make the research more comprehensive, I used Medline Database (OVID). In the OVID Database in the subject when I entered the term famine or starvation, 10,463 articles produced. When the search is limited to the English language, it produced 9,270 articles. When the term health or public health was searched, it generated 6,448,769 articles. When the two terms were combined and limited to the English language, 1811 articles were generated. I selected papers having in mind the short-term and the long-term impacts of famine as well as the mechanisms in which famine and starvation lead to public health problems. To manage the search in the database, I produced the titles and abstracts of those articles. Based on them I reviewed articles from the experiences of the Irish potato famine, Dutch famine, Russia - Leningrad Siege, Chinese famine, Nazi Concentration Camps, Nigeria Biafra conflict, Bangladesh, North Korea and Ethiopia. One of the major books I frequently consulted was The Minnesota Great Starvation Experiment, 1944-45 [16].

Why am I interested in studying the short and long-term effects of famine?

First, from my lived experiences and research in public health nutrition in the Horn of Africa, I realized that famine is a longstanding public health problem. I noticed that there are many people who may survive the famine and then face health problems accompanied by malnutrition-stunt growth, weakness, and susceptibility to diseases. Usually, relief agencies provide relief foods to save the lives of those who are on the verge of death. Children under five years old are most vulnerable to famine, and in many cases, the delivery of relief foods are made when it is too late. By the time relief foods are delivered, malnutrition has already taken its course and hindered the growth and the development of different organs, tissues, and cells in the fetus, infants and children. Although relief foods save lives, they are insufficient to raise healthy children who will be physically and mentally capable of solving their future problems. Those children who suffered from malnutrition at an early age will grownup being physically and mentally frail. Mental underdevelopment hinders educational achievement. These children will not be as adequately prepared to manage the social ills, i.e., conflict, human rights violations, and environmental stresses as the generation before them. Eventually, famine in one generation produces communities that are vulnerable to famine in the next generation. The burden of deaths and disabilities resulting from famine are intergenerational.

Second, malnutrition suppresses the immune system, and increase vulnerability to a wide range of infectious diseases. Infections further deplete energy, hinder the absorption of nutrients and further increase the need for food. Usually in areas where there is famine outbreaks of cholera, tuberculosis, meningitis, and measles are high. As famine kills or disables productive adults and children, it leaves children in poverty and makes them vulnerable to famine.

Third, from my research observations and others, as food insecurity persists for a long time, the need to have access to food overruns many of the social and cultural ethics of society. This is a major contributing factor for conflicts and instabilities. Conflict and instability erode society's resources and further increases vulnerability to famine.

Fourth, I noted that as societies suffer from malnutrition, the prevalence of human rights violations and conflicts increases and this conditions them to use natural resources unsustainably. This leads to widespread deforestation, soil

erosion, and environmental degradation. Environmental degradation further widens water scarcity and reduces the moisture and productivity of the soil. Such environmental degradations further increase the vulnerability of people to famine.

Fifth, famine is not affecting the people in the Horn of Africa in the same way. Politically powerful groups use their power to allocate vulnerability to famine to the marginalized and privileges to themselves. Indeed, in countries facing conflict and famine, women eat least and last. This creates an inequitable society and makes inequality inherited from one generation to the next. Unequitable societies are susceptible to conflict and famine.

Sixth, relief agencies and the Horn of Africa policymakers act to contain famine without deeply understanding the complexities of the problem. Fully understanding the problem is halfway to finding solutions. Inadequate understanding of the social processes of famine have limited the efforts made to prevent it, and this has left the region to experience significant public health problems. Policymakers need to move away from blaming nature and reacting only when malnutrition reached a critical stage and work together to contain the social causes of famine and guarantee food security.

Seventh, nutrients are the building blocks of our body. Early exposure to malnutrition hinders healthy growth and development as well as the differentiation of organs, tissues, and cells. The underdevelopment of these critical body parts leads in adulthood to functioning below normal physiology. Much of the current literature on famines makes clear that the health problems associated with malnutrition range from reproductive failure, increased risks of degenerative diseases, i.e., heart diseases, cancer, diabetes, osteoporosis, respiratory problems, exophthalmia, early aging and mental problems including schizophrenia. Famine adds extra public health burdens.

Eighth, I believe promoting food security and preventing famine in the Horn of Africa is a shared responsibility of states, organizations and private sectors. All the Horn of African states need to set conventional policies having in mind a food security and sustainability lens—a process that promotes critical thought about the impact of the programs and policy decisions on food security.

Ninth, public health nutrition promotion advances improved the nutritional health of the population through the application of nutrition sciences and knowledge of healthy eating. Public health nutrition promotes evidence-based practices. High quality, multidisciplinary nutrition research, and effective collaborations are the key to improve food security. The Horn of African countries are not producing impactful knowledge to prevent famine. They need to build on the strengths of society and identify and address their weaknesses. In order to make more significant advances, they need to move more quickly and transform thinking and actions.

Biology of Starvation (primary impacts)

The initial stage of starvation is the intense depletion of stored proteins. When starvation is prolonged, protein catabolism decreases, and the utilization of fats increase. The sudden drop in calories causes' the body to use stored protein and energy and causes weight and muscle tissue losses. Muscle tissues are needed to maintain essential body functions. Initially, acute starvation leads to nausea, vomiting and dizziness [2]. Prolonged starvation depletes the stored energy and weakens the physical strength of the person. It reduces body temperature, heartbeat, muscle strength, and brain function. It also suppresses the function of lungs, speech, seeing and hearing ability, tests, and smell [2]. Prolonged starvation might cause edema, poor muscular development, rough skin, and abnormal fat absorption.

Abnormal fat malabsorption hinders vitamin A, E, and D absorption. Vitamin A deficiency affects the development and function of the cornea of the eye and causes blindness such as exophthalmia [2]. The depletion of fat from the body and malabsorption of vitamin A and E lead to rough skin and suppress the immune system. Loss of muscles and energy also cause the depletion of the immune system and exposes the person to easily preventable infectious diseases. Infections usually cause high body temperature, which further increases protein-energy depletion. Sometimes, infection causes diarrhea and vomiting, which leads to malabsorption and further aggravates the problem.

Primarily starvation leads to a slower metabolism and lowers blood volume. Starvation leads to reduced coordination and increased muscle soreness. As the body muscle and fat get depleted, the person becomes vulnerable to cold and heat. It is hard to sit [16]. Suppression of the immune system and increases the infection rate and severity of the infection [17]. For those reasons, among the famine-stricken communities suppressed immunodeficiency symptoms and infectious diseases such as typhus, dysentery & malaria are frequent and severe.

Early life environments predict future health. Prenatal and young age exposure to famine is associated with an increased risk of underdevelopment of tissues, cells, and organs and contribute to metabolic disorders and cardiovascular diseases in adults [18]. Protein-Calorie deficiency causes kwashiorkor and marasmus. Energy-protein deficiencies are followed by the malnutrition of different types of vitamins and minerals. This further creates a short-term, and long-term health burden.

Protein provides the building materials for organs, tissues and cells and is essential to growth and development. Malnutrition in general and energy-protein, vitamin and minerals affect different age groups in unique ways [2]. Famine and malnutrition affect pregnant women, breastfeeding mothers, fetuses, and children more severely than others. Malnutrition of pregnant mother, fetus, infant, and children significantly increase mortality rates and cause mental and physical impairment. This leads to poor performance in school and in physically demanding jobs [7]. Iron deficiency is more prevalent among malnourished mothers. Malnourished mothers undergo long labor when they deliver babies. As we can see later, chronic malnutrition in the fetus and early babies affect their physical and mental development. Those impacts can manifest in the second and third generations.

Given that malnutrition decreases the immune system, it increases the risk of contracting infectious diseases, disease severity, and slows recovery [17]. Acute malnutrition makes children more susceptible to infection [18,19]. Being hungry, weak and stressed, displaced and fleeing from place to place for search of food, along with

poor prior health and immunization status, decreased access to basic needs, i.e., water, shelter, and sanitation, puts populations at high risk of contracting infectious diseases and subsequent deaths. Famines and epidemics often interact synergistically and increase the risk of early death and disability. This destructive cycle needs to be broken with appropriate nutritional promotion, food security, treatment of malnutrition as well as preventing and rapidly treating disease.

Short-term effects of Starvation

In complex biochemical pathways, most of the nutrients are critical to the development of the physical body and the mind. Inadequate nutrients affect the growth and development of critical body parts. For example, the protein-energy malnutrition suppresses the development of muscles. Calcium, phosphorus, and vitamin D deficiency hinder the development of bone. Protein-energy malnutrition compounded with a lack of calcium, phosphorus, and vitamin D suppresses the development of physical strength [2]. The weaker the bone and physical strength, the fewer people able to work in physically demanding jobs. Iron, iodine [20] and essential fatty acids are necessary for the growth and development of the brain and nervous system [2]. Early exposure to those nutritional deficiencies makes children underperform in school. If children underperform in school, the development of problem-solving skills are hindered. The underdevelopment of the physical body and mental capacity leaves them in lifetime poverty. In many cases, they are most likely to inherit poverty to the next generation.

Bone growth and development and Osteoporosis risk

Bone provides support for the body and attachment for muscles and internal organs. It protects vital organs, plays a critical role in blood and bone marrow formation. It also provides ionic calcium reserves. Micro-macro nutrients such as calcium, phosphorus and vitamin D are directly involved in the differentiation and development of the skeletal system. However, during famine calcium deficiency is one of the major problems. Deficiency of this nutrient leads to underdevelopment of several critical organs such as bones and cartilage. This increases the risk of stunt growth, bones being fragile and easily fractured [2,21].

Lower bone density, osteoporosis, and bone fractures are more frequently recorded among children who survived famine. As noted above, in Tigray and Wallo provinces of Ethiopia, famine has been occurring more periodically. In those provinces, the bone density of children and adults was more fragile. In the 1980s, public opinion at the time perceived the underdevelopment of bones among those people from those provinces to be genetic. However, children who were born after the 1990s in Tigray region in upper-class families do not show those symptoms. This proves that it is not genetic; it was related to malnutrition in general and calcium deficiency in particular. Data collected from China indicate that in-utero and early childhood exposure to famine had significant adverse effects on adult height, weight, weight-for-height, educational attainment, and labor supply [18].

There is another pathway in which famine causes the underdevelopment of bone. Famine increases the risk of fluoride toxicity and alters the healthy growth of bones and cartilage. The soil and water of the Rift Valley region of the Horn of Africa are high in fluoride. During famine people choices are limited, and for that reason, people become more dependent on the water high in fluoride. Besides, milk which is rich in calcium play as a protective factor to fluoride toxicity; however, during famine, the scarcity of milk exacerbate the problem and increase skeletal fluorosis--where cartilage turns to bones [22].

Development of the Circulation System and Risk to Heart Diseases

Early in life exposure to famine causes metabolic disorder and increases the risk of being diabetic, obese, and having dyslipidemia. Those metabolic disorders increase the risk of cardiovascular diseases and the early onset of coronary artery disease. For example, the record shows children who were born during the Leningrad siege and children born a few years before, were at greater risks of developing high blood pressure, and mortality from complications from heart problems were significantly higher than in the general public. The authors conclude that starvation accompanying chronic stress, particularly at the onset of or during puberty, may increase vulnerability to later cardiovascular disease [23]. Impaired growth in utero is linked to raised blood pressure and increased risk of ischemic heart disease and stroke. The study from the 1944-45 Dutch famine shows that the fetuses, infants, and children who survived the famine had a higher body mass index, lower glucose tolerance in their adulthood [25]. Data also reveal that famine hinders economic and health outcomes in adulthood. Fetal exposure to the Chinese famine was associated with an increased risk of anemia in adulthood [23,40].

Development of Reproductive System and Risk Factors

Starvation affects the development and differentiation of sex organs in both male and female. In men and women, starvation increases the infertility rate. In men, starvation stops sperm production, reduces sperm counts, motility, and morphology. In women, starvation might entirely stop menstruation or slow the development of egg cells. In women, it increases the risk of breast cancer [25] and early menopause. In both cases, it disrupts the energy-homeostasis and accelerates aging.

Starvation causes more stillbirths. The increase in stillbirths is more prevalent in the male fetus than the female. Newborn girls were able to better survive extreme starvation than the boys [26,43]. The greater biological vulnerability and stronger natural selection in utero of male versus female fetuses during severe famine may result in a stronger selection effect on men than women. Famine affects the ratio of females to males. Sexual desire become secondary or tertiary to food. During famines the priority is food. For example, one of the Oromo's oral story suggests that for starving couples, romance is spiritual. The physical desire for romances returns in a shorter time for women than for men.

Nervous System Development and Mental Health

Several nutrients are involved in the formation and differentiation of the nervous system and brain development. During famines, many of those critical nutrients are either in short supply or not balanced. The deficiency of these nutrients work individually or synergistically and hinder the development of the brain and nervous system of fetuses and children under the age

of five years. The underdevelopment of the brain and nervous system limits their mobility, slows motor skills, learning ability, and even increases the risk factor of several mental health problems. In fetuses and children under five, starvation leads to slower mental alertness, hinders concentration, and comprehension. In the male, it increases depression. For example, data collected from the Dutch and Chinese famines revealed that babies born and children under five years during the famine are at higher risk of developing psychologic disorders such as schizophrenia. The effects are stronger in the early gestation period than in the middle and last gestation periods [25].

Children who are exposed to starvation in the fetus stage and under five years of age are less educable, and they have difficulty developing problem-solving skills. Their productivities are significantly hindered for more so than the children of their age born and raised in healthy social conditions. The inhibited educability, problem-solving skills, and productivity lead to earning less. This leaves the sufferers in poverty the rest of their lives and makes them pass on poverty to their children. Not only that, epigenetic[1] science has now revealed that our genetic capacity could be altered based on the early social-environmental exposures [27].

The development of the brain and nervous system are dependent on the quality of life in early age. The brain is all about reasoning, the ability to learn, critical thinking, connecting information, constructing knowledge and finding workable solutions. The brain is critical to systematic and rational thinking and creatively providing solutions. If the brain and nervous system developments are hindered, learning skills, problem-solving and creativity are suppressed. This takes away one of the necessary tools needed for individuals to provide themselves the basic necessities in life. The more people's thinking capacities are hindered, the more the families and communities are kept in poverty. In China, it was reported that fetal exposure to malnutrition has substantial and long-lasting impacts on both physical and mental health. This includes cognitive abilities, the risks of stroke, physical disabilities in speech, walking and vision, and measures of mental acuity. The finding also revealed that early life exposure to famine increases the risk of being schizophrenic. The findings imply that policies and programs that improve the nutritional status of pregnant women yield benefits for the health of a fetus that extend through the life cycle in the form of reduced physical and mental impairment [28]. The work of Van Abeelen and colleagues [19] reveals that in the male, the harmful impact of famine exposure increases the risk of mental illness later in life.

Digestive and Endocrine System

The pancreas is responsible for the production of insulin needed to regulate blood glucose level. The pancreas is one of the organs vulnerable to malnutrition. More specifically, malnutrition affects the growth and development of beta cells of pancreases. Several studies have revealed that exposure to famine during early life may increase body mass index (BMI), increase the risk of overweight and obesity in general and females in particular [29]. Maternal and paternal nutritional status nutrition as an indicator of offspring metabolic syndrome risk in later life through epigenetic imprinting. Malnutrition in early life increases breast cancer risk [30,44]. In females' early exposure to famine in the early gestation period increases the risk of developing cardiovascular diseases, cancer, and breast cancer mortality than in those who were not exposed to famine [19].

Social Impacts of Famine

Food is one of the underlying biological needs. Consistent with Abraham Maslow's theory of the hierarchy of needs [31], human beings strive to the utmost to acquire basic physiological needs such as food, water, shelter, and clothing. Those who have experienced famine testified that when people suffer from famine, the need for food became a priority and religion (ethics) became second to food. The efforts people make to guarantee food security for self, family, and community takes over other social norms of the society. Self-protection and self-interest dominate over the rest. The need to consider the needs of others is last on their priority list.

Social historians and public health scientists have explored the role of famine in disease and mortality. The historical record shows that famine causes the breakdown of everyday social and economic organizations and coping skills and leads to mass migration and social disorder. Equally just as famine triggers the outbreak of mass communicable disease and increases mortality and morbidity, it also causes social breakdowns. One of the phenomena that follow famine is conflict in the family and community and subsequently, displacement. Indeed, conflict in the family, community, and between communities leads to instability [32].

Since the 1890s, Abyssinians have been migrating to the south and massively settling in Oromia and the other regions. The initial reason for the displacement of Abyssinians was famine caused by rinderpest virus [10] and maladministration. Although the settlement of Abyssinians was necessitated by biological need, in a short time, it led to other consequences. The settlers were armed with guns acquired from the European empire builders and equipped with epistemic racism propagated by the religious leaders. The large forceful settlement was followed by the construction of Orthodox churches and forceful religious conversion and political domination. This further intensified the illegal confiscation of land, cattle, and grains necessary to feed the unsalaried army and who also sent relief foods to their homeland. The settlers theorized that they were racially and culturally superior. The settlers used their guns to harass, kill, and assert their power. Within a short time, the settlers built their institutions and validated their power: as well, they used their power to validate their knowledge – i.e., the Orthodox religious teachings. The settlers became landlords, and the local people became the serfs. Controlling the land and resources further intensified colonial settlement and dispossession and eviction of people from their homes [33].

The first Abyssinian settlements in Oromia and the south were unplanned. The abrupt mass settlements spread diseases such as Rinderpest virus and caused famine in Oromia and other regions [10]. This further created resentment between the settlers and the host people. The disease and settlements created conditions for conflict and

[1] Epigenetics is the control of gene expression through mechanisms not directly related to the DNA coding sequence.

instability. In many ways, conflicts consumed lean resources and increased the risk factors for famine and diseases.

Oromo and other indigenous people are egalitarian societies. For example, the Oromo, Gedeo, and Konso freely elected their leaders every eight years. For them, participation in the political life of the society is not a choice but is mandatory. However, Abyssinians are from hierarchical society, and for them, politics is left for the elites. The Abyssinian settlers denied the Oromo people the right to participate in politics and shape their future and address their needs. This denial hindered the Oromo people and others from early identifying risks to famine and preventing them.

To explore the social impacts of not considering the needs of others, let me give a specific example. Before, before 1887, only a few Abyssinians had settled in Oromia, in the garrison camps. At that time, the Abyssinian king had not enough human resources and to establish domination. The Oromo oral story suggests that the early Abyssinian settlers were merely seen as colonizers but hopeless migrants. However, when the famine occurred in Abyssinia, many able-bodied men joined the Menelik army, and settled in Oromia and other regions. These men joined the army as a means of survival. At that time, the Abyssinian army was unsalaried, and they were instructed to generate their living by looting food from the people whom they had newly conquered. Those armed men had acquired foods and shelter for themselves, their families, and community and even generated relief food for people in their homeland from the people they conquered. The war and slave trade compounded with famine caused by rinderpest virus and looting further aggravated famine in Oromia and accounted for the deaths of two-thirds of the population [34].

Here another example. The famine caused by rinderpest severely affected pastoralist people. In the Kenyan case, when the famine occurred, the Maasai people were predominantly cattle breeders. The Kikuyu were mixed agriculturalists. As a result, the Kikuyu faced minor suffering from the famine compared to the Maasai. As a result, the Kikuyu used their agricultural practices to expand their territory as they traded land for food with the Maasai [10].

Famine is the most extreme manifestation of the existence of poverty, inequality, and the unfair distribution of decision making power [35]. At a personal level, hunger is a painful experience, and seeing others painfully dying of starvation amid the world's abundance of food and calories makes people develop a strong character. Unable to find food when you are starving and unable to feed loved ones when needed is stressful. Indeed, starvation causes unbearable physical and emotional pain. Stressed bodies and minds further suppress the immune system and further aggravate health problems. The stress resulting from famine has personal and social impacts. At a personal level, the stress further increases the trauma to the body and mind. At the societal level, it makes the survivors angry and frustrated and prone to violence.

Experimental biology and psychology has shown that eating behaviors can be conditioned [16]. Literature in the area of hunger in general and famine in particular shows increases impulsivity-hyperactivity, irritability-aggression, anxiety, and use of narcotics. The literature on food insecurity also shows that within affluent societies, famines causes a substantial burden of social problems. This substantiates the idea that hunger is an essential mediator of the social relationships between communities and within communities [36].

Food is a symbol of love, care, warmth, and friendship. Foods are valued in all cultures, and it is one of the necessities in life and the determining factor for motivation. It is for those reasons that societies celebrate events with food. Famine takes away all those positive factors. In the long term, starvation affects physical abilities and alter the mental capacity to judge right from wrong. Impoverished and starved individuals break ethical standards and the law. This leads to the risk of social aggression and even cannibalism [16]. For example, many researchers have carefully looked at a famine, and their findings reveal that the onset of famine results in the breakdown of normal social relations and produces many dysfunctional social behaviors. The most common survival strategies were migrations in search of food. Migration, on the one hand, led to family and community breakdown and on the other, it facilitated the spread of epidemic diseases such as cholera, dysentery, malaria, and many other infectious diseases. Although some of these diseases have no direct synergetic relationships with malnutrition, the abnormal social and environmental conditions created famine that in turn, aggravated the problem [4].

Displacement and population movements triggered by the threat of food shortages create new hazards for the migrants and the host group, including exposure to new diseases, which may be exacerbated by the declining quantity and quality of food. For example, during the 1985/86 famine in Tigray and Wallo province, the Ethiopian government massively settled those starving people in Western Oromia. The movement of people transplanted several diseases common in former provinces to the latter [34].

Let us now explore how food insecurity conditions people to eat nonstandard foods. Given that Lathyrus sativus or Grass Pea □□ have short vegetation period it is widely cultivated in Northern Ethiopia. The Grass pea is a member of the legume family and it is rich in protein. It also has a chemical that can damage the nervous system of spastic paraparesis of the lower limbs and paralyzes human and horse legs. This is known in the scientific community as neurolathyrism. Lathyrism is a disorder of the central motor system. The fresh and dried grass pea seeds are rich with the toxic chemical that causes the damage. The dried grass pea seeds are usually roasted before consumed as food. Researchers revealed that in Ethiopia during famines, one of the risks was an increase in neurolathyrism [37]. There are three possible explanations for the increase of neurolathyrism cases. The first reason is due to food insecurity more people take risks and eat nonstandard foods. Second, malnourished individuals cannot safely metabolize the small amount of chemical in the seeds. Third, people were more dependent on the seed than at regular time [38].

Environmental impacts

Food is part of the physical environment. Food security and environmental sustainability are intertwined. As environmental degradation causes famine, and famine

also contributes to environmental degradation. It causes communities to use natural resources unsustainably. When there is no food security, people are conditioned to cut trees for charcoal production, firewood sales, expand farmland or seek fertile land, and these contribute to deforestation [34]. Environmental degradation leads to scarcities of water, erode soil fertility, limit biodiversity, humidity, and alter the soil's Ph level. Environmental degradation hinders the fertility and productivity of the soil. It increases water evaporation and limits moisture in the soil and contributes to lakes, ponds, and rivers becoming dry. This further increase the risk factors for famine. Environmental degradation increases food and water-borne diseases such as biological contaminants and chemical pollutants. Furthermore, famine makes societies inherit the degraded environment and pass on poverty to their children & grandchildren.

Intergenerational effects of famine

Much of the current literature on the impacts of famine have focused on the first generation. However, the development of epigenetic sciences revealed that early life stress could be transferred from parents to children [27]. As we have noted in the case of Fetal Alcohol Spectrum Disorders, children's health and development are dependent on the health status of both parents. Child health and development are influenced by the preconception health status of fathers and mothers [39]. Child health and development are dependent on whether or not the father produced healthy sperm cells. The health status of the mother is more compelling because it starts from the formation of healthy egg cells and during conception by adequately nourishing the fetus in the womb and giving adequate breast milk after birth. If the father or mother or both were exposed to famine or suffered from malnutrition, they will have children with less than optimum physical and mental capacities. Optimal food is not only a prerequisite for the enjoyment of everyday living but also having healthy children.

Individuals who are exposed to famine early on are experience stunted growth, delayed cognitive and physical development, and they are most unlikely to live up to their potential. They cannot develop their full potential for cognitive, physical and emotional capacity and prone to metabolic disorders. Those individuals would pass on their weakened physical and mental capacity to their children and grandchildren through the epigenetic factor. The weaker their physical strength and mental capacity the poorer they are in the society. The poorer they are, the more likely they are to pass on poverty to their children and grandchildren.

3. Discussions

The relationships between food insecurity and public health are well known. A thousand years ago when Hippocrates said: "Let food be the medicine and the medicine be the food, "he made those relationships very clear. Food and nutrients are the building blocks of our body. In part or in whole, nutrients determine our physical strength, mental capacity, the capacity to fight infectious and chronic diseases and heal wounds. If nutrient deficiencies limit our mental capacity, this means they hinder the development of our problem-solving skills. Also, if they hinder the development of physical strength, they limit our effectively working in physically demanding jobs.

When individuals and societies ask questions and try to answer puzzles, they are engaged in research. When I closely look at the case of Oromo people, the research questions they had in the past and the social policies they developed were fascinating [40]. Oromo's social policies and their oral story clearly link the relationships between food and health. One of such policies is intended to reduce infant, child, and maternal mortality. In lowland regions of the Oromia-Borana zone, the longstanding policy promotes abstaining from sex up until the child is two years [41]. It is intended to widen the birth gaps between children and prevent marasmus and kwashiorkor. Also, when Oromos explained the relation between food and immunity they describe it in a metaphor, "wajiin banaa jetee falaxa qaraadhu, gargaari baana jetee maseena qaladhu jetee citooni"- literary if you want to be free from itching skin eat fattened beef.

Although, famine is a long-standing public health problem in the Horn of Africa, the public health impacts of famine and malnutrition are under-discussed. No adequate empirical date captured the experiences of famine survivors. The very few available sources have captured the short-term effects of famine. However, no one has made serious efforts to capture the impacts of famine on the survivors, to the second and third generations. In the absence of empirical data in this paper, I reviewed literature in the area and synthesized the knowledge on the experiences of others. Cultural differences are insignificant when it comes to the short term and long term impacts of famine.

Nutritional deprivation affects our body at the molecular and cellular level [42]. Describing the relationship between the foods we eat and personal development, the adage says, "you are what you eat." The social, economic, political, cultural, and environmental capacity of people and their quality of life are directly linked to their food security. Indeed, food security is one of the social determinants of population health. If pregnant mothers, breastfeeding mothers, and children are well fed the children will grow up healthy and happy [42]. These children will develop bodies and minds that think critically and act accordingly. Healthy children are educable, socially smart and quickly develop problem-solving skills. In their adulthood, they became producers, have low social costs, require fewer health care services, and will have a better quality of life. Healthy children will grow to be healthy adults and contribute to building a healthy society.

Malnutrition increases the risk of contracting infectious diseases and disease severity. Being physically weak from starvation compounded with displacement and stressed along with poor prior health, immunization status, limited access to necessities such as food, water, shelter, and sanitation, put the populations at high risk of contracting infectious diseases and subsequent death. Infectious diseases lead to diarrhea and vomiting that increase malabsorption and exacerbate malnutrition. Furthermore, infectious diseases increase protein-energy needs and further aggravate the problem. Research shows that poor nutrition accounts for more than half of the global burden of disease.

Wherever there is famine, there is displacement of people. Health risks among the displaced population include complications resulting from acute and chronic malnutrition such as micronutrient deficiencies. Displacement increases the risk of new and old infectious diseases. If people move into overcrowded or unsanitary settings where there is no adequate safe water or appropriate food for an extended period, people are at higher risk of infectious diseases. Guaranteeing food security is the cornerstone in assuring healthy growth and development of children and the prevention of diseases.

Prevention of malnutrition in general and famine, in particular, is achievable. We cannot adequately address famine and food insecurity without fully understanding and changing the social webs that cause it or can potentially improve food security. Improved household food security, and safety as well as controlling micronutrient deficiencies, are necessary to prevent and manage infectious diseases. The efforts we make to prevent malnutrition and famine are part and parcel of the effort we make to improve public health status and prevent famine.

Famine has detrimental social effects. An inadequate supply of nutrients to cells and tissues leads to underdevelopment of organs. The underdevelopment of those organs hinders personal, social, cultural, psychological, economic, political, and educational achievement. For example, well-fed pregnant mothers are most likely to deliver healthy children and provide adequate breast milk to her children [3,42,44].

Malnutrition, a scarcity of water, poor sanitation and displacement of people changes the host-parasite relationships. This exposes people to easily preventable communicable diseases. Also, as malnutrition suppresses the immune system and decreases the host's resistance, it increases the severity of infections. Besides, famine causes social disruption, displacement, crowding, and decreased sanitation. Decreased sanitation and increased severity of infections further upsurge the transmission of infectious diseases and increase the severity of the infection. Furthermore, displacements and movements of people from place to place increases the risk of new infections [3,44,45].

Famine causes enormous suffering. Unmapped and misunderstood systems make public health intervention impossible [12]. For many years researchers and policymakers cited the importance of nutrition to the growth and development of children. Early childhood experiences have profound impacts later in adulthood and the next generations. Famine and malnutrition have a ripple effect—they slow economic and human development and degrade the natural world. It slows progress in development like education and employment. Poor nutrition leaves children vulnerable to diseases and illness and can cause stunted physical growth and brain development. Researchers and policymakers need to envision going beyond the short-term effects of famine.

4. Conclusions

This paper has dealt with the ranges of public health impacts of famine. Based on those analyses, the following conclusions are made. First, nutrients are the building blocks of our body, and they are essential for the growth and development and differentiation of organs, tissues, and cells. Inadequate nutrient supplies during the growth and development of fetuses and children have implications for the underdevelopment of different organs, tissues, and cells.

Second, in the short term, starvation leads to the depletion of the stored protein-energy sources. The depletion of those and other nutrients suppress the immune system and result in increased vulnerability to infectious diseases. The more people starve, the more their immune system is suppressed, the higher the prevalence of easily preventable infectious diseases. For this reason, during famines, water, and foodborne diseases and vector-borne diseases increase. Also, infectious diseases increase energy expenditures and decrease nutrient absorption and exacerbate malnutrition.

Third, the altered growth and development mean repressed physiological functions. In the long term, repressed physiological functions mean that in middle age, the person is prone to many degenerative diseases. For example, early age life stress is associated with increased blood pressure, diabetes, hyperlipidemia, and a range of mental disorders.

Fourth, famine increases poverty in the community. The underdevelopment of organs, tissues, and cells resulting from starvation hinder the educability and productivity of those exposed to malnutrition early in life. Hindered educability and productivity means lower social-economic status. Indeed, famine makes families and communities pass on poverty to their children and grandchildren.

Fifth, just as famines are caused by the social problems which Sen (1999) described as the deficiency in democracy and human rights, they also create social problems. Food is one of the underlying biological needs and to guarantee self and family members adequate food human beings will do extraordinary things. As survivors say during a famine, food is the overwhelming priority. As a result, during famines, morality, ethics, and written and unwritten laws are often violated. This leads to violence in the family, community, and between communities. Conflict and instability in the community deplete resources and further create unhealthy social conditions.

Sixth, famine increases competition on built and natural resources and contributes to environmental degradations. Environmental degradation further increases risks to many public health problems, including famine.

Seventh, famine is one of the major public health problems in the Horn of Africa. Evidence collected in longitudinal studies makes it clear that famines are the causes of many public health problems. Eliminating the root causes of food insecurity is quintessential public health intervention. The effort that societies make to prevent famine and malnutrition need to be seen as part and parcel of addressing many public health problems.

Eighth, famine is an easily preventable public health problem. Evidence-based public health nutrition policies need to be directed towards the control of nutritional deficiencies. Failing to prevent famine constitute negligence by policymakers.

Ninth, from a public health perspective the prevention of the mortality and morbidity that result from malnutrition and food-water-borne diseases necessitate the promotion of social justice and empowering people.

Tenth, as I stated above, in their daily prayers when the Oromo elders say, give us peace (*nagaa)*, preclude us from extreme war (*waraana*), poverty (*deega*), famine (*beela*) and epidemic diseases (*dhukkuba*), they are stating their wishes and hopes. Those the longstanding wish should be the primary objective of their governing body.

References

[1] Raphael, Dennis (2004). Social Determinants of Health, Canadian Perspectives, Canadian Scholars Press Inc, Toronto.

[2] Feldman,Elaine(1988). Essentials of Clinical Nutrition, Essentials of Medical Education Series, Davis Company, Philadelphia.

[3] Editor (1991) Epidemiology and infection in famine and disaster, Epidemiol. Infect, 107, 241-251.

[4] Arnold, David (1993). Social Crisis and Epidemic Disease in the Famines of Nineteenth-century India, Social History of Medicine, Volume 6, Issue 3, 1 December 1993, P. 385-404.

[5] WHO (2011). Public health risk assessment and interventions The Horn of Africa: Drought and famine crisis July https://www.who.int/diseasecontrol_emergencies/publications/who_hse_gar_dce_2011_3.pdf?ua=1 (retrieved June 1, 2019.

[6] Hancock, Graham (1985). Ethiopia: The Challenge of Hunger, Victor Gollancz Ltd, London.

[7] Awuonda, Casper (1987). Human Response To Drought And Famine in Turkana, Kenya, A thesis submitted in fulfilment for the Degree of Doctor of Philosophy at the University of Nairobi. 1987.

[8] Sen, Amartiya (1999). Development as freedom. Oxford: Oxford University Press.

[9] Center for Food Safety (2014). Food & Climate Connecting the Dots, Choosing the Way Forward, http://www.centerforfoodsafety.org/reports/2947/food-and-climate-connecting-the-dots-choosing-the-way-forward.

[10] Dugassa, Begna (2018). Colonialism and Public Health: The Case of the Rinderpest Virus in Oromia Regional State in Ethiopia, Journal of Preventive Medicine, ISSN 2572-5483.

[11] Baro, Mamadou and Deubel, Tara (2008). Persistent Hunger: Perspectives on Vulnerability, Famine, and Food Security in Sub-Saharan Africa, January, Annual Review of Anthropology. 35(1).

[12] Dugassa, Begna (2012). Denial of Leadership Development and the Underdevelopment of Public Health: The Experience of the Oromo People in Ethiopia. Journal of Oromo Studies, Vol. 19, No. 1 &2, p139-174.

[13] Scutchfield, Douglas and Keck William (1997). Principles of Public Health Practice, Delmar Publishers, Albany.

[14] WHO (1996) Health Promotion Glossary, https://www.who.int/healthpromotion/about/HPR%20Glossary%201998.pdf?ua=1.

[15] New Brunswick Public Health Nutrition Framework for Action, 2012-2016 , New Brunswick, https://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/Publications/PublicHealthNutritionFrameworkforAction.pdf.

[16] Keys A, Brožek J, Henschel A, Mickelsen O, Taylor HL, et al. (1950). The biology of human starvation.

[17] Shears, P. (1991). Epidemiology and infection in famine and disasters. Epidemiol. Infect, 107. 241-251.

[18] Xin, Meng and Qian Nancy (2009). The Long Term Consequences of Famine on Survivors: Evidence from a Unique Natural Experiment Using China's Great Famine, Working Paper 14917 http://www.nber.org/papers/w14917, National Bureau of Economic Research.

[19] van Abeelen, Annet F M; Veenendaal, Marjolein V E; Painter, Rebecca C; de Rooij, Susanne R; Dijkgraaf, Marcel G W; Bossuyt, Patrick M M; Elias, Sjoerd G; Grobbee, Diederick E; Uiterwaal, Cuno S P M; Roseboom, Tessa J. (2011). Survival effects of prenatal famine exposure, American Journal of Clinical Nutrition 95(1):179-83.

[20] Dugassa, B. (2013). Iodine deficiency and women's health: Colonialism's malign effect on health in Oromia region, in Ethiopia. Health, 5, 958-972.

[21] Kueper, Janina, Beyth, Shaul, Liebergall, Meir, Kaplan, Leon and Schroeder, Josh. (2015). Evidence for the Adverse Effect of Starvation on Bone Quality: A Review of the Literature, Int J Endocrinol.; 2015: 628740.

[22] Dugassa, Begna, (2016), High Fluoride Level in Water and Soil in the Rift Valley Region of Oromia: When Colonialism Maintains and Exacerbates a Durable Public Health Problem, The Journal of Oromo Studies, Vol. 23, No. 1 &2, p239-282.

[23] Denny, Pär Sparén; Shestov, Dmitri; Plavinskaja, Svetlana; Parfenova, Nina; Hoptiar, Valeri; Paturot, Dominique; Galanti, Maria Rosaria, (2003), Long term mortality after severe starvation during the siege of Leningrad: prospective cohort study; BMJ, (published 5 December).

[24] Shi Z, Zhang C, Zhou M, Zhen S, Taylor AW. (2013). Exposure to the Chinese famine in early life and the risk of anaemia in adulthood**,** BMC Public Health. 2013 Oct 1; 13: 904.

[25] Rooij, Susanne and Roseboom, Tessa. (2013). The developmental origins of ageing: study protocol for the Dutch famine birth cohort study on ageing, BMJ Open 2013; 3: e003167.

[26] Zarulli, V., Barthold, J. A., Oksuzyan, A., Lindahl-Jacobsen, R., Christensen, K., & Vaupel, J. W. (2016). Women Survive Severe Famines and Epidemics Better Than Men. Abstract from Population Association of America 2017, Chicago, IL, United States.

[27] Tiffon, Celine. (2018). The Impact of Nutrition and Environmental Epigenetics on Human Health and Disease; International Journal of Molecular Sciences, 19, 3425.

[28] Kim S, Fleisher B, Sun JY. (2017). The Long-term Health Effects of Fetal Malnutrition: Evidence from the 1959-1961 China Great Leap Forward Famine. Health Econ.; 26(10):1264-1277.

[29] Zhou J, Zhang L, Xuan P, Fan Y, Yang L, Hu C, Bo Q, Wang G, Sheng J and Wang S. (2018). The relationship between famine exposure during early life and body mass index in adulthood: A systematic review and meta-analysis. PLoS One. 2018 Feb 6; 13(2): e0192212.

[30] He D, Fang Y, Gunter MJ, Xu D, Zhao Y, Zhou J, Fang H, Xu WH. (2017). Incidence of breast cancer in Chinese women exposed to the 1959-1961 great Chinese famine, BMC Cancer. Dec 5; 17(1): 824.

[31] Maslow, A. H. (1987). Motivation and personality (3rd ed.). Delhi, India: Pearson Education.

[32] Dugassa, Begna. (2008). Colonial Trauma, Community Resiliency and Community Health Development: The Case of the Oromo people in Ethiopia, Journal of Health & Development, Vol. 4, No. 1-4, p43-63.

[33] Clay, J., & Holcomb, B. (1986). Politics and the Ethiopian Famine 1984-1985. New Brunswick and Oxford: Transaction Books.

[34] Dugassa, Begna. (2008). Indigenous Knowledge, Colonialism and Epistemological Violence. The Experience of the Oromo People Under Abyssinian Colonial Rule, A thesis submitted in conformity with the requirement for the degree of Doctor of Philosophy, Department of Theory and Policy Studies in Education, Ontario Institute for Studies in Education of the University of Toronto.

[35] Dugassa, Begna. (2004). Human Rights Violations and Famine in Ethiopia. The Journal of Oromo Studies, Vol. 11, Number 1 and 2, page 47-68.

[36] Nettle, Daniel. (2017). Does Hunger Contribute to Socioeconomic Gradients in Behavior?, Front Psychol.; 8: 358.

[37] Getahun H, Mekonnen A, TekleHaimanot R, Lambein F. Epidemic of neurolathyrism in Ethiopia. Lancet. 1999; 354: 306-7.

[38] Getahun H, Lambein F, Vanhoorne M, Van der Stuyft P. Food-aid cereals to reduce neurolathyrism related to grass-pea preparations during famine. Lancet. 2003; 362: 1808-10.

[39] Williams, Janet; Smith, Vincent and the Committee On Substance Abuse. (2015). Fetal Alcohol Spectrum Disorders, PEDIATRICS Volume 136, number 5, Pe1395-1407, November.

[40] Dugassa, Begna. (2018a). Where is the Global South in the Health Discourse? Attempt Forthcoming from the Oromo People's Perspective, American Journal of Public Health Research, Vol. 6, No. 6, 243-252.

[41] Elemo, Ibrahim. (2005). HIV/AIDS, Gender and Reproductive Health Promotion: The Roles of Traditional Institutions Among

the Borana Oromo, Southern Ethiopia: Contemporary Issues in Borana, and the 38th Gumii Gaayoo Assembly, Addis Ababa, Ethiopia.

[42] Suresh C. Devkota and Asis De Sathian. (2015). American Journal of Public Health Research, 2015, Vol. 3, No. 4A, 1-5, Nutritional Deficiencies: Major Public Health Problem in Nepal

[43] Mu, Ren and Zhang Xiaobo. (2008). Gender Difference in the Long-Term Impact of Famine, International Food Policy Research Institute (IPRI) Discussion Paper 00760.

[44] Lumey, L.H; Stei Aryeh; and Susser, Ezra. (2011). Prenatal Famine and Adult Health; Annul. Rev. Public Health, 32-237-62.

[45] Boyd, Andrew; Cookson Susan, Anderson Mark, Bilukha, Oleg; Brennan Muireann, Handzel Thomas, Hardy Colleen, Husain Farah, Lopes Barbara, Carlos, Cardozo, Colorado Navarro, Shahpar Cyrus, Talley Leisel, Toole Michael, Gerber Michael (2017) Centers for Disease Control and Prevention Public Health Response to Humanitarian Emergencies, 2007–2016 Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 23, Supplement to December.