

Master Final Project

# A Systematic Literature Review to Define the Social Determinants of Stunting among Children aged 0-59 months. Evidence from the last 15 years.

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# List of Abbreviations

<b>AAH</b>	Actions Against Hunger
<b>ARI</b>	Acute Respiratory Infection
<b>BMI</b>	Body Mass Index
<b>CSDH</b>	Conceptual Framework for the Social Determinants of Health
<b>DHS</b>	Demographic and Health Survey
<b>EED</b>	Environmental Enteric Dysfunction
<b>GDP</b>	Gross Domestic Product
<b>HAZ</b>	Height for Age Z-Score
<b>HH</b>	Household
<b>IUGR</b>	Intrauterine Growth Restriction
<b>IYCF</b>	Infant and Young Child Feeding
<b>LBW</b>	Low Birth Weight
<b>NFHS</b>	National Family Health Survey
<b>RMNCH</b>	Reproductive, Maternal, Neonatal and Child Health
<b>SDG</b>	Sustainable Development Goals
<b>SUN</b>	Scaling Up Nutrition
<b>UNICEF</b>	United Nations Children’s Fund
<b>WASH</b>	Water, Sanitation and Hygiene
<b>WHA</b>	World Health Association
<b>WHO</b>	World Health Organization

# Executive Summary

Stunting is a well-established marker of children's nutritional status and the development of a country. Stunting is predominantly observed in low-middle-income countries, with the majority in South Asia and Sub-Saharan Africa. Social determinants play a critical role in stunting outcomes.

The main objective of the study was to identify the principal social determinants of stunting among children aged 0-59 months and offer vital information for future healthcare policy guidelines and interventions. A review has been administered on the available evidence regarding social determinants of stunting and the primary social determinants were identified and defined. Gaps in the research provided reason to suggest recommendations for needed interventions, and the analyzed information was consolidated to offer advice for future healthcare policy guidelines and interventions.

Social determinants were chosen as the focus because of their direct impact on chronic undernutrition and the hidden, devastating consequences that result in childhood stunting. The intertwining nature social determinants have on stunting outcomes was indisputable throughout the literature search. The determinants have been divided into three categories, basic, underlying and immediate determinants. The basic determinants lay the foundation for the remaining determinants, they resemble the origin of the social issues surrounding stunting outcomes. The basic determinants have been established as sociocultural context, rural verses urban, household economic status, maternal education and empowerment and gender. The underlying determinants are the next level of determinants, directly affected by the basic determinants, and directly affecting the immediate determinants. The underlying determinants were defined as water, sanitation and hygiene, health and healthcare, maternal height and BMI, and feeding and caring practices. Lastly, the immediate determinants, which are influenced by both the basic and underlying determinants, have been described as dietary intake and diversity and infections and disease.

There is an indisputable importance in the necessity to reduce stunting prevalence. Individual, community and national development is restricted with the presence of stunting. Stunting requires significant attention and multi-sectoral approaches to reduce the burden. Interventions must be targeted at the most vulnerable populations, both spatially and socially. The social determinants mentioned should be considered while forming interventions, keeping in mind the overlapping and interactive characteristics between each determinant.

# Introduction

As a main global health challenge, effecting the lives of hundreds of millions of individuals, families, communities and nations, lies a mixture of issues represented by inequities and undernutrition. Health inequities are, “the unfair and avoidable differences in health status seen within and between countries” (1). The factors which are held most responsible for health inequities are the social determinants of health (1). Social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. They are influenced by policy choices and are shaped by a distribution of money, power and resources at local, national and global levels. Undernutrition is represented throughout the top five leading risk factors for under-five mortality (2). There are two forms of undernutrition that are predominantly considered in health, acute and chronic, referring to wasting and stunting respectively. This study will focus on the far more frequent form, stunting. Stunting is when a child’s height is under proportionate to their age. Global 2018 data estimates 21.9% or 149 million children under-five are stunted (3,4). Stunting is an important marker for measuring inequities, as it develops over a long term and is a significant indicator of non-acute factors affecting growth (5).

Stunting has gained considerable attention as a public health priority due to the recognized cycles between generations and the long-term burden absorbed at the individual, community and national levels. Low socioeconomic status, demographic disparities and insufficient access to resources impede adequate nutritional foundations through gestation and early childhood, decreasing health, developmental and economic capacities. Stunting, as defined by the World Health Organization (WHO), is having a height for age z-score (HAZ) less than two standard deviations of the WHO Child Growth Standards median, or, being too short for one’s age (6). As Heaton *et al.* verbalized, HAZ is a well-established measure of child health and the overall development of a particular country (7), with many disparities seen within and between countries. Three-fourths of accounted for stunting is located in South Asia (35% prevalence) and sub-Saharan Africa (34.1%) (8). Unfortunately, despite being a well-established measure, stunting remains relatively neglected as a risk marker of child development, minimizing the associated public health costs.

Consequences of stunting range from short-term to long-term and place an enormous burden on individuals, families, communities and nations as a whole. In addition to increased mortality and morbidity, common consequences include increased susceptibility to infection and disease, impaired functional brain development, affecting educational and cognitive performance, and increased health care expenditures (9,10). While growth recovery can be achieved later in life, it is often restricted due to adolescents living under the same adverse nutritional, socio-economic and environmental conditions that triggered stunting as children (9). In any matter, permanent cognitive

impairments are frequently observed due to structural and functional brain damage caused by restricted nutrient supply and frequent infection (9). There is a critical 1,000-day period from pregnancy to age two in which impaired growth and development are proven to be detrimental. During this period brain and nervous system development are largely completed, and the perpetual negative effects of nutritional deficiencies are evidenced (10). Productivity loss resulting from delayed physical health and diminished cognitive development lead to economic limitations, ultimately impacting social and national development (11). The gross domestic product (GDP) loss due to malnutrition is estimated at several billion dollars per year (11). A cycle of poverty, poor health and malnutrition is perpetrated throughout generations by financial hardships and social discourse.

Social determinants are received as the most important factors influencing stunting patterns (12). The profound influence social determinants play on health inequality is due reason to highly consider them while developing health policy (7). Relatively few studies have documented the trends of social determinants of stunting. The majority of existing studies tend to focus on undernutrition in a general context, and commonly review individual developing country data. This study has attempted to evaluate social determinants of stunting on a global level, in an effort to help prioritize interventions for scaling up stunting reduction. There has recently been a change in emphasis from food security to multi-sectoral approaches, essential to world-wide reductions. Careful evaluation and adjustments of multi-sectoral approaches and ensuring decision-makers understand the social determinants and limiting factors amid regions and communities is vital to establish successful interventions and sustainable healthcare strategies. As repeated in the literature, social determinants are suggested to be the principal factor influencing inequities and reductions in under-five stunting (13–15). Understanding the social determinants affecting childhood stunting is necessary for implementation of effective interventions and policy guidelines.

## Objectives

### Main Objective

Identify the principal socio-demographic determinants of stunting among children aged 0–59 months, offering useful information for future healthcare policy guidelines and interventions.

## Specific Objectives

- Review the available evidence regarding social determinants of stunting
- Identify the main social determinants of stunting and review how they are being defined in the literature
- Identify gaps in the research that would provide further evidence required to develop effective interventions
- Consolidate analyzed information for future healthcare policy guidelines and interventions

## Methodology

A systematic literature review using peer-reviewed articles and grey literature has been administered in this academic work to help link causal social determinants with stunting outcomes. This paper is intended to be useful as a reference and frame for decision makers when legislating policy and creating interventions. The literature review aimed to look for evidence relating social determinants and stunting. Findings and analysis were circulated and association patterns in cross-sectional and longitudinal studies were compared. Key terms explored included a combination of “stunting” OR “stunted” AND “social determinants” OR “inequalities” OR “economic capacity”, making adjustments when appropriate. Variations in the search included the terms, ‘nutritional stunting’, ‘nutrition’ and ‘global’, similarly connected by the terms ‘AND’ and ‘OR’. An inclusion criterion consisting of all free, full-length articles in English, ranging from January 2004 to present, with a population of 0-59 months and their mothers were explored. The search included articles since 2004 to grasp the changing ideology of stunting relating to social determinants and recognize the variations in the research from 2004 till present. The screening methods took place in three stages. The first stage of the screening process consisted of reviewing the titles of each article. Titles which were deemed relevant, consisting of key words and relevant derivations of such, were considered for abstract review. Abstracts which portrayed information relevant to the study were followed by a full-text review. Full-text reviews were accompanied by full-text analysis for articles which detailed a clear link between stunting and social determinants. Publications which failed to mention the term ‘stunting’ were excluded from full-text analysis.

A flow diagram has been used to identify the number of articles in each stage of screening. Data extraction has been organized using a data extraction form on Excel. The form includes basic information about the article: article title, publication date, study population, location, study onset / end dates, study type and sample size — as well as social determinants mentioned, and an ‘other’

category, used to quote interesting facts and data found in the articles. The articles have been sorted through Mendeley, as to ensure organization and avoid duplications and loss of articles. The criteria remained constant throughout the search for peer-reviewed and grey literature. During the screening of the literature, identification and defining of the social determinants has been achieved by collecting and consolidating all the social determinants mentioned throughout the articles. The social determinants were then grouped by categories depending on their level of contact with stunting outcomes.

## Peer-Reviewed Literature

Peer-reviewed journals and databases which were selected for the screening of the literature include the following: PubMed, Population Information Online, Wiley Online Library, The Lancet Child and Adolescent Health and The Lancet Global Health. Only the first 100 publications in PubMed were reviewed due to the extent of the search results, the desire to review additional sources and the limited time available. Articles were selected from an assortment of journals and databases to ensure a wide range of search results were presented and all relevant information was considered. Search of various journals also provided the results to exhibit articles that may have been shadowed in PubMed's extensive database, as only the first 100 articles were reviewed.

## Grey Literature

The review of the grey literature included materials and research produced by relevant organizations outside of the traditional commercial or academic publishing and distribution channels. Information and grey literature was gathered from the following websites: UNICEF, World Health Organization (WHO), World Bank, United Nations, International Food Policy Research Institute (IFPRI), and Global Nutrition Report.

Grey literature was included in the research due to the relevance of information found in the aforementioned websites. International and non-governmental organizations do substantial work in the fields of nutrition, and they have considerable information to share through reports and policy recommendations.

## Study Results

Search results in peer-reviewed journals included a total of 310 articles which were scanned by article titles. Exclusion by article titles included 166 articles which were mostly found to be irrelevant to the study topic. In the case of Population Information Online and Wiley Online



Library, article title exclusion was also due to the lack of full article access. Succeeding the initial screening, 144 articles were imported into Mendeley to receive further evaluation amid the article abstracts and full text. Of the 144 articles imported, only 85 articles were reviewed by article abstract and-or full text due to the significance of information found and time constraints limiting further review. Elimination of 32 articles was made from the article abstracts, leaving 53 articles for full text analysis.

## Analysis

Social determinants impact the health of individuals through multiple pathways and on various levels. Throughout the screened literature, the social determinants affecting stunting were widely associated with two frameworks in particular, the CSDH Conceptual Framework for Social Determinants of Health produced by WHO and the UNICEF Conceptual Framework of the Determinants of Child Undernutrition (Annex I, Annex II). These two frameworks were produced in 2010 and 1990, respectively, and remain widely recognized and referenced in today's literature. Acting as references during the screening process, these frameworks assisted in organizing the article results. The social determinants selected follow strata structured components as seen in the UNICEF framework, and have been ordered by basic, underlying and immediate determinants. Social determinants have a profound influence on health inequality, with particular importance in the role of children's health, survival and nutritional status as a result of a child's inherent vulnerability and reliance on others to protect their health (7). The defined social determinants are highly interrelated and influential, relying substantially on one another in destructive and progressive terms.

### Basic Determinants

The basic social determinants of stunting lay the foundation for the underlying and immediate determinants. Negatively affecting a basic determinant will likely harm the underlying and immediate determinants as well; whereas, an advancement to the basic determinants will enhance the affiliated determinants, leading to reduced stunting. Improving childhood stunting begins with positive advances in the basic determinants. Throughout the literature, the following aspects were clearly established with high importance. The basic determinants of stunting have been determined to encompass the following aspects: sociocultural context, rural verses urban, household economic status, maternal education and empowerment and gender.

## *Sociocultural Context*

Sociocultural influences encompass a wide range of elements relating to social behaviors, cultural beliefs, and traditional practices. A cultural custom widely practiced, early marriage, creates many potential dangers to prospective childbearing. The highest global rates for childhood marriage are found in Sub-Saharan Africa and South Asia, corresponding to the highest stunting rates among children under-five. These regions have a similar prevalence of childhood marriages, with almost 40% of all women married before 18, and 10% married before 15 years of age (16). Early marriage tends to be directly followed by early conception due to social pressure to prove fertility (17). Among multiple adverse factors relating to early conception, young mothers may lack resources and education valuable in promoting greater health for their children (7). Moreover, early conception restricts nutrient availability to the fetus as a result of competing demands of ongoing maternal growth, preventing optimal height gain for women during adolescence (17,18). Poor maternal height increases the risk of intrauterine growth restriction (IUGR) and low birth weight (LBW) babies, ultimately resulting in stunting (17). As stunting is largely irreversible, stunted children are likely to become stunted adults, deepening the intergenerational cycle with high risks of IUGR and LBW leading to stunting (17).

Additional risks of stunting are observed by the number of offspring, and the birth order. Hangoma *et al.* has noted that children born later receive less favorable social interactions and are more likely to become stunted (19). Additionally, rapid childbearing is highly influenced by cultural ideologies and results as a major determinant of stunting. Children whose mothers practice improper birth spacing (less than 24 months) are twice as likely to be stunted (20). This may be attributed to early interruption of breastfeeding for the first-born, and greater risk for depleted maternal reserves and LBW in subsequent pregnancies (18,20).

Cultural values may affect mothers' perceptions on healthy versus non-healthy food choices, nutritional needs of their family members, and caring and feeding practices (21). Daily routines regarding mothers and children are heavily influenced by the mother's, or primary caretaker's, environment and their surroundings. The caretaker's significant others, immediate and extended family, neighbors and the healthcare providers the caregivers depend on for support are all possible influences (18). Varying ideals guide routines such as, food recipes or preparation techniques, largely influencing children's flavor preferences later in life (18). Stewart *et al.* observes, "repeated exposure to a variety of foods facilitates acceptance, [and] establishes food preferences...[therefore,] promoting a varied diet in infancy is likely to establish lifelong healthier eating patterns" (18). Improper complementary feeding practices can greatly influence the risk of stunting. Cultural views on timing and what types of complementary foods should be introduced, how to feed children when they are sick or do not want to eat, who can and should feed young

children or how food will help a baby sleep, can all be decisive factors effecting children's risk of stunting.

Further cultural rituals include for example, "eating-down" during pregnancy, a common practice in India and neighboring South Asia countries, or manual physical activity during pregnancy frequently seen in rural India (17). Cultural diets can regularly be seen as cereal-based, with low consumption of animal products, generating high levels of anemia from reduced iron intake (17). Anemia is a danger for pregnant women who have higher iron requirements, and can lead to adverse birth outcomes such as, LBW and stunting (17).

Ethnic minority groups encompass a vulnerable population regarding healthcare and birth outcomes. Ethnic minority groups are disproportionately poor and more often live in remote and mountainous areas (22). Remote areas, coupled with poor infrastructure, makes accessibility and travel distances to health facilities increasingly difficult. Minorities are also reluctant to utilize health systems due to language barriers and a low level of cultural competence among health workers, leading to discriminatory behaviors. As a result, minorities may not attend all their antenatal or postnatal care visits and prefer to have home deliveries, not always accompanied by skilled birth attendants. As well, fertility rates tend to be higher as cultural taboos towards contraceptives and abortion persist throughout many groups (22).

### *Rural vs Urban*

Social determinants are largely affected by place of residence, and the differences between urban verse rural residents hold significant importance in determining stunting outcomes. Demographic characteristics of population size and density, economic activity, administrative structures, services such as healthcare and education, infrastructure including roads, sanitation, water, energy and communication, and environment referring to green space and air pollution are prevailing differences seen between urban-rural regions (23). Regions burdened with difficulties of economic growth, lack of infrastructure and excessive poverty, often being characteristics of rural settlements, are more stained with childhood opportunity inequalities (24). Vulnerability of residents is largely increased in rural areas with suppressed developmental potentials (25). This threatens citizens opportunities for economic growth and educational freedom. Poor infrastructure results in long travel times to qualified care, restricting access and causing reluctance to utilize health care systems (22). World Bank estimates a total of three billion people live in rural areas, making up about 45% of the total global population (26). The majority of the world's rural population resides in Africa and Asia, making up 90% of the rural population (27). Disparities seen in rural population are well documented, with Cumming and Cairncross sharing data that 500 million people in rural areas are without access to safe water, and one billion do not have access to

sanitation facilities (28). Mothers in rural neighborhoods are at particular risk, as the limited healthcare access leads to poor reproductive health services; few antenatal care visits, home deliveries, no skilled birth attendant. These combined factors ultimately lead to children living in rural areas being at a greater risk of death and undernutrition (7).

Urbanization is increasingly common and generally perceived as an overall improvement in household well-being and improved public infrastructure. This includes enhanced health facilities and technologies facilitating distribution and access to varied food choices, increasing the quality and quantity of diets and improved access to markets, information and technologies (29). Improved health status of individuals can be seen as a result of, “more equitable access to education, healthcare, clean water and sanitation, and reproductive health services” (23). Ordinarily this holds true, as there are many positive aspects to urbanized societies - improved health services, increased job opportunities and enhanced educational systems. Although, attention must also be placed on consideration for the poor urban societies settled on the outskirts.

In recent years it has been highlighted that despite the many challenges faced by rural regions, and improvements seen in urban surroundings, urbanization does not always lead to the correct solution. There are often disparities seen within urban developments. Many people that migrate from rural to urban locations often settle on the perimeter, with deficient infrastructure, sanitation is poor or absent, and it is often overcrowded. These impoverished living conditions directly affect children’s diets, while indirectly affecting their psychosocial environments (5). It’s been noted that more than one-third of urban dwellers live in slums or informal settlements (28). Worsening rates of malnutrition may be the result of contextual factors including population density, degree of urbanization and climate change (18). Urban societies often are viewed with increased malnutrition from poor food choices, making citizens prone to obesity or diabetes. The risk of infection and disease may actually be greater in poor urban, compared to rural areas because of high population density doubled with limited infrastructure (28).

Rural and urban environments come with their advantages and disadvantages. Rural neighborhoods embrace solidarity within communities, they work together, support one another and build unity. Rural mothers have the ability to stay with their children during the day, taking their child on their back to work in the land. However, in general, urban children are taller and heavier than their rural counterparts (23). Greater economic and educational opportunity opens the door to better nutritional outcomes.

## *Household Economic Status*

Economic factors have been classified specifically as household economic status for various reasons. To start, an increase in national income does not necessarily correlate with improvements in stunting reduction, or health outcomes. National economic growth places nations in better positions to enhance health services (7), although as Heaton *et al.* points out, “economic growth may not be sufficient to promote substantial change if it is not accompanied by a more equitable income distribution and investments in healthcare” (7). Further, despite a picture of overall improvement perceived when increased national income results in improved services, it is established that the wealthy benefit more than the poor from provision of health services, ultimately increasing inequity (7,22).

As a result, household economic status has been established as a better indicator to determine reductions in stunting. Many of the publications are based on analysis of national surveys, such as the Demographic and Health Survey (DHS) or National Family Health Survey (NFHS). These population-based surveys mainly target women of child-bearing age, while also collecting data about the household (8). Household wealth index has a profound impact on child health outcomes and is a main determinant of stunting, measured through household asset-based wealth scores (7,8). The household asset indicators vary between country and are comprised of variations of assets including TV, refrigerator/freezer, radios, cellphones, computers, wristwatches etc., as well as household features; heating system, type of fuel in kitchen, internet access, source of drinking water, bathrooms, toilets, etc. (30). These indicators are a reflection of the household standard of living and directly affect health service use and outcomes of each family (7,31).

Economic status of a family highly influences their access to and utilization of health care (7), while also determining a child’s living conditions and their access to resources, such as nutrition, education and health (25). Greater household resources represent an increased ability to provide an adequate diet, with higher quality, nutritious foods, and higher quality child care (7,18,32). Material deprivation resulting from household poverty leads to poor nutrition and food insecurity, and increases exposure to dirty water, poor sanitation and hygiene, acute and chronic infections, stress, abuse and neglect (18,33). Additionally, it is observed that poor families are disproportionately affected by economic shocks and increased food prices (18). The entirety of the factors mentioned impact stunting outcomes. Increased household economic status impacts health seeking behavior, resulting in better nutritional status, reduced stunting and lower mortality rates. Economic status and income correlate greatly with education and can be highly reliant on political contexts effecting employment services and wealth distribution.

## *Maternal Education*

Maternal education was undeniably a key social determinant mentioned throughout the literature. There are well established intersections between maternal education and childhood stunting seen through various pathways. Education equips mothers to acquire more knowledge, it provides higher cognitive ability, allowing a higher transmission of information on health and nutrition (17,34). Higher cognitive attainment offers mothers with a better ability to access, understand and respond to the health information they receive (34). This benefits many aspects of the mother and child's lives, mothers are able to make better informed decisions and improve their capacity to absorb information. Mothers increase their, "ability to understand and respond to nutrition behavior change messages, to be more receptive to alternative food preparation methods or recipes, and to read and interpret food labels correctly" (18). A greater capacity for health information shapes maternal attitudes and behaviors and creates more informed decisions about nutrition, hygiene and preventative care, leading to higher access to and use of healthcare services (25,34,35). An increased receptibility to modern medicine and modern health services through modernized attitudes regarding healthcare, lead to mothers more likely to utilize the healthcare services and engage in behaviors that improve child nutrition (17,34). The ability to provide care is enhanced through increased caregiver behaviors and feeding practices, subsequently leading to mothers paying more attention to their children's health and development (25,36). Maternal levels of self-confidence are amplified, having a positive impact on decision making and willingness to consult health professionals (17). Ultimately, mothers have increased social networking opportunities, empowering one another through their interactions (17). Increased empowerment through education leads to higher decision making power, allowing mothers to allocate family resources to children (17,25). Higher decision making power provides women with the ability to decide their age at marriage, thus their age of their first pregnancy (17). Increasing the age of the first pregnancy has a number of beneficial health impacts for mother and child. Young girls, and mothers of young ages are in a constant struggle as they fight for nutrients during their pregnancy, as they themselves are continuing to develop into women. Achieving increased levels of maternal education increases human and cultural capital (34). The health status of the population as a whole increases with maternal education, as the impact of poverty on health is reduced (35). Maternal education is highly correlated with income and a strong predictor of socioeconomic status (34,35). As said by Heaton *et al.*, "much of maternal education's effect operates through socioeconomic indicators such as occupation type, HH wealth, type of earnings and that higher educated women tend to have higher educated husbands" (7). Higher educated husbands tend to have higher incomes, leading to a higher socioeconomic status of the family.

Overall, maternal education is an extremely important aspect to prevent childhood stunting. M. del Carmen Casanovas *et al.* acknowledged, “children of mothers with no schooling are generally the most disadvantaged with regard to stunting, regardless of their economic situation or whether living in urban or rural areas” (37). The immense increase in maternal health promoting behaviors and increased knowledge of health practices has been proven to improve children’s health and decrease the rate of stunting. Connecting maternal nutrition to the other basic determinants, it is shown that an increase in maternal education can be achieved by improved sociocultural ideologies and it will generally be a result of higher economic status, as well as a factor to increase economic status and gender empowerment.

### *Empowerment and Gender*

Empowerment of women and gender inequality are large factors influencing maternal health and nutrition, and the health of their children. Women’s empowerment has been divided into three domains by Sheila C. Vir, “control of resources and autonomy, workload and time, and social support environment” (17). Control of resources and autonomy encompasses various aspects referring to a women’s purchasing ability, decision-making power, power at family level, her access to money and freedom to mobilize throughout the day. Kamiya *et al.* defined autonomy as, “the ability...to obtain information and use it as a basis for making decisions about one’s private matters...” and “the control women have over their own lives – the extent to which they have an equal voice with their husbands in matters effecting themselves and their families” (38). Women’s autonomy is very multidimensional, regarding a variation of social, economic, political and psychological aspects that are highly dependent on the context and location. Mothers who have independent financial resources and can use their money independently, are more apt to spend the money on their child’s wellbeing (38). Freedom to go to the market, or healthcare facility at any time, without requesting permission from their husbands beforehand, increases women’s empowerment and decreases the risk of stunting for their children (17). Higher self-efficacy for accessing services, and greater confidence and self-esteem are very influential factors in a mothers capacity to care for their children (39). Greater empowerment positively influences women’s behavioral and caring practices. Women are more likely to invest in self-care, and improved nutritional care for themselves, their children and their family (17).

A strong environment of social support is crucial to provide women with adequate resources and assistance to ensure healthy self-care practices prior to and during pregnancy. An explicit explanation for disempowerment lies under the issue of domestic violence. Domestic violence leads to stunting through biological and behavioral pathways. Psychological stress, lower self-esteem, less control over household resources and less access to health services are detrimental

pathways derived from domestic violence (17). Self and child care becomes damaged, having adverse effects on fetal growth and pregnancy outcomes.

Ensuring equality throughout family members and avoiding gender and intra-household biases (13), while determining the nutritional needs of each family member, is essential between families. Guaranteeing appropriate portion sizes are devoted to each member during intra-family food distributions, lowers the risk for vulnerable ages and genders of families (21).

## Underlying Determinants

The underlying determinants of stunting impose a direct threat on the immediate determinants, and they rely on the status of the basic determinants. The underlying determinants are very important factors to childhood stunting as undesirable adjustments to the underlying determinants would result in direct consequences for the immediate determinants of stunting. Improved stunting outcomes depend upon appropriate management of the underlying determinants. The following determinants were reiterated throughout the literature with large significance. Underlying determinants of stunting have been established as: water, sanitation and hygiene, health and healthcare, maternal height and BMI, and feeding and caring practices.

### *Water, Sanitation and Hygiene (WASH)*

Resources concerning access and availability of water quantity and quality, sanitation facilities and adequate hygiene are strong determinants of childhood stunting. Safe water, sanitation and hygiene (WASH) practices are of paramount importance, stretching across multiple sectors of public health (28). Repeated throughout the literature is the significance of these determinants and how improved practices enhance stunting outcomes (15,31,40–43). WASH considers four aspects, first being the quantity of drinking water available to households, second the quality of drinking water, sanitation regards technologies and behaviors serving to safely contain excreta and prevent human contact, and lastly, hygiene refers to washing with soap at critical times, such as after defecation and before eating (28).

The greatest deficits of water and sanitation are seen in the regions with highest stunting prevalence, South Asia and Sub-Saharan Africa (28). Linking improved water, sanitation and hand washing behaviors to reduced stunting and better child development is achieved through reduced infection, reduced inflammation and increased social interaction (33). Prevention and reduction of the infectious disease burden can be largely attributed to improved WASH. Limited access to sanitation facilities, unsafe disposal of fecal matter, contaminated or inaccessible water supply, and many other unsafe WASH practices are common realities that span across populations globally.



From data presented by Cumming and Cairncross, over one-third of the world's population is without safe water and sanitation at their homes and less than one in five people wash their hands with soap after defecation (28). This adds to the 5.4 billion of cases of diarrhea and 1.6 million deaths per year that are estimated to occur due to contaminated water and poor sanitation (18).

Diarrhea along with soil-transmitted helminth infections and sub-clinical conditions of the gut, known as environmental enteric dysfunction (EED), are common biological pathways affecting stunting that result of poor WASH (28,42). Exposure to mycotoxins, arsenic and biomass fuels are further consequences seen from inadequate WASH practices, all of which influence low-birth weight and stunting outcomes (42). Half of the global population uses biomass fuels, which can be in the form of dung, coal or charcoal among other components, which gives rise to indoor air pollution effecting stunting (42). Open defecation and improper disposal of feces leading to fecal pollution is a widespread challenge in developing countries. Contaminants caused by fecal pollution are a particular danger for young children who are crawling, exploring, curious and learning to feed themselves, often putting their hands in their mouth and increasing their risk of infection (18).

WASH influences on stunting are considered through indirect pathways relating to social and economic mechanisms in addition to biological disease routes. Poverty increases exposure rates to poor sanitation and hygiene. Poverty stricken individuals may have less access to adequate water supplies and may face a high cost of energy, carrying water long distances from the source to their homes (28). The poorest households are seen to pay the highest percentile of their income for water, leaving them insufficient funds for other food and non-food items (28). Social benefits resulting from improved sanitation facilities include privacy and convenience (28). An absence of privacy endangers individuals, particularly women, from an increased risk of violence, including physical, sexual and psychological harm, all of which increase stunting risks.

Strengthening health and sanitation infrastructure in conjunction with water treatment and handwashing have a large impact on stunting reduction (20). Adequate WASH practices are particularly critical during the sensitive time period of infancy and young childhood. Provision of toilets, advocacy of hand-washing and improvement in quantity and quality of water are all important factors that complement one another, and together are required for improved stunting outcomes.

## *Health and Healthcare*

Health and healthcare are concepts consisting of an individual's overall health and their availability, access and utilization of healthcare resources. The health sector plays a crucial role in promoting healthy growth and development, and stunting outcomes can be susceptible to subtle changes within the sector (44). Specific importance for stunting outcomes relies on reproductive, maternal, neonatal and child health (RMNCH). The health condition of mothers and caregivers can influence their capacity to provide adequate childcare. Chronic diseases, HIV / AIDS and mental health disorders can restrain ability to care and constrain household resources (18).

Health care services are most likely to be utilized by women during the first 1,000 days of a newborn's life, from conception to age two (37). This provides an occasion for healthcare providers to deliver nutrition and health interventions that improve birth outcomes. Increasing health knowledge and ensuring modern attitudes of healthcare between individuals increases the likelihood of healthcare utilization (25,34). The health system does more than mediate differential consequences of illness in people's lives (1), it also prevents illness from occurring. Health services can improve child growth by, "preventing and treating acute and chronic illness and delivering interventions to improve child feeding and household hygiene" (37). Improving maternal and child health requires not solely the presence and availability of health systems, yet the quality and equitability of services provided.

Healthcare services must have sufficient management and be capable of providing high coverage quality services. High coverage of child immunization to prevent illness and an equitable distribution of family planning will improve stunting outcomes (35). Healthcare personnel must be adequately equipped with knowledge and competence to properly screen and identify inadequate growth and development (18). Overburdened health systems often have limited trained staff with restricted time available to deliver guidance on appropriate feeding practices (18). Stunting assessment remains a challenge in many countries due to the lack of skills and time by providers. This results in a low coverage of stunting diagnosis and limited interventions delivered to detected cases. In other circumstances, trained staff are left with inadequate resources, restricting interventions (37).

Equitable services are essential for healthcare systems to provide. Carmen Casanova *et al.* expresses the need to, "mainstream the principle of equity" in healthcare services (37). Increasing healthcare services to vulnerable populations through community based clinics focused on maternal and child health or exempted fees for maternal and child healthcare will ensure greater, targeted coverage of healthcare services (18,45). Additional services to increase coverage include child health days and lay community health workers used to deliver nutrition-specific

interventions. Healthcare services must also be capable to facilitate referrals from the community to appropriate healthcare providers (45). Targeting deprived population and ensuring adequate health provider training through health financing reforms will also improve children's health and nutrition (37).

### *Maternal Height / BMI*

Childhood stunting outcomes are very dependent on maternal behaviors and factors relating to her health status. Maternal height and body mass index (BMI) have been recurring determinants mentioned throughout the literature, forewarning the health status of infants and children. Maternal height can be subjective to the issue of early marriage, leading to early conception (17). While the mother is still growing herself, rivalry occurs between the mother and the fetus for scarce nutrients, resulting in early childhood undernutrition and stunting (46). Maternal height can be indicative of her nutritional status accumulated through nutritional, social and environmental exposures (36), and used as a marker to gage the nutritional conditions that a mother was born into (47). It has been estimated that maternal undernutrition contributes to 20% of maternal deaths and increases the risk for adverse pregnancy outcomes and child mortality (42), contributing to 20% of childhood stunting (17). Maternal height may be used as a convenient indicator to express intergenerational associations (36), as it is correlated with the mother's nutritional status as a child, her offspring's size at birth and post-natal stunting (42). Similarly to maternal height, low maternal body mass index (BMI) is an indicator of undernutrition and may be representative of poor dietary intake and adequacy, and low food availability (20). Mothers who were stunted in early childhood, or whom have short stature or low BMI are more likely to give birth to babies with IUGR or LBW, succeeded by childhood stunting (17,42,46). Low birth weight and stunting in children can be contributed to poor socioeconomic status of women, influencing behavioral practices relating to self and child care (17).

On the contrary, short maternal height may be a predictor for overweight mothers who are at risk to have stunted children. Although a typical indicator for childhood stunting is a mother with low BMI, obesity may be a consequence from childhood malnutrition. There is evidence low maternal height is associated with maternal obesity and childhood stunting (21). Short maternal height reflecting malnutrition from gestation and childhood may lead to obesity through a, "lower fat oxidation rate, lower energy expenditure, higher susceptibility to weight gain and impaired control of energy intake" (21).

## *Feeding and Caring Practices*

Child feeding and caring practices have an everlasting impact on a child's health. Appropriate care during post-delivery and childhood affects an individual's life into adolescence and adulthood, and may influence feeding and caring practices for the individual's offspring. Child feeding and caring practices are influenced greatly by maternal care resources, encompassing the mother's nutrition and physical well-being, her education, employment, access to facilities, and her family and social support (17). Appropriate feeding and caring practices, focused at infant and young child feeding (IYCF), include timely initiation of breastfeeding, timely introduction and quality of complementary feeding, treatment of illness, immunization and quality of substitute caretaking (17). Early initiation of breastfeeding is extremely important as breastmilk is rich in colostrum, a protective factor that strengthens immunity and ensures a healthy baby (46). The duration of breastfeeding is also an important indicator of child health, it is not advised to stop breastfeeding too early, the same as it is inadvisable to continue breastfeeding for too long.

The recommended length by WHO for optimal health is to continue exclusive breastfeeding up to 6 months of a newborn's life, this signifies no water or additives, strictly breastmilk for 6 months. Early termination of breastfeeding leads to stunting by inadequate energy intake, nutrient deficiencies and removal of passive immunity provided by breastmilk (18). Late interruption of exclusive breastfeeding may lead to protein deficiencies needed for growth, if breastfeeding does not go accompanied by complementary feeding at the appropriate time (19). It is recommended to start complimentary feeding at 6 months, and continue alongside continued breastfeeding until at least 24 months (46).

Adequate complementary feeding is important in terms of the quality of foods, proper feeding practices and food and water safety. Poor quality foods entails foods of poor micronutrient quality, low dietary diversity and low energy content (48). Inadequate feeding practices are comprised of infrequent feedings, inappropriate feeding during and after illness, thin food consistency, feeding insufficient quantities and non-responsive feeding (48). Unsafe food and water safety refers to contaminated food or water, poor hygiene, or unsafe storage and preparation of foods (48). Optimal breastfeeding and complementary feeding is critical during 6-24 months of age, when there is a high demand for nutrients (42). The majority of growth stunting occurs during the complementary feeding period, when infants become more independent and mobile, increasing the influence of their environmental factors on growth and development (18).

In a continuation to feeding practices, caring practices, such as child stimulation and sustained activity, is highly important. Inadequate child stimulation may initiate poor nutrition, impeding development through multiple pathways. Dietary intake may be modified by neglect or absence of

caregiver attention (18), and inadequate stimulus may affect responsive feeding cues in infants. Proper care and attention are vital through childhood and adolescence. Adolescent care continues to be important for stunting outcomes due to the timing of a child's final growth spurt, which can be adversely affected by inadequate care or onset of conception at a young age (17).

## Immediate Determinants

Immediate determinants directly affect the outcome of stunting. The basic and underlying determinants previously mentioned lay the foundation which lead to the immediate determinants. Modifications of the basic and underlying determinants, whether positive or negative, will have an effect on the immediate determinants. Management of the basic and immediate determinants is needed to ensure the immediate determinants are able to prosper. Poor regulation of the immediate determinants will ultimately determine whether a child becomes stunted. The immediate determinants of stunting have been established as: dietary intake and diversity and infections and disease.

### *Dietary Intake and Diversity*

Dietary intake and diversity are extremely essential determinants to childhood stunting. Dietary diversity refers to consuming four or more food groups in a 24 hour period (46). Diversification of children's diets is important to ensure they are receiving all the vitamins and minerals necessary for full growth and development. Micronutrient deficiencies are referred to as 'hidden hunger' and affect the lives of two billion people globally (42). Micronutrients affect children's neurological and physical growth and development and are crucial to ensure full potential of children's health. Deficiencies of micronutrients such as vitamin A, zinc, iron and iodine are common, and multiple deficiencies are often present in the same child (42). Small deficiencies of iron and iodine may attribute to irreversible neurological and cognitive impairments, while large deficiencies contribute to growth faltering (18). During the first 1,000 days of a child's life, from conception to age two, linear growth is the most sensitive to nutrition deprivation and environmental stress (49). During this time period it is imperative that mothers are receiving all their nutrients to pass to their baby through the placenta and breastfeeding, and complementary foods introduced at 6 months are nutrient rich and frequently fed. It is critical for expecting mothers to increase their intake of iron, vitamin A and calcium during and prior to the onset of their pregnancy (17). Maternal micronutrient deficiencies of iron and iodine are associated with adverse birth outcomes and LBW (17). Due to their abundant supply of protein and micronutrients, animal source foods are important for mothers to consume to avoid iron-deficiency anemia and stunted offspring (20). Poor

dietary diversity and poor availability of nutrients consumed may be affected by seasonality and access and affordability of higher-quality foods (18,50,51).

Seasonality has been seen to affect stunting as dietary deficiencies are more severe during the dry season, and improved during the rainy season (51). Household food security and a higher intake of energy, protein, iron, zinc, calcium and folate are achieved during the rainy season (51). Ensuring dietary diversity can be attained through improved agriculture biodiversity (50). Expanding agricultural biodiversity will lessen threats to agriculture from climatic shocks due to changing weather patterns (50). In locations where most households depend on rain-fed agriculture, it is important to recognize and prepare for threats due to deforestation, climate change, pollution and soil degradation among others (50).

Stunting is strongly associated with a minimum dietary diversity in infant and young child feeding (20). Micronutrients are essential for growth and development, improved dietary diversity ensuring foods that are both nutrient dense and culturally acceptable is imperative to improved stunting outcomes. Micronutrient supplements, fortified foods and products specifically designed for infants will help guarantee micronutrient requirement fulfillment.

### *Infection and Disease*

Repeated childhood infections and disease has been highly associated with stunted growth and development. Significant importance has been placed on infections and disease due to the recognized frequency among children and highlighted negative consequences arising from repeated episodes. Preventing recurrent infections in the first years of children's lives is critical for improved health status. Infection damages the nutritional status of children through reduced appetite, impaired intestinal absorption, increased catabolism and altered directionality of nutrients away from growth and towards immune response (18). The most common infections affecting stunting outcomes are diarrhea, environmental enteric dysfunction (EED), soil-transmitted helminth infections and respiratory infections. The majority of infections occur in locations characterized by poor water, sanitation and hygiene (WASH).

Diarrhea is a well-established determinant that has been shown to increase the risk of stunting multiplicatively (52). Diarrhea is one of the most frequent infections in children, particularly in poor WASH conditions (42). Increased risk of stunting occurs with each episode of diarrhea. Repeated or prolonged episodes of diarrhea lasting seven to thirteen days has been shown to significantly worsen stunting risks, while fourteen or more days doubles a child's risk (20). Diarrhea has been shown to amplify stunting risks due to acute micronutrient loss and subsequent immune system impairment, dehydration and immobilization which creates opportunity for further

infections (20). Further risks are explained by a loss of fluids and electrolytes, loss of appetite and absorption in the intestine (52). This creates a boomerang effect, as diarrhea is both a cause and consequence of undernutrition. Malnutrition can escalate both the likelihood and severity of diarrhea (28).

Environmental enteric dysfunction (EED) is a sub-clinical disorder of the small intestine that results as a major cause of stunting (53). A unique danger is carried as it is an asymptomatic syndrome. This sub-clinical infection is caused by repeated exposure to pathogenic microorganisms resulting in defected structure and function of the small intestine (18).

Development of EED occurs during infancy resulting from high fecal microbial ingestion in areas lacking adequate water, sanitation and hygiene (53). Frequent infections are seen in infants and children of poverty stricken areas due to their exposure of enteric pathogens from fecal-oral transmission (42). EED is characterized by chronic inflammation, reduction of intestinal nutrient absorption, and weakening of the barrier function of the small intestine (28). The risk of stunting has been shown throughout the literature to increase significantly with the presence of EED.

Contamination causing soil-transmitted helminth infections, such as hookworm, lead to malabsorption of nutrients and maternal anemia (28). This condition is transmitted through feces contaminated soil in areas of poor sanitation, via fecal-oral route (20). This is particularly harmful during pregnancy, and is seen in exceptionally high numbers in Sub-Saharan Africa with over one-fourth of pregnant women being infected (28). Maternal infection may lead to intrauterine growth restriction (IUGR), causing stunting in infancy (18). Growth and development is largely effected with the infection of pre-school children whom become nutritionally and physically impaired (42). Nutritional status is reduced through diminished digestion and absorption, chronic inflammation and loss of nutrients (42).

Acute respiratory infections (ARI) are highly associated with increased stunting risk. The increased risk is especially high for pregnant women. Indoor air pollution, present in many low-income settings is a common cause of ARI, resulting in elevated risk for low birth weight (LBW) and stunting (20). Exposure to particulate matter and other harmful substances during pregnancy can highly raise the risk of IUGR, attributing to LBW and stunting (20).

Repeated infections are particularly harmful to pregnant mothers and children, having immediate consequences leading to stunting. Diarrhea, helminth infections, environmental enteric dysfunction and respiratory infections were the most frequent infections mentioned throughout the literature, although various additional infections affecting mothers and children were referred to as well.

# Discussion

The main objective of the study was to identify the principal social determinants of stunting among children aged 0-59 months. The findings suggest that the social determinants of stunting are organized into three rankings, basic determinants, underlying determinants and immediate determinants. The ranking style has been adapted from the UNICEF conceptual framework of the determinants of child undernutrition. The social determinants of stunting have been selected based on their frequency and relevance throughout the literature review.

The basic determinants established based on the literature review were sociocultural context, rural verses urban, household economic status, maternal education and empowerment and gender. These determinants influenced inequalities between societies, families and genders. They set the stage for the health of the mother and child, determining the resources individuals have to be health conscious and fulfil their dietary and health needs. Sociocultural context refers to the social factors relating to a cultural context, the differences in beliefs, values and way of life, that differentiate cultural and ethnic groups. Cultural differences entail diet and eating preferences, beliefs on early marriage, cultural practices related to caring for infants and newborns. These dissimilarities between regions, and communities can differentiate between the health and well-being of children and mothers. Rural verses urban context is important due to the contrast differences found in between each settlement. Rural areas lack many basic necessities that are available for their urban counterparts. Access and availability of safe and clean water, sanitation and hygiene, as well as the variety of food choices presented, and infrastructure, aiding access to healthcare and basic services, are commonly missing or limited in rural areas. Whereas, urban dwellings typically have improved WASH, infrastructure and food security, policy makers must also be considerate of urban settlers on the outskirts that may be suffering the same or worse than their rural neighbors. This is a reason household economic status is an important factor, because it allows comparison between households to determine wealth status and asset possession of families. This can be used as a good indicator to display the resources households have available, influencing their financial ability to buy food, water or healthcare. Maternal education is an important indicator as it provides insights into the educational capacity mothers have to respond to health information and can measure a mother's independence and women's empowerment in a society. Empowerment is essential for women, providing them with freedom and willingness to seek healthcare for themselves and their children, leave the house to go to the market, or practice self and child care. Devoid of adequate basic determinants leaves individuals and families in a state of destabilization. Opportunities to satisfy the underlying determinants adequately become compromised by a lack of fundamental stability.



The underlying determinants of water, sanitation and hygiene, health and healthcare, maternal height and BMI, and feeding and caring practices act as the next level of determinants to childhood stunting. These elements represent risk factors leading to the immediate determinants, and to childhood stunting. Access and accessibility to safe water, sanitation and hygiene (WASH), which is largely influenced by aspects of the basic determinants, has direct consequences to childhood stunting. Insufficient WASH causes infections and disease in mothers and children, that can be transmitted through water-borne pathways, or fecal-oral route. Diseases such as diarrhea and helminth infections are extremely common in regions with poor WASH and can be detrimental to pregnant or breastfeeding women and their children. The importance of high-quality healthcare to prevent and treat disease is amplified within vulnerable groups of women and children. Healthcare workers equipped with adequate knowledge, skills and resources allows the delivery of diagnosis and interventions throughout the community. Maternal height and BMI represent forewarnings into the health status of a newborn. Maternal height and BMI can be used as an indicator of the mother's nutritional background and her current nutritional conditions, and depending on the mother's height and BMI, she may have an increased risk of IUGR or LBW baby. Feeding and caring practices followed by the mother to the child may be swayed by her ethnic background, health status, employment status, empowerment in the community or her household resources. Feeding and caring practices encompass the timing of infant feeding, a timely transition from breastfeeding to complementary foods and appropriate responsiveness to infant and child care signals. These vital practices have the ability to shape the health and nutritional status of children. The underlying determinants are crucial to maintain and monitor the health and nutritional status of mothers and children. These determinants have direct access to change the status of the immediate determinants, and of stunting outcomes.

The immediate determinants have the highest significance when relating to stunting outcomes. These determinants cannot be considered without the weight of the basic and underlying determinants. The first two sets of determinants act as the foundation and ultimately affect the status of the immediate determinants. The immediate determinants of stunting outcomes were established as dietary intake and diversity, infections and disease. Dietary intake and diversity are very important with stunting outcomes because they ensure that a child is receiving an adequate amount of food intake each day, while guaranteeing the diversity of the food items eaten. Diversity is a crucial element to avoid micronutrient deficiencies, which directly affect growth and development. The hidden nature of micronutrient deficiencies, that families are often unaware of because they believe they are intaking a sufficient amount of food product without realizing the deficit in their diet, makes micronutrient deficiencies a startling setback. Insufficient dietary intake and diversity directly leads to stunting outcomes through a lack of food product to the child or inadequate variety in food, leading to poor nutritional and health status and faltered growth and

development. Infections and disease are exceptionally harmful to stunting outcomes for pregnant women and children. Repeated episodes or prolonged infection limits nutritional intake, nutrient absorbance, and distribution and function of energy and nutrients throughout body. Pregnant women and mothers experiencing repeated infections have a deficit capacity to provide proper nutrients to their fetus, and care for their children. Repeated infection in children affects their nutritional status, ultimately weakening their immune response, provoking further infections, and influencing their growth and development.

Stunting outcomes are affected by many determinants, not limiting them to this paper. Although, with this literature review attempt was made to classify the most prominent social determinants, structuring them in a pyramidal manner. All of the determinants mentioned ultimately coexist with one another. Despite being divided into strata and explained individually, in reality the social determinants mentioned overlap and interact to compromise growth and development.

Gaps in the research are represented by the lack of attention that stunting receives on an international basis for global health and development. Undernutrition represents an astonishing one-third of under-five mortality (10), yet less than one-percent of global foreign aid is dedicated to nutrition (54). This can be explained by families, communities and policymakers overlooking nutritional necessities due to the common “hidden hunger”, or micronutrient deficiencies, lacking symptoms of extreme hunger or starvation (54). Overlooking the severity of the issue is reason for minimal foreign aid and reason for national nutritional programs to proceed underfunded. It is vitally important to understand the magnitude of stunting outcomes. Nearly 150 million children are burdened with everlasting consequences that will remain through generations to come. Depositing due investment on the 14 countries which account for an estimated 80% of the world’s stunting (10) will drastically decrease the burden which suffocates individuals, generation after generation.

## Study Limitations

The findings of this study must be interpreted in the context of the study design. The wide scope and variability of the study makes it difficult to draw firm conclusions. There are many social factors affecting stunting outcomes, many intertwining between one-another through various pathways. This study has attempted to organize the social determinants in a structural way, while understanding that the directionality may vary between determinants. The generalized aspect of this study, focusing on stunting globally, may limit applicability in specific locations.

The data in this study has mainly been obtained from cross-sectional studies using demographic and health surveys in low- and middle-income countries. The cross-sectional nature of these studies may present data unrepresentative of a true cause and effect relationship between the social determinants mentioned and stunting outcome. This result is partly mediated by the longitudinal cohort studies analyzed and compared for assurance measures.

The exclusion factors during the article collection phase may have limited the study, only free full-length articles in English have been included, which excludes many potential articles. The databases chosen for the search have not included all of the relevant data sources and information which is available on the topic, as all of the relevant databases are unknown and there has been a limited time frame available.

Reasoned by time constraints, not all of the articles filtered by title were reviewed by abstract and full-text. This may present a lack of comparative data. Relevant literature may have been overlooked as a result of time constraints and being limited to a single reviewer of the literature has left space for error or bias.

## Conclusions

This study aimed to identify and define the main social determinants of stunting among children aged 0-59 months and offer useful information for future healthcare policy initiatives and interventions. The extended results of the literature reveal the multifaceted dimensions of stunting determinants. Worldwide acceptance of the ideology that there is an, “ethical imperative to ensure all people attain their health, irrespective of their social-economic status, race, gender, etc.” (25) is of the utmost importance. There is a clear threat to the health of men, women and children due to deteriorative social determinants. Stunting has been decreasing globally at a slow yet appreciable rate, between 2000 and 2018 stunting prevalence decreased from 32.6% to 22.2% (55). This decrease has been in gratitude to diminishing stunting rates in all regions, except Africa. Unfortunately, despite a reduced percentage of stunting prevalence in Africa, the absolute number of stunted children continues to grow as the population increases (55). Although, the heightened values of stunting in Africa do not surpass the region with the greatest burden of stunting prevalence, South Asia.

The importance of reducing stunting, specifically in South Asia and Sub-Saharan Africa where the burden of stunting is the greatest and values have increased, is imperative for improved individual and regional development. Improvement in health through enhanced social determinants is achievable with focused interventions.

The interaction present between the various social determinants requires collaborative measures amongst various sectors, policy makers and communities to improve stunting outcomes. There is a long road ahead to eliminate stunting, although with the help of global change and movements such as, Scaling Up Nutrition (SUN), progress is achievable. The SUN movement, “unites governments, civil society, businesses and citizens in a worldwide effort to end undernutrition” (37). SUN provides collaborative measures through global interest and investment, which is the interaction needed to reduce the global challenge.

Interventions improving health demoting cultural behaviors, living conditions and household economic status of rural and urban outskirts dwellers, and maternal status and education will have lasting benefits. Interventions focused on the basic determinants in theory should improve the latter, underlying and immediate, determinants. Water, sanitation and hygiene, health and healthcare, maternal height and BMI, and feeding and caring practices would be improved with water and food security and health knowledge capacity, potentially as an outcome of improved basic determinants. Improvement in the immediate determinants, dietary intake and diversity and infection and disease require facilitated development to the previous determinants to be successful. The determinants mentioned have attempted to generalize the factors to be relatable regardless of the individual, although the extent to which each determinant act on individuals may vary greatly.

Vulnerable groups require the most attention and support, often facing substantial inequities, restricting improvements in living conditions and advancement in society. Identifying vulnerable groups prior to intervention planning is imperative for effective implementation.

Stunting is a subject requiring global concern. In line with the 2015 UN Sustainable Development Goal (SDG) 2.2, reducing all forms of malnutrition by 2030 (56) and the global target agreed upon at the World Health Assembly (WHA) for reducing under-five stunting by 40% by 2025 (57,58), stunting requires greater attention and investment. If current trends in stunting continue, in 2025 stunting will include 30 million children above the 100 million child target (57). With over 90% of stunted children living in low-and low-middle income countries (59), immediate action calls upon the international community for investment in stunting reductions.

# Recommendations

This study places existing studies into application with a focus on summarizing the *social* determinants of stunting, while trying to generalize the information globally, as to be applicable in any setting. Interventions to fight the social determinants of stunting must be effective, equitable and sustainable.

As mentioned by Cumming *et al.*, “identifying where stunting is spatially and socially clustered and targeting these populations will be important” (28). The social determinants of stunting often coincide through the joint prevalence of poverty, undernutrition and poor infrastructure. The key to interventions must be aimed at prevention, fixing the underlying problems and challenges that stunting outcomes arise from. Prevention starts with the health of young girls and future mothers, ensuring they have strength, health and adequate nutritional status. This requires safe and wholesome living environments, equitable access to services and health promoting atmospheres.

Targeting interventions at the critical 1,000 day period from conception to age two is exceedingly important as effects of stunting tend to remain irreversible after this period. A critical component to ensure stunting reduction is the need for comprehensive strategies. Achieving improved growth and development requires policy development which include every influential sector, acknowledging the aspects which lie outside the nutrition and health sectors. Policy makers must focus on improving health through advancements in nutrition, society and the environment. Effective agendas demand improved WASH services, household poverty reduction, food security, education and empowerment of women. Interventions as minimal as support for breastfeeding is estimated to prevent over 820,000 under-five deaths per year (60). Stunting reduction strategies require multisectoral approaches to eliminate all the determinants surrounding such outcomes. Interventions targeted at the most vulnerable populations, in the most prominent stunting regions, should be a top priority.

Governmental agencies must promote health policies by engaging actors to work together in multidimensional approaches. Governmental commitment provides recognition and accountability to strategies, motivating actors to engage in interventions. Actors from multiple fields, from nutrition, health and agriculture to WASH and infrastructure, must be present to form comprehensive strategies to improve stunting. As identified by Casanovas *et al.*, “it is important that all concerned sectors and actors equally appreciate the severity of stunting and what each can contribute to its reduction” (37).

Public policies must be considerate and adapted to regions and communities, pursuing acceptability of policies through cultural adaptability. Communities and individuals must be adaptable and

willing to make changes to routines or ideals that may be instilled in their culture or daily environment. Families need to support one another and their neighbors to promote equality within households and safe environments for children to live. Expanding higher education for women must be accepted throughout communities and cultures and widely provided to the public.

Future studies can be applied to social determinants of stunting by measuring the effects of specific determinants. This study did not include political context as a social determinant, although it's effects can be incorporated into the various components mentioned in this paper. Despite having a role to play within selected social determinants, political context was not mentioned as a major contributor throughout the literature. This element could be considered in future studies.

Additionally, the notion of catch-up growth can be considered in future studies. Catch-up growth was not reviewed during this paper, although there may be potential for it in many situations. Learning the factors that allow catch-up growth could add an enormous reduction to stunting prevalence.

Promise remains in global stunting reduction. This paper is intended to be helpful to policy makers as it identifies the social determinants associated with stunting. With effective, sustainable strategies and interventions, there is potential to accelerate progress in stunting elimination.

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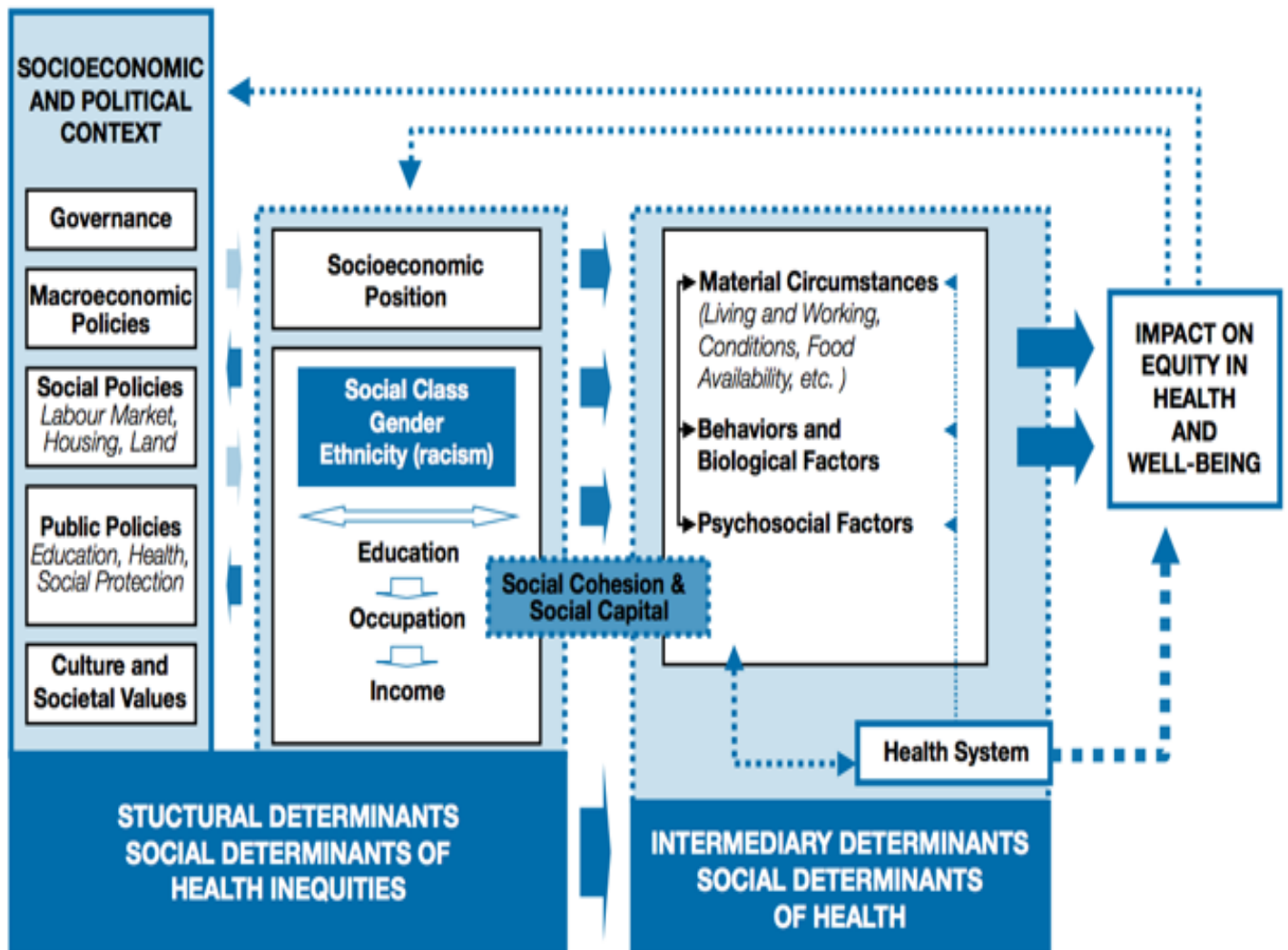
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# Annex

## I. CSDH Framework for Social Determinants of Health

Figure A. Final form of the CSDH conceptual framework



II. UNICEF Conceptual Framework for the Determinants of Child Undernutrition

FIGURE 1

