

# Maternal Education, Domestic Violence and Childhood Malaria in the Democratic Republic of the Congo

Robert Luanda Baroki  
Anastasie Bulumba Mariam

Research Paper 557

AFRICAN ECONOMIC RESEARCH CONSORTIUM  
CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

# Maternal Education, Domestic Violence and Childhood Malaria in the Democratic Republic of the Congo

By

Robert Luanda Baroki  
Université Catholique la Sapiencia de Goma, DRC  
Faculty of Economics

and

Anastasie Bulumba Mariam  
Université Libre des Pays des Grands Lacs, DRC  
Faculty of Economics

AERC Research Paper 557  
African Economic Research Consortium, Nairobi  
April 2024

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium  
P.O. Box 62882 - City Square  
Nairobi 00200, Kenya

ISBN 978-9966-61-262-5

© 2024, African Economic Research Consortium.

# Contents

List of tables

Acknowledgements

Abstract

1. Introduction	1
2. Literature review	4
3. Methodology	8
4. Source of data and variables	12
5. Results and discussion	16
6. Conclusion and Policy implications	20
References	21
Appendix A	24
Notes	25

# List of tables

1	Descriptive statistics for the included variables	13
2	Malaria and anaemia	14
3	Child health indicators in regard to mother's attitude toward domestic violence	15
4	Logistic model for child malaria	16
5	Anaemia model	18
A1	Model robustness to IPV perception measure	24

## Acknowledgments

This study received technical and financial support from the African Economic Research Consortium. The authors are also grateful to Professors David Sahn and Doctor Simone Schotte for their guidance.

# Abstract

This study investigates the effect of maternal human capital and domestic violence perception on child malaria in the Democratic Republic of the Congo (DRC), one of the countries with the highest malaria prevalence in the world. Second only to Nigeria, the DRC recorded the highest number of malaria victims in the world in 2022, representing 12% of global malaria deaths. Malaria is the main cause of child mortality and morbidity in the DRC, with nearly 30% of children below the age of five testing positive, as reported in the latest UNICEF survey. These statistics contrast with the widespread use of insecticide-treated bed nets and excellent knowledge of the modes of malaria transmission in the country. Therefore, this study explores other potential determining factors for malaria, particularly maternal education and attitude toward domestic violence, a measure of empowerment, in order to inform policy measures to combat the disease. The study also analyses anaemia as a malaria-related outcome, in an effort to comprehensively assess the effect of the proposed control factors on the malaria burden, as recommended by the World Health Organization. Using a logistic model based on Rosenzweig and Schultz's framework and the 2013–2014 DRC Demographic and Health Survey, it is found that maternal education significantly and positively affect child malaria while female empowerment has positive and significant effects on anaemia. Cluster's altitude, father's education and mother's age are other significant predictors of child malaria and anaemia.

Key words: Child health production function, Maternal education, Malaria, Domestic violence, Demographic and Health Survey, Democratic Republic of the Congo.

# 1. Introduction

Malaria is one of big threats to child health and, therefore, to human capital accumulation and long-term productivity. The world recorded 21 million malaria cases in 2022, with the Democratic Republic of the Congo (DRC) the second most affected country after Nigeria, representing respectively 12% and 27% of cases worldwide (WHO, 2023). In the same period, the disease was responsible for 608,000 deaths on the planet, with Nigeria and DRC the two most affected countries with 31% and 12%, respectively, of global malaria deaths. Children under five made up the biggest group (WHO, 2023). Despite efforts aimed at reducing malaria deaths among children, it still accounts for 76% of deaths worldwide for children under five (WHO, 2023).

Being aware of this life-threatening disease, the DRC Government has made the fight against malaria among its top health priorities. However, despite its Programme National de Lutte contre le Paludisme (PNLP) and its series of insecticide-treated mosquito net distribution and hanging campaigns as well as preventive treatments, among other interventions (PNLP, 2013), latest statistics (US PMI, 2020; WHO, 2023) show that much still needs to be done in the fight against the disease. Various campaigns led to the widespread use of insecticide-treated bed nets and knowledge of malaria's main transmission channels, as well as information about other good practices to combat the disease. According to the Demographic and Health Survey (DHS) of the Democratic Republic of the Congo conducted by the "ministère du Plan et Suivi de la Mise en oeuvre de la Révolution de la Modernité (MPSMRM), 50.2% of households were found to be using insecticide-treated nets and 84% of the DRC population know that malaria is transmitted through mosquito bites (MPSMRM; MSP & ICF International, 2013–2014).

Despite this, statistics show that malaria is still the main cause of mortality and morbidity in the DRC, accounting for 22% of deaths and 44% of morbidity cases; children aged under five years constitute the most affected group (US PMI, 2020). More than 30% of children under five tested positive for malaria during the last UNICEF MICS survey (PMI, 2020). Moreover, in addition to being a life-threatening disease, malaria creates a huge financial burden for the country (DHS, 2013).

Therefore, factors other than bed net use and knowledge of transmission channels, which are widespread in the country, need to be identified for more effective antimalarial policies. Among these are the household stock of human capital, in particular maternal education, and attitudes toward intimate partner violence, a measure of self-esteem and empowerment that is associated with the mother's ability

to effectively take care of her children. Maternal education represents a household efficiency factor in the health production process (Grossman, 2006; Jacobson, 2000). Conversely, empowered women are likely to be in good health and able to make more resources available for their children's health (Lépine and Strobl, 2013; Nuhu, 2015).

The existing literature on the impact of maternal human capital on child health status does not address contextual factors likely to reduce its effectiveness, like those prevailing in the DRC. This is a country where gender-based violence and inequality are very likely to affect maternal human capital accumulation and utilizing its full potential (World Bank, 2018). The country ranks among the worst performing in terms of gender-based violence and equality on the continent. In the UN gender inequality index, the DRC lagged behind with an index of 0.65, which is higher than the average in low HDI (human development index) countries (0.58) and the sub-Saharan African average (0.56). This is evidenced by the low percentage of women with a secondary education level, 36.7 against 65.8 for men (UNDP, 2018). As far as gender-based violence is concerned, the country was reported to be among the bottom third on a list of sub-Saharan African countries, ranked on the basis of a women's empowerment indicator that takes into account gender-based violence (UNDP, 2018). 52% of women were reported to have experienced physical abuse from age 15, with 67.9% of them at the hand of their husband (Women's International League for Peace, 2018). In this context, women are more likely to develop a tolerant attitude toward intimate partner violence, thereby reducing their self-esteem, empowerment level and ability to cater for their children's health needs (Bender and Chalise, 2015; Arestoff and Djemai, 2013; Lépine and Strobl, 2013; Nuhu, 2015). Empirical studies analyzing the topic in this context are scarce and the one that is available presents mixed results and limitations in terms of dealing with potential endogeneity in the key explanatory variables. While Ma et al. (2017) found an association between maternal education and child malaria, the association is not statistically significant in Charchuk et al. (2016). These studies focused only on correlation (Spearman's rank correlation, chi-squared statistics or Fisher exact tests). Another study is by Karemere et al. (2020), which associates insecticide-treated net use with malaria prevalence between 2005 and 2014, but without focusing on the impact of maternal education in their analysis.

Therefore, this study aims to bridge those gaps and provide evidence on this relationship in the context of the DRC. In this paper, we explore the perception of women about domestic violence as a measure of women's bargaining power, and therefore test its effect on child health outcomes following Nuhu (2015) and Arestoff and Djemai (2013), among others. Malaria is also known to be associated with anaemia, which is another significant child health threat in the DRC (Schellenberg et al., 1999; White, 2018; MPSMRM, MSP & ICF International, 2013–2014). Following a recommendation from the World Health Organization (WHO) and the Roll back Malaria movement, an analysis of anaemia as a malaria-related outcome is also proposed in order to assess the effect of the proposed control factors on the malaria burden (Korenromp et al., 2004; Mathanga et al., 2010).

The latest statistics on anaemia in the country show that 60% of children under the age of five tested positive for anaemia (USAID, 2021).

The child health production theoretical framework, as developed by Rosenzweig and Schultz, 1983, is used in an effort to respond to the following research question: Is there a significant relationship between the mother's level of education and attitude towards domestic violence on childhood malaria and anaemia in DRC? More specifically, the study intends to address the following questions: Does a mother's level of education significantly affect child malaria and anaemia? Does a mother's attitude towards domestic violence significantly correlate with the prevalence of child malaria and anaemia?

## Research Objectives

This study aims to:

- (i) examine the effect of a mother's education level on child malaria and anaemia in the DRC; and
- (ii) investigate the relationship between women's attitudes towards domestic violence on child malaria and anaemia in the DRC.

The rest of the paper is organized as follows: Section 2 presents the literature review, both theoretical and empirical; Section 3 covers the theoretical framework and the estimation strategy adopted in this study. In section 4, the source of data as well as the variables are described; Section 5 presents the estimation results and, finally, Section 6 concludes and outlines the policy implications of the study.

## 2. Literature review

### 2.1 Theoretical Review

This study uses the child health production theoretical framework developed by Rosenzweig and Schultz (1983). In line with Becker's household production model which distinguishes market goods and commodities entering directly into the household utility function, Rosenzweig and Schultz considered child health as one of those commodities. As in any production function, the main focus is on the relationship between output, which is health in this case, and the inputs used to obtain it. Education, particularly maternal education, is specifically considered among these inputs due to either its productive efficiency or allocative efficiency effect (Grossman, 2006).

Unlike the Rosenzweig and Schultz model, the Grossman model proposes an estimation of the demand for the commodity "good health" (Grossman, 1972) and not of the health production, which is estimated in this study. Drawing on the household production function developed by Becker (1965) and the Grossman health demand model, the Rosenzweig and Schultz model was found to be the most appropriate for this study considering both its relevance for the topic and its successful application for informing policies in developing countries (Mwabu, 2007).

This framework highlights the key role of human capital in the household health production process. As in the labour market, education is assumed to increase productivity in the household (Grossman, 1972). In fact, human capital, education in this case, promotes good health practices and raises awareness about disease prevention. Moreover, basic education skills like literacy and numeracy enable people to effectively benefit from a health programme (Todaro, 2012). By understanding, for example, the malaria transmission mechanism and ways to prevent it, an educated mother can reduce children's likelihood to contract the disease (Norton, 2012). Moreover, an educated mother is more able to efficiently use society's available facilities for the benefit of their children's health (Maiga, 2015).

The theories presented here advocate promoting women's education, which is needed in the DRC too, where there is still a gender bias against women in the education sector, with 15% of women without any level of education against 4% of men (MPSMRM, MSP & ICF International, 2023-2014). The impact can be significant

on child health considering that women are still considered the main child rearers in Congolese culture, and therefore spend more time with children than men. Thus, efforts toward improving child health, and those targeting child malaria, are likely to be more effective if women's education is taken into account (Norton, 2012).

## 2.2 Empirical Review

Several studies have found a strong relationship between maternal education and child health status, for example, Desai and Alva (1998); Makoka (2013) and Ahiati (2015). However, the relationship is presented differently between researchers and according to various selected variables.

The studies of Desai and Alva (1998), for example, examined the effect of maternal education on three child health indicators in 22 developing countries: child mortality, children height-for-age Z score and immunization status. The results show a strong relationship between maternal education and child mortality, and the children's height-for-age Z score in some countries. The effect proved to be statistically significant on children's immunization status in almost half of the selected countries.

Using 2010 HIES data, Kumar et al. (2014) analyzed the effect of schooling by mothers and child growth in Bangladesh. Using the ordinary least squares (OLS) estimation method, they showed that while the father's education is positively correlated with children's vaccination, the mother's education is associated with long-run health effects on children, including the height-for-age Z score. Other researchers, such as Ahiati (2015) and Siri (2014), considered the variable prevalence of malaria among children.

Ahiati analyzed mothers' characteristics that influence malaria prevalence among children under five in Ghana using a binary logistic regression model. His results show that some characteristics like education, place of residence and religion are important factors affecting malaria such as prevalence among children under five. However, other indicators, such as ethnicity, marital status and wealth quantile were not good predictors of malaria prevalence among children under five. Using a DHS and malaria indicator from nine sub-Saharan countries, Siri examined the association between socioeconomic status variables and malaria parasitemia. He confirmed the association and proved that the mother having completed six years of education is associated with significantly low chances of infection among children (Siri, 2014).

The infant mortality variable was considered by other authors, such as Mostafavi (2009) or Kedir (2014). Mostafavi (2009) argues that the mother's education effect on infant mortality is small. However, using other pathways such as the use of health services and increased income, this effect can be important. Kedir (2014) wanted to determine the chain through which maternal education may affect the mortality of children under five in Ethiopia. His results prove that the large share of the maternal education effect can be substituted by other factors that can improve socioeconomic status.

The use of health services, women's health behaviour and investment in girls' schooling are important ways of contributing to the improvement of child health in the long run as the effect through formal education takes too long.

Other works considered the child nutritional status variable. One is by Makoka (2013) who analyzed the impact of maternal education on child nutrition in Malawi, Tanzania and Zimbabwe using bivariate analysis and the Pearson chi square test of independence to test the association between maternal education and three child nutrition measures: Child nutrition stunting, wasting and underweight. The results demonstrated that the three child nutrition measures decrease significantly with the increase in maternal education level.

For studies on the impact of maternal education on the prevalence of some diseases among children in general, Lina et al. (1994), for example, focused on the association between maternal education and infant diarrhoea in different households and community environments in the city of Cebu, Philippines. Using a multi-level interactive model, the authors wanted to assess if the protector effect of maternal education on infant diarrhoea risk is modified by three aspects of the community and family environment of the mother: the household and community properties, economic resources and the existence of mothers' clubs. The results showed that the positive effects of maternal education on infant diarrhoea vary according to the mother's socioeconomic environment.

As far as the relationship between maternal education and malaria prevalence among children is concerned, empirical studies conducted in the context of the DRC reveal mixed results. Ma et al. (2017) analyzed the association between mother's education and child malaria in three North Kivu province towns and the results show a statistically significant association between the two variables. However, no statistically significant association was found by Charchuk et al. (2016) in their study conducted in an internal displacement camp in the Walikale territory in North Kivu province. The common limitation of both studies is that they all used small-scale data and therefore have low statistical power. However, they lack causality implications and draw their conclusions from correlation analysis mostly relying on chi-squared statistics, Fisher's exact test or Spearman's rank correlation. Although multivariate regression is used to some extent, causality identifications cannot be drawn from the studies due to statistical limitations as acknowledged by the authors. Without focusing on the relationship between maternal education and malaria prevalence among children, Karemere et al. (2020) found a significant association between the scale-up of insecticide-treated net use and a decline in all causes of child mortality in the country.

Another set of studies analyzed the relationship between intrahousehold bargaining, domestic violence and child health using instrumental variable methods. Nuhu (2015) explored a unique exogenous instrument to analyze how the intrahousehold bargaining position of women influences the health outcomes of their children in Ghana using a 2sls-IV estimation. Lépine and Strobl (2013) focussed on women's bargaining power and child nutritional status in rural Senegal using

a mother's ethnicity as instrument. The results reveal an underestimation of the true impact by the OLS if the endogeneity of bargaining power is not taken into account. Ahmed and Nobi (2013) use religion and prevalence of polygamy in the neighbourhood as instruments; the results show a positive and significant impact of the mother's empowerment on the long-run health of her child.

Most of the above-mentioned studies proved the effect of maternal human capital, particularly maternal education, on child health using different variables. However, in a context of widespread gender-based violence against women, as in the DRC, human capital accumulation and its full utilization can be hampered (World Bank, 2018) and there is a need to understand how the relationship evolves for policy-making purposes. The available studies in this context are limited either in scale or in terms of causality implication. This is why a country-wide survey was used to take into account the broad context of gender-based violence in the country, and a causality identification strategy is adopted. Chalinga et al. (2020) analyzed the association between domestic violence and child malaria in Malawi, but without addressing endogeneity in the regressors. Other studies appraised the effect of domestic violence against women on other measures of child health, but not specifically malaria prevalence (Kajsa et al., 2008; Ferdousy and Matin, 2015). Based on Rosenzweig and Schultz's theoretical framework, a health production function is estimated using an IV probit model and 2013–2014 DRC DHS data.

## 3. Methodology

### 3.1 Theoretical Framework

Maternal education and maternal human capital in general is a key factor in the household health production process, especially when it comes to child health (Grossman, 2006). Educated mothers are able to effectively invest in their children's health (Cadwell and Caldwell, 1984; Cleland, 1990). This applies to child health in general, but also to child exposure to illnesses such as malaria. Even though education level is assumed to be closely associated with socioeconomic status in child malaria factors analysis, empirical studies recognize that the two factors can be analyzed separately and appeared to have different effects (Siri, 2014). Female empowerment is another main factor of interest in this study, considering the particular context of the DRC where violence against women is prevalent. In such a context, women are likely to be tolerant toward intimate partner violence and to have low self-esteem, and hence are less empowered to utilize resources necessary for their children's health (Arestoff and Djemai, 2013; Mahmud et al., 2011). The effect of the mother's education on child health can, therefore, be hampered by exposure to violence (World Bank, 2018).

The formalization of links between the above factors and child malaria can be found in Rosenzweig and Schultz's child health production theoretical framework. The starting point is a family's utility function, which denotes the household's preference over a set  $X$  of goods entering directly into its utility function (e.g., clothes);  $Y$  goods entering the household health production in addition to their utility effects (e.g., cigarettes, alcohol, physical exercise); and  $H$ , child health (Rosenzweig and Schultz, 1983). Using the exact Rosenzweig and Schultz notation and following Mwabu (2007), we have:

$$U = U(X_i, Y_j, H) \quad \text{with } i = 1, \dots, n \text{ and } j = n + 1, \dots, m \quad (1)$$

A function to be maximized considering the following child health production function:

$$H = \Gamma(Y_j, I_k, u) \quad \text{with } k = m + 1, \dots, r \quad (2)$$

Where  $I$  is defined on a set of  $r$  health inputs that are consumed only because of their direct effect on health and hence their indirect effect on utility (e.g., healthcare).  $Y$  has the same meaning as in Equation 1, and  $u$  stands for specific health endowments known to a household but not under its control, making its members more health resistant, such as their genetic traits. This is likely to be correlated with domestic violence, as women with better intrinsic characteristics can be assumed to be powerful and hence have a high self-esteem or empowerment level (Lépine and Strobl, 2013). Non-self-cluster means are used in this study for potentially endogenous explanatory variables. Following Jacobson (2000), in Equation 2 we can also have mother's and father's education representing the efficiency parameters or the household productivity.

The utility function is also subjected to the following budget constraint (Rosenzweig and Schultz, 1983; Kovsted et al., 2003):

$$F_j = X_j + p_y Y_j + p_I I_j \quad (3)$$

$F$  is exogenous money income, and  $p_y$  and  $p_I$  respectively, are the exogenous prices for goods  $Y$  and health inputs  $I$  to be purchased by the household in order to increase its utility through their health effect (such as healthcare).

Solving the household maximization problem, Equation 1 subject to Equations 2 and 3; the demand function of the  $r$  goods,  $Z$ ; that include  $r-n$  health inputs,  $I$ , beside goods  $X$  and  $Y$ ; is as follow:

$$Z_t = D_t(p_y, p_I, F_j, u_j) \quad t=1, \dots, r \quad (4)$$

As far as child health is concerned, we have the following reduced form demand function:

$$H_j = \Psi(p_y, p_I, F_j, u_j) \quad (5)$$

Neither Equation 4 nor 5) is useful in estimating the causal effect of health inputs on health outcomes (Maldonado, 2014). Some studies managed to estimate Equation 4 in developing countries, but cases estimating Equation 5 are rare (Mwabu, 2007). This is due to, among other factors, the lack of data on health inputs in the context of developing countries (Rosenzweig and Schultz, 1983) as well as the lack of connection between inputs and health outcomes in both equations (Maldonado, 2014). Therefore, hybrid health production functions are often estimated.

The following equation combines equations 2, 4 and 5 which lead to child health as a function of health inputs  $I$  and the factors from the reduced form equations,  $p$  and  $F$ . This is expressed as:

$$H = \theta(I, p_l, F, u) \quad l=1, \dots, m-1, m+1, \dots, r \quad (6)$$

Where  $I$  is the set of endogenous health inputs (such as healthcare), which are choice variables and hence selected according to the household health status as well as health endowment;  $p_I$  is a set of prices for health inputs; and  $F$  the exogenous money income.

As far as the functional form  $\theta$  is concerned, the literature suggests a transcendental logarithmic health production function (Mwabu, 2007).

### 3.2 Estimation Method

Unlike in many others, the outcome variable in this study is measured by the prevalence of child malaria. This is a binary variable, taking a value of 1 if the child tests positive for malaria and 0 otherwise. Moreover, as in any health production function, some covariates are potentially correlated with unobserved household characteristics such as the genetic traits of household members, creating an endogeneity issue. This is dealt with by using non-self-cluster means. Following Mwabu (2007), Baye (2009), Maldonado (2014), Feumeni (2020) and Lépine and Strobl (2013), the structural model (Equation 6) can be rewritten by splitting set  $I$  into the two health inputs of interest in this study (education and intimate partner violence perception) and using a unique set for all the exogenous variables including household income, as follows:

$$H_i = \alpha_0 + \sum_{k=1}^n \alpha_k E_k + \sum_{k=n+1}^m \alpha_k IPV_k + \sum_{k=m+1}^l \alpha_k Z_k + u \quad (7)$$

Where  $H$  stands for child health;  $E$  represents maternal education (non-self-cluster mean of mother's education level); and intimate partner violence (IPV) stands for women's perception of intimate partner violence. In fact, a more tolerant view towards intimate partner violence is indicative of low bargaining power (Bender and Chalise, 2015; Arestoff and Djemai, 2013). In the DHS data used in this study, five different variables capture the views of women on the acceptability of beating under five circumstances (going out without telling the husband, neglecting children, arguing with the husband, refusing to have sex and burning food). In this study, a combination of three reasons for wife beating, with which most women agree, was used to measure women's attitude towards wife-beating. These are: going out without telling the husband, neglecting children and arguing with the husband. A dummy was created using this combination. It takes a value of 1 if a woman thinks that beating is justified under all the three circumstances (hence with low bargaining power) and 0 otherwise. The use of women's perception of intimate partner violence as a measure of female empowerment is supported by the literature on the topic (for example, Bender and Chalise, 2015).  $u$  is the error term and  $Z$  is a vector of other exogenous variables including bed net use (non-self-cluster mean), child characteristics (sex, twin, rank among siblings, nutritional characteristics, anaemia test result); other characteristics of the mother (age, occupation, malaria transmission knowledge); father's characteristics (education, age, occupation);

household head characteristics (sex, age) and environmental and community factors (area of residence, cluster's altitude in meters); and cluster means of asset-based wealth index.

An IV probit model would be well indicated in this case considering the many potentially endogenous explanatory variables included in the model. However, the lack of valid instruments, partly due to the configuration of the DHS data set used in this paper, does not allow the use of this method. In fact, the partner's childhood experience of parents' violence, which was not available for children who took the malaria diagnostic test during the survey, would be a good instrument for intimate partner violence perception (referring to the literature on the topic, e.g. Assaad, et al., 2016) and a causality analysis would have been envisaged. The survey was conducted such that the set of individuals selected for the domestic violence module, which also contained some eventually valid instruments, specifically for intimate partner violence and perception thereof, is different from the set selected for the child malaria module.

Therefore, a logistic model was used in this study. However, endogeneity remained a concern and in order to address it in our main regressors, i.e., maternal education, non-self-cluster means were used.

Apart from endogeneity, another issue was the fact that for some observations the data were missing and such observations could not be taken into account in the equation of interest, Equation 7. Thus, there is a potential sample selection bias in this equation. However, considering that only households eligible for the malaria module were taken into account in this study and that nearly all of them had the test results, the sample selection model was not relevant for our analysis.

Malaria is also found to be associated with anaemia, which is another big child health threat in the DRC (Schellenberg et al., 1999; White, 2018; DHS, 2013–2014). Theoretically, malaria transmission is known to increase the risk of anaemia both in high and low transmission settings (White, 2018). The anaemia risk from malaria is very high for pregnant women and younger children, who are of particular interest in this study. Considering this association, this study suggests a more complete analysis of the malaria burden by running a separate anaemia model. This is based on the WHO and the Roll Back Malaria movement recommendations on ways to assess the effect of malaria control interventions on the diseases' burden (Korenromp et al., 2004; Mathanga et al., 2010). This constitutes the value added by this study, in the sense that it allows an appraisal of the policy impact of the proposed malaria control factors on the full malaria burden.

Using the same health production framework developed in Sub-section 3.1, anaemia is analyzed as a malaria-related outcome and the same covariates used in the malaria model are also used here. Following Job et al. (2008) and White et al. (2018), the following slightly modified version of the model in Equation 7 was estimated for child anaemia:

$$A_i = \beta_0 + \sum_{k=1}^n \beta_k E_k + \sum_{k=n+1}^m \beta_k IPV_k + \sum_{k=m+1}^l \beta_k Z_k + \omega \quad (8)$$

Where  $A_i$  is child anaemia status. The other variables are defined as in Equation 7 and further details on all variables are given in Table 1.  $\beta$ , are parameters and  $\omega$  is the error term for this model.

## 4. Source of data and variables

### 4.1 Data

This study used cross-sectional data from the DHS survey conducted in the DRC in 2013–2014. The survey was a follow-up to the 2007 DHS and, like the current one, it was aimed at collecting data related to women’s health and that of their respective younger children, their fertility, the knowledge and use of contraceptive methods, and maternal and under-five child mortality. Alongside the anaemia test performed on every individual in the sample, a malaria test known as “test de depistage rapide” was also performed on children aged five and below. Women aged 15–49 were targeted who either permanently lived in the selected household or spent the previous night there. 18,300 households (5,474 in urban areas and 12,886 in rural areas) were selected from 540 clusters (161 in urban areas and 379 in rural areas) enabling the survey to successfully provide representative results for both the rural and urban population. The final data set that was compiled contains women, men, children and household member modules. To be able to successfully link children’s characteristics, particularly child malaria test results, to their mothers, children’s data were extracted from the individual module. Considering only household members below the age of five on which a malaria test was conducted, a total of 8,448 children were tested with 8,146 yielding results. This data set, with relevant malaria test results for children, was then merged, as a master, with another children’s data set combining children, women and household data sets. This allowed us to capture other children’s characteristics and household characteristics in the final data set. In both data sets that were merged, children are the units of analysis. The final successfully merged data set contains 7,516 children with available malaria test results as well as mothers and households’ characteristics.

### 4.2 Variables

Table 1 provides descriptive statistics related to some of the key variables of interest. The table shows that 22% of children aged below five selected in the sample tested positive for malaria. Their mothers’ ages range from 15 to 49, with an average of 29.11 years of age and a deviation of 6.9 years around the mean. 28.7% stay in an urban area. Concerning domestic violence, around 78.2% of women think that a husband’s beating is justified for at least one of the five reasons considered in the survey (going out without telling the husband, neglecting children, arguing with the husband, refusing to have sex and burning food). 38.4% perceive wife-beating to be acceptable for three out of the five reasons.

Table 1: Descriptive statistics for the included variables

Variable	Obs.	Mean/Percent.	St.Dev.	Min	Max
<b>Outcome variables</b>					
Malaria status = 1 the child tested positive	7516	25.7	43.7		
Anaemia level (haemoglobin level)	7516	102.9	17	24	198
<b>Potentially endogenous explanatory variables</b>					
Mother's education level (non-self-cluster mean)	7516	1.2	0.5	0	2.7
<b>Exogenous explanatory variables</b>					
Mother's age	7516	28.8	7	15	49
<b>Perception of intimate partner violence</b>					
Beating justified for going out without telling husband	7516	52	50		
Beating justified if wife neglects children	7516	52	50		
Beating justified if wife argues with husband	7516	61	49		
Beating justified if wife refuses to have sex with husband	7516	51	50		
Beating justified if wife burns the food	7516	28	45		
Beating justified for at least one of the reasons	7516	78.2	41.2		
<b>Beating justified for three out of five reasons:</b>					
Going out without telling the husband, neglecting children, arguing with husband	7516	38.4	48.6		
<b>Beating justified for all five reasons: The three above + refusing to have sex and burning food</b>					
	7516	17.5	38		
Father's/mother's partner education level	7516	1.6	0.7	0	3
Household size	7516	6.9	2.9	2	24
Household head age	7516	38.8	11.7	17	89
Child's age (in year)	7516	2.1	1.3	0	4
Child sex = 1 if male	7516	50	50		
Area of residence = 1 if urban	7516	28.7	45.2		
Household head sex = 1 if male	7516	77.4	41.8		
Bed net use (non-self-cluster mean)	7516	48.3	26.5		
Health Knowledge (non-self-cluster mean)	7516	85.5	18.4		
Wealth (non-self-cluster mean)	7516	2.6	1.1	1	5
<b>Cluster altitude in meters</b>					
	7516	703.4	397.4	9	2033

Source: Compiled by authors using DRC 2013–2014 DHS survey data.

### 4.1.1 Intimate Partner Violence Perception Measurement

The DHS survey asked questions on the different reasons under which women consider beating by the husband to be justified. In this study, this is used as an indicator of empowerment level considering that it reflects women's self-esteem level, an aspect of bargaining power (Bender and Chalise, 2015; Arestoff and Djemai, 2013). Women's attitude towards domestic violence is measured as whether a woman agrees that beating by a husband is justified under three out of the five circumstances covered in the DRC DHS survey. These are: Going out without telling husband, neglecting children and arguing with the husband. This is the combination of the three reasons with which most women agreed. Agreeing with most of the reasons included in the DHS (three out of five) can be considered, therefore, as a more tolerant attitude towards intimate partner violence or a low level of self-esteem. To come up with a binary variable we combined all three reasons and generated a new variable taking a value of 1 if the values of the three variables for the three reasons add up to three (as agreeing with each reason is coded as 1 in the DHS data base) and 0 otherwise. Only non-missing values were taken into account in the calculations. This combination of reasons is just one possible combination of the different reasons, but it generates estimation results that are robust for the choice of an indicator of IPV perception. Estimation results for "agreeing with at least one out of the five reasons" is provided in Appendix A for a robustness check.

### 4.1.2 Correlation between Key Variables

The relationship between a mother's attitude towards intimate partner violence and child health is analyzed using simple correlation. Therefore, child health outcomes are linked to different levels of the mother's empowerment. The correlation between malaria and anaemia is also analyzed.

#### 4.1.2.1 Correlation between malaria and anaemia

Table 2: Malaria and anaemia

	Malaria	Anaemia
Malaria	1	
Anaemia	0.22	1

Source: Compiled by authors using DRC 2013–2014 DHS survey data.

From Table 2, a positive correlation between malaria and anaemia exists. However, the magnitude of the link is small, as revealed by the data.

### 4.1.2.2 Difference in child health indicators in regard to mother's attitude towards domestic violence

**Table 3: Child health indicator and mother's attitude toward domestic violence**

	Average Malaria rate	Average haemoglobin level
Domestic violence is acceptable	26	101
Domestic violence is not acceptable	25	103

Source: Compiled by authors using DRC 2013–2014 DHS survey data.

Table 3 shows that a non-tolerant view towards domestic violence and therefore a high empowerment level of a mother, is associated with a good health status of her children for both indicators considered. The difference in child health status is considerable when it comes to child anaemia with regard to the mother's empowerment level.

## 5. Results and discussion

In this section, estimation results are presented for the child malaria and anaemia models. Women’s perceptions towards intimate partner violence capture their empowerment level as explained in Section 4. While malaria is measured as a binary variable, taking a value of 1 if the child tested positive and 0 otherwise, the haemoglobin level is used as an indicator for anaemia level. Therefore, this last indicator informs exposure to anaemia and the model enables the understanding of determining factors. Considering the measurement scale of the two variables, two different estimation approaches are used for the two outcome variables. A logistics model is used for malaria and an OLS estimation method for anaemia. Potential endogeneity in key variables, such as mother’s education, among other factors, were dealt with using non-self-cluster means.

### 5.1 Maternal Education, Attitude towards IPV and Child Malaria

A logistic model was estimated to examine the relationship between a mother’s education level, her perception towards intimate partner violence, and whether her child had malaria.

Table 4 summarizes the estimation results. The model is globally good with a very big chi<sup>2</sup>/F and an associated P-value equalling zero.

Table 4: Logistic model for child malaria

Variables	Logit (marginal effects)
	Malaria
Characteristics of the mother	
IPV perception	0.002(0.9)
Age	-0.002(0.00)***
Education	-0.1 (0.00)***
Health knowledge	-0.03(0.36)
Characteristics of the father	
Education	
Primary	0.03(0.11)
Secondary	-0.02 (0.31)

Higher	-0.1(0.00)***
Occupation	
Managerial	0.01 (0.9)
Clerical	-0.1 (0.2)
Sales	-0.01 (0.9)
Agricultural	0.04 (0.4)
Services	0.02 (0.7)
Skilled manual	-0.01 (0.9)
Unskilled manual	0.05 (0.5)
Army	0.03 (0.6)
Household characteristics	
Place of residence	0.01 (0.4)
Cluster altitude	-0.0001 (0.00)***
Household size	-0.003(0.1)
Household head sex	0.01 (0.4)
Household head age	0.001(0.004)***
Wealth	0.02 (0.03)**
Child characteristics	
Sex	0.01 (0.4)
Age	0.04 (0.000)***
Twin	0.041(0.1)
F/LR ch2	405.66
Prob>F/Prob>chi2	0.000
R-squared/Pseudo R2	0.05
A R-squared	
Observations	7516

(.) = P values; \*\*\* p<0.01. \*\* p<0.05. \* p<0.1.

Table 4 shows that the mother's education significantly and positively affects malaria prevalence among children. The likelihood of a child testing positive for malaria decreases by about 10% with an increased education level beyond secondary school for the mother. This finding is in line with some previous studies on this relationship, although some portrayed only mere associations, such as the DHS (2014) and Emina et al. (2021). Other significant determinants of child malaria are mother's age and father's education level, which significantly reduce the likelihood of malaria among children. Older women are considered more experienced and can better take care of their young children. Low-lying areas are associated with high child malaria prevalence. Twins are also more likely to test positive for malaria than single births. This may be related to a reduced number of resources required to take care of twins compared to single children. Older children are found to be more significantly exposed to malaria than younger ones. As children grow, they are less likely to attract attention from

their parents, especially in countries such as the DRC where the birth rate is high – estimated between 138% and 307% (MPSMRM, MSP & ICF International, 2023-2014). According to Emina (2021), younger children share a bed with their mothers and are therefore well protected from mosquito biting.

Mothers' perception towards intimate partner violence does not significantly determine child malaria status.

## 5.2 Maternal Education, IPV and Child Anaemia

Unlike the analysis proposed in Section 5.1, this section presents the association between a mother's education level, and her perception of IPV and child anaemia. The OLS estimation method was used, considering the continuous characteristics of the anaemia measure used.

Table 5: Anaemia model

Variables	OLS
	Anaemia
Characteristics of the mother	
IPV perception	-1 (0.08)*
Age	0.12(0.00)***
Education	-0.08 (0.89)
Health knowledge	0.8(0.5)
Characteristics of the father	
Education	
Primary	-0.77(0.297)
Secondary	-0.34(0.63)
Higher	2 (0.01)**
Occupation	
Managerial	-0.2(0.93)
Clerical	3 (0.3)
Sales	0.5(0.8)
Agricultural	-1.3(0.5)
Services	-0.3(0.9)
Skilled manual	-0.4(0.83)
Unskilled manual	-1(0.5)
Army	-0.2(0.9)
Household characteristics	
Place of residence	-0.3(0.6)
Cluster altitude	0.01(0.0)***
Household size	-0.02(0.8)
Household head sex	0.3(0.53)

Household head age	-0.04(0.06)*
Wealth	1 (0.007)***
Child characteristics	
Sex	-1(0.08)*
Age	1.5(0.00)***
Twin	-4.6(0.004)***
F/LR ch2	17.56
Prob>F/Prob>chi2	0.000
R-squared/Pseudo R2	0.06
A R-squared	0.05
Observations	7516

(.) = P values; \*\*\* p<0.01. \*\* p<0.05. \* p<0.1.

The results reveal a negative association between a mother's perception of intimate partner violence and child anaemia. A positive attitude towards intimate partner violence, a sign of a low empowerment level, increases the risk of anaemia in children below five years of age. Children from a mother with a tolerant view of wife-beating have significantly lower haemoglobin levels than those from women with a negative view of IPV. This difference in terms of association between IPV perception and the two diseases being analyzed may stem from their differing nature. Anaemia, being a long-term pathology, is more likely to be influenced by factors with long-term effects on child health. As far as IPV is concerned, a more tolerant mother, hence with low bargaining power in the household, is less able to influence resource allocation in the household and is therefore unable to successfully access enough resources for her children's nutritional needs (Lépine and Strobl, 2013). This may lead to long-term negative child health outcomes such as low haemoglobin levels and anaemia. However, the parent's education (mother's and father's at a high education level) has no significant effect on child anaemia. Moreover, younger mothers are more likely to have anaemic children than older ones. Older women are more experienced and have advanced knowledge in terms of child care.

## 6. Conclusion and Policy implications

The reported intimate partner violence in the context of the DRC significantly affects child health beyond its obvious negative effects on the victims. In fact, in such a context, intimate partner violence is likely to be considered normal, leading to a tolerant view towards a husband's violent behaviour towards women (Arestoff and Djemai, 2013). Women's perception in regard to domestic violence also allowed us to capture the impact of female empowerment on child health following the literature on the topic (Bender and Chalise, 2015; Arestoff and Djemai, 2013). Maternal education's effect was also assessed and found to significantly affect child malaria cases.

Our findings show a significant and positive association between a hostile view towards IPV, a sign of low empowerment level, and a child having anaemia. Children from highly empowered mothers were found to have higher haemoglobin levels than those from less empowered women. Malaria is significantly and positively affected by the parent's education. Table 4 indicated that women's education reduces the likelihood of malaria among children under five. However, the effect on the malaria burden is not evidenced by this study considering that a mother's education has no significant effect on child anaemia.

The DRC's 2006 law against gender-based violence condemns intimate partner violence, among other gender-based abuse. However, despite its enforcement it is clear that women still consider domestic violence as normal, years after the law was passed. The effect on women's self-esteem and ability to stand up for themselves and for their younger children is negative as confirmed in this study and several others (Nuhu, 2015). Further sensitization campaigns around the law and more efforts in terms of women's education could have a direct and positive effect on child health in general, through a reduction in child malaria and anaemia, which are big child health threats in the country. One of the strategies to make such campaigns successful is involving men in positions of authority, such as religious leaders, as suggested by World Health Organization experts (Garcia-Moreno et al., 2005).

## References

- Ahiati, R. 2015. *Maternal Characteristics and Malaria Prevalence among Children in Ghana*. Thesis in partial fulfilment of the requirement for the degree MA in Population Studies. University of Ghana, Legon.
- Ahmed, M. and Nobil M.N. 2013. "Intra-household bargaining power and investment in child health : Evidence from Nigeria." *The Chicago University Journal of Social Sciences* Vol. 31 (A). p.43-64.
- Arestoff, F and E. Djemai. 2013. *Women's empowerment across the life cycle and generations: Evidence from Sub-Saharan Africa*, Document de travail DT/2013-16, Dauphine Université Paris, Paris.
- Baye, F. and Fambon, S. (2009). *Linking Parental Education, Child Health and Economic Well-being in Cameroon*, Paper Presented at the Centre for the Study of African Economies (CSAE) Conference, 2009 at St Catherine's College, Oxford.
- Becker, G.S., 1965. "A theory of the allocation of time. *The Economic Journal*" 75, 493–517.
- Bender, and N. Chalise. 2015. "Differentiating perceptions of intimate partner violence in Nepal" *International Social Work*, Volume (1), 79-92..
- Caldwell. J. C. 1994. "How is greater maternal education translated into lower child mortality." *Health Transition Review*. Vol.4.No.2:224-229.
- Chalinga, E.; Collin-Véniza, D., MacIntosh, H. et al., 2020. "Prevalence and determinants of malaria infection among children of local farmers in central Malawi". *Malaria Journal*, 19:308.
- Charchuk, R., Katsuva, M. JP., Masumbuko K. C. et al. (2016). "Burden of malaria is higher among children in an internal displacement camp compared to a neighbouring village in the Democratic Republic of the Congo". *Malaria Journal*, 15:431.
- Cleland. J.G. and Van Ginneken. J.K 1998. "Maternal education and child survival in developing countries : The search for pathways of influence." *Soc Sct Med*. Vol. 27, No 12. 1357-1368.
- Desai, S. and Alva, S. (1998). *Maternal education and child health : is there a strong relationship?* *Demography*, volume 35-Number 1, :71-81.
- Emina, J.B.O., Doctor, V.H., Yé, Y.. 2021. "Profiling malaria infection among under-five children in the Democratic Republic of Congo". *PLOS On*, 16(5) : e0250550. .
- Ferdousy. E. and Matin. M. 2015. "Association between intimate partner violence and child morbidity in south Asia." *Journal of Health, Population and Nutrition*, vol.33:16.
- Feumeni, S. 2020. *Role of Maternal Education and Prenatal Care on Child Health in Cameroon*. Paper No. 399. African Economic Research Consortium, Nairobi.

- Garcia-Moreno, C., Jansen, H., Ellsberg, M. et al. 2005. WHO Multi-country Study on women's Health and Domestic violence against women: Initial results on prevalence, health outcomes and women's responses. World Health Organization.
- Grossman, M. 1972. "On the concept of health capital and the demand for health". *The Journal of Political Economy*, 80(2):223-255.
- Grossman, M. 2006. *Education and nonmarket outcomes*. NBER, Working Paper 11582, National Bureau of Economic Research, New York.
- Jacobson, L. 2000. "The family as producer of health — an extended Grossman model". *Journal of Health Economics*, 19(2000): 611–37.
- Job, C.J., Phiri, K. Faragher, B., et al. 2008. "Severe anemia in Malawian children". *The New England Journal of Medicine*.88-99.
- Monemi. K.A. 2008. *The Impact of Violence against women on child growth, morbidity and survival*. Digital comprehensive summaries of Uppsala Dissertations from the Faculty of Medicine. 366. Uppsala Universitet, Sweden.
- Kedir, Y. 2014. *The Effect of Maternal Education on Underfive Mortality in Ethiopia*. Research Paper. International Institute of Social Studies, the Hague, the Netherlands. At <https://thesis.eur.nl>
- Karemere, J., Nana, G.I, Andrada, A., et al. 2020. "Association the scale-up of Insecticide-Treated Nets and Use with the Decline in all-Cause Child Mortality in the Democratic Republic of Congo from 2005 to 2014". *Malaria Journal*, 20:241.
- Korenromp, E.L, Armstrong-Schellenberg, Williams, B.G., et al. 2004. "Impact of malaria control on childhood anaemia in quantitative review". *Tropical Medicine and International Health*, 9(10): 1050–65.
- Kovsted, et al. 2003. "Child health and mortality: Does health knowledge matter?" *Journal of African Economies*, 11(4): 542–60.
- Kumar, R., Majumder, M., Rayhan, S. 2014. "The impact of maternal education on child health: Evidence from Bangladesh". *Asian Journal of Social Sciences and Humanities*, 3(4). 19-27.
- Lépine, A. and W. Strobl. 2013. " ". *World Development*. 45:17-30.
- Ma, C. Masumbuko, K.C., Kibendelwa T.Z. et al. 2017. "Is maternal education a social vaccine for childhood malaria infection? A cross-sectional study from war-torn Democratic Republic of Congo". *Pathogens and Global Health*, 111(2): 98–106. At <http://dx.doi.org/10.1080/20477724.2017.1288971>
- Maiga, E. 2015. Mother's education and children's nutrition outcomes in Burkina Faso: Is there a strong causal relationship? AGRODEP, Working Paper 0019. African Growth & Development Policy
- Makoka, D. 2013. *The impact of maternal education on child nutrition : Evidence from Malawi, Tanzania and Zimbabwe*, DHS Working Paper No. 84. ICF International, Calverton, Maryland, USA
- Maldonado, N. "Production of Health in Chinese Households: Children's overweight and obesity", The Ohio State University, Essay No. 2, The Ohio State University, Ohio.
- Mathanga, D.P., Campbell Jr, H.C., Eng, J.V., et al. 2010. « Comparison of anaemia and parasitaemia as indicators of malaria control in household and EPI-health facility surveys in Malawi". *Malaria Journal*, 9: 107., <http://www.malariajournal.com/content/9/1/107>.
- Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM),

- Ministère de la Santé Publique (MSP) and ICF International. 2014. Democratic Republic of Congo Demographic and Health Survey 2013-14: Key Findings. Rockville, Maryland, USA: MPSMRM, MSP et ICF International.
- Mostafavi, S. F. 2009, Estimating the causal effect of Maternal Education on Infant Mortality with DHS Data for Iran. Paper submitted to the XXVI IUSSP International Population Conference, Marrakech 2009.
- Mahmud, S., Shah, N.M, Becker, S. 2012. "Measurement of women's empowerment in rural Bangladesh." *World Dev*, 40(3):610-619.
- Mwabu, G. 2007. Health Economics For Low-Income Countries. Yale University, Economic growth Center Discussion Paper No.955, Yale University, New Haven.
- Norton, S.W. 2012. *Maternal education and childhood malaria: Evidence from the 2010 Zambia national malaria indicator survey*. Georgetown University, Master's Thesis, Georgetown University, Washington
- Nuhu, A.S. 2015. Intra-household bargaining, domestic violence laws and child health development in Ghana. Eastern Illinois University., Kiel und Hamburg, <http://hdl.handle.net/10419/125776>
- U.S President's Malaria Initiative. 2020. *Fighting malaria and saving lives: Democratic Republic of the Congo*. At <https://www.finddx.org>
- Rosenzweig, M. and T.P. Schultz. 1983. Estimating a household production function: Heterogeneity, the demand for health inputs and their effects on birth weight. Yale University, Economic Growth Center Discussion Paper No. 437, Yale University, New Haven..
- Schellenberg, D., C. Menéndez, E. Kahigwa et al. 1999. "African children with malaria in an area of intense plasmodium falciparum transmission: Features on admission to the hospital and risk factors for death." *The American Journal of Tropical Medicine and Hygiene*.61(3):431-8.
- Schultz, T.P. 1983. Studying the impact of household economic and community variables on child mortality. Yale University, Economic Growth Center Discussion Paper No. 460,, Yale University, New Haven.
- Siri, J.G. 2014. "Independent associations of maternal education and household wealth with malaria risk in children". *Ecology and Society*, 19(1): 33. At <http://dx.doi.org/10.5751/ES-06134-190133>
- Siri, J. Wilson, M.L., Murray, S. 2010. "Significance of travel to rural areas as a risk factor for malarial anemia in an urban setting." *The American Journal of Tropical Medicine and Hygiene*, 82(3):391-7..
- Todaro, M.P. and S.C. Smith. 2012. *Development Economics*. Boston, US: Pearson Education.
- United Nations Development Program. 2018. "Human development indices and indicators: 2018 statistical update." Briefing Note for Countries on the 2018 Statistical Update: Congo (DRC). UNDP. New York.
- United States Agency for International Development). 2021. "Democratic Republic of the Congo: Nutrition profile". USAID.
- World Health Organisation. 2023. *World Malaria Report*. World Health Organization, Geneva.
- White, N. 2018. "Anemia and malaria". *Malaria Journal*, 17:371, available at <https://doi.org/10.1186/s12936-018-2509-9>
- World Bank. 2018. "Democratic Republic of Congo: Systematic Country Diagnostic". Report No. 112733-ZR. World Bank, Washington, D.C.

# Appendix A

Model robustness to IPV perception measure<sup>1</sup>

Variables	Logit (marginal effects)	OLS
	Malaria	Anaemia
Characteristics of the mother		
IPV perception	-0.002(0.9)	-1 (0.03)**
Age	-0.002(0.00)***	0.11(0.00)***
Education	-0.1(0.00)***	-0.08(0.9)
Health knowledge	-0.03(0.35)	0.7(0.5)
Characteristics of the father		
Education		
Primary	0.03(0.11)	-0.8(0.29)
Secondary	-0.02(0.31)	-0.34(0.63)
Higher	-0.1(0.00)***	3 (0.01)**
Occupation		
Managerial	0.01(0.9)	-0.2(0.91)
Clerical	-0.1(0.2)	3 (0.3)
Sales	-0.01(0.9)	0.5(0.8)
Agricultural	0.04(0.4)	-1.3(0.5)
Services	0.02(0.7)	-0.3(0.9)
Skilled manual	-0.01(0.9)	-0.4(0.85)
Unskilled manual	0.05(0.5)	2(0.5)
Army	0.03(0.6)	-0.2(0.9)
Household characteristics		
Place of residence	0.01(0.4)	-0.3(0.7)
Cluster altitude	-0.0001(0.00)***	0.01(0.0)***
Household size	-0.003(0.1)	-0.02(0.8)
Household head sex	0.01(0.4)	0.3(0.51)
Household head age	0.001(0.004)***	-0.04(0.05)*
Wealth	0.02(0.03)**	1 (0.008)***
Child characteristics		
Sex	0.01(0.4)	-1(0.07)*

Age	0.04(0.000)***	1.5(0.00)***
Twin	0.05(0.1)	-4.6(0.004)***
F/LR ch2	405.65	17.61
Prob>F/Prob>chi2	0.000	0.000
R-squared/Pseudo R2	0.05	0.06
A R-squared		0.05
Observations	7516	7516

## Notes

- 1 This is an alternative estimation approach whereby IPV perception is measured as women agreement with at least one of the five assumed reasons for wife-beating.



## Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

Bringing Rigour and Evidence to Economic Policy Making in Africa

- Improve quality.
- Ensure Sustainability.
- Expand influence.

[www.aercafrica.org](http://www.aercafrica.org)

## Learn More



[www.facebook.com/aercafrica](https://www.facebook.com/aercafrica)



[www.instagram.com/aercafrica\\_official/](https://www.instagram.com/aercafrica_official/)



[twitter.com/aercafrica](https://twitter.com/aercafrica)



[www.linkedin.com/school/aercafrica/](https://www.linkedin.com/school/aercafrica/)

## Contact Us

African Economic Research Consortium  
Consortium pour la Recherche Economique en Afrique  
Middle East Bank Towers,  
3rd Floor, Jakaya Kikwete Road  
Nairobi 00200, Kenya  
Tel: +254 (0) 20 273 4150  
[communications@aercafrica.org](mailto:communications@aercafrica.org)