Disparities in Child Survival in Ethiopia: Evidence From Nationally Represented Data

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Abstract

Background: Even though Ethiopia has made considerable progress in improving child health and survival, the country is experiencing one of the highest infant and under 5 mortality rates. The purpose of this study was to examine the disparities in child health and survival in Ethiopia.

Method: Data were drawn from the 2016 Ethiopian Demographic and Health Surveys (EDHS). Proportional odds regression was used to identify the determinants of poor child health and survival outcomes. The Mosley and Cohen's child health framework was used to measure child survival.

Results: The proportion of both poor health and mortality were high. The likelihood of falling into the poor health and survival category increases for: male children; children born with preceding birth interval of <18 months; those never breastfed; born to mothers having higher deprivation index or having poor health service utilization score; poor diet diversity score; living in a household with non-improved toilet facility; having a father with low education level; and those living in a community where mothers' education is low ($p < 0.05$).

Conclusion: Inequalities hamper Ethiopia's true progress in improving child health and survival. Given the fact that nearly two-thirds of Ethiopian women have no education and half live in financially disadvantaged households, this study recommends aggressive intervention in promoting women's status at the grassroots level through community education and behavioral communication strategies that will eventually help to significantly reduce huge disparity in early mortality in the population.

1. Introduction

Starting in the new millennium, the United Nations helped mobilize countries from across the world to address issues of poverty and its multiple dimensions effectively. This effort led to the development of a framework that articulated eight Millennium Development Goals (MDGs)(1), which have generated Sustainable Development Goals (SDGs) (2). The SDG-3 explicitly promotes health (ie., "Ensure healthy lives and promote well-being for all at all ages.") This goal has 13 targets, including three targets related to reproductive and child health(3–5). Despite this promising development, under-5 mortality (U5M) remains alarmingly high and mainly concentrated in the poorest regions of the world (6). Most notably, sub-Saharan Africa reports that one-in-nine children die before their fifth birthday (3). Thus, for an increasing number of sub-Saharan African countries, including Ethiopia, addressing the health disparities has become an important priority and a major objective for their national development plans(7, 8).

Child survival is generally determined by a wide range of social, economic, demographic, environmental, cultural, and behavioral factors(9–15). According to the Mosley and Chen framework, socio-economic context is the main driver of disparities in child health, which usually work through biological mechanisms to influence morbidity and, then mortality (16, 17). The major socioeconomic and demographic determinants frequently reported include maternal education, rural-urban disparities, household income, sex of the child, ethnicity, and dependency (12–15). Some other studies conducted in

developing countries link the disparity in child survival with behavioural and socio-cultural factors (18–21). For example, a recent comprehensive and comparative analysis of inequalities in early mortality in 53 low-and-middle-income countries (LMICs) reported remarkable social inequalities in poor health and early mortality across countries (22). Other researchers align early mortality with aspects of the natural environment such as climate change and the quality of water, household environment such as sanitation (23).

There is a general knowledge gap on child health/survival and the impacts of risk factors (such as sanitation, breastfeeding, women autonomy, family structure, and key maternal characteristics). These factors are detrimental to child survival in the context of high prevalence of mortality, and yet are not fully explored. According to data from the Ethiopian Demographic and Health Surveys (EDHS), under-5 mortality (U5M) has noticeably declined between 1990 and 2016, from 216 to 67 deaths/1,000 live births, respectively (24). Despite the improvement in the national averages, substantial inequalities in child health outcomes among the different socio-economic subgroups persist, and progress is uneven. To the best of my knowledge, no study conducted at the national scale has focused on full spectrum of the health status for the children. The few studies conducted have focused on mortality and were limited in scope (25, 26) and/or based on a specific region or district within Ethiopia (27, 28). To address these gaps, the purpose of this study was to examine the disparities in child survival and health among under-5 children in Ethiopia.

2. Materials And Methods

2.1 *The study context*

Ethiopia is a Sub-Saharan African country with an estimated population of over 110 million people (the second-most populous country in Africa, after Nigeria). The country has a federal system with nine autonomous Regional States, which are divided into zones, and then further subdivided into larger (*weredas*) and smaller (*kebeles*) administrative units(29). Ethiopia is one of the poorest countries in the world, relying heavily on an agrarian economy. Agricultural sector accounts for more than 60% of its GDP and employs nearly 85% of its population (30). Over the last decade, Ethiopia's economy has grown at an annual rate of approximately 10%, but nearly a third of its population still lives below the poverty line, and two-thirds have no education and limited access to healthcare services (28–30). Despite efforts to provide universal access to healthcare through the implementation of the National Health Sector Development Program(31), the country is still experiencing severe health inequalities and poor health outcomes for children, especially regarding under-5 mortality (30).

2.2 *Data sources*

Starting in 2000, Ethiopia has conducted comprehensive demographic and health surveys. The Ethiopian Demographic and Health Survey (EDHS) is a nationally representative cross-sectional survey of households carried out by the Central Statistical Agency (CSA) under the guidance of the Ministry of Health (MOH). The present study used the EDHS with representative and weighted samples of 10641

households for the year 2016, respectively. We used the children's file, which included both sociodemographic and health-related variables.

2.3 Measures of child survival

Mosley and Cohen believe that a child's death is the ultimate consequence of a cumulative series of biological event (17). Thus, they developed a single outcome variable combining both child death and child health status. They regarded weight-for-age as a measure of health status rather than solely of nutritional status. They also argued that both child mortality and child growth are affected by the same set of underlying nutritional and infectious conditions. Accordingly, Mosley and Cohen defined five health status categories: healthy (90% or higher of standard weight-for-age); Grade I (75–89% of standard); Grade II (60–74% of standard); Grade III (below 60% of standard); and dead. Kenneth (2003) stated that the index of health status has the great advantage of providing many more observations than a dichotomous alive/ dead outcome(16).

2.4 Measures of exposure variables

The selection of explanatory variables was made based on a review of literature, availability of the variable in the data set, and statistical plausibility. The exposure variables were categorized into three major groups: 1)maternal and child characteristics (sex of the child, breastfeeding, birth space, Diet Diversity Score (DDS), maternal deprivation score, health service utilization score); 2) household characteristics (wealth index, paternal education level, household size, type of toilet facilities); and 3) community-level factor (maternal education at cluster level).

Indices/scores for some of the potential predictors were constructed by combining different variables. The child health service utilization score was constructed from six dichotomous responses (ANC, delivery care, postnatal care, vitamin A, Iron, and deworming supplementation). The DDS was measured based on the consumption of the seven food groups (0=no, 1=yes) (32). These food groups are (i) grains, roots, and tubers; (ii) legumes and nuts; (iii) flesh foods (meat, fish, poultry, and liver/organ meats); (iv) eggs; (v) vitamin A rich fruits and vegetables; (vi) dairy products (milk, yogurt, cheese); (vii) other fruits and vegetables(32). The DDS values were obtained by summing up the dietary diversity score, which ranges from zero to seven, where zero represents non-consumption of any of the food items, and seven represents the highest level of diet diversification. The maternal deprivation index was constructed from mothers who are non-literate, unemployed, residing in rural areas, and living below the poverty level (asset index 20% poorest quintile). Household poverty was approximated by household wealth, which was estimated in the DHS with an asset-based index that combines information about ownership of consumer goods and housing quality (33).

Intimate partner violence (IPV) was measured using a series of women's' response of questions related to her experiences of emotional, physical, and sexual violence during a reference period of twelve months prior to the survey. The DHS survey used affirmative (yes or no) responses to these items. Similarly,

women's autonomy was measured by aggregating responses of women on their involvement in the household decision regarding childcare, finance, mobility, and major household purchases.

2.5 Statistical analysis

The data processing and management were carried out using STATA version 12 (34). Descriptive analysis was used to examine the characteristics of the study sample. Proportional odds regression was used for assessing the key risk factors of childhood health and survival controlling for all possible confounders. The proportional odds assumes the same regression coefficients for covariates of the various sub equations are the same except their intercept. The proportional odds assumption was tested using a score test (35) to determine if the proportional odds assumption is appropriate in this analysis. Correlations among the explanatory variables was checked using Variance Inflation Factors (VIF). A purposeful variable selection method was used, which is commonly used when the main purpose is risk factor modeling and not just prediction. All variables having a p -value < 0.20 significance level were entered in the bivariate analysis (36). Odds ratios with 95% confidence interval were calculated for each factor in the proportional odds model. Interactions were tested between significant variables to assess additive effects. All analyses were weighted according to DHS guidelines (33).

2.6 Ethical considerations

The EDHS followed previously approved standard protocols, data collection tools, and procedures (16). Participation in the survey was voluntary. Permission to use the data for the purposes of the present study was granted by ORC Macro International (U.S.) and Central Statistics Authority (Ethiopia). Ethics approval was also received by the University of Saskatchewan, Behavioral Research Ethics Committee.

3. Results

The key socio-economic characteristics of the study participants are presented in Table 1. It is worthy to note that nearly two-thirds of the mothers were in their main reproductive years (20–34 years old). Overall, most mothers and fathers had no formal education. Most of the respondents resided in rural areas, lived in medium-size households (4–7 members), and were in monogamous relationships. Finally, the non-monetary wealth index indicates many people (about 49%) in the poorer and poorest category. Table 1 further shows that about 73% of the children were healthy (90% or higher of standard weight-for-age), 8% were in the last category (dead), and the remaining 19% of the children had mild to severe health problems.

Table 2 presents the bivariate relationship between key socio-economic characteristics and child survival in Ethiopia. Significant associations were observed for most of the variables (p -value < 0.05). Only those with a p -value of < 0.20 were entered in multivariable analysis in Table 3.

Table 1
Sociodemographic characteristics of the study participants, Ethiopia

Characteristics	
	n(%)
Mothers' age	
15–24 years old	2446(22.2)
25–34 years old	5843(53.0)
34 + years old	2734(24.8)
Mothers' education	
No education	7284(66.1)
Primary level	2951(26.8)
Secondary and above	788(7.1)
Fathers' education	
No education	5637(51.1)
Primary level	4116(37.3)
Secondary and above	1270(11.6)
Place of residence	
Urban	1216(11.0)
Rural	9807(89.0)
Household size	
1–3 members	1156(10.5)
4–7 members	5593(50.7)
7 + members	4274(38.8)
Wealth category	
Poorer and poorest	5156(46.8)
Medium	2280(20.7)
Richer and richest	3587 (32.5)
Family structure	
Monogamous	9803(89.9)

Characteristics	
	n(%)
Polygamous	1219(11.1)
Child health and survival	
Healthy (90% or higher of standard weight-for-age)	8037(72.9)
Grade I (75–89% of standard)	688(6.2)
Grade II (60–74% of standard)	1009(9.2)
Grade III (below 60% of standard)	411(3.7)
Dead	878 (8.0)

Table 2
Bivariate association between individual, household, and community factors with
child health and survival.

Variables	OR	95% C.I. for OR		
		Lower	Upper	p-values
Maternal and child characteristics				
Sex of child				
Male				
Female	0.824	0.737	0.922	0.001
Preceding birth interval				
> 18 months				
< 18 months	1.992	1.626	2.445	0.000
Breastfeeding				
Beast fed				
Never breast fed	4.442	3.116	6.333	0.000
History of pregnancy termination				
No				
Yes	1.099	0.886	1.364	0.389
Age of mother	0.991	0.846	1.161	0.914
Maternal deprivation score	1.343	1.239	1.457	0.000
Maternal service utilization score	0.771	0.731	0.818	0.000
Diet diversity score	0.912	0.845	0.984	0.017
Household factors				
Household size				
Small				
Medium	0.618	0.493	0.774	0.000
Large	0.581	0.460	0.734	0.000
Source of drinking water				
Improved				
Non improved	0.928	0.799	1.076	0.322

Variables	OR	95% C.I. for OR		
		Lower	Upper	p-values
Toilet facility				
Improved				
Not improved	1.433	1.240	1.654	0.000
Type of family structure				
Monogamous				
Polygamous	1.233	1.022	1.488	0.029
Intimate partner violence				
No violence				
Low to high violence	1.030	0.882	1.204	0.704
Fathers education				
No education				
Primary	0.771	0.663	0.898	0.001
Secondary and above	0.535	0.419	0.685	0.000
Community-level factors				
Community level women education (mean)	0.901	0.862	0.942	0.000

Table 3 presents the results of proportional odds regression for key determinants of child health and survival. Proportional odds assumption was tested using Score test, and the result confirmed parallel line assumptions are met (p -value = 0.052). Multicollinearity analysis among the explanatory variables indicate that none of them had significant relationship ($VIF < 10$). The scatterplot between the dependent and continuous independent variables confirmed linearity assumptions are met.

In the regression result, a positive coefficient ($AOR > 1$) means that increases in the explanatory variable are associated with higher values (poorer child health and survival status) of the response variable. In contrast, a negative coefficient ($AOR < 1$) means that increases in the explanatory value are associated with decreases (better child health and survival status) in the response value.

The significant maternal and child variables were sex of the child, breastfeeding, birth interval, maternal deprivation scores, maternal health service utilization score, and child diet diversity score. Female children were 13% less likely ($AOR = 0.869$; $CI: 0.756-0.999$) to be in one of the higher categories as they are to be in the lowest category, i.e., they are less likely than male children to experience poor health or death. Children born with a birth interval of < 18 months had 1.88 times ($1.531-2.319$) more chance than

those with an interval of > 18 months of falling in a poor health and survival category than being healthy. Compared to those breastfed, those who were not breastfed had a higher chance of experiencing poor health or death (AOR = 4.580; CI: 3.002–6.987) than falling into a lower category. The likelihood of falling in poor health and survival categories significantly increases with increasing maternal deprivation score (AOR = 1.202; CI: 1.044–1.383). On the other hand, the likelihood of child death or poor health decreases as the maternal and child health service utilization scores increased (AOR = 0.833; CI: 0.771–0.901). Similarly, the likelihood of poor child health and death decreased by 10% for a unit increase in child diet diversity score (AOR = 0.904; CI: 0.825–0.991).

Table 3
Results of multivariable ordinal logit for predictors of child survival, Ethiopia

Variables	AOR	95% C.I. for AOR		
		Lower	Upper	p-values
Maternal and child characteristics				
Sex of child				
Male				
Female	0.869	0.756	0.999	0.048
Preceding birth interval				
> 18 months				
< 18 months	1.884	1.531	2.319	0.000
Breastfeeding				
Beast fed				
Never breast fed	4.580	3.002	6.987	0.000
Maternal deprivation score	1.202	1.044	1.383	0.010
Health service utilization score	0.833	0.771	0.901	0.000
Diet diversity score	0.904	0.825	0.991	0.031
Household factors				
Household size				
Small				
Medium	0.319	0.212	0.478	0.000
Large	0.282	0.186	0.428	0.000
Toilet facility				
Improved				
Not improved	1.227	1.003	1.499	0.046
Fathers education				
No education				
Primary	0.881	0.742	1.046	0.147
Secondary and above	0.734	0.537	0.599	0.050

Variables	AOR	95% C.I. for AOR			
		Lower	Upper	p-values	
Community-level factors					
Community level women education (mean)	0.941	0.893	0.991	0.022	

Among the household variables, household size, type of toilet facility, and paternal education were significantly associated with the outcome variable. The likelihood of a child having poor health and survival decreased for those resided in medium and large-sized households, compared to small. Those living in households with non-improved toilet facilities had 1.23 times (AOR = 1.227; CI:1.003–1.499) more chance to fall in poor health and survival category than healthy category. Children born from educated fathers had less chance of falling in the poor health category than those born from none educated fathers. The analysis considered examining the interaction effects of selected significant explanatory variables (maternal deprivation score and health service utilization score; household size and toilet facilities). None of these interactions had significant association with the outcome variable.

4 Discussion

The results of our study provide several noteworthy findings regarding levels of disparity in child health and survival in Ethiopia. The regression analyses revealed a range of individual, household, and community variables affecting children's' survival. Sex of the child, breastfeeding, birth interval, maternal deprivation, health service utilization, diet diversity were the individual-level variables most strongly associated with child survival. Among the household-level variables, household size, household wealth, and type of toilet facility significantly predicted child survival. The mean maternal education at the community(cluster) level has become an important community-level predictor of child survival.

The results of this study showed that female children were less likely than male children to experience poor health and death during the first five years of life, a finding that is consistent with previous studies conducted worldwide(37, 38). Analysis of the Demographic and Health Surveys data for selected countries indicated that girls were less likely to suffer from respiratory and diarrheal infections, stunting or wasting (39). Another study found that boys and girls have different probabilities of death due to biological factors, and these differences vary between infancy and early childhood(40). However, we still find some studies reporting gender (socially constructed behavior) as a determinant of child survival. For instance, a study in India reported that girls experience lesser mortality during the neonatal period due to biological reason, but showed subsequent increase in the higher age groups which was explained by the reflection of cultural disadvantage and discrimination against the girls in care practices(41). Gender-based discrimination has also been shown to privilege male children in caregiver health-seeking behavior, mainly in South Asia and China but also in Africa(42).

The interval between births also emerged as a strong predictor of the present study, with women reporting shorter intervals (< 18 months) experiencing a greater likelihood of poor child health and survival. Short intervals between births may impact child survival by reducing the mother's ability to provide adequate child attention and/or through disease transmission among closely spaced siblings(43, 44). The interval between births becomes particularly shorter for mothers with more than one child under 5 years of age in the household and may trigger poor quantity and quality of care due to stiff competition for meager resources(45–47). Where the preceding or succeeding interval is short, the mother will still have demands from the older sibling and possibly be physically weaker as a result of the very short spacing between births(10). A recent study conducted in southwestern Ethiopia documented that the risk of mortality was higher among those with short birth intervals of less than 18 months (40). In countries like Ethiopia, where fertility is high, about 5 per female, the shorter post-partum amenorrhea may also result in morbidity and consequent death due to shortened breastfeeding (48, 49).

Another notable finding is the substantial association between maternal deprivation and child survival. The result indicates how marginalizing women greatly impacts child health outcomes. A gender analysis study in eastern parts of Indonesia where women are known to suffer from marginalization reported the presence of very high levels of chronic child undernutrition (58% stunting and ~ 33% underweight) (50). Maternal marginalization and deprivation generally pass through a wide range of pathways to affect child health outcomes. It may affect gender roles in the household and determines the level of maternal autonomy, food distribution within the household, etc., all of which may have a subtle impact on the nutrition of both women and young children(51). Other studies link the maternal deprivation with the workload as women usually work in the homestead (reproductive role), engage in productive activities (including working on a farm and engaging in petty trading to earn income) and also have various social responsibilities in their communities compromises their nutritional health, limiting their ability to efficiently contribute to the healthy functioning of the home environment(52). Other studies demonstrated that mothers and/or primary caregivers greatly influence the neurobiological and psychological development of children, and deprived mothers most often do not have enough patterns of care, which are likely to affect the quality of the mother-baby interaction. Perry & Polard (1998) consider that persistent failures in the manipulation of babies in their first months of life contribute to decreasing the number of neuronal connections or to their inadequate development(53). Because children younger than three years are especially vulnerable and dependent on their mothers for nutrition and stimulation, researchers now acknowledge that maternal wellbeing is crucial for child development(54–56).

The current study found that child health service utilization had a strong inverse association with child health and survival. This finding is consistent with research in Cambodia that reported that children's health was associated with a mother's feeding practices, parent's health-seeking behavior, and personal hygiene(57). Mulholland and Colleagues associate the enormous under-5 deaths in developing countries with a lack of equity in the access and utilization of basic health services (58). Given the fact that common childhood disease (such as neonatal disorders, diarrhea, pneumonia, and malaria) are the main reported causes of under-5 mortality in developing countries (59), the role played by health service

utilization have been the dominant factor in recent reductions in child mortality rates in these countries(59).

The findings indicated a significant association between diet diversity score and the likelihood of child survival and health. Immediate causes of undernutrition are inadequate dietary intake and disease(59). For this reason, studies in developing countries reported that severely malnourished children comprise a significant proportion of pediatric deaths. (60). Previous studies in Ethiopia reported that household food insecurity and poor feeding practices are main factors affecting child's dietary intake (61, 62). It is well established that good nutrition, more importantly during the first 1000 days, is the bedrock of child survival, health and development since it offers an extraordinary window of opportunity for preventing undernutrition and its consequences(59).

These findings indicate positive association between household size and child health outcome. Studies in low-income countries generally have observed an inverse relationship between household size and child health(63, 64). The negative effects of having large household size on child survival is premised on the view that high dependency depletes resources, both tangible and intangible, to the disadvantage of children (65). Generally, poor households with many children are usually characterized by competition for care and resources. Contrary to this, some studies reported positive impacts of large household size on child health and survival. Such studies argue that the effect of high child dependency could be compensated for by the number of adults in the household who are capable of providing care and resources for child welfare (65).

The type of toilet facility was significantly associated with poorer child survival. It is well documented that almost one-tenth of the global disease burden could be prevented by improving water supply, sanitation, hygiene, and management of water resources(66, 67). A study conducted in the slum areas of Bangladesh's national capital, Dhaka, reported that the use of an improved water source had a significant impact on the incidence of childhood diarrhea(68). In the context of Ethiopia, eliminating the huge rural-urban disparities and improving water supplies would help to improve child health status.

The results also showed that fathers' education had a significant effect on child survival. This is not surprising, as previous studies have reported that educated fathers are more involved with issues of diet/nutrition, exercise, play, and parenting behaviors, which actively contribute to the overall health and well-being of their young children (69, 70). Additionally, educated fathers provide a higher household income, more freedom and supports, higher social status and stability, and more opportunities for their families to access healthcare services (71, 72). An interesting study based on national data from Indonesia(73) emphasized the importance of both maternal and paternal education. In this study, average education in the household had the effect of reducing the early mortality of children, which is consistent with the current finding.

Some environmental variables, such as sanitation and cooking fuel, are commonly reported factors in most studies of under-5 mortality(66–68). However, these factors did not become significant determinants of under-5 mortality in the current study. One of the reasons could be due to the

homogeneity of responses by a larger proportion of the respondent. This finding, however, sheds light on the importance of improving the toilet facilities to increase the likelihood of child survival and health.

The overall findings of this study strongly suggest that future reductions in under-5 mortality inequities would largely depend on our ability to decrease the abovementioned key risk factors or promote their desirable behaviors (especially breastfeeding, reduce intimate partner violence, manage pregnancy) through the use of initiatives that emphasize community literacy programs and formal education. In Ethiopia, serious efforts are needed to help reduce the unacceptably high proportion of mothers (71%) with no education. First, opportunities to receive a basic education empower mothers to better access healthcare services and become informed decision-makers in matters related to their own and their children's health(45, 46). Second, better-educated mothers are known to prefer smaller family sizes, which permits them to make more efficient use of their time and resources(47). Third, educated mothers are likely to marry later in life and experience longer birth intervals, which in turn may help reduce infant mortality risk(40, 48). Finally, our study revealed that father's education also plays a critical role in influencing their children's under-5 mortality, and therefore, more research in this area is warranted.

Strengths and Limitations

To our knowledge, this is the first study of its kind to investigate child survival and population-level impacts of key risk factors and/or potential interventions to U5M in Ethiopia. The current study analyzed data from a large and nationally representative survey and provides keen insight into the disparities in child survival in Ethiopia, a country perennially suffering from high early-life mortality rates. The findings could prove useful on a national scale in assessing the progress in our fight to improve child health and reduce U5M and serve as an important resource for the planning, targeting, monitoring, and evaluating of future health promotion activities and programs.

This study also has some methodological limitations. First, the DHS survey employed a cross-sectional design, which permits us to report on associations between the exposures and outcome of interest but cannot infer causality. Second, considering the sensitive nature of some of its questions and self-report structure of the survey, there may be instances of recall bias and inaccurate reporting by mothers (many of whom are illiterate) on important information (age of death, age of birth and other sociodemographic variables) leading to measurement errors and under- or over-reporting of child deaths.

5. Conclusions

Inequalities hamper Ethiopia's true progress towards reducing its U5M and achieving SDG-3. Though several drivers appeared to impact childhood survival and mortality differently, the four most significant factors warranting more attention are women's living context (rural residency), breastfeeding, the household structure they live in (domestic violence and poor autonomy), and health services. Given the fact that nearly two-thirds of Ethiopian women have no education and one-in-two live in financially disadvantaged (poor) households, the current study implies that a significant reduction in Ethiopia's U5M becomes possible mainly through the urgent implementation of national equity programs and policies

that improve the overall status of women. Aggressive intervention in promoting women's education and behavioral change communications at the grassroots level will enhance their status, and eventually helps to significantly reduce the huge disparity in early mortality in the population.

List Of Abbreviations

ANC: Antenatal Care

AOR: Adjusted Odds Ratio

CSA: Central Statistics Authority

DDS: Diet Diversity Score

DHS: Demographic and Health Surveys (DHS).

EDHS: Ethiopian Demographic and Health Surveys

GDP: Gross Domestic Product

IPV: Intimate Partners Violence

MOH: Ministry of Health

SDGs: Sustainable Development Goals

VIF: Variance Inflation Factor

U5M: Under Five Mortality

WHO: World Health Organization

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board of the University of Saskatchewan. The DHS took informed consent from respondents prior to the administration of the questionnaire.

Consent for publication

Consent to publish the data was taken from ICF International/ DHS.

Availability of data and material

The datasets used for this study are made available from ICF international upon request.

Competing interests

The authors declare no competing interest.

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Author Contributions:

NR, CF, and SW were involved in the study conception and design. NR was responsible for the data analysis; CF and SW contributed to the discussion, interpreted the findings. JB, RL and CH critically reviewed/edited the manuscript for intellectual content. All authors read and approved the final manuscript.

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