

Does reducing violence against women improve children's health? The case of Cameroon

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Abstract: Improving child health is one of the sustainable development goals of the United Nations. It is also seen as a means of promoting their well-being. The empirical literature on the relationship between child health and domestic violence is less clear. Using quantitative data from the Cameroon Demographic Health Survey, this study explores the effect of domestic violence, as measured by physical, sexual and emotional abuse, on health indicators of birth weight, growth and occurrence of diarrhea episodes in children. Emphasis is placed on the potential endogeneity of domestic violence that could bias the relationship between child health and domestic violence. The econometric method used was either a probit with instrumental variable or a two-step least square. The results are mixed. We observe a non-significant effect of domestic violence, whatever its form, on the birth weight and growth of the child. On the other hand, a significant effect, albeit slight (10%), of physical violence on the contraction of diarrhea by the child was observed.

Key words: domestic violence, child health, household production
JEL-codes: D13, D63, I1

I. INTRODUCTION

Violence has probably always been a part of human life. The various consequences can be seen in all parts of the world. Violence, whether self-inflicted, collective or directed against others, results in more than one million deaths per year and many more injuries (WHO, 2002). According to WHO (2013), nearly one-third of women worldwide who are in a couple relationship experience physical and/or sexual violence from their intimate partner. 23.2% of these acts are perpetrated in high-income countries and 24.6% in the Western Pacific regions. In the Mediterranean and South East Asia regions, the rates are 37% and 37.7% respectively. The prevalence of such violence therefore varies according to the region, the social context and even emergency situations such as epidemics. Domestic violence, especially intimate partner violence, is widespread and pervasive in Cameroon. The Cameroon Demographic and Health Survey (CDHS) (2018) estimates that 42% of women aged between 15-49 years suffer from this scourge. It has negative consequences on the health of children, which is one of the components of human capital.

According to the studies of Becker (1964), all household members jointly maximize a certain welfare function at the household level and income is distributed so that the marginal rate of substitution between two goods is the same for all household members. This means that as long as the members

remain unchanged, it can be treated as if it were a single individual. Resources in this case are pooled and then reallocated according to a common rule. This is the conception of the unitary model, which emphasizes the altruism of the head of the household.

This conception was later put into full effect in the work of Becker (1981a, 1981b). Indeed, even if the members of a household have very different preferences, and provided that one of them is sufficiently altruistic, the distribution of income in the household, at least within a certain range, may have no impact on the expenditure pattern. Much other work in the fiscal neutrality literature follows from this theory and demonstrates how multi-agent models can replicate the behavior of single-agent models. Bernheim and Bagwell (1988) point out that the structure of interpersonal relationships in such models can be much more general than assumed in simple nested generation models, without affecting the results. Bergstrom and Varian (1985) reported similar results on the independence of Nash equilibria from the distribution of individual characteristics, while Bergstrom et al. (1986) draw the same conclusions for Nash equilibrium models of private contributions to public goods.

The rejection of the unitary model has led to the emergence of a class of household models that use a multi-utility framework. In these models, each member of the household is assumed to have his or her own preferences, which makes conflict possible within the household. The household as a whole is also assumed to make Pareto-efficient decisions. The first set of these models, called the bargaining model, uses tools from game theory to model the complex interactions that occur within the household (Manser and Brown, 1980; McElroy and Horney, 1981).

Building on the work of Chiappori (1988), Apps and Rees (1988), Chiappori (1992), collective household models are the second set of models that use the same multi-utility framework. These models measure individual welfare and bargaining power within the household by identifying changes in or the level of a known quantity of the resource share. This share can be defined as the proportion of total household expenditure allocated to each household member.

Browning et al (1994), Chiappori et al (2002) and Vermeulen (2002), use variables known as distribution factors to identify changes in the proportion of total expenditure allocated to each

household member. Distribution factors are external variables that affect the sharing of resources but do not affect the preferences or budget constraint of the household. Since it can be quite difficult to test whether a variable is indeed a distributional factor, a recent strand of the literature on collective models identifies the level of resource shares by imposing non-parametric or semi-parametric restrictions on individual preferences.

While all unitary models and a subset of collective models assume that intra-household resource allocation processes lead to Pareto efficient outcomes, this is not always true. When resource allocation outcomes are not efficient, there may be additional room for policy intervention. Such examples of inefficient resource allocation outcomes within the household have been documented in the context of agricultural production in some African countries (Jones and McGraw 1986; Udry 1996).

Udry (1996) demonstrated that marginal land productivity is not equalized between wife-managed and husband-managed plots in Burkina Faso, even after controlling for land quality, which is a clear violation of the Pareto efficiency of intra-household resource allocation. A stochastic extension of the Pareto efficiency test was attempted by Dercon and Krishnan (2000) and Duflo and Udry (2004) who found that the income shock was not fully pooled within a household, providing further evidence that intra-household income allocation is not always efficient.

Collective models often point to the possibility that social institutions and norms that differentially affect the access of different household members to various economic resources may have significant implications for intra-household resource allocation outcomes. These institutions include: laws and other social norms governing marriage, inheritance and access to common property resources (Haddad and Kanbur 1990; Chiappori et al., 2002). Under such circumstances, Pareto optimal resource allocation is not necessarily guaranteed.

Women, compared to men, are reported to spend a larger share of their income on family welfare and on children in particular (Thomas, 1990). The evaluation of the PROGRESA program shows that when women have resources, they contribute to better health and education for children (Duflo, 2010). Gertter and Boyce (2001) find a 23% reduction in disease incidence, a 1-4% increase in height and an 18% reduction in anemia in children of mothers with resources compared to those without. Even when they are housewives, they contribute to the well-being of the family through the good humour and attention they give to children.

Women play a key role in promoting early childhood development, strongly influencing the long-term intellectual and physical health of children (Smith and Haddad, 2000). Despite this positive influence on health, women continue to be disadvantaged in the economic and family spheres in many societies, with barriers ranging from discrimination in the labor

market, access to credit, inheritance and property rights in the family (World Bank, 2011; Lenze and Klasen, 2017).

Women's empowerment would be welcome to improve the health of children in households. Lepine and Strobl (2013) found that women with bargaining power tend to have children with better nutritional status in rural Senegal. Ueyama (2006) found a positive effect of women's participation in agriculture on children's health, through the income effect and the food effect. Afridia et al (2012) found in their studies that a guarantee of rural employment by the Indian government is associated with better educational outcomes for their children. Despite women's more efficient allocation of resources, it is noted that within the household, the possession of income is often a cause of intimate partner violence (Macmillan and Gartner, 1999; Aizer, 2007). This violence has consequences for the person in whose home it is inflicted and for other household members including children (Fowler et al., 2009; Jamison et al., 2021). Within the household, it imposes direct and indirect costs on the economy. Direct costs include reduced labor force participation of women, increased health and legal costs and negative effects on women's mental health and well-being (Ellsberg et al., 2008). An indirect effect is the impact on those exposed. In this sense, some studies argue that exposure to intimate partner violence negatively affects the cognitive and emotional development of young children (Wolfe et al., 2003; Evans et al., 2008; (Goli et al., 2020).

As Cameroon is a country with social gender norms that can be detrimental to women, and reinforced by the male posture characteristic of a patriarchal society, we propose in this study to examine the influence of violence against women in the household on the health of children in Cameroon. The rest of the paper is organized in three sections. Section 2 presents the theoretical framework and methodology. Section 3 presents and discusses the statistical and econometric results obtained. Finally, the last section is devoted to the conclusion and policy recommendations.

II. MATERIAL AND METHODS

2.1. *Presentation of data and measurement of variables*

2.1.1. *Presentation of the data*

In this study we use secondary data from the 2018 Cameroon Demographic and Health Survey (CDHS, 2018) conducted in the field from 16 June 2018 to 19 January 2019. This is a survey conducted every five years with financial support from the Government of Cameroon, the United States Agency for International Development (USAID), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA), and the World Bank. The survey includes 13,160 households (6,860 households in 245 clusters in urban areas and 6,300 households in 225 clusters in rural areas). It is stratified to be representative by residence (urban-rural). The EDSC (2018) has information on the behavior of individuals in the household, demographic indicators including health status, education level of children and types of violence experienced by women. Four types of questionnaires were used to collect

data: the household questionnaire, the individual man questionnaire, the individual woman questionnaire and the biomarker questionnaire. In this study, we will use the women's module.

2.1.2. *Measurement of variables*

Birth weight is an important public health indicator worldwide as it is used to determine perinatal morbidity and mortality. Women who had given birth to at least one child in the last 5 years (14,677) were interviewed, and for 2,102 of them, information on the child's birth weight was obtained either through the child's diary or verbally from the mother. Since the EDSC data we will use is cross-sectional, we do not have any variables that capture violence during pregnancy. In order to evaluate violence, the database asks questions on the forms of violence (physical, sexual or emotional) during the last twelve months preceding the survey. In the absence of a variable capturing violence during pregnancy, we will assume that the violence perpetrated by the intimate partner one year ago occurred during the pregnancy, hence the restriction to children under one year of age.

2.1.3. *Empirical specification*

The causal chain we want to show is represented by the relationship between child health indicators at birth and domestic violence against women (DVW), controlling for other woman and household characteristic variables. In line with Wooldridge (2002), Ajakaiye and Mwabu (2007), and Mwabu (2009), the empirical specifications can take the following form:

$$Y = x\delta + \eta DVW + \varepsilon_1 \tag{1}$$

Where, Y, DVW, and X are respectively the child health indicators, the form of violence experienced by the woman and the vector of exogenous variables such as the characteristics of the woman and the household etc. x is a vector of exogenous variables that takes into account the characteristics related to the woman and the household. δ , η , and ε , are the parameters to be estimated of the exogenous variables, violence against women and the error term respectively.

Equation 1 is the structural equation of interest, i.e. the production technology of child health whose parameters are to be estimated. It is likely that there is an endogeneity bias in the estimation of equation 1. For example, the behavior exhibited by the woman during pregnancy may lead to her partner abusing her. In this situation, classical models (OLS, probit, logit,...) generally produce biased and inconsistent estimates. To purge the potential endogeneity problem, instrumental variables are used that do not belong to the outcome equation but are correlated with the endogenous explanatory variable.

Equation 2 is the probit for sample selection. It is the probability that a child will be included in the estimation sample. Since children whose selected health indicator has not been measured are systematically excluded from equation 1, equation 2 allows for a correction for sample selection bias in

the estimated parameters. This correction factor is the chance of non-selection, which Heckman (1979) calls the inverse of the Mills ratio (Φ). To take into account potential endogeneity, non-linear interactions of unobservable variables (biological characteristics), sample selection bias simultaneously, equation 1 will be rewritten after several transformations following (Garen, 1984; Mwabu, 2009) as follows:

$$Child's\ health = \alpha_0 + x_1\delta + \eta DVW + \alpha_2\varepsilon_2' + \gamma(\varepsilon_2', DVW) + \lambda\phi + u_1 \tag{2}$$

where, ε is the adjusted residual of DVW, derived from the linear reduced-form probability model of domestic violence; is the interaction of the adjusted residual of domestic violence with the true value of the woman's violence experience; is the inverse of the Mills ratio; u_1 is a composite error term comprising ε_1 and the unpredicted part, under the assumption that; and δ , η , α , γ and λ are parameters to be estimated

III. DESCRIPTIVE STATISTICS AND ECONOMETRICS OF VARIABLES

3.1. *Statistical results*

According to the 2018 Cameroon Demographic Health Survey, about one in nine women reported experiencing physical violence from their husbands (Table 1). As for the other types of violence, 8.56% of women reported emotional violence and 3.34% sexual violence. As the literature shows, physical violence is the most common type of violence perpetrated in the country. The same table shows us that, exceptionally for the form of sexual violence, where the proportions are the same, it is the first age group (15-29) that suffers the most from the three types of violence. Overall, 13.96% of the women have experienced at least one of these three types of domestic violence.

Table 1: Incidence of domestic violence among women by age (%)

Wife's age	Type of violence			
	Physique	Emotional	Sexual	Domestic violence
15-29	15,33	12,19	4,59	20,28
30-39	14,18	11,10	4,59	17,86
40-49	2,90	2,41	0,84	3,74
Global	10,80	8,56	3,34	13,96

Source: Authors based on EDSC data

Table 2 allows for a cross-analysis between the health indicators of the child and the characteristics of the woman.

When we look at the indicator of birth weight of the one-year-olds in our sample, we can see that the averages obtained according to the woman's characteristics are normal (according to WHO, the birth weight of a child is said to be normal when it is within the range [2.5-4] kilograms. Like many developing countries, the nutritional status of children is a public health problem in Cameroon. The averages of the stunting variable, which deviates from the zero value, indicate the prevalence of malnutrition among children in our study. Indeed, the further

the value is from zero, the higher the prevalence. When we consider the variables related to forms of violence against women, the averages are all negative. Compared to the other forms of violence, the prevalence is higher when the woman is subjected to sexual violence (-0.72). The averages for the other forms of violence are -0.24, -0.15 and -0.002 for emotional, physical and domestic violence respectively.

With regard to the variable "the child had an episode of diarrhea in the two months preceding the survey", the table shows that the proportion varies according to the type of violence. While this proportion is 15.43% highest when the woman has experienced sexual violence, it is 14.49% (emotional violence) and 13.58% (physical violence).

Table 2: Incidence of child health in Cameroon by woman's characteristics (mean and percentage)

Variables	Child health indicator		
	Birth weight	Size for age	Diarrhea episode
Type of violence			
Physique violence	3.519122	-.1501437	13.58
sexual violence	3.467063	-.7180952	15.43
Emotional violence	3.468448	.2432015	14.49
domestic violence	3.477876	-.0028634	13.95
Wife's age			
15-29	3.411275	-.456224	13.82
30-39	3.480932	-.1992575	10.99
40-49	3.496037	-.2650898	6.58
Wife's education			
No education	3.342428	-.2423167	9.73
Primary	3.522627	-.5767517	11.95
Secondary	3.431557	-.2709155	13.74
Superior	3.36063	-.1814286	10.63
Women's religion			
Muslim	3.462259	-.1912212	13.04
Christian	3.439153	-.4005493	12.41
Other religion	3.401429	-.4466038	4.17
Professional status of the woman			
Unemployed	3.369492	-.4678824	11.70
Has a job	3.481472	-.2911817	12.58
Place of residence			
Rural	3.466039	-.5611306	11.16
Urban	3.427536	-.1649096	13.24
Decision on women's health :			
Taken by a household member	3.40301	-.3902632	12.74
Taken by the woman	3.40051	-.3489877	11.30
Taken by the couple	3.440167	-.3427191	11.82

Source: Authors based on EDSC data

3.2 Econometrics results

Tables 3, 4 and 5 present the results of the estimation of equation (1), measuring the influence of violence against women on the health of the child. In concrete terms, this means measuring the influence on the probability of being born with a low birth weight (< 2500g), on the probability of experiencing an episode of diarrhea and on the growth of the child.

Following the narrative provided in the previous sections, the discussion focuses on the role of women's forms of violence in influencing the indicators of child health specified above. Most of the other variables have already been tested before in other studies on domestic violence (Rao, 1997; Jejeebhoy, 1998; Flake, 2005; Panda and Agarwal, 2005)

Table 3 highlights in each column the results of the different forms of violence on the child's experience of a diarrhea episode. The model taken into account in this estimation is the linear probability model (Probit) with instrumental variable in order to take into account the endogeneity of the violence suffered by the woman. It shows that only the physical and domestic forms (in the context of this work, this means having experienced at least one of the physical, sexual or emotional forms of violence) have a positive and significant effect on the probability of having had an episode of diarrhea by the child. If a woman is subjected to one of these forms of violence, the probability of occurrence of diarrhea increases by 1,755 (physical) and 1,989 (domestic) (statistically significant at the 10% level), with the other two forms not significant. This result would seem to support the Male-backlash theory (Bhattacharyya et al., 2011)

An increase in female age has a negative effect on the probability of diarrhea occurrence in children. Compared to the age group 15-29, there is a reduction in diarrhea episodes from 30-39 to 40 - 49. This consolidates our results, as in the previous section we found that the proportion of violence in all forms decreased with age. The fact that the woman takes decisions in her household has a significant negative impact in part (not in terms of all forms of violence) on the woman's behavior with regard to caring for her child.

With regard to the results obtained in Tables 4 and 5, we observe a non-significant relationship between the growth of the child and violence against women, on the one hand, and between the probability of the occurrence of children born with a low birth weight and violence, on the other. But we can still interpret the sign obtained in Table 4. Although not significant, the growth of the child seems to be negatively influenced by the violence of the husband. This would explain the 20% rate of child malnutrition reported by the Cameroon Demographic and Health Survey 2018.

Tableau 3: IV-probit – Probability of experiencing child’s episode of diarrhea, instrumental variable

VARIABLES	Experience of diarrhea episodes by the child			
Types of violence				
Physical violence	1.755*			
	(1.032)			
Sexual violence		4.179		
		(2.758)		
Emotional violence			3.106	
			(2.038)	
Domestic violence				1.989*
				(1.186)
Wife’s age				
30-39	-0.323**	-0.350**	-0.334**	-0.347**
Ref : 15-29	(0.128)	(0.155)	(0.149)	(0.140)
40-49	-0.519**	-0.479**	-0.572**	-0.565**
	(0.214)	(0.226)	(0.254)	(0.231)
Wife’s education				
Primary	-0.271	-0.181	-0.232	-0.328
Ref : Never educated	(0.217)	(0.200)	(0.225)	(0.249)
Secondary	-0.165	-0.164	-0.301	-0.269
	(0.216)	(0.242)	(0.315)	(0.271)
High education	-0.0262	-0.0350	-0.0347	-0.0294
	(0.258)	(0.285)	(0.291)	(0.265)
Wife’s professional status				
Worked	0.0478	0.243*	-0.00340	-0.0278
Ref : no work	(0.115)	(0.138)	(0.150)	(0.144)
Residence				
Urban	0.121	0.0842	0.241*	0.162
Ref : rural	(0.104)	(0.117)	(0.146)	(0.112)
decision maker on woman’s health				
Woman	-0.498**	-0.238	-0.390	-0.421*
Ref: other	(0.248)	(0.207)	(0.239)	(0.227)
Jointly	-0.146	-0.0966	0.0122	-0.0775
	(0.104)	(0.122)	(0.160)	(0.116)
Age at first cohabitation				
Before 18 years	0.0886	0.0285	0.220*	0.107
Ref : 18+	(0.109)	(0.139)	(0.129)	(0.110)
Constant	-1.404***	-1.397***	-1.729***	-1.608***

	(0.191)	(0.211)	(0.378)	(0.283)
Observations	1,426	1,426	1,426	1,426

Source: author with EDSC 2018 data. Note: Standard deviation in brackets *** significant at p<0.01, ** significant at p<0.05, * significant at p<0.1

Table 5: IV-Probit - Probability of having a low weight, estimation with instrumental variable.

VARIABLES	Child’s low weight birth			
Types of violence				
Physical violence	0.248			
	(1.659)			
Sexual violence		0.225		
		(2.905)		
Emotional violence			0.360	
			(2.589)	
Domestic violence				0.267
				(1.801)
Wife’s age				
30-39	0.0610	0.0596	0.0613	0.0608
Ref : 15-29	(0.179)	(0.190)	(0.178)	(0.182)
40-49	0.181	0.172	0.162	0.173
	(0.251)	(0.275)	(0.303)	(0.268)
Wife’s education				
Primary	0.0768	0.0961	0.0811	0.0680
Ref : Never educated	(0.402)	(0.323)	(0.385)	(0.455)
Secondary	0.0156	0.0264	0.00321	0.00100
	(0.386)	(0.352)	(0.472)	(0.471)
High education	-0.169	-0.172	-0.172	-0.171
	(0.401)	(0.400)	(0.406)	(0.406)
Wife’s professional status				
Worked	-0.110	-0.0981	-0.118	-0.124
Ref : no work	(0.163)	(0.159)	(0.195)	(0.222)
Residence				
Urban	-0.168	-0.173	-0.159	-0.165
Ref : rural	(0.143)	(0.143)	(0.166)	(0.148)
decision maker on woman’s health				
Woman	-0.221	-0.167	-0.194	-0.207
Ref: other	(0.337)	(0.268)	(0.264)	(0.284)
Jointly	-0.161	-0.155	-0.142	-0.153
	(0.147)	(0.159)	(0.226)	(0.170)
Age at first				

cohabitation				
Before 18 years	0.0438	0.0464	0.0666	0.0460
Ref : 18+	(0.184)	(0.163)	(0.156)	(0.173)
Constant	1.531***	-1.501***	-1.555***	-1.550***
	(0.324)	(0.289)	(0.459)	(0.408)
Observations	1,050	1,050	1,050	1,050

Source: author with EDSC 2018 data. Note: Standard deviation in brackets *** significant at p<0.01, ** significant at p<0.05, * significant at p<0.1

Table 4: Two-step least squares estimation of height for age

VARIABLES	Height for age			
Types of violence				
Physical violence	-0.340			
	(0.694)			
Sexual violence		-1.339		
		(2.809)		
Emotional violence			-1.003	
			(2.196)	
Domestic violence				-0.514
				(1.074)
Wife's age				
30-39	0.0605	0.0686	0.0736	0.0703
Ref : 15-29	(0.177)	(0.184)	(0.193)	(0.186)
40-49	0.131	0.130	0.171	0.154
	(0.170)	(0.171)	(0.228)	(0.196)
Wife's education				
Primary	-0.0860	-0.109	-0.0629	-0.0509
Ref : Never educated	(0.163)	(0.135)	(0.210)	(0.227)
Secondary	0.349	0.356	0.424	0.399
	(0.268)	(0.276)	(0.371)	(0.326)
High education	0.320*	0.313*	0.349*	0.342*
	(0.174)	(0.175)	(0.198)	(0.188)
Wife's professional status				
Worked	0.270	0.231	0.301	0.306
Ref : no work	(0.225)	(0.222)	(0.253)	(0.253)
Residence				
Urban	0.357	0.370	0.325	0.343
Ref : rural	(0.228)	(0.228)	(0.246)	(0.232)
decision maker on woman's health				
Woman	0.0595	0.0620	0.0765	0.0527
Ref: other	(0.171)	(0.180)	(0.210)	(0.167)
Jointly	0.0688	0.0891	-0.00677	0.0460
	(0.198)	(0.206)	(0.250)	(0.201)

Age at first cohabitation				
Before 18 years	0.306	0.350	0.283	0.309
Ref : 18+	(0.347)	(0.367)	(0.349)	(0.348)
Constant	-0.926**	-0.921**	-0.801	-0.870*
	(0.418)	(0.419)	(0.532)	(0.447)
Observations	984	984	984	984
R-squared	0.002	0.004		

Source: author with EDSC 2018 data. Note: Standard deviation in brackets *** significant at p<0.01, ** significant at p<0.05, * significant at p<0.1

IV. CONCLUSION

Using the individual module of the Cameroon Demographic Health Survey 2018, we explored the link between child health and domestic violence in Cameroon. Taking into account the bias, endogeneity the age difference variable between husband and wife was used as an instrumental variable. Once we controlled for this bias, mixed results were obtained on the effect of violence against women on children's health. When we cross-reference the different types of violence with respectively birth weight, child growth or the occurrence of diarrhea episodes, we obtain significant results only for the diarrhea episode indicator. The relationship is only significant for the physical and domestic forms. As for the effect of violence against women on the birth weight and growth of the child, there is no significance.

This study raises the role that women play in a household and contributes to the theory of women's well-being. This well-being, when it deteriorates, has a negative impact on the health of the child. These results are certainly not the last word on this important and difficult subject. Data on domestic violence suffer from under-reporting and can lead to measurement errors. The insignificant effect of violence on other child health indicators could be the result of the difficulty of understanding the subject of violence, as well as the different levels at which the factors may operate. Data limitations do not allow for the consideration of community-level factors, such as weak community sanctions against domestic violence or social norms that restrict the public visibility of women (Garcia-Moreno et al., 2002). Opportunities for further research include addressing these methodological problems.

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