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ASSOCIATION BETWEEN WOMEN'S EMPOWERMENT ON STUNTING
AMONG CHILDREN AGED 6 TO 59 MONTHS: FROM THE 2016 ETHIOPIAN
DEMOGRAPHIC AND HEALTH SURVEY

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CollegeofHealthSciences
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AMONG CHILDREN AGED 6TO 59MONTHS:FROMTHE 2016ETHIOPIAN
DEMOGRAPHICAND HEALTHSURVEY DATASET

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List of Abbreviations

- ACC/SCN - Administrative Committee on Coordination – Subcommittee on Nutrition
- AOR- Adjacent Odd Ratio
- BMI- BodyMassIndex
- CI- Confidence Interval
- COR- Crud Odd Ratio
- CSA– Central Statistical Agency
- CSPro -Census SurveyProgram
- EAs -Enumeration Areas
- EDHS-Ethiopian Demographicand Health Survey
- DHS- Demography and Health Survey
- EAs- EnumerationAreas
- HIV/AIDS-Human ImmunodeficiencyVirus Infection and Acquired ImmuneDeficiencySyndrome
- IFSS- InternetFileStreamingSystem
- IR-Individual Recode
- KR-Kids Recode
- SDG-Sustainable DevelopmentGoals
- SBCC-social behavior change communication
- SPSS -StatisticalPackage for the SocialSciences
- UN-United Nation
- WHO– World Health Organization
- SNNPR- Southern Nations, Nationalities, and People's Region

Abstract

Background: Stunting is predominantly irreversible nutritional deficiency disorder of children. Evidence on the impact of women empowerment to reduce child stunting are limited in Ethiopia.

Objective: To determine the association

between women empowerment on stunting among children aged 6 to 59 months from the 2016 Ethiopian Demographic and Health Survey datasets.

Methods: The study used the Ethiopian Demographic and Health Survey 2016 dataset, which is a cross-sectional study. The study participants were current married women of the reproductive age (15–49 years) group living with their husbands or partners who have children aged 6–59 months in the household who were alive at the time of the survey. Data selected and exported to SPSS version 22 for analysis. Complex sample binary logistic regression analysis was employed to determine the association between children stunting aged 6–59 months and the predictor variables. In addition, multivariable logistic regression model was performed using variables that are significant at $P \text{ value} \leq .05$ with 95% of confidence level.

Result: The prevalence of stunting among children aged 6–59 month with 95% confidence interval was 41% (3,318) (95% CI: 39% - 43.3%). Around 45% (3806) of mothers employed in the last 12 months before the survey. Among mothers who had a job, 2072 (54%) had seasonal jobs and the rest 1734 (45%) had jobs throughout the year. About 50.5% (1921) of the mothers have been not paid for the job they were engaged with. Approximately 5855 (69%) of mothers have had a positive attitude towards the husband justifying hitting or beating his wife. Maternal attitude towards wife beating (AOR [95% CI] = 1.057 [0.889, 1.256]), decision on large household purchase (AOR [95% CI] = 1.001 [0.807, 1.243]) had no association with child stunting. In contrast, Household wealth index (AOR [95% CI] = 1.98 [1.44, 2.726]), Maternal height (AOR [95% CI] = 1.9 [1.280, 2.82]), child sex (AOR [95% CI] = 1.255 [1.077, 1.463]) were significantly associated with child stunting.

Conclusion and recommendation: The study indicated very high child stunting among children age 6–59 month. It also identified low women's economic and socio-familial empowerment. Thus, it is recommended that Ministry of Health up to local health service authority should strengthen their effort on the implementation programs which aim to improve childhood undernutrition. Advocacy programs should be introduced to strengthen the practice on implementation policies and proclamation that enshrines women's right so as to support women empowerment and thereby

improve young childhood nutrition in Ethiopia.

1. BACKGROUND

1.1 Introduction

Stunting is a form of malnutrition which malnourished children fail to reach the normal international standard of height/length for their age. It is caused by experiences of chronic nutritional deprivation. A child is defined as stunted, the percentage of children aged 0 to 59 months, whose height for age is below minus two standard deviations (stunting) and minus three standard deviations (severe stunting) from the median of the WHO Child Growth Standards (1).

It has adverse effects on children, including increased infectious disease morbidity and mortality, impaired cognitive and mental development, poor school performance, and low adult wages and productivity. Overall, stunting negatively impacts the socio-economic development of a nation (2). It is now identified as a major global health priority and the focus of several high-profile initiatives like Scaling up Nutrition, the Zero Hunger Challenge and the Nutrition for Growth Summit. It also gets a focus on the Sustainable Development Goal (SDG) 2, target 2.2 calling for strategies to end all forms of malnutrition focused on stunting along with wasting and overweight among children under 5 years of age (3). In addition in 2012, the World Health Organization (WHO) has adopted a resolution on maternal, infant and young child nutrition that includes six global targets to reduce the high burden of disease associated with malnutrition, particularly during the critical period, from conception to 24 months of age. The first target is to address the devastation caused by stunting and aim to reduce by 40% the number of stunted children under 5 years of age in 2025. (4)

Empowerment is defined as a way of change in which an individual with previous inability to choose; has access and freedom to make choice (5). Women's empowerment involved an ability to influence decision making in life aspects such as economic, socio-familial, cultural and interpersonal and legal dimension (6). Economically empowered women are more involved in income-generating activities and in control over finance, and often have significant control over food purchase, either to their children benefit or to the improvement of their own diet or nutritional status. Women's socio-

familialempowermentischaracterizedby
theirfreedomofmobilityanddecisionmakingandattitudetowardsdomesticviolenceregardinginterperso
nal orfamilyaffairs.Socio-familialempowermentenhancestheability
toacquireresources,suchasinformation
andsupportfromfriendsandrelatives(7).Furthermore,empowermentofwomenisoneofthemostimportan
t components in the sustainable developmentgrossaspiration.

1.2 Statement of the Problem

Stunting is the most prevalent form of malnutrition and it affects approximately 22.9% under-five children globally (i.e. 154.8 million children), although it has declined by 23% between 2000 and 2016 (8). About half of all stunted children lived in Asia and above one-third in Africa (9). As a result of growing population and the problem's persistence among young children living in sub-Saharan Africa, Africa shows a rising number of stunted children, which is a 16% increase from 50 million stunted children. Around 59 million under-five children suffer from stunting in Africa (10). Eastern Africa is among the five sub-regions where child stunting rate has exceeded 30% among children under five of years of age (Ibid). In Ethiopia, the prevalence of stunting is still high as compared to other African nations, although the country has substantially reduced stunting rate from 57% to 38% between 2000 and 2016. It has also regional variation, around 41-46% of children are affected by stunting in Amhara, Benishangul-Gumuz, Afar, and Dire-Dawa regions (11).

Under-five children are vulnerable and the most important target group where malnutrition plays a pivotal role in their mortality and morbidity along with delayed mental and motor development. Stunting is the outcome of inadequate nutrition during this critical developmental phase of life (12). Children suffering from stunting may never grow to their full height and their brains may never develop to their full cognitive potential (13). Children aged 12-23 are more likely affected by stunting followed by children aged group 25-36 months (14,15).

According to the United Nations, globally women constitute half of the humanity, contributing two-thirds of the world's work hours and they earn only one-third of the total income. The lack of economic empowerment for women both jeopardizes growth and poverty reduction and leads to less favorable development outcomes for women and their children (16). Women with lower socio-familial empowerment are at high risk of being unhealthy and mentally depressed or injured as the result of limited access to reproductive health services and the high risk of domestic violence. Women are responsible for household food preparation in 85-90 percent

of cases surveyed in a wider range of countries (11). Thus, their poor physical and mental health may indirectly hinder the provision of timely, independent and proper feeding and childcare (5).

In Ethiopia, among married women, 48% are currently employed. The percentage of employed married women whose cash earnings were 35% whereas 49% of the married women are not paid for their work. Concerning participation in major household decisions, 21% of women's husbands usually make decisions about major household purchases, husband decides for 18% women's healthcare and their husbands are primarily responsible for making decisions about visits to her family or relatives for 16% of women while 10% are not involved in any of these decisions. Women could gain direct and indirect access to economic resources. However, this access is meaningless unless women also have the control how their earnings are used. Participation in household decision making is an essential aspect of women's. Hence, the aim of this study was to determine whether a woman empowerment has an impact on child stunting. Mothers are the primary caregivers of their children in a country like Ethiopia (10). There is a consensus that empowerment is multidimensional and is expressed at multiple levels. But there is less agreement on which dimensions and levels matter more. Some indices have been proposed for low-income and middle-income countries using the Demographic and Health Surveys (17,18) which have included an empowerment module since 1999. Thus, this research was carried out using analysis of 2016 EDHS datasets (11). Furthermore, demographic health survey datasets have quality, standard and less expensive data to yield reliable and valid research finding.

In addition, it is important to study these relationships in the local context so as to fill the information and knowledge gap in this area so as to potentially contribute to a policy and program design to appropriately address child stunting in a sustainable way through women's empowerment in Ethiopia.

2. LITERATURE REVIEW

2.1. An Overview of Child Stunting

Sufficient nutrition is indispensable in early childhood so as to make sure a healthy growth, proper organ formation, function, as well as a strong immune, neurological and cognitive development. Economic growth and human development require well-nourished populations who can learn new skills, think critically and contribute to their communities. Child malnutrition impacts cognitive function and contributes to poverty through impeding individuals' ability to lead productive lives. Moreover, it is estimated that more than one-third of under-five deaths are attributable to undernutrition. (4)

Child stunting, a major public health problem, has currently received an international attention due to its high prevalence among children globally and its severe temporary and lengthy adverse health outcomes such as increasing a risk of nutritionally related health problems accompanied by weight gain in later childhood. Moreover, studies have found a consistent association between severe stunting and moderate stunting with multidimensional development such as biological, cognitive and socio-emotional across a diversity of country and culture. The finding is supported by a cohort study conducted in Ethiopia, Peru, India, and Vietnam showing the detrimental effect of stunting on cognitive development in each of the countries. Therefore, it is a cross-cutting problem which requires a multi-sectoral response. It has an international agreement on its definition and a vigorous standard that define the normal human growth which is applicable everywhere regardless of ethnicity, socioeconomic status and types of feeding. (1, 19)

Over the past two decades, Ethiopia has implemented various interventions to address the high prevalence of undernutrition in the country. But millions of children remain malnourished. The government has adopted innovative approaches 'Seqota' Declaration to end child undernutrition by

2030; promoting nutrition security in some of the most food-insecure area of the country. Zero stunting in children less than 2 years is a primary goal in the declaration. The declaration Implementation Plan is focused on delivering high impact nutrition-specific; and nutrition smart interventions across multiple sectors including health, agriculture, water, education, and social protection. All of these interventions will be driven by social behavior change communication (SBCC) strategies with special consideration for cross-cutting issues such as gender mainstreaming, multi-sectoral coordination and integrated community development approaches for nutrition. (20)

2.2. Magnitude of Stunting among Under Five Children.

A study conducted in Zambia has shown that the prevalence of stunting among children aged 6- 59 months was 21% (24). In Nairobi, Kenya the prevalence of stunting among children age 6-59 months was 47% (Ibid). In the study of malnutrition among children under the age of five in the Democratic Republic of Congo shows the prevalence of stunting was 37.2% (25). A study conducted in India, Andhra Pradesh State indicated that child stunting in under five children was 40% (26). Ethiopian has the highest burden of stunting, although the magnitude has declined in the proportion of stunting among children under five from 58% in 2000 to 38% in 2016 (11). A cross-sectional study conducted in the Southern National Nation State of Ethiopia has shown that the prevalence of stunting was 39.1%. A study was done in Lalibela Town Administration, North WolloZone; Amhara Regional State has shown that the prevalence of stunting was 47.3% (15).

2.3. Causes and Factors of Stunting among Under Five Children

Child stunting can happen in the first 1000 days after conception and is related to many factors, including socioeconomic status, dietary intake, maternal nutritional status, infectious diseases, micronutrient deficiencies, and the environment. In low and middle- income countries, children living in urban areas are generally less likely to be stunted than children in rural areas. This is due to the better equipped urban health care system and high access to a health care facility (21). Studies conducted in Ethiopia, Ghana and Zambia have shown that children living in poor households are more like get stunted as compared to children from rich households because it is believed that rich households are provided adequate and proper nutrition for their children, good hygiene and sanitation practice than poor households (22-24). In addition, a study conducted in the Southern Nations, Nationalities, and Peoples' Region have shown that child age, child sex, maternal education,

household wealth index, maternal BMI, mother's height were all significantly associated with child stunting at $p < 0.05$ (14).

2.4. Women's Empowerment

Empowerment of women is one of the most important components of sustainable development (27). United Nations Children's Fund report states that 'Eliminating gender discrimination and empowering women will have a profound and positive impact on the survival and well-being of children. Direct and complex indirect pathways underlie the relationship between women's autonomy and health outcomes, especially child growth and survival (28). Moreover, women are often the primary caregivers; their empowerment can influence the nutritional status of their children (29). Economic empowerment includes various domains such as property promotion and financing. Also, a huge part of economic empowerment is focused on the economic empowerment of women. In addition, it often refers to the fact that people are allowed to have more control over resources, and have the right of choice for their own lives. The social dimension of empowerment is raised as a process of independence, self-confidence and control over health and freedom from domestic violence. The familial dimension of empowerment often refers to the women's ability to make decisions, which would bring significant gains for themselves and their families (6).

According to the United Nations' definition, women's empowerment and their full participation based on equality in all economic and social aspects including participation in the process of decision making and

accessing the power is considered to be one of the major components of ‘achieving equality, development, and peace’. Also according to the definition of this organization, factors of women’s empowerment are access to better social, economic, legal and political opportunities and facilities.

Although improvement in women’s status is a key factor in child health, its relative importance is not clearly understood as many researchers use proxy indicators such as education, employment or wealth status. Recent literature represents empowerment to be multidimensional and contextual in nature, identifying key elements, including decision-making capacity inside and outside the house; mobility outside the house; financial independence; and attitude towards domestic violence (29- 32).

The impact of women’s socio-familial and economic empowerment and child nutrition outcomes might or might not follow the same patterns (33,34). A study conducted in selected South Asian countries has shown that women empowerment greatly depends on women’s socio-demographic factors such as age, place of residence, educational status and wealth index (35). Maternal autonomy decision-making power reflecting whether the woman is allowed to act without asking permission from her husband to sell crops, to spend household money, attend meetings like women’s groups, buy medication for herself or her children, attend a health institution for health education or for medical examination. (14) Women’s freedom of mobility outside the house helps them to go to the market could potentially provide a forum for an exchange of information that helps them to gain knowledge and advice which is beneficial for care, feeding or nutrition advice for children’s health (25).

2.5. Effect of Women Empowerment on Child Stunting

A study has shown the important linkages between women’s empowerment dimensions and nutritional outcomes. Women are often primary caregivers and therefore can directly influence their children’s nutrition through child care practices, as well as indirectly through their own nutritional status. Improvements in various empowerment indicators have been associated with improvements in maternal and child nutrition, and

conversely, women's disempowerment has shown to be associated with poorer child and maternal health and nutrition outcome (28).

According to the study done in India, low maternal autonomy represented by single indicators, namely the freedom to use discretionary money and permission to go to the market, is associated with child stunting in Andhra Pradesh, where the prevalence of child stunting was 40%. The main explanatory variables of autonomy are presented by four dimensions: decision making, permission to travel, attitude towards domestic violence and financial autonomy. Women with higher economic autonomy and freedom to choose to go to market were significantly less likely to have stunted child. In contrast to these findings, however, the decision-making domain of maternal autonomy, attitude towards domestic violence were not significantly associated with the stunting in the study (36)

A study in Bangladesh has shown that child stunting decreased significantly through rise in the decision making of woman in household. Women have not decided on the major house purchase their children could possibly get stunted ($p < 0.01$). The finding was also consistent with the rise in the decision of women on own health. Women who have not taken the part decision on their own health, their children could be two times more likely to get stunted ($P < 0.05$). (37)

The study in Nepal has shown a strong association between women's empowerment and nutrition status of their children even after adjusting for numerous demographic covariates. There was a five-fold increase in odds of underweight, a three-fold increase in odds of stunting, and a ten-fold increase in odds of wasting among children whose mothers had low empowerment status compared to high empowerment status. (16)

Another study done in Bangladesh in 2012 examined the relationship between women empowerment and child stunting. The study has observed various dimensions of women empowerment on the effect of under-five children stunting. It is indicated that greater empowerment of women (measured by attitudes toward abuse) and

reduced child stunting. Due to the fact that exposure to intimate partner violence directly influences the physical and mental well-being of women and is associated with such health outcomes as depression, anxiety, and low self-esteem and self-efficacy. Physical abuse hinders a woman's ability to provide adequate care through diminished physical capacity, increased psychological stress, and possibly nutritional deprivation. (38)

A study conducted in Chad has shown that caregiver's decision-making ability involving income generation activities component of maternal autonomy associated with child stunting after controlling for household structure, and social support (39). The finding also consistent with a study conducted in the Dominican Republic children found to be significantly less stunted in female-headed vs. male-headed households, suggesting that female-generated income is allocated to ensure adequate dietary intake for children (40).

Studies examined specific aspects of maternal autonomy and operationalized the concept of autonomy as a single indicator representing a certain dimension or used an indirect/proxy measure of autonomy. Mothers with high maternal autonomy were 33% times less likely to have stunted child than mothers with low maternal autonomy (14, 35).

In summary, the studies have shown factors that are related to child stunting like child demography (child age, sex,) maternal socio-demographics factors (maternal age, maternal education, maternal BMI, maternal height and wealth index) and women's empowerment. These factors have an effect on children stunting at individual and household level. However this study was to see the effect of these factors on child stunting in the local context.

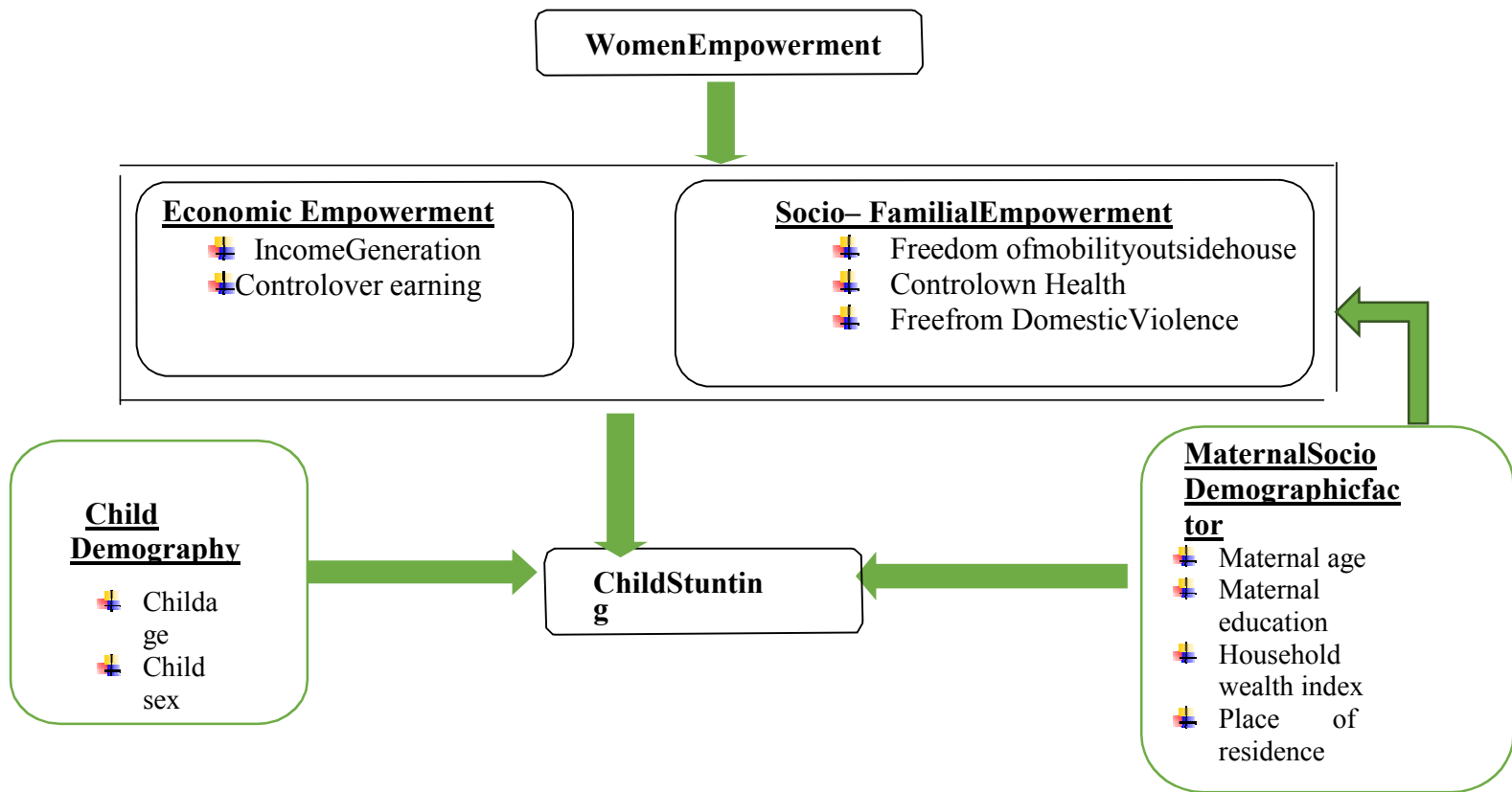


Figure 1 Conceptual framework linking Women Empowerment with Child Stunting Adapted from Association between women's empowerment and infant and child feeding practices in sub-Saharan Africa: an analysis of Demographic and Health Surveys, Muzi Na, 2015. Public Health Nutrition (5)

3. STUDY OBJECTIVE

3.1. General Objective:

To determine the association of women's empowerment on stunting among children aged 6 to 59 months in Ethiopia: from the 2016 Ethiopian Demographic and Health Survey dataset

3.2. Specific Objectives

- 3.2.1. To estimate the prevalence of stunting among children aged 6-59 months in Ethiopia according to EDHS 2016 datasets
- 3.2.2. To describe women's level of empowerment in Ethiopia based on EDHS 2016 dataset
- 3.2.3. To determine the association of women empowerment and other potential predictors of stunting among children aged 6 to 59 months.

4. METHODS

4.1. Study Area and Setting

Ethiopia is situated in the Horn of Africa, between 3 and 15 degrees north latitude and 33 and 48 degrees east longitude. It is a country with great geographical diversity; its topographic features range from the highest peak at Ras Dashen, which is 4,550 meters above sea level, down to the Afar Depression at 110 meters below sea level. Women are 52% of Ethiopian population (41). Ethiopia has one of the highest levels of food insecurity in the world, in which more than 35% of its total population is chronically undernourished. Women head also account for 25 percent of all Ethiopian households (42).

4.2. Data and Sampling Procedures

4.2.1. Demographic and Health Survey (DHS) Datasets

The Ethiopian Demographic and Health Survey (EDHS) was first implemented in Ethiopia in 2000 and a total of four rounds of every five years national surveys have been conducted as of 2016. The surveys are implemented by the Ethiopian Central Statistical Agency (CSA) with its implementing partners (11). It collects comparable population-based data on fertility, contraception, maternal and child health and nutrition in developing countries. Nowadays, DHS core questionnaires cover a wide range of population and health topics such as HIV/AIDS, malaria, domestic violence and biomarkers. The survey target groups were women age 15-49 and men age 15-59 in randomly selected households across Ethiopia. The main purpose of DHS is to provide quality data for policy development and programme planning, monitoring and evaluation (43). The present analysis used datasets from the last round EDHS collected in 2016.

4.2.2. Sampling Procedures

A stratified, two-stage sampling procedure was used to recruit the nationally representative sample in the survey from January 18, 2016, to June 27, 2016. The Nine Regional states and two City Administrations regions found in Ethiopia were initially stratified into urban and rural areas. The 2016 EDHS sample was stratified and selected in two stages. Each region was stratified into urban and rural areas, yielding 21 sampling strata. Samples of EAs were selected independently in each stratum in two stages. In the first stage, a total of 645 EAs (202 in urban areas and 443 in rural areas) were selected with probability proportional to EA size (based on the 2007 PHC) and with independent selection in each sampling stratum. Following the selection of EAs, a fixed number of 28 households per cluster with an equal probability selection from the newly created household listing. The survey was conducted in 16,650 residential households, 5,232 in urban areas and 11,418 in rural areas. All women age 15-49 and men age 15-59 who are the usual members of the selected households and those who spent the night before the survey in these selected households were eligible to be interviewed in the survey. It also includes all children under the age 5 years eligible for height and weight measurements. The sample was expected to generate an estimated 16,663 completed interviews with women age 15-49, 5,514 in urban areas and 11,149 in rural areas (11). The study mainly focuses on the association between women empowerment and children stunting among mothers aged 15-49 who have child/children's whose aged 6-59 months.

4.2.3. Sampling Weight

EDHS applied sampling weight, a result of the non-proportional allocation of the sample to different regions and their urban and rural areas as well as possible differences in response rates. Considering the 2016 EDHS sample is a two-stage stratified clusters sample, the sampling weights were based on sampling probabilities separately for sampling at each stage and of each cluster. The design weight was adjusted for household non-response and individual non-

response to obtain the sampling weights for households, and for the women and men surveys respectively data to ensure the actual representative of the survey results at both the national and domain levels.

4.3. Study Sample

From the EDHS 2016, 8496 children and women pair was considered for the analysis. Among the children age 6-59 months, who were eligible for the study. However, only 8070 children who have taken their height measurement were enrolled the analysis.

4.4. Inclusion and Exclusion Criteria

The main inclusion criteria for the eligibility were current married women with reproductive age (15–49 years) living with the husband or partner who has one or more child aged 6-59 months in the household who is alive at the time of the survey. Exclusion criteria were incomplete data on age and height/ length and children who have incredible height for age Z score value HFA Z score < -6 or $> +6$ according to the WHO 2006 child growth standard.

4.5. Data Quality Management

To ensure the EDHS data quality: CSA employed and trained 294 people for the main field work to serve as team supervisors, field editors, interviewers, secondary editors, and reserve interviewers. The questionnaires were pre-tested for their accuracy and consistency prior to the collection of data on clients outside the study subjects. Data was transferred via IFSS to the CSA central office in Addis Ababa, where they were stored on a password-protected computer. Data editing was accomplished using CSPro software. For this particular study, the data quality was assured through reviewing data sets to identify the variables that were deemed important from kids recode (KR) and individual recode (IR) data files. Data merging was done by determining common identification variables followed by data sorting using identifiers so as to establish a unit of analysis for the study. Data were also recorded by women empowerment status.

4.6. Variables

4.6.1 Dependent Variable

- Children stunting age 6-59 month

4.6.2. Independent Variables

Economic empowerment dimension includes labor force participation domain, created from the following indicators:

- Respondents' occupation
- Type of women's earnings.
- The seasonality of a respondent's job
- Women's incomes compared to their partners
- A decision on respondent's income use

Socio-familial empowerment dimension includes domains of household decision making, attitude toward violence. Participation in decision-making was assessed by three items, namely:

- A person who decides the respondent's health care;
- A person who decides large household purchases;
- A person who decides whether the respondent can visit her family or relatives.
- Attitudes toward violence assessed using five variables describing whether the beating was justified if the wife: goes out without telling her husband; neglects the children; argues with her husband; refuses sex with her husband; burns food.

In addition, the study included socio-demographic variables such as child's age, sex; place of birth, region, mother's age, education, BMI and height.

4.7. Data Analysis

Data analysis was conducted taking the complex sampling design of the survey into account. For that, the analysis plan was prepared using sampling weight, primary sampling unit and sample strata for sampling error. All the estimated reports are according to the weighted sample (N = 8496). In order to adjust for the over-representation the small regional states in the country, the sampling weight was conducted to amend for inequality in sampling probability. Adjustment for the design effect was also done to account for variance inflation due to cluster sampling. The prevalence of child stunting was estimated by the proportion of the height for age < -2 Z- score. In addition, multi-collinearity check carried out using collinearity diagnostics with the variance inflation factor. The data was administered and analyzed using SPSS version 22. Descriptive statistics of independent and dependent variables were presented as frequency distributions and percentages. Complex sample binary logistic regression analysis was employed to determine the association between children's stunting and the independent variables. In addition, a multivariable logistic regression model was performed using variables that are significant at p values $\leq .05$ level of binary analysis with 95% confidence interval.

4.8. Data Access and Ethical Consideration

Ethical clearance and permission letter was obtained from Ethical Review Board of the School of Public Health, Addis Ababa University. Access to the dataset was officially granted by Demographic Health Survey Program after submitting a request outlining the purpose of the study (<https://dhsprogram.com/data/new-use-registration.cfm>). The researcher accessed the datasets on January 28/2019(45).

4.9. Operational Definitions

- ❖ Women empowerment is referred hereto both women's economic and socio familial empowerment
- ❖ Women economic empowerment is referred to the capacity of women to participate in income

generation activities and control their income to contribute for themselves and their family

- ❖ The socio-familial dimension of empowerment: the women's ability to participate in household decisions, their freedom of mobility and free from domestic violence which would bring significant gains for themselves and their families to change social relations and the institutions.
- ❖ Currently, a married woman referred here a woman who is married or living together with her partner and are not either divorced, widowed or separated
- ❖ Women involvement in decision-making is referred here to women's ability to express their opinion and involvement in family decision processes.
- ❖ Women's autonomy is referred here to married women's capacity of taking initiatives and actions without asking for their partners' approval.
- ❖ Positive attitude toward partner violence is referred here a woman in her opinion, a husband justified in hitting or beating his wife in one of the following situations: if the wife: goes out without telling her husband; neglects the children; argues with her husband; refuses sex with her husband; burns food.
- ❖ Negative attitude partner violence is referred here a woman in her opinion, a husband not justified in hitting or beating his wife in any of the following situations: if the wife goes out without telling her husband; neglects the children; argues with her husband; refuses sex with her husband; burns food.

4.10. Dissemination of Results

The final results of the study will be disseminated to Addis Ababa University to the School of Public Health. In addition to this, the final result document will be communicated to Federal Ministry of Health and Regional Health Bureaus and other responsible bodies working in the area. Beside to this, the findings of the study will be sent to peer reviewed journals for publication.

5. RESULT

5.1 Socio- Demographic Characteristics of Respondents.

A total of 8496 mothers were included in the study, out of which 2624 (31%) comprised age group 25-29. Among the interviewed mothers, 5682 (67 %) have never attained any formal education. Of the total respondents who attained formal education; 2248 (26%) have accomplished the primary education level. In addition, 7588(89 %) of the mothers dwelt in the rural part of the country while 908(11%) were residing in the urban. Moreover, 3962(47%) of women were living in a poor household. Amongst children age 6 - 59 month, 2897(34%) of them were age 6 – 23 month; male children accounted for 4391(52%). Pertaining to maternal body mass index, 6083 (74%) of the respondents were in a normal range, Kg/m² (18.5 - 24.9). Among mothers majority 8098 (97.8%) their height was above 145 cm, not short stature (Table1).

Table 1. Socio- demographic characteristics of the mothers' age 15-49 years, 2016 EDHS Datasets (N=8496)

Variable	Options	Frequency(N)	Percent (%)
Place of residence	Urban	908	11
	Rural	7588	89
Respondent's age	15-19	198	2
	20-24	1501	18
	25-29	2624	31
	30-34	1998	24
	35-39	1376	16
	40-44	594	7
	45-49	204	2
	No education	5682	67
Education attainment	Incomplete primary	2089	25
	Complete primary	159	2
	Incomplete secondary	308	3
	Complete secondary	57	1
	Higher	201	2
	BMI (Kg/m ²)	< 18.5	1638
18.5- 24.9		6083	74
> 25		504	6
Wealth Index	Poorest	1977	23.3
	Poor	1985	23.4
	Middle	1811	21.3
	Rich	1521	17.9
	Richest	1201	14.1
Maternal height	<145 cm	186	2.2
	>145 cm	8098	97.8
Child age	6-23 month	2897	34
	24- 35 month	1770	21
	36-47 month	1848	22
	48-49 month	1981	23
Child sex	Male	4391	52
	Female	4105	48

5.2. Prevalence of stunting among children aged 6-59 month

The prevalence of stunting among children aged 6- 59 months of age with 95% confidence interval; 3318(41%) (95%CI: 39%-43.3%). Among male children 1823(43.9%) (95%CI; 41.2 - 46.7) were stunted. 1495(38.1%) (95%CI: 35.4%-40.9%) female children were also stunted.

Table 2 Prevalence of child stunting aged 6-59 months from 2016 EDHS datasets (N=8070)

Variables		Nutritional status			
		Stunted		Normal	
		Frequency(n)	Percent (%)	Frequency(n)	Percent (%)
Child age	Male	1823	44	2326	56
	Female	1495	38	2456	62
Child age	6-11	163	17	814	83
	12-23	738	41	1071	59
	24-35	814	48	880	52
	36-47	812	46	937	54
	48-59	792	43	1049	57
Overall average		3318	41	4782	59

5.3 Women's Level of Empowerment

As it is shown in Table 3. 3806(45%) of mothers were having some type of employment in the last 12 month before the survey. Among mothers who had a job, 2072(54%) have had a seasonal job and the rest of 1734(45%) had a job throughout the year. Amongst employed mothers; 1921(50.5%) of them did not received payment for the job they have engaged with. 392(10.3%) mothers paid in kind. When we compare the amount of cash earned between mothers and their husbands; 807(54%) of them have earned less than their partners. Moreover, regarding the decision on how to spend the mothers' income; 1352(90%) of them decided alone or jointly with their partner to use their income. 2015(24%) mothers have participated in decision making on large household's purchase. For 1790(21%) of the respondents, their husbands were the sole decision-maker for their health care. Approximately 1517(18%) of mothers their husbands were

the only decision-makers regarding their family visit. Furthermore, among the respondents 5855(69%) of them had a positive attitude for wife beating which is husband justifies hitting or beating his wife in one of the following situations: goes out without telling her husband; neglects the children; argues with her husband; refuses sex with her husband; burns food

Table 3 Women’s economic and socio- familial empowerment indicators among mothers age 15- 49 years from 2016 EDHS datasets (N=8496).

Variables	Options	Frequency(N)	Percent (%)
Economic Empowerment			
Respondent occupation	Yes	3806	45
	No	4690	55
Seasonality of work	Throughout the year	1734	46
	Seasonal	2072	54
Earning type	In cash only	1178	39
	In cash and In kind	315	8.3
	In kind only	392	10.3
	Not paid	1921	50.5
Income comparison	More than him	230	15.4
	Less than him	807	54
	About the same	346	23.2
	Partner doesn’t bring in money	57	3.6
	Don’t know	53	3.5
Decision on income use	alone or jointly	1352	90.5
	husband	141	9.5
Socio - Familial Empowerment			
Decision on large household purchase	alone or jointly	6479	76
	husband	2017	24
Decision on respondent health care	alone or jointly	6706	79
	husband	1790	21
Decision on respondent family visit	alone or jointly	6979	82
	husband	1517	18
Attitude on partner violence	Positive attitude	5855	69

Women empowerment indicators	Options	Stunting status	Region										
			Tigray	Afar	Amhara	Oromia	Somali	Benishangul	SNNPR	Gambela	Harari	Addis Adaba	Dire Dawa
			%	%	%	%	%	%	%	%	%	%	%
Respondent occupation	No	Stunted	38.1	43.4	50.3	40.4	29.4	42.5	42.1	28.9	39.1	17.9	44.3
	Yes	Stunted	44.3	45.7	52.1	35.5	26.9	47.2	40.8	19.9	27.7	16.5	45.7
Seasonality of work	Seasonal	Stunted	45.7	58.8	53.7	35.0	42.8	46.3	39.3	25.8	18.5	49.9	
	Throughout the year	Stunted	40.7	35.4	49.2	35.9	22.0	50.6	42.5	14.7	27.3	16.2	42.2
Earning type	In kind/not paid	Stunted	47.5	43.5	52.9	34.2	26.7	46.5		23.9	24.0	20.7	36.4
	In cash	Stunted	39.2	47.5	48.9	37.9	27.1	53.1	41.3	17.1	28.3	15.7	49.3
Income comparison	Less/partner not bring/don't know	Stunted	41.3	49.4	51.7	37.8	27.9	55.8	40.6	21.2	33.0	18.9	55.9
	More/ the same with partner	Stunted	35.6	44.1	45.8	38.0	26.1	51.1	43.3	10.2	21.4	8.8	44.5
Person decide how to spend	Partner	Stunted	22.4	37.0	59.1	49.6	45.1	56.1	34.9	30.7	42.5	0.0	62.9
	Alone/joint	Stunted	40.3	48.9	48.4	36.0	24.6	52.4	42.1	16.3	27.3	15.7	48.3
Large household purchase	Partner	Stunted	43.8	40.1	57.5	42.7	32.7	45.4	45.4	29.9	43.5	31.9	48.1
	Alone/joint	Stunted	41.4	45.6	50.4	36.9	27.2	46.2	39.9	23.1	34.5	15.3	43.8
Decision on respondent health care	Partner	Stunted	52.4	41.0	48.8	40.8	31.5	48.3	43.6	33.6	46.1	12.2	36.4
	Alone/joint	Stunted	40.1	45.2	51.9	37.7	28.0	45.3	40.9	22.4	34.6	17.6	46.6
Decision on family visit	Partner	Stunted	51.5	43.8	55.9	46.0	29.2	50.7	46.5	26.8	52.3	24.2	47.8
	Joint/.alone	Stunted	39.6	43.8	50.9	36.8	28.9	44.7	39.9	24.6	34.0	16.8	44.3
Attitude on partner violence	Positive	Stunted	42.2	42.4	54.0	39.0	30.6	46.4	41.9	29.1	41.5	20.9	49.6
	Negative	Stunted	41.0	48.7	45.4	36.5	27.6	45.2	40.8	18.5	27.9	16.5%	36.7

Table 4 Women empowerment among mothers' age 15-45 years and child stunting age 6-59 month by the regions from EDHS 2016 datasets.

As it is depicted in table 4, the prevalence of child stunting, among mothers who were having some types of job in the last 12 month was 50.3% in Amhara; 44% in Dire Dawa and 42.5% in Benishangul region. Among mothers who are having a seasonal job, the prevalence of child stunting was 58% in Afar, 53.3% in Amhara, 49.9% in Diredawa region. Among mothers whose partners have decided on how to spend their income, the prevalence of stunting was 62.9% in Diredawa, 59.1% in Amhara and 56.1% in Benishangul region. The mothers who have a positive attitude toward partner violence, prevalence of child stunting have shown that 54% in Amhara, 49% in Diredawa and 46% in Benishangul.

5.4. Binary logistic regression on women's economic and socio-familial empowerment and other potential predictors on child stunting

Bi-variable logistic regression analysis was carried out to see the effect of independent variables on dependent variables (Stunting) which is dichotomous. The normal children group is treated as a reference category. Crude analysis on the determinants of child stunting on bi-variable logistic regression analysis have shown that child sex, maternal education, mother's height, maternal BMI, household wealth index, places of residence, decision on the large household purchase, a decision on a family visit and attitude towards wife beating were all significantly associated with child stunting.

Pertaining to the place of residence, mothers who were living in rural area 1.91 (COR [(95% CI) = 1.91[1.41– 2.59]) times more likely to get stunted children as compared to mothers who were living in the urban area. Mothers with short stature, less than 145cm were 1.9 (COR [(95% CI) = 1.90[1.289 – 2.806]) times more likely to get stunted children than mothers with height ≥ 145 . In addition, mothers with thin BMI were 2.27 (COR [(95% CI) = 2.27[1.12- 4.579]) times more likely to get stunted children in contrast to obese mothers. Mothers who were from the poorest household wealth index 2.67(COR [(95% CI) = 2.67[2.056- 3.47]) times more likely to get stunted children than the richest household. Boy children were 1.27 (COR [(95% CI) = 1.27[1.10 – 1.46]) times more likely to be stunted as compared to girl children (Table 4).

Table 5. Bi-variable logistic analysis for socio-demographic factors affecting child stunting among children age 6- 59 months (N=8070)

Variable	Specifics	Nutritional Status		COR 95% CI
		Normal N (%)	Stunted N (%)	
Place of residence	Urban	612(13)	238(7.2)	1
	Rural	4140(87)	3081(92.8)	1.913(1.41- 2.59)*
Respondent's age	15-19	96(2)	90(2.7)	1.021(0.513 - 2.033)
	20-24	834(17.5)	609(18.3)	0.787(0.497- 1.246)
	25-29	1529(32)	984(29.6)	0.694(0.439-1.097)
	30-34	1114(23.4)	777(23.4)	0.752(0.465- 1.215)
	35-39	720(15)	562(16.9)	0.842(0.519- 1.367)
	40-44	360(7.6)	204(6.1)	0.612(0.367- 1.02)
	45-49	100(2)	93(2.8)	1
Education attainment	No education	3000(63)	2379(72)	3.73(2.075- 6.705)
	Incomplete primary	1227(25.8)	788(24)	3.021(1.655- 5.517)
	Complete primary	113(2.4)	43(1.3)	1.787(0.779- 4.098)
	Incomplete secondary	225(4.7)	68(2)	1.433(0.667- 3.078)
	Complete secondary	42(0.9)	10(0.3)	1.114(0.382- 3.251)
	Higher	145(3)	31(0.9)	1.0
	Maternal BMI	Thin	93(19.3)	686(20.9)
Normal		3407(73)	2455(75.1)	2.157(1.075- 3.326)
Overweight		287(6.1)	103(3.2)	1.075(0.507-2.277)
Obese		72(1.5)	24(0.7)	1.0
Wealth index	Poorest	932(19.6)	887(26.7)	2.67(2.056-3.47)*
	Poor	1035(21.8)	883(26.6)	2.39(1.818-3.15)*
	Middle	1019(21.4)	718(21.6)	1.98(1.492-2.62)*
	Richer	939(19.8)	535(16.1)	1.579(1.22-2.08)*
	Richest	827(17.4)	295(8.9)	1.0
Maternal Height	< 145	78(1.7)	102(3.1)	1.9(1.289-2.806)*
	≥ 145	4623(98.3)	3186(96.9)	1.0
child age	6-11	814(17.1)	163(4.9)	0.266(0.194- 0.364)
	12-23	1071(22.5)	738(22.2)	0.912(0.752- 1.107)
	24-35	880(18.5)	814(24.5)	1.224(0.989- 1.516)

	36-47	937(19.7)	812(24.5)	1.147(0.935- 1.406)
	48-59	1049(22)	792(23.9)	1.0
Child sex	Male	2326(49)	1823(55)	1.27(1.1-1.46)*
	Female	2426(51)	1496(45)	1.0

*Significant at 0.05 level

Regarding women's empowerment indices, mothers who did not participate in the decision of large household purchase were 1.2(COR [(95% CI) = 1.2[1.01- 1.432]) times more likely to get stunted children than mothers whose partners were sole decision makers. In addition, mothers who did not participate in a decision on family visit were 1.3 (COR [(95% CI) = 1.3[1.092- 1.59]) times more likely get stunted child than mothers who were participated. Mothers' who had a positive attitude towards wife beating were 1.23 (COR [(95% CI) = 1.23[1.052- 1.427]) times gets stunted child compared to mother with a negative attitude. Independent variables which were significantly associated with the outcome variable at 0.05 and less level of significance from the bi-variable analyses were entered into the multivariable logistic regression. P- Value < 0.05 considered as statistically significant and odds ratio with 95%CI to see the important association (Table 5).

Table 6 Table 6. Bi-variable logistic analysis for women empowerment factors affecting child stunting among children age 6- 59 months (N=8070)

Variables	Specifics	Stunting Status		COR 95% CI
		Stunted N (%)	Normal N (%)	
Economic Empowerment				
Respondent occupation	Yes	1817(55)	2624(55)	1.0
Seasonality of work	No	1502(45)	2128(45)	0.981(0.832-1.156)
	Permanent	858(57)	1124(53)	
Earning type	Not permanent	644(43)	1004(47)	1.19(0.936-1.514)
	In cash only	426(28.3)	676(31.7)	0.6(0.445-0.809)*
	In cash and In kind	120(8)	166(7.8)	0.556(0.406-0.76)*
	In kind only	205(13.6)	181(8.5)	0.638(0.442-0.92)*
Income comparison	Not paid	751(50)	1105(52)	1.0
	More than him	82(15)	135(16)	0.517(0.194-1.382)
	Less than him	304(55.7)	458(54.3)	0.562(0.236-1.337)
	About the same	122(22.3)	186(22)	0.556(0.225-1.376)
	Partner doesn't bring in money	9(1.6)	40(4.7)	0.202(0.044-0.94)*
Decision on income use	Don't know	29(5.3)	24(2.8)	1.0
	alone or jointly husband	488(89.3)	765(90.8)	1.199(0.683- 2.10)
		58(10.6)	77(9.1)	1.0
Socio - Familial Empowerment				
Decision on large household purchase	alone or jointly	2466(74.3)	3691(77.7)	1.203 (1.01-1.432)*
	husband	853(25.7)	1061(22.3)	1.0
Decision on respondent health care	alone or jointly	2597(78.2)	3777(79.5)	1.076(0.889-1.30)
	husband	722(21.7)	975(20.5)	1.0
Decision on respondent family visit	alone or jointly	2646(79.7)	3984(84)	1.3 (1.092-1.59)*
	husband	673(20.3)	678(16)	1.0
Attitude on partner violence	Positive attitude	939(28.3)	1549(32.6)	1.23 (1.052-1.427)*
	Negative attitude	2380(71.7)	3203(67.4)	1.0

*Significant at 0.05 level

The multivariable logistic regression analysis has shown that maternal height, child sex, and household wealth index still show a significant association with child stunting. Mothers whose height are less than 145cm, short stature were 1.9 (AOR [95%CI] = 1.9[1.280, 2.82]) time more likely to get stunted child compared to mothers whose height were $145 \leq$ cm. Linking child stunting among levels of household wealth index, mothers from the poorest household were 1.98(AOR [95%CI] = 1.98[1.441, 2.726]) more likely to get stunted children as compared to mothers from the richer household. In addition, comparing child stunting among the sex of the children, boys children were 1.25 (AOR [95%CI] = 1.25[1.077, 1.463]) times more likely stunted than girl children. Among women empowerment indicators, a decision on large household purchase, a decision on a family visit and mothers' attitude toward wife beating were not statically significant in multi-variable logistic regression (Table 6).

Table 7 Multivariable logistic regression analysis for socio- demographic and women empowerment factors associated with child stunting among children age 6 – 59 months (N= 8070).

Variables	Option	Number	Percent	Adjusted OR(95%CI)
Place of residence	Urban	850	10.5	1.0
	Rural	7220	89.5	1.198(0.830 -1.729)
Maternal Height	< 145	179	2.2	1.901 (1.280 - 2.82)*
	≥ 145	7809	97.8	1.0
Maternal BMI	Thin	1588	20.5	1.901 (0.908 - 3.981)
	Normal	5662	73.2	1.841 (0.905- 3.748)
	Overweight	390	5	1.100 (0.510- 2.370)
	Obese	95	1.2	1.0
Wealth index	Poorest	1819	22.5	1.982 (1.441- 2.726)*
	Poor	1918	23.7	1.834 (1.319- 2.550)*
	Middle	1737	21.5	1.511 (1.091- 2.091)*
	Rich	1475	18.3	1.307 (.977- 1.749)
	Richer	1121	13.9	1.0
Child sex	Male	4149	51.4	1.255 (1.077- 1.463)*
	Female	3921	48.6	1.0
Decision household purchase	Partner	1913	23.7	1.001 (0.807- 1.243)
	Jointly/ alone	6156	76.3	1.0
Decision on family visit	Partner	1440	17.8	1.180 (0.939- 1.481)
	Jointly/alone	6629	82.2	1.0
Attitude partner violence	Positive attitude	5582	69.2	1.057 (0.889- 1.256)
	Negative attitude	2484	30.8	1.0

*Sig

nificant at 0.05 level

6. DISCUSSION

The study used a nationally representative population-based survey data of Ethiopia. Although there is no standard tool to measure women's level of empowerment at national and global levels, this study has assessed the association between women socio-familial and economic empowerment with child stunting using the Demographic Health Survey women empowerment measurement index. The study has also considered other potential predictors of child stunting. The study has shown that the prevalence of child stunting aged 6-59 month was 41%, which is very high according to the WHO classification severity of malnutrition by prevalence(46). It has shown that approximately three in every five under-five children are stunted which indicates stunting remains a major nutritional problem in under-five children in a developing country like Ethiopia where the prevalence stunting still high.

The study demonstrated mothers' economic empowerment through mothers' participation in income generation activities and decision on how to spend their income as well as their income difference with their partners and types payment the mothers earn. According to the study, 45% of women age 15-49 were employed. Among employed mothers, 50.5% of them were not paid for the job they were engaged with. It has shown that one in every two employed motheris not get paid for what they have done. It indicated the mothers' economic inequality at household level. In turn low mothers economic empowerment. The cause might be due to mothersare traditionally more responsible for the domestic activities such as caring children and household chores which prevented them to get enough times to actively participate in income generation activities so as to economically empower themselves. Moreover, the study showed that these components of women economic empowerment did not have a significant association with children stunting. The finding is not supported by the study conducted in Andhra Pradesh India (36), where the prevalence of stunting is 40% and Bangladesh (37) which revealed maternal with high economic empowerment and freedom to use their money is found to be positively associated with child stunting. The discrepancy might be due to variation in cultural, environmental, national and food habits and consumption of the study population.

Mother's socio-familial empowerment which indicated by mothers' participation in the decision on large household purchase and freedom to family visit were not significantly associated with child stunting. These women empowerment indexes have shown the mothers' power within household and power within the community. The mothers' power within the household and power with the community are indication of women's gender role and attitude. Although it is believed that when the mothers are empowered, they become independent and possibly join their support group in their community. Consequently, they might easily access to exchange information and get advice from their friends and relatives about appropriate child feeding and care practices since they are the primary caregivers in a country like Ethiopia. The study indicated that mothers' socio-familial empowerment did not have contribution for alleviating children stunting. Thus, these study finding is consistent with the similar studies done in Zambia (24) India (36).

According to the study 69% of mothers' had a positive attitude towards wife beating by their husband in some household scenarios.. These indicators measure women's level of acceptance of the norms in societies that perpetuate violence against women and deprive women's independence. In addition, it helps to measure a woman's self-esteem. Mothers are considered to have high self-esteem if she does not agree with any one of these reasons as justification for a husband to beat his wife; otherwise, her self-esteem is considered to be low (50). It is caused by patriarchal custom and norms of the society which leads to the violation of women's right and their self-determination. Furthermore, mothers' low level of education predisposes them to the problem. The study is indicated that mothers' have low self-esteem in the control of their body. It has shown that mothers' attitude towards wife beating was not significantly associated with childhood stunting. The finding is consistent with a study conducted in India (36).

In this study, child sex had a statistical significant association with child stunting. Boy children were 1.25 (AOR [95%] =1.255[1.077, 1.463]) more likely to be stunted than girl children. It indicates that there is health inequality between boy and girl under-five children. The study finding is supported by a cohort study conducted in pre-term infant and children which had depicted both morbidity and mortality to be consistently higher in males than females in early life. The difference was reported to

have persisted even after adjusting for gestational age and body size (47). Apart from the chromosomal factor the underlying mechanism of why male predominance in both asymptomatic and symptomatic morbidity has not well understood in the literature. Therefore, the cause might be due to some biological difference between the boy and the girl children. The finding concurs with study done to assess the prevalence of malnutrition and its associated factors among child aged 6-59 months in Southern Nation, Nationality and People Regional State (14).

The study found that maternal short stature, <145cm, according to an international report from ACC/SCN was associated with an increased risk of getting stunted children. Short stature mothers were 1.9 (AOR [95% CI]=1.9 [1.280, 2.82]) times more likely to get stunted children as compared to mothers with height relatively in a normal range, which is ≥ 145 cm. It is indicated that mothers' chronic malnutrition is a risk factor for children to be stunted. This might be due to shared environmental factors which contribute to the chronic nutritional deficiency that modifies the genetic factors and move through the intergenerational cycle of malnutrition. Perhaps, it is essential to note that during the first 12 months the relationship between mother's and child's malnutrition is affected by biological consequences of maternal malnutrition during lactation. The study finding is consistent with similar research reports about the association between maternal and child nutrition in Southern Nation, Nationality and People Regional State, Ethiopia (48) and Ghana (49), where Child Stunting was significantly associated with the height of their mothers.

The study also showed that household wealth status was a factor for children stunting. Children living in poor wealth households had a great risk of stunting than those living in richer wealth households. According to the study, children from poor household were 1.98(AOR [95% CI]= 1.98[1.441, 2.726]) time to get stunted as compared to the children from the richest household. This might be due to household food insecurity, lack of clean water and poor sanitation. Households with poor wealth index might not able to provide proper nutrition for their children during the complementary feeding period. In the first two years of age children need all essential nutrients which are necessary for their full potential growth. In addition, as compared to the rich household wealth index the poor households do not get access to clean water and good sanitation which are

predisposing factors for children to be infected with different communicable diseases. Furthermore, household with poor wealth index can't afford care and treatments to their children. Consequently, their children exposed to both macro and micronutrient deficiencies. The study result is consistent with studies conducted to assess the association socio-economic status with child stunting in Ethiopia (22) and Ghana (23).

7. STRENGTHS AND LIMITATIONS OF THE STUDY

7.1. Strengths of the Study

- ❖ The study used less expensive datasets because the DHS datasets accessed without any charge.
- ❖ The study operated on the nationally representative data for the analysis

7.2. Limitations of the Study

- ❖ The study is a cross-sectional and it is difficult to establish a causal relationship between different dimensions of women empowerment and child stunting.
- ❖ Poor measurement aspect of DHS women empowerment indexes since different women empowerment indicators cannot be treated as equivalent or even substitute and not comprehensive.
- ❖ Different aspects of the DHS women's empowerment indicators do not all relate in the same way to one another or to various explanatory variables which are not to be very specific about what is to be measured.
- ❖ The study also doesn't include the women's entire empowerment dimension.
- ❖ DHS measure women empowerment at the household level but it will be good if it is measured at an individual level.

8. CONCLUSION

This study revealed that child stunting is very high (41%) among children aged between 6- 59 months in the country. Male children are more affected by stunting as compare to female children. One out

of two mothers was not economic empowered. Positive attitude towards partner violence was found high (69%) among mothers'. It is an indication of their low socio-familial empowerment.

The study further concludes mothers' economic and socio-familial empowerment aspects cannot guarantee for the mothers to get stunted children. In contrary, household income, mother's height and child sex have appeared a strong factor for the childhood stunting.

Women economical and socio-familial empowerment indicators mainly focused on the household level which might not reflect the level of empowerment at an individual level.

9. RECOMMENDATION

- ❖ Ministry of Health up to local health service authority should strengthen their effort on the implementation programs which aim to improve childhood undernutrition.

- ❖ Advocacy programs should be introduced to strengthen the practice on implementation policies and proclamation that enshrines women's right so as to support women empowerment.
- ❖ Behavioral change intervention is needed to address the high level of mothers' positive attitude towards partner violence at the household.
- ❖ Community sensitization program should be initiated so as to address the norms and custom that prevents women's economic participation in their community in general and within the family members in particular.
- ❖ Nutritional intervention for poor households should be strengthened so as to prevent chronic nutritional deficiency, particularly for boys.
- ❖ Further study should be conducted to examine an individual level of mother's empowerment within the household with child stunting.

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11. ANNEXES

Annex 1. DHS Empowerment Items and Aggregate Codes

Each woman's score will be calculated from the sum of nine individual questions scored 0 (=not empowered) or

1 (=empowered). Table 1 summarizes the aggregation rules used to code the more empowered response of each question

Dimensions	Item label	DSH question	DSH response categories	Aggregates recoded going to be used for analysis
Economic	Respondents' occupation	Have you done any work in the Last 12 months?	1. Yes 2. No.	Code 1 if Q1=1 Code 0 if Q1=2
	Seasonality of a woman's job	Do you usually work throughout the year or seasonally	1. Throughout the year 2. Seasonality 3. Once in a while	Code 1 if Q2=1 Code 0 if Q2= 2 or 3
	Women's earnings	Are you paid in cash or kind for this work or are you not paid at all?	1. Cash only 2. Cash and kind 3. In-kind 4. Not paid	Code 1 if Q3 = 1 or 2 Code 0 if Q3 = 3 or 4
	Women's incomes were compared to their partners'	Would you say that the money that you earn is more Than what your (husband/partner) earns, less than what he earns, or about the same?	1. More than him 2. About the same 3. Less than him 4. Not earning 5. I don't know	Code 1 if Q4 = 1 or 2 Code 1 if she is sole earner Code 0 if Q4 or 5 Code 0 if 4
	Decision on partner's income use	Who usually decides how the money you earn will be Used.	1. Respondent 2. Jointly 3. Partner 4. others	Code 1 if Q1 or 2 Code 0 if Q3 or more

Socio-Familial	Decides major household purchases	Who usually makes decision about major household purchase	1. Respondent 2. Jointly 3. Partner 4. Someone else 5. Others	Code 1 if Q1 or 2 Code 0 if Q3 or more
	Decides respondent's healthcare	Who usually make a decision about healthcare for your self	1. Respondent 2. Jointly 3. Partner 4. Someone else 5. others	Code 1 if Q1 or 2 Code 0 if Q3 or more
	Person who decides whether respondent can visit her family or relatives	Who usually makes decision about visit to your family or relative	1. Respondent 2. Jointly 3. Partner 4. Someone else 5. others	Code 1 if Q1 or 2 Code 0 if Q3 or more
	Attitude on partner violence	In your opinion, is a husband justified in hitting or beating his wife in the following situations:	1. Yes 2. No.	Code 1 if all five Q8's = 0 Code 0 if at least 1 Q'8 = 1

Table 8. DHS empowerment items and aggregate codes. Adapted from Women's empowerment and male involvement in antenatal care: analyses of Demographic and Health Surveys (DHS) in selected African countries, Larissa Jennings, 2014. BMC Pregnancy and Childbirth(5

Annex 2. Questionnaire

INTRODUCTION AND CONSENT

Hello. My name is _____. I am working with Central Statistical Agency (CSA). We are conducting a survey about health and other topics all over Ethiopia. The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 30 to 60 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.

Do you have any questions? May I begin the interview now?

Signature of interviewer _____ Date _____

Respondent Agrees

Respondent Does Not Agree

To Be Interviewed. . . 1

To Be Interviewed. . . 2



Section 1. Respondent Backgrounds

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
103	Just before you moved here, did you live in an urban or rural area?	Urban Area 1 Rural Area 2	
104	Before you moved here, which Region and Zone did you live in?	Region Code Zone Code OUTSIDE OF [COUNTRY] 96	
105	In what month and year were you born?	Month Don't Know Month 98	
107	Have you ever attended school?	Yes 1	
108	What is the highest level of school you attended: Primary, secondary, technical/vocational or higher?	Primary 1 Secondary 2 Technical/Vocational... 3	
109	Do you have any sons or daughters that you have father who are now living with you?	Yes 1 No 2	
110	a) How many sons live with you? b) How many daughters live with you? If None, Record '00'.	a) Sons at Home b) Daughters at Home	

Section 2. Employment and Gender Roles and Decision Making

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
111	Have you done any work in the last seven days?	Yes 1 No2	
112	Although you did not work in the last seven days, do you have any job or business from which you were absent for leave, illness, vacation, or any other such reason?	Yes 1 No2	
113	Have you done any work in the last 13 months?	Yes1 No 2	
114	What is your occupation? That is, what kind of work do you mainly do?		
115	Do you usually work throughout the year, or do you work seasonally, or only once in a while?	Throughout the year 1 Seasonally/Part of the year. . 2 Once in a while3	
116	Are you paid in cash or kind for this work or are you not paid at all?	Cash only 1 Cash and kind 2 In kind only 3 Not paid 4	

117	Who usually decides how the money you earn will be used: you, your (wife/partner), or you and your (wife/partner) jointly?	Respondent 1 Wife/Partner 2 Respondent and wife/partner jointly. . 3	
118	Who usually makes decisions about health care for yourself: you, your (wife/partner), you and your (wife/partner) jointly, or someone else?	Respondent 1 Wife/Partner 2 Respondent and wife/Partner jointly. . 3 Someone else 4 Other 6	
119	Who usually makes decisions about making major household purchases?	Respondent 1 Wife/Partner 2 Respondent and wife/Partner jointly. . 3 Someone else 4	

120	In your opinion, is a husband justified in hitting or beating his wife in the following situations:	YES NO DK	
	a) If she goes out without telling him?	a) Goes Out . . 1 2 8	
	b) If she neglects the children?	b) Neglects Children. . 1 2 8	
	c) If she argues with him?	c) Argues 1 2 8	d)
	d) If she refuses to have sex with him?	Refuses Sex 1 2 8	
	e) If she burns the food?	e) Burns Food 1 2 8	

Section 3 Demographic and Health Surveys Biomarker Questionnaire

Section 3.1 Weight and height measurement of children age 0-6

121	<p>If mother interviewed: Copy child's date of birth (day, month, and year) from birth history. if mother not interviewed ask: What is (name)'s date of birth and age?</p>	<p>Day ... Month ... Year ... Age ...</p>	<p>Day ... Month ... Year ... Age ...</p>	<p>Day Month ... Year ... Age ...</p>
122	<p>Check 103: Child Born In 2003-2008?</p>	<p>Yes 1 No 2 (Skip To 114)</p>	<p>Yes 1 No 2 (Skip to 114)</p>	<p>Yes 1 No 2 (Skip to 114)</p>
123	<p>Weight In Kilograms.</p>	<p>Kg. Not Present . .9994 Refused 9995 Other. 9996</p>	<p>Kg. Not present. . .9994 Refused 9995 Other 9996</p>	<p>Kg. Not present .9994 Refused9995 Other 9996</p>

124	Height In Centimeters.	Cm. Not present . . 9994 Refused9995 Other9996 (Skip To 108)	Cm. Not present. .9994 Refused. . . 9995 Other.9996 (Skip To 108)	Cm. Not Present9994 Refused 9995 Other -- 9996 (Skip To 108)
125	Measured lying down and standing up?	Lying Down . . .1 Standing Up . . 2	Lying Dow. 1 Standing Up . . .2	Lying Down. 1

Section 3.2 Weight and height measurement of women age 15 - 49

127	Weight in kilograms.	Kg.		
128	Height in centimeters.	Cm.		

