The Effect of Structural Gender Inequality Revealed in Small for Gestational Age

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Abstract

Background This study proposes that being small for gestational age (SGA) is not only an important indicator for neonatal health but also could be a consequence of gender inequality. Low birth weight (LBW) has been widely used as a measurement for adverse birth outcomes, whereas much less attention has been given to the use of small for gestational age (SGA). Despite the importance and worldwide acknowledgement of promoting gender equality and women’s empowerment to improve maternal and infant health, previous studies on SGA have focused on nutritional status, social and medical infrastructures, and socioeconomic status. The impact of structural violence against women on SGA has not been explored sufficiently. Therefore, the aim of this study was to examine the effect of gender inequality on SGA, using the Gender Inequality Index (GII).

Methods A total of 106 low- and middle-income countries (LMICs) from the most recent three global datasets—Institute of Health Metrics and Evaluation (IHME), the UN Development Programme (UNDP), and World Bank—were assessed.

Results Findings from generalized linear model analysis suggest that significant links exist between years of potential life lost (YLL) from SGA and gender inequality, maternal health status, and country level of income.

Conclusions Our findings advance the understanding of the role of gender inequality on SGA and reiterate the importance of considering structural violence in maternal and infant health research. These associations can support the message of designing public health and socioeconomic development as well as creating campaigns to promote gender equality in efforts to advance maternal and infant health and to prevent adverse birth outcomes across the globe.

Keywords Small for gestational age · Birth outcomes · Gender Inequity Index · Maternal and child health

Abbreviations

GII Gender Inequality Index
IHME Institute of Health Metrics and Evaluation
LBW Low birth weight
LMICs Low- and middle-income countries
SGA Small for gestational age
UNDP UN Development Programme
WHO World Health Organization
WB World Bank
YLLs Years of potential life lost

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Background Size at birth is an important indicator of maternal health and health status of newborn infants as well as a predictor for health outcomes in childhood and later life (Gluckman et al., 2008; Godfrey & Barker, 2001). Several different types of measurements are used when estimating size at birth, including gestational age, birth weight, birth head circumference, and birth length (Godfrey & Barker, 2001). Low birth weight (LBW), defined as a birth weight of less than 2500 g regardless of gestational age at birth, is the most commonly used birth size (Kramer, 1987). Small for gestational age (SGA) is another widely used measurement to describe babies who are smaller than usual for the number of weeks of pregnancy. These babies have a birth weight below the 10th percentile for infants of the same gestational age (McCowan & Horgan, 2009). Because body size increases with age, it is important to specify the gestational age regardless of the type of anthropometric measure being used (Sachdev & Fall, 2005). In addition, the WHO recommends that birth weight should
be considered with respect to gestational age in the presence of information on gestational age (WHO, 2001). However, unlike LBW, SGA does not have a single standardized definition or measurement used worldwide (Zeve et al., 2016). Many SGA babies are born with low birth weight and have smaller body mass than other babies of the same gestational age, but not all are premature (Ota et al., 2014; Zeve et al., 2016). Regardless of its complicated identification and estimation issues, SGA along with LBW are major determinants of perinatal mortality if not treated appropriately (Katz et al., 2014; Ludvigsson et al., 2018). The 2010 global estimation showed that about 32.5 million infants specifically in low- and middle-income countries (LMICs) were born SGA (19 million of whom are not LBW), which is double the prevalence of LBW. More than half of these SGA infants were born in South Asia (53%, 16.8 million) followed by Sub-Saharan Africa and Southeast Asia (Katz et al., 2013). SGA and LBW rates significantly differ between countries, yet mostly occur in LMICs.

LMICs account for about 98% of the estimated 2.6 million preventable stillbirths in 2015 worldwide and about 94% of 295,000 preventable global maternal deaths in 2017 (WHO, 2019b). Despite global efforts to improve maternal and infant health, SGA along with LBW remain major contributors to more than half of perinatal mortality and long-term morbidity in children. According to the WHO, all preterm and SGA babies are 15 times more likely to die, and one-third of neonatal deaths occur in babies born SGA (WHO, 2020). Numerous evidence indicates that adverse birth outcomes and poor environment after birth are substantial risk factors for childhood stunting, physical and cognitive development, as well as a long-term risk of non-communicable diseases in later life such as cardiovascular disease, obesity, and insulin resistance (Godfrey & Barker, 2001; Godfrey & Barker, 2001; Sachdev & Fall, 2005; Gluckman et al., 2008). Research suggests that high rates of SGA in Southern Asia are considered a leading cause of non-communicable disease burden (Bhutta et al., 2004). Hence, adverse birth outcomes have a universal impact on long-term public health and social costs in high income and more so in LMICs (Katz et al., 2013; Lee et al., 2017).

The majority of SGA research has found and highlighted the importance of maternal health-related factors (e.g., hypertension, undernutrition, smoking, and alcohol use) and social environmental (e.g., access to prenatal care and socioeconomic status) determinants of SGA (McCowan & Hogan, 2009; Shah, 2010). Other risk factors for SGA point to the ethnic differences in small-size women, who have short stature, lower BMI, and less weight gain during pregnancy compared to other ethnic groups (Khanam et al., 2019). However, results from population-based studies in high-income countries showed that significant gestational weight gain and growth are linked to maternal weight gain and health regardless of genetic factors (Shah, 2010). The 2010 study on the prevalence of adverse birth outcomes displayed that East Asia had the least prevalence of SGA, preterm births, and LBW followed by North Africa (Lee et al., 2013). Thus, studies on adverse birth outcomes including SGA should consider and examine other potential factors and pathways besides genetic causation attribution. Women in LMICs, for instance, suffer from some of the worse health outcomes and are susceptible to adverse birth outcomes in the world due to a lack of basic and health-related infrastructure and skills (WHO, 2019b). More specifically, women in Sub-Saharan Africa (SSA) regions show a significantly lower prevalence than in other regions due to skilled birth attendance, antenatal visits, and the use of modern contraceptives (Alam et al., 2015). While most studies on SGA by far have focused on individual maternal characteristics, only a few studies have examined social determinants at the population level such as maternal health-related and environmental risk characteristics.

The discourse on promoting gender inequality and empowering women has long been the focus and subject of much research and policy in efforts to improve the lives of women, infants, and children both in high-income countries and LMICs. It is well understood that the overall unequal socio-political and economic conditions of women, together with uneven power relations, are associated with the risk of exposure to environmental hazards and social trauma, access to resources such as information and services, and the ability of individuals to respond and cope with the social environment (Krieger, 2005; Osmani & Sen, 2003). Previous studies have suggested that women’s status in society is significantly associated with nutritional status and healthcare utilization for women and children (Katz et al., 2013). Disparities in the prevalence of adverse birth outcomes as well are believed to be the result of the embodiment of unequal gender-related social experiences.

The embodiment of gender inequality is aligned with the weathering hypothesis, which is based on the notion that there is a biological “weathering” of the body which increases with the length of time a person is exposed to stressors (Geronimus, 1992). This weathering then leads to the deterioration of the mother’s body, which has potentially negative consequences for fetal development and health. There is institutional and structural inequality that an individual cannot change or control, which may contribute to a biological reaction altering not only maternal health but also optimal womb conditions during fetal development. Institutional-level factors, therefore, may be a critical mechanism underlying cross-national and within-country disparities in adverse birth outcomes. In this study, we used the Gender Inequality Index (GII), which displays gender inequality between women and men in each country. Previous studies have found that GII and other socio-ecological indicators
have a significant effect on child nutrition and mortality (Brinda, Rajikumar & Enemart, 2015), adult obesity (Wells et al., 2012), and life expectancy/longevity (Kim & Kim, 2014, 2017). We also expect that countries specifically among LMICs with greater gender inequality would present higher SGA.

While the importance of promoting gender equality and women’s empowerment to improve maternal and infant health is well acknowledged across the globe, the role of gender inequality on adverse birth outcomes has been barely understood. Also, most of the prior research has focused on examining individual-level maternal health and socioeconomic characteristics contributing to adverse birth outcomes, yet little research has assessed how maternal health at a population level and infrastructure measures might be associated with them. Because adverse birth outcomes are multifaceted, it is necessary to consider larger influences apart from individual characteristics. The purpose of this study is, therefore, to examine whether gender inequality accompanied by the health of reproductive-age women and social infrastructure is associated with adverse health outcomes and years of potential life lost (YLL) due to SGA.

**Materials and Methods**

**Data and Indicator Sources**

This study is a cross-sectional analysis of the association between the Gender Inequality Index (GII) and small for gestational age (SGA) among 106 countries. We used three publicly available data sources collected in 2017: Institute for Health Metrics and Evaluation (IHME),1 the United Nations Development Programme (UNDP),2 and World Bank (WB).3

A total of 106 countries, which included 8 countries in South Asia, 11 countries in the Middle East and North Africa, 13 countries in East Asia and Pacific, 18 countries in Europe and Central Asia, 20 countries in Latin America and Caribbean, and 36 countries in Sub-Saharan Africa, were used in the analysis. The list of classification of countries by region is provided in the appendix (see Supplementary Tables 1–3).

We derived years of life lost (YLLs) from small for gestational age (SGA) as the main outcome in the IHME by setting the measure as YLLs rate per 100,000 and risk as low birth weight for gestation. The years of life lost (YLLs) is a summary measure of estimating the average time a person would have lived had he or she not died prematurely (Gardner & Šanbon, 1990). The Gender Inequality Index (GII) was obtained from human development data provided by UNDP. GII is a metric that has five indicators classified by three aspects: reproductive health (maternal mortality ratio and adolescent birth rates), empowerment (proportion of parliamentary seats occupied by females and proportion of adult females and males aged 25 years and older with at least some secondary education), and labor market (labor market participation and measured by labor force participation rate of female and male population aged 15 years and older). GII is used as a continuous measure that the higher the GII indicates a greater loss of potential human development due to gender inequality. It ranges from 0 to 1.

Indicators for maternal health such as the prevalence of dietary iron deficiencies, maternal hypertension, maternal sepsis, and sexual violence were obtained from IHME by setting the measure as prevalence rate per 100,000 among women of reproductive ages between 15 and 49 years old. Indicators for social infrastructure such as the percentage of access to electricity and the population using at least basic drinking water services were obtained by the World Bank. Basic drinking water services are defined as drinking water from an improved source; provided collection time is not more than 30 min for a round trip. Improved water sources include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water. The classification of income followed the criteria of GNI per capita in World Bank 2018–2019.

**Statistical Analysis**

All data were aggregated at the country level. Among 159 countries with Gender Inequality Index (GII), 106 countries were analyzed, excluding 49 countries with high-income status and 5 countries (Argentina, Central African Republic, Kyrgyzstan, Slovakia, and American Samoa) with missing data of indicators for social infrastructures. A generalized linear model (GLM) was used as a regression method for analyzing the association between GII and YLLs from SGA by adjusting related indicators. Two severely skewed variables (percentage of the population having access to electricity and percentage of the population using at least basic drinking water services) were converted into binary variables using 95% as the threshold (i.e., 95% or more and less than 95%). We developed three types of models to tease out the differential impact of GII on YLLs from SGA. In model 1, we examined the relationship between YLLs from SGA and indicators for maternal health and social infrastructure, which are well known to affect SGA. In model 2, along with

1 Institute for Health Metrics and Evaluation (IHME). GBD Compare. Seattle, WA: IHME, University of Washington. https://www.healthdata.org/
2 United Nations Human Development Programme, Human Development Reports. Gender Inequality Index https://hdr.undp.org/en/content/gender-inequality-index-gii
3 The World Bank. World Development Indicators. Washington, D.C.: The World Bank. https://data.worldbank.org/indicator
the indicators included in model 1, the influence of countries’ income levels on SGA was examined. Finally, model 3 examined the relationship with YLLs from SGA, including GII. Multicollinearity was tested in our data using the variance inflation factor (VIF) for all explanatory variables in the model. The VIF values did not exceed 4.5, suggesting that multicollinearity was not present.

**Results**

Out of 106 countries, 23 countries (21.7%) were low income, 32 countries (30.2%) were low middle income, and 47 countries were upper middle income by World Bank’s standards. The outcome variable, mean YLLs, from SGA was 1670 (SD 1480), ranging from 76.4 (Cuba in Latin America and Caribbean) to 7050 (Mali in Sub-Saharan Africa) (Table 1). As exposure variables, GII ranged from 0.13 (Montenegro in Europe and Central Asia) to 0.84 (Yemen in the Middle East and North Africa) with a mean value of 0.45 (SD 0.15). The prevalence of maternal health indicators in low-income countries was higher than those in upper-middle countries. The percentage of social infrastructure in low-income countries was lower than those in upper-middle countries.

In Fig. 1, it shows as GII increases, the YLLs from SGA increase. In addition, the degree of YLLs from SGA varies depending on the income status. This result indicates that

| Table 1 | Descriptive statistics for key variables used in analysis of 106 low- and middle-income countries in 2017 |
|---------|-------------------------------------------------------------------------------------------------|
|         | Low-income countries (N = 23)                                                                 |
|         | Low middle-income countries (N = 34)                                                             |
|         | Upper middle-income countries (N = 49)                                                           |
|         | Total (N = 106)                                                                                  |
| Years of life lost due to small for gestational age | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range |
| Gender Inequality Index                             | 0.59 (0.10)                                      | 0.37–0.84 | 0.48 (0.11) | 0.23–0.74 | 0.35 (0.11) | 0.13–0.54 | 0.45 (0.15) | 0.13–0.84 |
| Prevalence of dietary iron deficiency               | 24,400 (10,200)                                  | 5910–48,400 | 21,300 (9000) | 1510–39,700 | 15,300 (6890) | 3190–36,800 | 19,200 (9140) | 1510–48,400 |
| Prevalence of maternal hypertensive disorder        | 356 (212)                                        | 14.5–804 | 220 (222) | 1.82–824 | 84.6 (120) | 1.59–480 | 187 (207) | 1.59–824 |
| Prevalence of maternal sepsis and other maternal infections | 421 (197)                                                  | 76.9–735 | 242 (164) | 42.9–590 | 108 (88.9) | 29.3–473 | 219 (187) | 29.30–735 |
| Prevalence of sexual violence                       | 5980 (3460)                                      | 1460–13,200 | 4460 (2260) | 1790–9690 | 3780 (2590) | 1120–18,700 | 4470 (2810) | 1120–18,700 |
| Indicators for social infrastructure                |                                                                                                          |
| Percentage of the population having access to electricity, % | 43.40 (29.20)                             | 9.30–99.30 | 77.50 (21.60) | 33.70–100 | 96.30 (9.55) | 52.50–100 | 78.80 (28.00) | 9.30–100 |
| Percentage of the population using at least drinking water services, % | 63.30 (15.00)                             | 38.70–97.20 | 81.00 (15.00) | 41.30–99.10 | 95.40 (4.07) | 82.50–100 | 83.80 (16.80) | 38.70–100 |
GII positively correlates with YLLs from SGA. In upper-middle-income countries, the relationship between YLLs from SGA and GII was less strong than that in low-income countries.

Table 2 shows the results of the multiple regression analysis for the association between YLLs from SGA and maternal health indicators and social infrastructure indicators. In model 1, indicators for maternal health are positively related to YLLs from SGA; the prevalence of dietary iron deficiency (estimate coefficient 0.04; 95% CI 0.02, 0.06), the prevalence of maternal hypertensive disorder (estimate coefficient 1.49; 95% CI 0.04, 2.94), and the prevalence of maternal sepsis and other maternal infections (estimate coefficient 2.87; 95% CI 1.09, 4.66). Among indicators for social infrastructure, basic drinking water service (estimate coefficient − 445; 95% CI − 888, − 2.49) is associated negatively. The income status variable is added to model 2. While indicators for maternal health are still positively linked to YLLs from SGA, indicators for social infrastructure are no longer relevant. Income status shows highly negative association; low middle-income status (estimate coefficient − 1138; 95% CI − 1604, − 672) and upper-middle-income status (estimate coefficient − 1399; 95% CI − 1958, − 840). Model 3 includes all variables of model 2 and adds GII. The prevalence of maternal hypertensive disorder (estimate coefficient 1.48; 95% CI 0.27, 2.7) and GII (estimate coefficient 3371; 95% CI 1756, 4985) are significantly associated with YLL from SGA, whereas indicators for maternal health and social infrastructure are no longer significant. Income status shows a negative association, but the size of correlation has decreased; lower-middle-income status (estimate coefficient − 930; 95% CI − 1372, − 487) and upper-middle-income status (estimate coefficient − 1060; 95% CI − 1603, − 517). The F-statistics for 3 models (38.46, 30.85, and 42.36) indicate the statistical significance of the model.

Discussion

The vital importance of improving the lives of women, infants, and child health should continue to be on the global priority agenda. According to the WHO, the vast majority of maternal and infant mortality and morbidity can be avoided through improving access to basic health care and infrastructure services (Alam et al., 2015). Specifically, investing prior to and during pregnancy by increasing affordable timely and proper antenatal care (ANC) and skilled birth attendants is critical for the maternal population in a low-resource setting (Tunçalp et al., 2017; WHO, 2020). Also, the postnatal is considered the most decisive period in the lives of both the mother and the newborn; yet this is often the most neglected...
area in LMICs. Several reports have described significant regional and wealth disparities in maternal health utilization in many LMICs (WHO, 2019b).

In the context of SGA, a greater understanding of the risk factors and finding evidence exclusive to SGA or in combination with other adverse birth outcomes, including LBW and preterm, would accelerate reducing the prevalence of conditions and facilitate the development of specifically targeted interventions and program implementation. Since health needs in LMICs have become more complex, better quality population-based data in LMICs for gestational age in addition to birthweight are critical in assessing the associated risk of SGA, guiding individual clinical care, and identifying at-risk populations.

Our study findings suggest that reducing adverse birth outcomes relies not only upon maternal health status and socioeconomic infrastructure improvement but also on advancing gender equality. All these areas need development and are closely linked with improving women’s status in society. The fact that empowering women is a multifaceted process, it requires social, cultural, legal, and economic attention; understanding; and efforts across the lifespan of women. Much of the advancement regarding gender equality can and should be understood and explained by increased access to education for girls, family planning programs such as delayed first pregnancy, improved nutrition, increased availability of safe water sources and better sanitation, improved infrastructure, pro-poor economic growth, and creating more diverse employment opportunities (Oxaal, 1997).

Despite improvements in maternal and infant health, there are still a large number of maternal and infant deaths occurring each year throughout the world. Yet a larger number of births are marked by prematurity, LBW, and SGA. To better examine the role of gender inequality as well as the economic and infrastructural environment associated with disparities in YLLs from SGA, we executed multivariate analyses of GII, population-level indicators for maternal health and social infrastructure, and income levels (based on GDP) among the 106 LMICs. Utilizing the most recent multiple global datasets and accounting for all factors, our results showed that countries with higher gender inequality, higher prevalence of maternal hypertension, and lower levels of income are significantly associated with higher YLLs from SGA. Most notably, our findings showed that a significant contribution of GII to the YLL from SGA can be observed even after accounting for income levels among LMICs. SGA appears to be more greatly associated with maternal health and social infrastructural factors compared to other previously studied indicators. This finding suggests that population-level characteristics may play a more crucial role in poor birth outcomes than individual-level indicators. This also confirms other previous research findings that GII and other socio-ecological indicators have a latent effect throughout the life course from birth, childhood, adulthood,

| Table 2 | Multiple regression results for the effect of Gender Inequality Index and other indicators on years of life lost due to small for gestational age |
| --- | --- | --- |
| **Model 1** | **Model 2** | **Model 3** |
| **Estimate** | **95% CI** | **Estimate** | **95% CI** | **Estimate** | **95% CI** |
| Prevalence of dietary iron deficiency | 0.04** | 0.02 | 0.06 | 0.03* | 0.01 | 0.05 | 0.01 | 0 | 0.03 |
| Prevalence of maternal hypertensive | 1.49* | 0.04 | 2.94 | 1.88* | 0.59 | 3.17 | 1.48* | 0.27 | 2.7 |
| Prevalence of maternal sepsis and other maternal infections | 2.87* | 1.09 | 4.66 | 1.11 | −0.6 | 2.82 | 1.07 | −0.52 | 2.65 |
| Prevalence of sexual violence | −0.03 | −0.1 | 0.04 | −0.03 | −0.09 | 0.03 | −0.03 | −0.09 | 0.03 |

**Indicators for maternal health**  
(female, age 15–49, per 100,000)

- Prevalence of dietary iron deficiency
- Prevalence of maternal hypertensive
- Prevalence of maternal sepsis and other maternal infections
- Prevalence of sexual violence

**Indicators for social infrastructure**

- Percentage of the population having access to electricity, %
- Percentage of the population using at least drinking water services, %

**Income status by world bank**

- Low income
- Low middle income
- Upper middle income

**Gender Inequality Index (GII)**

| *R*²-adjusted | 0.650 | 0.764 | 0.779 |
| F-statistics | 38.46 | 30.85 | 42.36 |

Note. *p < 0.05; **p < 0.01
and death (Wells et al., 2012; Kim & Kim, 2014; Brinda, Rajikumar & Enemark, 2015; Marphatia et al., 2016; Kim & Kim, 2017; Kim, 2022). The plotted graphs on the continual spectrum between GII and YLLs from SGA (Fig. 1) suggest that the impact of GII on health outcomes of SGA may vary by the condition or levels of income or development. These results highlight the need to continue examining predictors and underlying factors associated with poor birth outcomes at the country level.

Our findings support the notion that gender is a social determinant of health linked across all levels of society, including barriers that limit access to healthcare, nutrition, and educational attainment as well as being more prone to gender-based violence, early marriage, and pregnancy. In some societies in LMICs, the husband decides when to take his wife to the hospital or seek more advanced medical care (Wai et al., 2015). Also, a strong patriarchal ideology dominates and dictates the day-to-day lives of many women. These women are likely to allow dominant cultural ideologies to influence their own beliefs on gender dynamics. These situations and experiences often result in inadequate care, pregnancy complications, and maternal and infant mortality. Unequal structure and environment can be internalized in ways that impair maternal health and fetal development during pregnancy (Gage et al., 2013).

Given the analysis of the previous research on SGA is limited at the individual level, this study adds to evidence of the impact of the institutional and structural factors on pregnancy outcomes, stressing contextual variables beyond individual measures should be considered in future research. Our exploratory model suggests that factors associated with SGA may further prove that these are possibly linked to the factors directly influencing the maternal body. While current research assessed gender inequality, there could be other high levels of economic, political, and other social inequalities affecting such maternal health outcomes. A combined effect of such complex factors may play a significant role in getting under the skin of women in ways that influence both maternal and fetal development.

This present study has potential limitations. Some of the data regarding social infrastructure variables was missing, especially in low-income countries, which led to the omission of those countries from the analysis. Adding such countries to our analysis would have enhanced the strength of association examined in our study. Also, considering the nonlinear relationship between YLL and GII, we have tested GLM using a quasi-family which showed the same results of estimates and significance as the ordinary least squares (OLS) regression. Since this study aimed to propose generating new hypotheses, we decided to utilize OLS regression analysis, the basic statistical method. Since the normality assumption cannot be satisfied even with the log-transformation, we suggest future studies consider performing a non-parametric approach. Another limitation is the use of a proxy measure of multi-dimensional gender inequality that was not able to capture the extent to which indicators or dimensions are associated with SGA. Future research needs to continue exploring the specific dimension and indicators within gender inequality. For instance, female literacy rates indicate access to basic knowledge and education for women as well as the value placed on women’s education within the country. This is an important factor for examining maternal and infant health as most maternal and infant deaths occur among young women in low-income countries (WHO, 2019a). Lastly, due to the ecological nature of the study, the validity of inference based on the aggregated level results should be made with caution.

Unequal gender may interact with infrastructural and environmental indicators that are significantly associated with maternal and infant health. It is necessary to better understand and assess the unmeasured confounding factors driving the associations and whether institutional level contexts are maybe even more powerful in shaping the risk of SGA. Future studies, therefore, should critically examine higher-level influences on birth-related outcomes as well as conduct a rigorous multi-level approach to account for individual-level characteristics and experiences. Despite these limitations, this research provides a comprehensive view of gender inequality and adverse birth outcomes in LMICs. Our findings suggest evidence of the impact of gender inequality on potential years of life lost from SGA and emphasize the need to focus on improving the lives and rights of women in various social settings.

The current COVID-19 pandemic has indeed imposed substantial challenges in advancing women’s status and rights as well as maintaining maternal and infant health services. Women in LMICs are more likely to engage in informal work at higher rates and less likely to work from home, leading to a higher unemployment rate and more susceptible to infection during the pandemic. It is reported that the pandemic has caused the rise of domestic and sexual violence and caused the withdrawal of essential programs and resources for maternal and infant health. Several studies have already estimated the indirect adverse impact of COVID-19 on maternal and infant health and suggested that women and infants would have considerably distinctive consequences from the pandemic in the long term (Graham et al., 2020; Menendez et al., 2020).

Implications for Policy and Practice

The COVID-19 crisis may add an extra layer to existing inequalities in society, putting the lives of women, newborns, and children at greater risk. While the crisis response and public policy measures across the globe have focused on
mitigating the spread of COVID-19, continuing investment in the health system has not been properly pursued nor reinforced. The failure of multilateral organizations to function effectively amid the global crisis has contributed in part to the neglect of women and children at risk of suffering. Measures for minimizing disruption of existing sexual and reproductive health services for women should be sought out and included in the planning and implementation process.

Conclusions

This present study contributes to the existing literature by assessing associations between gender inequality and one of the perpetual adverse birth outcomes, SGA, by utilizing the most recent LMICs data. Our findings support the evidence that gender inequality has an impact on potential years of life lost from SGA existence. We propose further attention to examining this relationship and emphasize the advancement in the effort to improve the lives and rights of women in various social settings. Our study reiterates the importance of continuity in investigating persistent structural inequalities in maternal and infant health studies, which should never be overlooked despite all the crises at hand.

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Author Contribution EHP carried out conceptualization, methodology, formal analysis, and writing original draft. SJK carried out project administration, conceptualization, data curation, and writing original draft. YEC contributed writing, review, and editing.

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Declarations

Ethics Approval and Consent to Participate Not applicable.

Consent for Publication Not applicable.

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