



Factors Influencing Women's Health in Conflict Zones in Africa

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Abstract: This study sought to examine the factors that influence women's health in conflict zones for the period spanning 1975–2018. The investigation was motivated by the fact that war and violent conflict strain already underdeveloped healthcare systems and frequently put disadvantaged groups—particularly women and children—at risk of being denied access to essential services like healthcare. Living in or close to conflict zones puts women at a higher risk for sexual assault, poor reproductive health, unwanted pregnancy, and poor maternal health outcomes. By destroying infrastructure, food, water, and sanitation systems, armed conflict reduces access to healthcare. The results showed that the remittances and life expectancy have a negative relationship with maternal mortality. Development assistance, the number of refugees, and military expenditure were seen as having a positive relationship with maternal mortality, but no significant relationship was found with either economic growth or internet usage. This calls for new policy and self-care interventions. There is also a need to explore how to maximise the benefits of technology in delivering health interventions to hard-to-reach populations. There is also a need for policymakers to explore how to maximise the benefits of technology in delivering health interventions to hard-to-reach populations.

Keywords: women; women's health; conflict; war; sexual violence



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1. Introduction

Armed conflicts pose a serious threat to public health, and they also pose significant challenges to health systems [1–3]. Epidemics, disruptions to the healthcare system, and population displacements are examples of immediate consequences resulting from armed conflict. In times of conflict, everyone suffers, but children, girls, and women are particularly at risk. Rostomian [4] concurs and states that mothers, children, and young girls bear a disproportionate share of the burdens of conflict because their health depends on regular access to functioning healthcare systems. This causes challenges during times of violent conflict. According to Firoz [5] and Ndebele [6], women who live in conflict- or post-conflict-affected areas are especially susceptible to sexual assault, poor reproductive health, unintended pregnancies, and poor maternal health outcomes. Crisis situations overburden and impair the healthcare systems.

Beyond the battlefield, the repercussions of conflict affect future generations. Conflict has an impact on the infrastructure, people, and financial resources that make up a nation's current health system. Due to the damage to infrastructure, food-distribution channels, water, and sanitation systems during violent conflict, the provision of healthcare services is greatly affected. Requejo et al. [7] and the Red Cross [8] assert that healthcare facilities are frequently destroyed in violent-conflict situations, health personnel flee and or stop working out of fear, and aid personnel are frequently unintentional or intended targets of attacks by conflict participants. As a result, women, children, and other population groups cannot access the essential healthcare they need. In addition, even though armed conflict also impacts some nations with advanced and effective health systems, many conflict-affected states already have deficient health systems even before the conflict begins.

Conflict-affected countries consequently have some of the lowest health indicators and weakest healthcare systems worldwide [9].

Conflict negatively affects health infrastructure, which is intentionally or unintentionally plundered and or damaged by belligerent factions. Health facilities that are not completely damaged possibly end up scaling their services or shutting down completely. As in Sudan in 2023, hospitals can occasionally turn into battlegrounds when opposing armies occupy them as army bases [10–12]. This may impede the provision of healthcare and, in turn, worsen health inequalities. Limited access to maternal health services because of safety, financial, and geographic constraints, as well as the breakdown of the health system, increase maternal morbidity and death during a conflict. Around 61% of maternal deaths occur in humanitarian and unstable situations as a result of the enormous gaps in access to and the quality of maternal and newborn care present in these circumstances [13,14].

Conflicts and unstable conditions increase pre-existing discrimination practises against women and girls, putting them at risk for human-rights abuses [15]. While all civilians are negatively impacted by armed conflict, it is undeniable that women and girls are predominantly and frequently the targets of sexual violence [16]. Women are vulnerable to coercion and sexual violence during times of crisis. Gender-based violence, such as coercion and sexual violence, deprives a person of their autonomy in reproductive roles and their ability to make decisions. Women often have a higher risk of illness due to their reproductive roles and a larger need for health services. Making matters worse, women and girls may not have access to basic services like healthcare, which includes sexual and reproductive health services, putting them at an increased risk of unintended pregnancies, maternal mortality and morbidity, severe sexual and reproductive injuries, and STIs [15,17,18]. Internally displaced women frequently lack access to sufficient reproductive healthcare treatments and interventions, and they may also be subjected to abuse, violence, forced labour, trafficking, forced sexual exploitation, and kidnaping. For this reason, Duff-Brwon [19] and Masset [20] contend that the effect of armed conflict on the health of women “far exceeds” the impact of those directly hurt or killed by the violent conflict.

When the above information is taken into consideration, it may be inferred that conflict-induced disruptions, such as human displacement, supply chain disruption, and deterioration or damage to health facilities, limit the ability of the national health system to address this increased demand for healthcare services [21]. Armed conflicts significantly impair essential health services which women substantially rely on for their health, or make them inaccessible during crisis conditions [12,22]. This compounds health risks for all affected populations, particularly women. Akseer [23] further states that access to crucial services for maternal and reproductive health is significantly worse in conflict-affected nations than in non-conflict ones. One in five women are likely to become pregnant during a crisis, and three out of five preventable maternal fatalities occur in conflict, displacement, and natural disasters [24,25].

This study explores the environment in which women and girls manage their health and well-being during conflict, to attain a better comprehension of the factors influencing women’s health in conflict settings. The academic community has not adequately engaged with this topic despite accumulating evidence of the catastrophic impact of armed conflict on public health [4]. Most of the focus is on the conflict, not the health and well-being of those affected by the violence [19]. The limited literature and attention in healthcare delivery in conflict settings demonstrates that women’s health issues have not been fully integrated into the delivery of healthcare in conflict settings, despite being an important political and social goal of the international community’s engagement in conflict-affected states. Women’s health issues in conflict situations are typically unaccounted for, which makes them a vulnerable group in practices of conflict [26]. This makes it worthwhile to understand the health challenges that women face during violent conflict and crisis. Understanding the challenges of delivering healthcare in armed conflict helps guide and shape policies and frameworks implemented in such contexts. This study, therefore, aims to examine the factors influencing women’s health in conflict settings in Africa.

2. Results and Discussion

2.1. Correlation Statistics

The correlations statistics of the independent variables used in the analysis are presented in Table 1.

Table 1. Correlation matrix.

	LE	REM	ODA	REFUG	INTUSE	ME	GDP
LE	1.0000	0.5164	−0.2989	−0.2686	−0.4867	0.5164	−0.1665
REM	0.5164	1.0000	−0.0760	−2.2778	0.4788	−0.0576	−0.0409
ODA	−0.2989	−0.0760	1.0000	0.0180	−0.3689	0.0952	0.5844
REFUG	−0.2686	−2.2778	0.0180	1.0000	−0.2045	−0.4093	−0.0454
INTUSE	−0.4867	0.4788	−0.3689	−0.2045	1.0000	−0.1076	−0.2165
ME	−0.4675	−0.0576	0.0952	−0.4093	−0.1076	1.0000	0.1064
GDP	−0.1665	−0.0409	0.5844	−0.0454	−0.2165	0.1064	1.0000

Table 1 shows that all the series do not exhibit high-correlation coefficients. This shows that the independent variables were not correlated. This is desirable, as high correlation can result in multicollinearity.

2.2. Main Results

The system of GMM and the one-step GMM were carried out, and the results are shown in Table 2. However, this study focuses on the system's GMM estimates, as it is a generally recognized technique for addressing the endogeneity and simultaneity bias problems.

Table 2. System's generalised method of moments results. Dependent variable: maternal mortality.

VARIABLE	S-GMM	GMM
ME	0.1157 ** (0.0507)	0.2090 *** (0.0727)
UINT	2.2436 (0.0872)	2.3331 (0.4571)
DA	−0.6618 *** (0.1175)	−0.6717 *** (0.1158)
REF	0.1534 *** (0.0550)	0.0153 (0.0287)
REM	−0.5691 *** (0.1238)	−0.1806 *** (0.0506)
GDP	0.1179 (0.0756)	0.2614 *** (0.0717)
LE	0.5583 *** (0.1341)	0.7099 *** (0.1637)
R-Squared	0.64	0.67
Sargen test statistic (<i>p</i> -value)	0.1167	0.1634

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The coefficient associated with REM is negative and significant. This confirms that the relationship between remittances and maternal mortality is negative; when remittance flows increase, maternal mortality decreases. In conflict situations, remittances support people who cannot leave because leaving carries the prospect of losing everything and being stranded in miserable conditions in a foreign area. In most cases, those who choose to stay are extremely dependent on others for their livelihood. Numerous immigrants and refugees, especially those living in countries that are safer and have greater incomes,

send money to loved ones back home. More than one in five refugees and migrants from other countries come from unstable and conflict-affected areas, where families are more likely to be severely poor and reliant on remittances [27]. The results of this study are also consistent with Mahmood et al.'s [28] findings. Mahmood et al. [28] report that international remittances have a considerable and favourable impact on pregnant mothers' health outcomes. The study's findings supported the hypothesis that households that receive remittances are more likely to make informed health decisions and that they also have better health outcomes.

The coefficient associated with DA is positive and significant. This confirms that the relationship between development assistance and maternal mortality is positive. The findings appear unexpected at first glance because foreign aid is supposed to improve health outcomes like maternal mortality. However, it has been observed that supplying aid in conflict zones can be difficult and risky for both aid recipients and those supplying the aid. In conflicts and unstable situations, aid may not always reach those who need it the most because it is frequently sent to regions where there are better health outcomes already or where infrastructure and prior aid has already been established. This claim is supported by Greco, Powell-Jackson, Borghi, and Mills [29] and Kotsadam et al. [30]. Greco, Powell-Jackson, Borghi, and Mills [29] monitored the flow of health-related aid from 2003 to 2006 and discovered that support for maternal health did not always reach the nations most impacted. Aid can be politically manipulated in the way that it is distributed [30]. Williamson [31] also found that foreign aid is ineffective in improving overall health. Likewise, Pandolfelli et al. [32] indicated that International monetary fund loans and structural adjustment contribute to higher maternal mortality in Sub-Saharan Africa. Therefore, instead of lessening intergroup inequities, development aid may actually make them worse.

The coefficient associated with REF is positive and significant. This confirms that the relationship between refugees and maternal mortality is positive. The findings imply that maternal mortality rises during periods of intense refugee migration. This agrees with earlier research. Studies have indicated that women have less success with resettlement than males do, which is crucial for refugee mothers who must deal with the challenges of both parenthood and exile. Furthermore, studies show that refugee women risk having their access to medical facilities delayed [33]. Refugee women experience poor outcomes and low sexual and reproductive service utilization, which may be caused by the availability and calibre of sexual and reproductive services at their new locations [34]. All these findings support the current study's finding.

The coefficient associated with ME is positive and significant. This confirms that the relationship between military expenditure and maternal mortality is positive. This shows that when military expenditure increases, maternal mortality also increases. This may be caused by the fact that governments in conflict zones frequently channel financial resources into military activities. This is in line with the literature. It is believed that government spending on the military has opportunity costs and might displace other types of expenditure. The opportunity costs of defence can be linked to the potential trade-off between military investment and public-health spending [35,36]. Ikegami and Wang [37] presented evidence that supports the view that military spending in particular can divert government funds from publicly financed health spending. Fan et al. [38] showed that the trade-off between military expenditure and health outcomes is more manifested in low-income countries, where a 1% increase in military spending results in a 0.962% drop in health spending. Their study also showed that conflict, among other things, influences this trade-off. Gillani et al. [39] revealed that countries with lower levels of military spending have a moderately high life expectancy and low infant mortality compared to nations that spend much on their military.

The coefficient associated with INTUSG is negative and insignificant. This confirms that internet usage does not influence maternal mortality. This may be caused by the fact that healthcare within conflict environments is naturally complicated, given the entangle-

ment of affected populations, militaries, and deteriorating public services [40]. This might explain why there is no relationship between internet usage and maternal mortality. Another reason is that in conflict and violent situations, African countries usually shut down the internet. This makes it difficult for the masses to access the internet and the usefulness of the internet is curtailed. However, it must be indicated that healthcare delivery could be revolutionized by the use of digital health technology, such as telemedicine, electronic medical records, wearable health devices, mobile health (mHealth), and cutting-edge software applications [41]. Additionally, technology has long been anticipated to assist in examining and identifying elements that contribute to outbreaks of violence and disease [42]. Majeed and Khan [43] proved that ICT had a positive but weak relationship with population health.

The coefficient associated with GDP is positive and insignificant. This confirms that there is not a relationship between economic growth and maternal mortality. Income makes nutritional foods and appropriate and timely healthcare accessible and affordable at the time of pregnancy [44,45]. Li et al. [46] provided evidence which suggests that income reduces maternal mortality. The study showed that income reduced maternal mortality through prenatal care and hospital delivery. Ensor et al. [47] presented evidence that suggested that economic downturns have a negative association with maternal and infant outcomes, particularly in earlier stages of a country's development. However, the findings of this study do not align with those of Manfredini [48]. Manfredini [48] showed that GDP per capita does not show any significant effect on maternal mortality.

The coefficient associated with life expectancy is positive and significant. This confirms that the relationship between life expectancy and maternal mortality is positive. One of the most commonly used measures of population health is life expectancy [49,50]. Bilas, Franc, and Bošnjak [51] state also that an essential synthetic indicator for evaluating a nation's or a region's economic and social growth is life expectancy. Life expectancy, therefore, is a synthetic indicator for assessing the quality and access of healthcare in a country. In order to achieve equity and universal health coverage, as well as to lower mother- and newborn-mortality rates, interventions to improve healthcare quality are essential [52].

2.3. Diagnostic Tests

Two tests were performed for diagnostic purposes. These tests were the Sargan test and the Arellano–Bond test. The results are shown in Table 3.

Table 3. Arellano–Bond test.

Test Order	m-Statistic	Prob
AR(1)	−1.601	0.0102
AR(2)	0.7261	0.4678

The *p*-value for AR(1) is less than 0.05 and for AR(2) is insignificant. This shows that the null of no serial correlation cannot be rejected. Furthermore, Table 2 shows that the Sargan test statistic is insignificant (0.1164). Hence, it can be concluded that the instruments used in the model are valid. The estimation regressions satisfy mutually the serial correlation test and Sargan test of over-identifying restrictions.

3. Materials and Methods

3.1. Research Approach and Data Sources

The study used secondary quantitative panel data, often available from official government sources and trusted research organizations. The study period spanned the years 2000–2020. The following countries that experienced violent conflict were selected for the analysis: Burkina Faso, Burundi, CAR, Chad, DRC, Equatorial Guinea, Gambia, Mali, Sudan, and Somalia. The data were obtained from the World Bank. The choice of the starting period and country selection was constrained by the availability of data. Table 4 presents descriptions of the variables in the study.

Table 4. Summary of variable descriptions.

Variable	Description and Unit of Measurement	Source
MM	Maternal mortality	World Bank
LE	Life expectancy	World Bank
REM	Remittances	World Bank
DA	Development assistance	World Bank
REFUG	Refugees	World Bank
INTUSE	Individuals using the internet (% of population)	World Bank
ME	Military expenditure (% of GDP)	World Bank
GDP	Economic growth	World Bank

3.2. Model Specification

This study adopted a modified model of Grossman [53] and the work of Adu et al. [54]. Grossman derives the demand for health from an optimal control model, in which health capital is both a consumption and an investment good. In his approach, the individual chooses his/her level of health and therefore his/her life span. Adu et al. [54] also utilized Grossman's theory when they conducted a study that tested the effects of individual- and community-level factors on maternal health outcomes in Ghana. This study modifies Adu et al.'s [54] model. The general model of this study is specified as the following:

$$MM = F(LE, REM, ODA, REFUG, INTUSE, ME, GDP) \quad (1)$$

The study uses maternal mortality (MM) as a measure of women's health as the dependent variable. The independent variables are as follows: life expectancy (LE), official development assistance (ODA), number of refugees (REFUG), remittances (remittances are usually understood as the money or goods that migrants send back to families and friends in origin countries) (REM), military expenditure (ME), the number of people using the internet (INTUSE), and economic growth (GDP).

3.3. Estimation Techniques

The study used a system generalised method of moments (GMM) for estimation. This is because, in assessing the panel model estimation, potential endogeneity issues arise because of unobserved heterogeneity and cross-sectional dependence [55,56]. Endogeneity can be loosely defined as a correlation between independent variables and error terms in a regression model [57]. To overcome such issues, the study used the system's GMM. The system's GMM estimator of Blundell and Bond [58] uses the equation in levels to obtain a system of two equations, one differentiated and the other in levels. By adding the second equation, additional instruments can be obtained. Thus, instruments for the level equation are the lagged differences of explanatory variables, while instruments for the differenced equation are obtained from the lagged levels of the explanatory variables [59].

3.4. Diagnostic Tests

According to Ullah et al. [60], when applying the generalised-method-of-moments model, researchers need to apply two post-estimation tests to ensure that an appropriate econometric model is applied. The study applied the Arellano–Bond test for first-order and second-order correlation and the Sargan test. The Arellano–Bond test for no autocorrelation (or no serial correlation) is used under the null hypothesis that the error terms of two different time periods are uncorrelated. In other words, it means that the lagged variables are not correlated with the error term. The second condition is tested by a Sargan test of overidentifying restrictions. The null hypothesis of the test corresponds to the nonexistence of the correlation of the instruments with the error term against the hypothesis of correlation [61].

4. Conclusions

This study sought to examine the factors that influence women's health in conflict zones for the period spanning 1975–2018. This study drew from the fact that violent conflict strains already strained health systems and frequently puts disadvantaged groups, especially women and children, at danger of being denied access to essential services such as healthcare. Women who live in or close to conflict zones are particularly vulnerable to sexual assault, poor reproductive health, unwanted pregnancies, and poor health outcomes. Armed conflict adversely affects all civilians, but it is undeniable that women and girls are disproportionately and frequently the victims of sexual violence. During times of crisis, women are vulnerable to coercion and sexual assault.

The results showed that the relationship between remittances and maternal mortality is negative; when remittance flows increase, maternal mortality decreases. The results further showed that the relationship between development assistance and maternal mortality is positive. The coefficient associated with REF is positive and significant, and this confirmed that the relationship between refugees and maternal mortality is positive. Military expenditure was seen to have a positive relationship with maternal mortality. This showed that when military expenditure increases, maternal mortality also increases. The coefficient associated with internet usage was negative and insignificant, suggesting that internet usage does not influence maternal mortality. Economic growth was also seen to have an insignificant relationship with maternal mortality. This suggests that there is not a relationship between economic growth and maternal mortality. Life expectancy was seen to have a negative relationship, and this suggests that when life expectancy increases, maternal mortality decreases.

In light of these findings, we recommend that governments and the financial industry in conflict-ridden regions improve the flow of remittances. These are pillars of the economy that could at least partially cushion the shocks of decreased income. It is believed that sending money to conflict-ridden and war-torn countries is typically more expensive than sending it elsewhere. Reduced transaction costs would be extremely beneficial to beneficiary families. To get these communities back on track toward a recovery that is inclusive, resilient, and sustainable, it is crucial to make sure that remittances reach them. There is also a need to rethink how development assistance is channelled in conflict-ridden areas. Measures must be put in place to ensure that development assistance reaches the intended targets. When development assistance does not reach the intended beneficiaries, this can exacerbate existing inter-group disparities instead of reducing them.

The results also show that when the numbers of refugees increase, maternal mortality also increases. This calls for policy makers to intervene and promote self-care interventions. Self-care interventions can work well when there are enough resources to support women in conflict situations. Self-care in crisis-affected settings can also be successful as a complement to provider-led services in health facilities and has been shown to support self-autonomy. Self-care for sexual and reproductive health can equip women and girls with skills and knowledge passed through generations to manage their health. There is also a need for policymakers to explore how to maximise the benefits of technology in delivering health interventions to hard-to-reach populations. Technology can be a useful source of self-care. Technology can help update and upgrade health workers' skills and educate women about pregnancy care.

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