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WOMEN EMPOWERMENT AND CHILDREN HEALTH OUTCOMES IN ETHIOPIA

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Women Empowerment and Children Health Outcomes in Ethiopia

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Declaration

I, Nahom Shewangizaw, declare that this thesis titled “*Women Empowerment and children Health Outcomes in Ethiopia*” and the work presented in it are entirely my original work submitted to the Department of Economics at Addis Ababa University in partial fulfillment of the requirements for Masters of Science in Development Economics. I confirm that any part of this thesis has not been presented for the award of any other degree or other similar titles of any other university or institution and sources for quoted works of others have been duly acknowledged.

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Abstract

This study aims to assess the association between women's empowerment and children's health outcomes and the interplay among other socio-economic variables by using the 2016 Ethiopian Demography and Health Survey empirically. Children's health outcomes are measured using stunting and acute respiratory infection, while the women's empowerment index is constructed using the survey-based women empowerment index from three dimensions: decision making, domestic violence, and social independence, and to assess their interplay, other socio-economic variables such as access to electricity, type of fuel used for cooking, type of toilet facility used, source of drinking water, place of residence, wealth level of the household, and sex of the child are used. For empirical analysis two logit models are constructed corresponding to both health outcomes. The study showed that except for the decision-making dimension, the social independence, and domestic violence dimensions have a significant association with both stunting and ARI, which leads to a significant decrement in exposure to stunting and acute respiratory infection. This is due to empowered women is financially secured, and independent to influence her inter-household dynamics. In the same way, the interplay between women empowerment, children's health outcomes, and socio-economic variables also resulted in a varying result. Also, rural residents, households without toilet facilities, drinking water from unprotected sources are more likely to be stunted. In that fashion, children from households with no electricity, and traditional cooking fuel are more likely to be exposed to acute respiratory infection. Thus, gender-based policies are expected to increase women's access to education, even by expanding basic adult education, information, technology, employment, financial independence, social protection, creating access to infrastructure to smoothen women's burden, where this, in turn, will improve children health outcomes.

Key words: Association, Women Empowerment, Stunting, ARI, Socio-economic Variables,

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Chapter 1: Introduction

1.1 Background of the Study

Improving children's nutritional and health outcomes are a strategic priority of the international development agenda as it is a pivotal phase of human development and persists throughout their lifetime (Tiruneh, et.al, 2017). Accordingly, its urgency leads to the adoption of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) by the United Nation in 2000 and 2015 respectively. The third SDG is dedicated to promoting good health and wellbeing for all prioritizing and vulnerable. It has targeted to end under-5 children mortality at least 25 per 1000 live births by 2030 (UN, 2015).

Considerable progress has been made in reducing the under-5 mortality rate globally than it was in 1990. Statistically, in 1990 over 12.6 million children, or 93 per 1000 live births, passed away globally, but this figure has declined to 5.2 million children or 38 per 1000 live births deaths in 2019 (WHO, 2020). Globally, acute respiratory infection (ARI) has recorded around 2.38 million deaths of children under-5 in 2016. The other cause of child mortality is stunting which in recent years has shown a declining trend of 21.3% than it was 32.4% in early 2000. Although stunting has reduced by almost half in most developing countries, it remains unevenly distributed across regions. Regionally it is still a burden in East Africa with the highest rate of 34.5% followed by South Asia at 31.7% (WHO, 2020).

Ethiopia is among nations challenged by a high annual under-5 death rate. But the trend depicts a declining rate of 59 deaths per 1000 live birth in 2017 from 202 deaths per 1000 live birth in 1990 (Abreha, et.al, 2020). As studies reported in Ethiopia, a higher proportion of under-5 deaths emanates from malnutrition (stunting, wasting, and underweight), in addition, acute respiratory infection (ARI), diarrhea, and malaria are still causing a high risk of deaths (CSA, 2016).

The health status of children under-5 is determined by several factors including social, economic, environmental, community level, cultural and demographic factors (Woldeamanuel, 2019). Among several factors determining children's health outcomes women's empowerment is prominent. Numerous international and local studies have found that to meet the development goals and wellbeing of society, women's empowerment contributes a lot. Recent studies in Ethiopia have also acknowledged the importance of women's empowerment as a determinant of children's

health status, predominantly for children under five years. Accordingly, achieving gender equality and empowering all women and girls is the fifth SDG goal, set to be achieved by 2030 under the UN (UN, 2015).

Even though there is promising progress at the global level, the above statistics discloses improving children's health status in Ethiopia is still a major challenge. Up until recently, 38% of the children are stunted, and 7% of annual death is caused by ARI (CSA, 2016). Thus, as an objective of analyzing the association between women's empowerment and children's health status, this paper assessed factors determining children's health outcomes with a focus on women's empowerment.

1.2 Statement of the problem

The adoption of international development goals like SDGs has enabled Ethiopia to achieve notable progress in improving child health outcomes and women empowerment in recent years than it was in the early 1990's (Abreha et al., 2020; UN, 2016). Regarding children's health outcomes, stunting and ARI is the most significant health problem in Ethiopia despite Ethiopia's promising attempt to reduce the prevalence. For instance: a cursory glance at Ethiopian Demographic and Health Survey (EDHS) 2016 report indicates that; the proportion of stunted children decreased steadily from 57% in 2000 to 44% in 2011 and further decreased to 38% in 2016. Regarding the non-anthropometric health measures, the 2016 EDHS depicts deaths from acute respiratory infections particularly pneumonia accounts for 7% (CSA, 2016).

The progress on women's empowerment as per the Sharma et.al, (2020) Ethiopia was ranked 82nd and has closed 70.5% of the gender gap to date. Despite remarkable progress on the political empowerment sub-index in recent years, there remains a significant gap on some of the critical gender parity sub-indexes. The first is education, where Ethiopia is ranked 140th, and 20% of women are still not receiving formal primary education. The second is economic opportunities, where only 56.8% of the gap is closed, and Ethiopia is ranked 125th. Finally, the gender gap is widening in health services due to the under provision. For instance, 400/100,000 mothers die giving birth each year, and about 27% of births are only attended by a skilled health professional.

In general, the health status of Children under-5 is highly associated with women's empowerment, since women are primary caregivers in the household, and their intra-household dynamics

influence their children's nutrition directly through childcare practices (Ndaimani, 2018). Thus, an empowered woman can make a well-versed decision to alleviate the burden of children mortality beyond its contribution to the overall development prospect. Although diversified attempts have been made by researchers regarding the association between women empowerment and children health outcome, is still limited to either to nutritional outcomes or to few empowerment indicators. Because, all dimensions of women's empowerment are not related to children's health outcomes indicators, some of the dimensions have a varying degree of association with the different children's health indicators.

A study conducted by Abreha et al. (2020) analyzed the association between women's empowerment and children's health in Ethiopia using the multiple indicators multiple causes (MIMIC) model. Also, Jones et al. (2019) examined the pathway in which women's empowerment influences children's nutritional status via an intrinsic agency in East Africa by employing a structural equation model. As well as, the role and association of women empowerment with educational status and infant mortality in Ethiopia is empirically investigated (Alemayehu et.al, 2015). Also, empirical studies on women empowerment and children's health outcomes in Ethiopia already exist (Asaolu et al., 2018; Melesse, 2020; Seff, et.al, 2018; Tiruneh et al., 2017; Wado, 2018).

To the best of the researcher's knowledge, most studies in this thematic area doesn't construct a women empowerment index or assessed it at an individual level. A handful of studies have emphasized limited dimensions of women's empowerment and didn't clearly assert which dimension affects the most, as the exact health groups are not identified, which may lead to wrong conclusions (Van Der & Kassens, 2018). In addition, most studies focused only on nutritional indicators to assess children's health outcomes.

Thus this study examined the association between two children's health outcomes (stunting and acute respiratory infection) and women empowerment measured by constructing a survey-based women empowerment index (SWPER) from three Dimensions: (Decision-Making; Attitude to Violence; Social Independence). This study tried to fill the gap on women empowerment and children's health literature in two ways: First, using the recent EDHS the study generated a survey-based women empowerment and observed its association with the selected children's health

outcomes. Second, investigated the interaction across women's empowerment, socioeconomic status of household and children health outcomes.

1.3 Objectives of the Study

The general objective of the study was to assess the factors determining children's health status in Ethiopia with a primal focus on women's empowerment. The specific objectives of this study are:

- To investigate the associations between women empowerment and children's health outcomes in Ethiopia.
- To assess the interplay between women empowerment, socioeconomic status of households, and child health outcomes in Ethiopia.

1.4 Significance of the Study

The study enables us to understand the association between children's health outcomes and women's empowerment, invigilated empirically by constructing a survey-based women empowerment index, in the context of Ethiopia and sub-Saharan countries in General. This endeavor will help us design more efficient policies to lessen vulnerability and target children under-five mortality, malnutrition, and women disempowerment. Beyond achieving intrinsic value (the wellbeing of children, men, and women), empowering women enables them to achieve instrumental value: reducing poverty and income inequality, achieving gender equality, and attain inclusive economic growth. Thus, besides meeting development goals, women's empowerment will enable a nation to achieve economic development. As a result, this study may be a stepping stone for further researches by allowing us to have an in-depth insight on gender, nutrition, and health-related topics and as an intervention mechanism depending on the findings.

1.5 Scope and Limitations of the Study

Drawing upon nationally representative household datasets for Ethiopia the study utilizes the recent (2016) Ethiopian Demographic and Health Survey. This study has two limitations. First, the study used cross-sectional data from the latest wave to generate a SWPER index, although it was vital to use panel data to track progress and conduct comparisons over time. Second, since most SWPER indicators apply to partnered women only, this study could not explore empowerment among single, widowed, and divorced women. Another limitation emanates from relying upon

secondary data sources. Due to this, some of the variable's interests are not correctly specified or are missing. Thus, sizable samples are dropped from the empirical analysis, due to missing observations.

1.6 Organization of the Study

The study is organized as follows: In chapter 2, the relevant theoretical and empirical literatures are reviewed. Chapter 3 outlines the basic methodological framework of the study. Chapter 4 discusses the key findings. Finally, the conclusion and the recommendations are presented in chapter 5.

Chapter 2: Literature Review

2.1 Theoretical Literature Review

2.1.1 Definition and Measurement of Women Empowerment

The concept ‘empowerment’ has recently acquired a substantial role in development literatures and is defined differently by various scholars and institutions (Alkire et al., 2012). It is conceptualized as a process, from being unpowered to being powered to make purposive choices and transform those choices into desired outcomes. Similarly, women empowerment’s definition is still in disagreement (Imai, et.al, 2014; Kabeer, 1999) because it has a different meanings depending on the socio-political and economic context in which it is used. Kabeer (2001) defined it as a process through which women achieve the power to make strategic life choices and the ability to take control of ownership over resources that were previously denied to them. As well as Duflo (2012) defined it as a headway to access the fruits of development such as: health, opportunities, education, earning, and political participation.

Variations in the definition, as well as its multidimensional nature, poses a constraint on the way in which women's empowerment is empirically measured. The indices used to operationalize women’s empowerment passed through different stages. UNDP 1995 constructed two indices, the Gender Development Index (GDI) and Gender Empowerment Measure (GEM) (Pillarsetti & McGillivray, 1998). According to, Klasen (2006) although GDI was considered a gender-sensitive extension of the Human development index to measures the gender gap from life expectancy, education, and income dimensions; Gender Empowerment Measure (GEM) was the first index used to measures gender inequality globally. In 2010 by amalgamating indicators from both GDI and GEM and introducing indicators such as health vulnerability, UNDP upgraded the index to Gender Inequality Index (GII) (Klasen, 2006; Pillarisetti & McGillivray, 1998). All prior women empowerment indices conducted a macro-level assessment.

In 2012, Oxford Poverty and Human Development Index (OPHI), United States Agency for International Development (USAID), and International Food Policy Research Institutes (IFPRI) introduced Women Empowerment in Agriculture Index (WEAI). It was designed to track women’s engagement in agriculture at the individual level with five domains (production, resources, income, leadership, and time-use) (Alkire et al., 2012). Among scholars and researchers, a Survey Based

Women Empowerment Index (SWPER) which was crafted by Fernanda and her colleagues in 2017, is boldly mentioned. SWPER has many benefits methodologically it enables trend analysis and also, within and across country comparison (Ewerling et al., 2017). This index enables to extend researches regarding women's empowerment and to give a better estimate of the effect on health interventions and outcomes. Thus, this study employs the SWPER index to measure the Status of women's empowerment in Ethiopia.

2.1.2 Women Empowerment and Children's Health Outcomes

Children's health status is measured from both anthropometric and non-anthropometric indicators. The word "Anthropometric" is generally meant to represent the measure of people's growth indicators such as weights and heights related to their age and sex (WHO, 2020). According to this measurement, the three children nutritional/health status is determined using basic measurements such as height, weight, age, and sex. Employing internationally recommended World Health Organization (WHO) child growth reference standard and the three ways (Standard Deviation (Z score), percent of median, and percentile) of stating these comparisons; the three composite indices of children under-nutrition are stunting (height-for-age); wasting (weight-for-height), and underweight (weight-for-age). On the other hand, non-anthropometric indicators of children's health statuses are anemia, pneumonia (Acute Respiratory infection), treatment of diarrhea, iron deficiency, and vaccination level (Abreha et al., 2020; Zereyesus, Amanor-Boadu, Ross, & Shanoyan, 2017).

Literatures has emphasized that children's health is a worldwide concern, as they are the most vulnerable groups, and children's health outcomes are associated with women's empowerment (Pratley, 2016). Even though women's empowerment has gained attention in the past two decades, the associations between different dimensions of women's empowerment and children's health outcomes are not yet established Abreha et al. (2020). Many scholars have tried to investigate the association between women's empowerment and children's health status, and the relationships varied across different domains of women's empowerment and children's health outcomes.

Studies have concluded with a positive association between women's empowerment and children's nutritional outcomes. A review of literature conducted by Pratley (2016) showed a positive and statistically significant impact of women's empowerment on child health outcomes such as child mortality, being fully vaccinated, and nutritional status. Also, a study conducted in Benin by

Alaofo et al. 2017 showed that promoting women's self-confidence and decision-making can enhance efforts to improve nutrition in children.

Abreha et al. (2020), analyzed the magnitude of women's empowerment and examined its correlation with children's health. They resulted in enhancing women's empowerment in the household in terms of their socio-economic status for instance: increasing women's access to education, information, media, and promoting saving were associated with less likelihood of the children's being stunted or wasted. Also, when women are empowered in their decision-making children's health status is improved.

A review on women's empowerment and child nutritional status resulted that women's empowerment was associated with children's malnutrition level, still, the findings were mixed (Gupta 2008). Other studies have resulted that women's empowerment dimensions can relate differently to different children's health and nutritional outcome indicators. Also, J.Deutsch and J.Silber (2019) analyzed the impact of women's empowerment on child nutritional status via the MIMIC framework in Mozambique. The result doesn't appear with a clearer association regarding the possible impact of women empowerment captured from five domains: decision making, use of violence by husband/partner, the attitude of the woman towards this use of violence, available information, and material resources on the nutritional status of children, but, the control variables like the material wealth of the household, and the educational level are positively associated with the nutritional status of children and higher for female children.

However, a study conducted in Ghana on women's empowerment in the agriculture sector and statistically yield a nonsignificant association with children's health outcomes. Whereas, children's health status was significantly correlated with other socio-economic variables such as mother's education, child's age, and place of residence (Zereyesus et al. 2017).

Thus, the literature on the association between women's empowerment and children's health status focused on children's health outcomes from nutritional outcomes only. There are very few studies that sought to determine children's health outcomes from pneumonia, anemia, and diarrhea. Thus, this study addressed the gap in the literature on women's empowerment and child health outcomes in Ethiopia by employing a survey-based women empowerment index (SWPER) to measure the magnitude of women empowerment and assessed the association between women empowerment and children health outcomes measured from stunting and Acute respiratory infection particularly

pneumonia. Thus, this study has empirically examined the correlation between women's empowerment, children's health outcomes, and socioeconomic variables.

2.2 Empirical Literature Review

Several empirical studies have been undertaken so far at the global, regional, and national levels to analyze the association between women's empowerment and children's health outcomes _and factors socio-economic factors determining children's health status.

Shafiq et al. (2019) employed binary logistic regression with marginal effects to empirically analyze the effect of women's empowerment (mother's education, employment status, and household decision-making) on children's nutritional status in Pakistan using the 2012/13 Pakistan demographic health survey. Using the composite index of anthropometric failure (CIAF) as a dependent variable and resulted in an inverse relationship between child malnutrition, women empowerment: employment status -0.167 and mother's education (primary -0.071, secondary -0.692, and higher -0.633); and wealth index (Poor -0.175 middle, class -0.456, and rich -0.674) but for an increase in household size, there is a positive relationship of 0.028. Finally, they have concluded that the empowerment of women acts as a means to enhance children's nutritional status, which causes important developmental outcomes.

Imai et al. (2014) investigated the relationship between women's empowerment (relative education attainment, domestic violence, and autonomy) and children's nutritional status using three waves of NFHS data 1882-2006 in India. Improved children's nutrition measured by 'weight for age' and 'weight for height' status is positively and significantly associated with women's relative education attainment 19.7% and 24.3% respectively. And quantile regression resulted in a strong relation between women empowerment and improved children nutritional status stunting, as well as, the better nutritional measure is ensured by access to health insurance, health-related facility, infrastructure, and environment.

A notable study on women empowerment and children's health from Africa is Yaya et.al, (2020). It assessed the association between women's empowerment (decision making and attitude towards violence) and childhood nutritional status in sub-Saharan African countries by utilizing the Demographic and Health Survey conducted in 2011–2017 across 30 Sub-Saharan Africa countries. Bivariate and Multivariate level analysis was conducted to examine the association between

outcome and exposure variables and the effect of women's empowerment on childhood nutritional status respectively. Women empowerment measured from attitudes towards violence (OR=1.13, 95% CI: 1.10, 1.16) and experience of violence (OR=1.07, 95% CI: 1.04, 1.11) has shown a positive association with childhood nutritional statuses while decision-making (OR=-0.84, 95% CI: 0.83, 0.86) showed a negative association. Thus, Policies and programs should include interventions designed to empower women in Sub-Sahara Africa to reduce childhood malnutrition.

When it comes to the specific case of Ethiopia, Abreha et al. (2020) applied a Multiple Indicators Multiple Causes (MIMIC) model to measure the association between women empowerment and children's health status in Ethiopia using the 2016 Ethiopian Demographic and Health Survey. Variables of interest are children's health outcomes measured by (Stunt, waste, pneumonia, and anemia) and Women empowerment variables (participation in decision-making, attitudes towards wife-beating, barriers to health care access, asset ownership, and socio-economic) constructed using explanatory and confirmatory factor analysis. All women empowerment dimensions are not related to children's health outcomes and also those relating have a varying degree of association. The results suggest that enhancing women's empowerment in the household in terms of their socio-economic status was associated with less likelihood of the children's being stunted 26.3% ($p<0.001$) or wasted 3.24% ($p<0.05$). Also, higher women's empowerment in terms of household decision-making power reduces the likelihood of having pneumonia 2.5% ($p<0.001$) and anemia 10.8% ($p<0.001$). To improve children's health status, they recommended gender-specific strategies focusing on women's access to education, media, information, and promoting saving and household decision making.

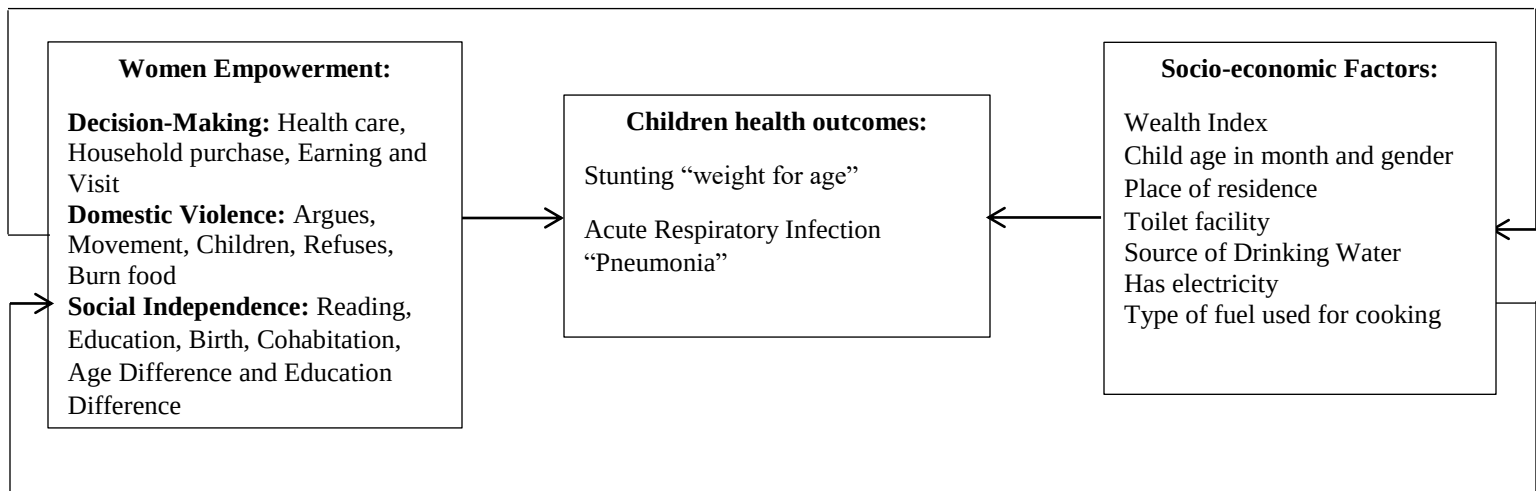
Woldeamanuel (2019) assessed the risk factors that have been attributed to under-5 death in Ethiopia by applying descriptive statistics and logistic regression techniques via the 2016 Ethiopian Demographic Health Survey. Considered variables such as maternal and child Socioeconomic, Demographic, Environmental, and cultural characteristics as determinants of under-five deaths. The results were that born from mother with no education (OR=2.610, 95% CI: 1.598, 4.265), occupation of mother, age at first birth, 11 to 17 years ages at birth (OR=1.556, 95% CI: 1.243, 1.949), childbirth order of five and above, 1 to 18 months birth intervals (OR=2.164, 95% CI: 1.821, 2.570), were found significantly associated with under-5 deaths. Finally concluded

that interventions that focus on birth spacing, mothers living in Afar, Gambela, and uneducated mothers are required for improving child survival in Ethiopia.

2.3 Conceptual Framework

Previous literature showed that how women's empowerment is a crucial factor for the wellbeing of society and children particularly Abreha et al. (2020), Pratley (2016), and Imai et al. (2014). Improved children health outcome is achieved when women have better access to education, healthcare, finance, wealth, political participation, control over resources, and asset ownership. The relationship between women's empowerment and children's health outcomes is described in the framework shown in figure one. Children's health is conceptualized as a response variable depending on women's empowerment and other socio-economic variables.

Figure 1: A Conceptual Frame work on the Association between Women Empowerment and Children Health Outcomes



The anthropometric measure of children's nutritional outcome, stunting (child's height to age z-score), and the non-anthropometric measure of children's health outcome, acute respiratory infection (pneumonia) is used to measure children's health outcomes. These two latent child health outcomes are used separately to compare and contrast the association of women's empowerment with these two different categories of health outcomes.

On the left-hand side of figure one, Women Empowerment is represented by three dimensions of empowerment computed from the survey-based women empowerment index (SWPER) (Fernand, et.al, 2017) using principal component analysis. The first dimension Decision-Making is measured from four indicators which are health care, household purchase, earning, and visit. The second dimension Domestic Violence is also measured from five indicators which are, argues, movement, children, refusal, burn food. And the third dimension of women empowerment Social Independence is also measured from six indicators such as reading, education, birth, cohabitation, age difference, and education difference Ewerling et.al, (2017).

The path diagram in figure one also shows the existence of influence from women empowerment and other control variables to the children's health outcomes. The socio-economic control variables assumed to determine children's health outcomes are child gender, age in a month, mother's age, place of residence, household wealth index, toilet availability, access to electricity, and type of fuel used for cooking (Bekele et.al, 2020).

Chapter 3: Methodology

3.1 Data Type and Source

This study used the recent 2016 Ethiopian Demographic and Health Survey (EDHS) data. The EDHS is a nationally representative, and secondary dataset designed to provide the essential nationwide trends and patterns in children's health estimates at the national level and how it correlates with women's status. So far the survey was conducted in 2000, 2005, and 2011 respectively by the Central Statistics Agency (CSA) of Ethiopia under the guidance of the Ministry of Health and the Ethiopian Public Health Institute (EPHI) with technical assistance from Inner City Fund International (ICF), and financially supported by the United States Agency for International Development (USAID) and other development partners. The 2016 survey on a representative sample of 16, 650 residential households where 5,232 were in urban areas and 11,418 in rural areas was conducted by using two-stage stratified random sampling (EDHS, 2016). Although the 2016 EDHS contains 16,583 eligible women for an interview with a response rate of 95%, the sample for this study is restricted to only 10,641 women between 15-49 years old, with at least a child under the age of five, since this study emphasis on children health outcomes.

3.2 Variable Definition and Measurement

Health Outcomes: The study used both anthropometric (Stunting) and non-anthropometric (Acute Respiratory Infection) indicators as dependent variables. Anthropometric Indicators are used to measure individual nutritional status following the World Health Organization (WHO) child growth standard expressed via Z-score (standard deviation score) by using basic information on child weight, height, and age. The non-anthropometric indicators are used to measure exposure to infectious diseases.

Stunting (Height-for-Age): measures height relative to age and is also termed chronic (long run) malnutrition. It is defined as the percentage of children aged 0 to 59 months whose height for age is below -2 standard deviations categorized as (moderate stunting) and -3SD termed as (severe stunting) from the median of the WHO Child Growth Standards (WHO, 2006).

Acute Respiratory Infection (ARI): represents the exposure to an infectious disease called pneumonia which interferes with normal breathing. Data regarding ARI were collected on children who had the symptoms two weeks before the survey was collected by CSA, and it will be taken in

the form of the data is collected by CSA. The questionnaire asks whether there were short, rapid breaths and the response categories were no, yes, and do not know, which were coded as one, zero, and missing, respectively. Therefore, this study will take the dummy variable categories for analysis (CSA, 2016).

Independent Variables: Women's Empowerment, is a focal independent variable and operationalized using similar dimensions as identified in the SWPER for Africa (decision making, attitude to violence, and social independence) and 15 indicators available in the DHS survey. **Decision Making:** will be measured by four indicators such as seeking for own health care, large household purchases, visits to families and relatives, and woman working/ earning status in the last year. **Attitude to Violence:** will also be measured based on five indicators related to the woman's opinion on whether a husband beating his wife is justified in specific situations: going out without telling; neglecting the children; burns food; arguing him, and refusing sexual relation with him. **Social Independence:** is comprises six items such as; frequency of reading newspaper or magazine, her education in years of schooling completed, age at first birth and first cohabitation, age and education difference between the woman and her husband (Ewerling et al., 2017; Ewerling et al., 2020).

Table 1: survey-based women's empowerment index used to calculate women empowerment

Dimensions	Indicators	Variable Descriptions	Code or Unit
Decision	Health Care	Respondents health care	<i>Husband or other alone=-1; Respondent and husband =0; Respondent alone=1</i>
	HH purchase	Large household purchase	<i>Husband or other alone=-1; Respondent and husband =0; Respondent alone=1</i>
	Visit	Visits to families/ relatives	<i>Husband or other alone=-1; Respondent and husband =0; Respondent alone=1</i>
	Earning	Respondent worked in past 12 months	<i>No=0; In the past year=1; Have a job, but on leave last 7 d=2; Currently working=2</i>
Violence	Movement	Wife goes out without telling the husband:	<i>Yes=-1; Don't know=0; No=1</i>
	Children	Wife neglects the children	<i>Yes=-1; Don't know=0; No=1</i>
	Argues	Wife argues with husband	<i>Yes=-1; Don't know=0; No=1</i>
	Refuses	A wife refuses to have sex with husband	<i>Yes=-1; Don't know=0; No=1</i>

	Burns food	Wife burns the food	<i>Yes=-1; Don't know=0; No=1</i>
Independence	Reading	Frequency to read newspaper/ magazine	<i>Not at all=0; <once a week=1; ≥once a week=2</i>
	Education	Completed years of schooling: Years	<i>1 if secondary education and above; 0 otherwise</i>
	Birth	Age at first birth:	<i>Years</i>
	Cohabitation	Age at first cohabitation	<i>Years</i>
	Age Difference	Woman's age minus husbands age	<i>Years</i>
	Education Difference	Women's minus husband's years of schooling	<i>Years</i>

Source: (Ewerling et al., 2017)

Socio-economic and demographic variables: Based on previous literature the following children's characteristics (Child's age in months and gender); Mother's characteristics (mother's age in years and marital status); household characteristics (region, place of residence (Rural/Urban) and wealth index); and socio-economic characteristics (access to bank account, access to mobile phone, house ownership, land ownership, toilet availability, and water supply) are included.

3.3 Method of Analysis

3.3.1 Measuring Women Empowerment Index

The survey-based women empowerment index constructed for Ethiopia is computed by using principal component analysis and equation one was used for estimating an individual's standardized scores for each component having j :

$$S_{ij} = \frac{[[\lambda_{1j} (x_{1i} - \bar{x}_1)] + [(\lambda_{2j} (x_{2i} - \bar{x}_2))] + \dots + [\lambda_{14j} (x_{14i} - \bar{x}_{14})]]}{\sigma_j} \quad (1)$$

Where; S_{ij} - the individual standardized scores for individual i and component j ;

$x_{1j}, \dots, x_{14j}$ are the individual values for items x_1 to x_{14} included in the PCA;

σ_j is the standard deviations of the predicted scores of each component j .

And the weight given to each of fifteen items in the component j is defined as:

$$\lambda_{vj} = \frac{\varphi_{vj}}{\sigma_v} \quad (2)$$

Where φ_{vj} is the PCA loading for each of the items v in each domain j and σ_v is the standard deviation of each item v in the combined dataset, whereby using simple algebra equation 3 is the simplified form of equation 2.

$$S_{ij} = \frac{[-(\sum_{v=1}^{14} \lambda_{vj} \bar{x}_v) + (\sum_{v=1}^{14} \lambda_{vj} x_{vi})]}{\sigma_j} \quad (3)$$

A standardized individual score of the three dimensions such as decision making, Attitude to violence, and Social independence is calculated using equations from 4 to 6 respectively.

$$Score_{Decision Making i} = y_{1i} + \sum_{v=1}^{14} (\lambda_{v1} x_{vi}) \quad (4)$$

$$Score_{Attitude to Violence i} = y_{2i} + \sum_{v=1}^{14} (\lambda_{v2} x_{vi}) \quad (5)$$

$$Score_{Social Independence i} = y_{3i} + \sum_{v=1}^{14} (\lambda_{v3} x_{vi}) \quad (6)$$

Where y_{vi} are the values assigned for dimension; x_{vi} are the values of items for v and each individual i and λ_{v1} to λ_{v3} are the item weights.

3.3.2 Empirical Model

After measuring the magnitude of women's empowerment level this study has conducted two Empirical analysis, first measured the association between women empowerment and children health outcomes measured from stunting and Acute Respiratory Infection and second, invigilated the interplay across women's empowerment dimensions, children health outcomes and socio-economic status of household by using a logit model (Barros & Hirakata, 2003). Accordingly, the analysis is performed by using Statistical Software Stata 16.

$$(Children's Health Outcomes) = \beta_0 + \beta_1 \left(\begin{matrix} Women's \\ Empowerment \end{matrix} \right) + \beta_2 (Socio-economic variables)$$

Where: Children's health outcomes are measured by using Stunting and ARI. SWPER index used to measure the magnitude of women's empowerment has three domains: The decision making (Dmk), Domestic violence (Dmv), and Social independence (Soi). Socio-economic variables are child sex (sex), household wealth level (Wealth), place of residence (Resid), electricity access (Helec), type of toilet facility (Ttoilet), type of fuel used for cooking (Tfuel), and source of drinking water (Swtr).

$$\begin{aligned} \text{Stunting/ARI} = & \beta_0 + \beta_1(Dmk) + \beta_2(Dmv) + \beta_3(Soi) + \beta_4(\text{sex}) + \beta_5(\text{Wealth}) + \beta_6(\text{Resid}) \\ & + \beta_7(\text{Helec}) + \beta_8(\text{Ttoilet}) + \beta_9(\text{Tfuel}) + \beta_9(\text{Swtr}) + \mu \end{aligned}$$

Therefore, as the study has two health outcomes Anthropometric and non-anthropometric indicators will use two logit models. While the first logit model used Stunting as a dependent variable, the second logit model used ARI as a second dependent variable.

Model 1: logit model used to measure stunting

$$\begin{aligned} (\text{Stunting}) = & \beta_0 + \beta_1(Dmk) + \beta_2(Dmv) + \beta_3(Soi) + \beta_4(\text{sex}) + \beta_5(\text{Wealth}) + \beta_6(\text{Resid}) \\ & + \beta_7(\text{Helec}) + \beta_8(\text{Ttoilet}) + \beta_9(\text{Tfuel}) + \beta_9(\text{Swtr}) + \mu \end{aligned}$$

Model 2: Logit model used to measure ARI

$$\begin{aligned} (\text{ARI}) = & \beta_0 + \beta_1(Dmk) + \beta_2(Dmv) + \beta_3(Soi) + \beta_4(\text{sex}) + \beta_5(\text{Wealth}) + \beta_6(\text{Resid}) \\ & + \beta_7(\text{Helec}) + \beta_8(\text{Ttoilet}) + \beta_9(\text{Tfuel}) + \beta_9(\text{Swtr}) + \mu \end{aligned}$$

Chapter 4: Results and Discussion

4.1 Descriptive Analysis

Table 2: Descriptive statistics of the dependent, independent, and control variables.

Variable	Description	Mean	SD
Women empowerment index			
Decision making	Health care, HH purchase, Visit, Earning	0.31	0.93
Domestic Violence	Movement, Children, Argues, Refuses, Burn food	0.44	1.15
Social Independence	Reading, Education, Birth, Cohabitation, Age difference, Education difference	0.23	1.36
Socioeconomic Variables			
Child sex	Male=1, Female=0	0.51	0.50
Wealth index	Poorest=1, Poorer=2, Middle=3, Richer=4, Richest=5	2.60	1.55
Residence	Urban=1, Rural=0	0.18	0.38
Has electricity	Yes=1, No=0	0.22	0.42
Type of toilet facility	Has facility=1, No facility=0	0.61	0.49
Type of fuel used for cooking	Modern fuel=1, Traditional fuel=0	0.05	0.23
Major source of drinking water	Protected Source=1, unprotected source=0	0.61	0.49
Children health outcome			
Stunting	Stunted=1, non-stunted=0	0.72	0.45
Acute respiratory infection (ARI)	Yes=1, No=0	0.13	0.34

Table 3 presents the sample characteristics of the variables considered in this study. More than 80% of the samples taken live in rural areas where 49% of the children are female. From the women's empowerment variables, 69% of the women face meddling from a partner in making the decisions they want regarding the household purchase, visit, and even health care. In addition, they face violence if they were found doing what not to do. 44% of the women reported that the husband beats the wife if the wife goes out without telling the husband, argues with him, refuses to have sex with her husband, and burns the food. However, for the rest of the women husband was not justified to beat the wife due to the reasons above.

Regarding social independence, 23% of the women have received the necessary education, can read independently, have a right to decide their cohabitation, and have a lower age and educational gap with their husbands. This makes them more than 3/4th of the women dependent on their husbands existing a larger age and educational gap.

The women show a disadvantage in their socio-economic status with 78% having no access to electricity and 95% using a traditional cooking mechanism. Access to toilet facilities and safe drinking is a little bit better compared to the other socioeconomic variables. 61% of the households have access to a toilet facility ranging from modern and eco-friendly. However, the rest of the households doesn't have access even to the minimum level of the toilet. In the same manner, 61% of the households have an access to safe water for drinking. Regarding to children's health outcome, from the children under the study, 72% of them are stunted while 13% of them are exposed to a respiratory disease called Acute Respiratory Infection (ARI) particularly Pneumonia.

A nonparametric equality-of-medians test is applied to check whether the median empowerment dimensions between the categories of child health outcomes stunting and acute respiratory infection are identical. The test result indicates that all women empowerment dimensions do not observe a significant difference across both health outcomes stunting and ARI. Where, the three dimensions of women's empowerment measured from the SWPER indexes such as domestic violence, social independence, and decision-making ability are statistically different between a child being stunted or not ($Pr = (0.0003; \text{which is } Pr < 0.01)$).

However, a variation exists regarding the decision-making power of women on ARI of children, and it does not enable to observe a significant difference whether the child is exposed or non-exposed to an acute respiratory ($Pr=0.6080$). The remaining dimensions social independence and Domestic violence of the women are statistically different between being exposed or not being exposed to ARI ($Pr = 0.4126$ and 0.2238) respectively.

4.2 Women empowerment and children health outcomes

The association between children's health outcomes measured in terms of stunting and ARI to the women empowerment index constructed using the SWPER index is shown in table 4. The significance level of the dimension varies along with the health outcomes. Model one illustrates the association between the three dimensions of women's empowerment and children's nutritional outcome stunting. Exposure to domestic violence and the social independence of the women are statistically significant and affect the stunting, while decision making is not statistically significant to determine and to associate with stunting. The level of stunting of the child is significantly affected by domestic violence ($p < 0.05$) and social independence ($p < 0.05$).

Table 3: Women's empowerment Dimensions and children health outcomes

Women Empowerment Dimensions	Children health Outcomes	
	Model 1: Stunting	Model 2: ARI
Decision making	-0.0823 (0.746)	0.0379 (0.280)
Domestic Violence	0.1803*** (0.008)	0.1429** (0.032)
Social Independence	-0.1243*** (0.003)	-0.2208*** (0.002)
Standard errors in parentheses * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$		

There is a positive association between the domestic violence and stunting level of the child, if domestic violence on women from her partner increases due to a beating accounted for going out without his approval, not properly taking care of her children, having an argument with him, refusing to have sex with him, or burns food, the children's exposure to stunting will increase by 18.03%. Thus, the association between stunting and domestic violence is negative. The same is true for acute respiratory infection, where a child is 14.29% more exposed to infectious disease due to increased violence on the mother by her partner/ husband.

Regarding the third dimension of social independence, there exists a negative association between the social independence of the women and the health status of the children. The negative association implies a positive impact on the health outcomes since stunting and acute respiratory infection decreases following an increment in women's ability to be socially independent.

The association level of social independence on stunting is positive with an 12.4% decrease in the level of stunting due to an increase in the social independence of the women emanating from decreased age gap with her husband, increased ability to read a newspaper or magazine at least once a week, increase the level of education and decrement in the education gap among the couples, lag in the early marriage and early birth. The more the mother become educated and increases her ability to read the more likely she is to know about the requirements of vitamins, carbohydrates, and other minerals relevant for the health of the child, and the more she provides modern solutions to her problem significantly decreasing the stunting level of children.

The effect of the increase in the social independence of the women is significant and very high in decreasing the exposure of the child to ARI. Advancements in educational level by narrowing the gap with her partner, ability to read a newspaper, decrease in the age and educational gap and other relevant reasons in increasing independence decrease the child exposure to ARI disease by 22%.

Although other related studies have stressed the significant impact of decision-making on decreasing the level of stunting and exposure to ARI. This study found that the decision-making ability of women either in collaboration with the partner or independently is not significantly association with both stunting and ARI exposure of the child.

This finding, is consistent with the findings that showed both domestic violence and social independence dimensions are positively and significantly associated with both children health outcomes Imai (2014); Essilfie et.al, (2020). This particular finding has been gotten, due to the fact that empowered women's inter household dynamics is a critical factor determining children health outcomes. However, the finding by Abreha et al. (2020) contradicts and the finding that both children health outcomes stunting and wasting are not significantly related to the decision making dimension of women empowerment due to place of residence is a major factor.

4.3 Women empowerment, children health outcomes, and socio-economic variables

Table 4: logit model result for both models.

Variables	Model 1: Stunting	Model 2: ARI
Decision making	-0.0823 (0.746)	0.0379 (0.280)
Domestic Violence	0.1803*** (0.008)	0.1429** (0.032)
Social Independence	-0.1243*** (0.003)	-0.2208*** (0.002)
Child sex	0.2304* (0.073)	0.0350* (0.056)
Wealth index	-0.5201* (0.067)	-0.0875** (0.010)
Residence	0.3122*** (0.002)	0.0142 (0.102)
Has electricity	0.1261 (0.161)	0.1175* (0.087)
Type of toilet facility	0.0462* (0.061)	-0.1388 (0.283)
Type of fuel used for cooking	-0.0134 (0.321)	0.2229* (0.100)
Major source of drinking water	0.1390*** (0.009)	0.0910 (0.147)
N	9139	9150
Standard errors in parentheses *p<0.10 **p<0.05 ***p<0.01; the number of observations vary due to missing values in children health outcomes		

The interplay of women's empowerment dimensions and socioeconomic variables with the children's health outcomes is described in table 5. The significance in the association between the variables differs among the two children's health outcomes, while some variables are significantly associated some are not significant with both or either of the health outcomes.

Decision-making, access to electricity, and the fuel used for cooking are not statistically significant with stunting. Thus the availability or unavailability of electricity, the modern or the traditional is the fuel type used for cooking does not affect stunting. For ARI decision making, place of residence, type of fuel used and source of drinking water are not statistically significant.

There exists a significant and positive association between domestic violence and both health outcomes stunting ($p<0.01$) and ARI ($p<0.05$). The extent of children under five being stunted and exposure to ARI increases by 18% and 14.29% respectively, following domestic violence by her

partner for going out without his approval, not properly taking care of the children, having arguments with him, refusing to have sex with him, burning food.

Similarly, a significant but negative association between the third women empowerment dimension social independence, and both children's health outcomes ($p < 0.01$) exists. The magnitude of children under five being stunted or exposed to ARI decreases by 12.4% and 22% respectively, due to an increment in women's social independence measured in terms of a narrowing age and education gap with husband/partner, increasing access and ability to read a newspaper, increasing in the level of education, lag in the early marriage and early birth.

Among the socio-economic variables, the gender of the child has a direct and positive association with both children's health outcomes significantly ($p < 0.10$ for both). Female children than male children are more vulnerable to being stunted or exposed to ARI by 23.04% 3.5% respectively.

Household wealth level is negatively associated with both stunting and ARI. Under-5 children from a higher wealth level than children in the same group from the poorest are more likely to overcome stunting by 52% and have a chance of 8.75% to avoid exposure to ARI. The result is significant with a p-value of $p < 0.10$ and $p < 0.01$ for both stunting and ARI respectively. Place of residence is significantly associated with stunting ($p < 0.01$). Household's place of residence located in the rural area affects the level of under-5 children to be stunted by 31.22% than household dwelling in an urban area. However, place of residence does not alter or affect children under-5's exposure to ARI.

The socio-economic variable household's access to electricity and its association with children's health status resulted that, significant and positively associated with ARI ($p < 0.10$). Children-5 exposure to stunting will increase by 11.75% for children living in households without electricity access.

Regarding the type of toilet facility used, and household's source of water is significantly and positively associated with the stunting aspect of the children's health outcome respectively ($p < 0.10$ & $p < 0.01$). Children under-5 living in a household without a toilet facility are likely to stunt by 4.6% than those children living in a household with a toilet facility. As well, children are still likely to stunt by 13.9% due to having water for drinking from unprotected sources than those children having water for drinking from protected sources. Whereas, children's health outcome ARI is

positively associated with the type of fuel used. Thus, children under-5 are more likely to be exposed to ARI by 22.3% if the household uses a traditional fuel to cook food, than those using the modern form. These findings are in line with the findings that showed both children health outcomes such as stunting and wasting are positively and significantly associated with child sex, residence, and type of fuel used for cooking Imai (2014); Gloria et.al, (2020). This particular finding has been gotten, due to the fact that empowered women's inter household dynamics is a major factor determining children health outcomes.

Finally, after analyzing the association or interplay between children's health outcomes, women's empowerment, and other socio-economic variable goodness of fit of both models are specified by using both Akaike Information Criterion (AIC) and Bayesian Information Criteria (BIC), where the smaller AIC and BIC values indicate a better fit model. In this case, even though both are a good fit, the second model which is constructed to measure acute respiratory infection shows a good fit model compared to the first model used to measure the association with stunting.

Chapter 5: Conclusion and Implications

The study empirically assessed the association between women's empowerment and children's health outcomes, using the 2016 Ethiopian Demography and Health Survey EDHS. The association was analyzed by using two children's health outcomes stunting and acute respiratory infection which results from pneumonia. The three dimensions of women's empowerment decision making, social independence, and attitude towards domestic violence are computed from the survey-based women empowerment index. To assess the interplay among the socio-economic variables, type of toilet facility, source of drinking water, gender of the child, type of fuel used to cook, household wealth level, access to electricity, and place of residence were taken as control variables. Two logit models are constructed to assess the association.

For both anthropometric (stunting) and non-anthropometric (ARI) children's health outcomes are not significantly associated with all women empowerment dimensions. Except for the decision-making dimension, the social independence, and domestic violence dimensions have a significant association with both stunting and ARI which leads to a significant decrement in exposure to stunting and acute respiratory infection.

In the same way, the interplay between women empowerment, children's health outcomes, and socio-economic variables also resulted in a varying result. For instance, the sex of the child has a positive and significant association with both stunting and ARI, which means if the child is female she is more likely to be stunted or exposed to ARI than her male children. Where, access to electricity, decision making, and type of fuel used for cooking is not statistically significant and do not associate with stunting, as well, place of residence, decision making, and source of drinking water are not also associated and statistically significant to determine children's exposure to ARI. Rural residents, households without toilet facilities, drinking water from unprotected sources are more likely to be stunted. In the same way, are households with no electricity, and traditional cooking fuel are more likely to be exposed to acute respiratory infection.

These results have strong implications for gender, and health-related development outcomes, indicating the need for development policies of the government to consider gender as a critical issue for development. Thus, gender-based policies are expected to be enacted which would increase: women's access to education through basic adult education, women's exposure to media

and information, freedom of mobility, and decision making by giving women's social protection, as well, access to employment through creating more jobs for women. In Parallel, creating a system that incentivizes or invests in women's entrepreneurial ideas to enable women to become emotionally strong, and have financial independence. Above all, the government must give priority to infrastructure development like creating access to electricity, clean water, and creating awareness on the type of fuel used for cooking, type of toilet facility to use; and strengthening market linkages to farmers/rural dwellers to smoothen women's burden, where this, in turn, improves children's health outcomes.

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Appendix

Appendix1: rank-sum test

```
. ranksum aut_score , by( ARI )
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

ARI	obs	rank sum	expected
0	7923	36334218	36263571
1	1230	5559063	5629710
combined	9153	41893281	41893281

```
unadjusted variance    7.434e+09
adjustment for ties    -2114.4706
```

```
adjusted variance      7.434e+09
```

```
Ho: aut_sc~e(ARI==0) = aut_sc~e(ARI==1)
```

```
z = 0.819
```

```
Prob > |z| = 0.4126
```

```
. ranksum dec_score, by( ARI )
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

ARI	obs	rank sum	expected
0	7923	36219344	36263571
1	1230	5673937	5629710
combined	9153	41893281	41893281

```
unadjusted variance    7.434e+09
adjustment for ties    -4020.1758
```

```
adjusted variance      7.434e+09
```

```
Ho: dec_sc~e(ARI==0) = dec_sc~e(ARI==1)
```

```
z = -0.513
```

```
Prob > |z| = 0.6080
```

```
. ranksum att_score, by( ARI)
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

ARI	obs	rank sum	expected
0	7923	36368452	36263571
1	1230	5524829.5	5629710
combined	9153	41893281	41893281

unadjusted variance 7.434e+09

adjustment for ties -27702.875

adjusted variance 7.434e+09

Ho: att_sc~e(ARI==0) = att_sc~e(ARI==1)

z = 1.216

Prob > |z| = 0.2238

```
. ranksum att_score, by( stunting )
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

stunting	obs	rank sum	expected
0	2609	12661492	11927044
1	6533	29131161	29865610
combined	9142	41792653	41792653

unadjusted variance 1.299e+10

adjustment for ties -48516.216

adjusted variance 1.299e+10

Ho: att_sc~e(stunting==0) = att_sc~e(stunting==1)

z = 6.445

Prob > |z| = 0.0000

```
. ranksum aut_score , by( stunting )
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

stunting	obs	rank sum	expected
0	2609	12613395	11927044
1	6533	29179258	29865610
combined	9142	41792653	41792653

unadjusted variance 1.299e+10

adjustment for ties -3701.4221

adjusted variance 1.299e+10

Ho: aut_sc~e(stunting==0) = aut_sc~e(stunting==1)

z = 6.023

Prob > |z| = 0.0000

```
. ranksum dec_score, by( stunting )
```

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

stunting	obs	rank sum	expected
0	2609	12334934	11927044
1	6533	29457719	29865610
combined	9142	41792653	41792653

unadjusted variance 1.299e+10

adjustment for ties -7037.7501

adjusted variance 1.299e+10

Ho: dec_sc~e(stunting==0) = dec_sc~e(stunting==1)

z = 3.579

Prob > |z| = 0.0003