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Vulnerability and Reproductive Choices of Households in Benin

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Abstract: This paper aims to analyze the influence of fertility on household vulnerability in Benin. It proposes a theoretical framework that breaks down economic vulnerability into vulnerability due to household poverty and vulnerability due to general risks and idiosyncrasy. It then regresses each of the vulnerabilities on the observable characteristics of households. This application is made with data from the 2021/22 Harmonized Survey on Household Living Conditions (EHCVM) on Benin. The results show that the number of children has a positive effect on vulnerability, thus absorbing the positive effect on risk-related vulnerability. These results suggest that incentives for parental responsibility should be put in place and social protection systems should be strengthened for vulnerable low-fertility households.

Keywords: Household, Fertility, Children, Vulnerability

JEL Classification Number: J10, J13, I32

1. Introduction

With all the great challenges facing the world today, no progress is possible without poverty reduction. Most of the existing studies have been limited to establishing links between poverty and demographic variables, in particular household fertility (Krishnaji 1983; Aassve et al. 2005; Wietzke 2020; Shiekh et al. 2020; Polyzos et al. 2022; Maitra 2024). Whether a household is poor or not is widely recognized as an important, if overly considered, indicator of a household's well-being.

However, the poor of today may not be the poor of tomorrow (Chaudhuri et al., 2002), Currently non-poor households that face a high probability of a large negative shock may, by suffering this shock, become poor tomorrow. And currently poor households may include some that are only transitorily poor as well as others that will continue to be poor (or poorer) in the future. Indeed, traditional analyses of the relationship between fertility and poverty offer a new prism if it is analysed from the perspective of household vulnerability. Indeed, classical studies on fertility and poverty tend to explore how large families, for example, may be more exposed to poverty due to heavier financial burdens.

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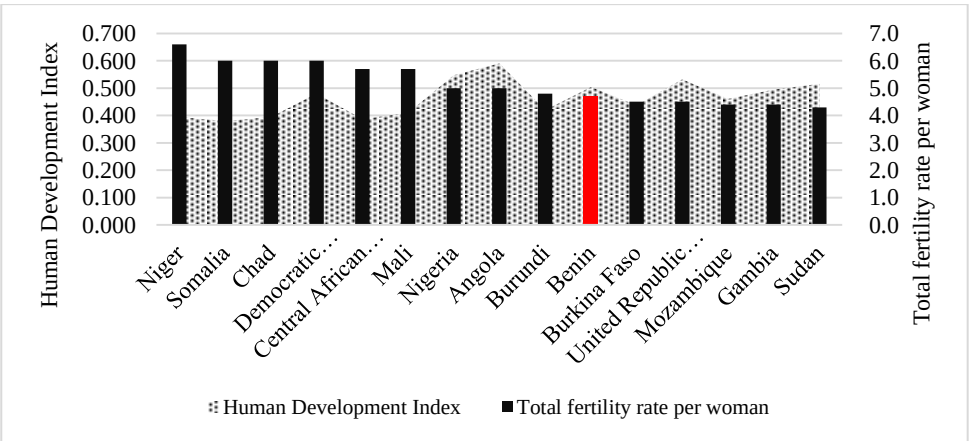
However, a focus on vulnerability will include dimensions such as a household's ability to cope with risks related to its own characteristics or external risks (such as economic crises or natural disasters), to adapt to social changes or to access essential services (education, health, housing).

Benin's demographic profile, similar to that of the Sahel countries, is suspected by most development actors as an obstacle to capturing the demographic dividend (World Bank, 2020). Benin has experienced robust economic growth in recent years, with an average real GDP growth of 5.5% over the period 2008-2018 (World Bank). However, given the sustained population growth, annual GDP per capita has averaged only 1.5% over the same period, and poverty remains widespread.

Benin, with a total fertility rate of 4.7 children per woman (National Institute of Statistics and Demography of Benin (INStaD 2023)) and a human development index (HDI) of 0.504, is in an intermediate situation among countries with high fertility rates and low human development (Figure 1).

Figure 1: Top 15 African countries with high total fertility rate with their human development index



Source: Authors based on 2023-24 HDR and 2024 SWOP data.

Compared to other countries with similar indicators, it stands out for its high fertility, although less extreme than that of countries such as Mali (5.7 children per woman) or Chad (6.0 children per woman). Benin's low HDI reflects a reality shared with countries such as Burkina Faso (HDI of 0.438) or Burundi (HDI of 0.420). Benin is thus in a group of countries that share common challenges related to fertility management and improving the quality of life for young and rapidly expanding populations.

The objective of this paper is to analyze the effect of fertility on household vulnerability in Benin. The study seeks to understand how the size of the biological children of heads of households can affect their level of economic vulnerability. Such an analysis of household vulnerability is an important basis for social protection strategies (Baulch and Hoddinott, 2000).

2. The Model

We show here how high-rise households have a lower well-being than low-rise households in the presence of shocks. We take a utilitarian approach to defining vulnerability in a risky environment. Suppose that there is a finite population of households represented by $i = 1, 2, \ldots, m$, and either ω any state of the set of states of Ω ($\omega \epsilon \Omega$). In each household, we assume n individuals who live there. This number is made up of at least one active person who we assume to be the head of household who provides the household's resources and the other individuals are inactive people who depend on the head of household. We focus on the distribution of each household's consumption expenditure:

$$c = c_i(\omega) \quad (1)$$

This equality means that consumption is a random function that depends on a given state. Note c_i the average per capita consumption of the members of each household. To measure vulnerability, we choose for each household a function with a strictly increasing and weakly concave real variable $U_i: \mathbb{R} \to \mathbb{R}$. Given the function U_i, Vulnerability is defined as the decline in well-being induced by the function of the household:

$$V_i = U - U_i(c_i) \quad (2a)$$

In this equation, U represents the measure of household well-being in an ideal world. V_i measures the level of total vulnerability of the household. U_i is the level of well-being observed by the household in relation to the level of its current consumption.

Consistent with the literature on poverty when assuming a baseline (z) below which of the households are assumed to be poor, and above the "non-poor" households, we can rewrite equation 2 as follows:

$$V_i = [U_i(z) - U_i(c_i)] + [U - U_i(z)] \quad (2b)$$

The first factor characterizes household poverty and the second factor measures vulnerability due to general risks and idiosyncrasy.

In the expression (2b) only the utility function U is undetermined. With reference to the demonstration and imitation effect developed by Duesenberry (1952), we assume that households have a reference in terms of consumption, and this level of consumption is the ideal to achieve in order to achieve ideal well-being.

Suppose a community ζ with households $j \in I = [1, k]$. We assume ζ a partition of the finite population of households. The consumption of households in the community is referred to as c_j.

Within each community, the consumption c_j converge towards the maximum c_{max} of ζ so that the ideal well-being of the household is that obtained by consuming c_{max}. In other words, the ideal well-being (U) of each individual of ζ converges to $U_i\ (c_{max})$.

3. Empirical Application

3.1. Vulnerability assessment and analysis

Before you can really use the data to calculate the vulnerability of a household, you will first have to choose the $\{U_i\}$. Based on the work of Ligon and Schechter (2003), we assume that $\{U_i\}$ take the simple form $U_i\ (c) = (c^{1-\alpha})/(1-\alpha)$ for a parameter $\alpha > 0$; as α increases, the function U_i is becoming increasingly sensitive to both risk and inequality. This utility function is more often used in the empirical literature devoted to the study of risk behaviours. The parameter α can be interpreted as the relative risk aversion coefficient of households. In agreement with the estimates of this parameter found in the micro econometric literature, we take $\alpha = [0; 1]$.

To analyze vulnerability calculated in 2b, the multiple linear models is used to estimate the calculated level of vulnerability of households from a set of variables related to characteristics.

$$V_i = X_i\beta + \varepsilon_i \qquad (3)$$

With X_i the vector grouping household characteristics, i.e. the characteristics of the head of household, the sociodemographic characteristics and the housing characteristics of households; β the vector of the parameters to be estimated and ε_i the error term.

In order to reduce the number of variables and to account only for variables that actually have an effect on the calculated vulnerability, the Furnival-Wilson algorithm based on the forward stepwise selection method and the Bayesian Information Criterion (BIC) is used. This method is not only relevant to use the model for prediction purposes but also eliminates non-significant variables.

Model 3 is estimated for each type of vulnerability calculated (poverty vulnerability, general risk vulnerability, and idiosyncrasies, and total vulnerability combining the first two). For each vulnerability, model 3 is estimated with different levels of household risk-taking, namely: $\alpha = 0{,}25$; $\alpha = 0{,}50$ and $\alpha = 0{,}75$.

3.2. Data

The data used are those of the Harmonized Survey on Household Living Conditions (EHCVM) of Benin 2021/22. The EHCVM-Benin 2021/22 is implemented by the INStaD

with the support of the World Bank and the Commission of the West African Economic and Monetary Union (UEMOA). The EHCVM is a nationally representative survey of 8,032 households, which are also representative of geopolitical areas (both urban and rural).

3.3. Empirical Results

Analysis of the estimation tables (Table 1, Table 2 and Table 3) shows that variables concerning the number of children of the head of household, whether male or female, are the main determinants of vulnerability due to poverty, risk and total household vulnerability. The three paintings have similar but nuanced effects.

Table 1: Vulnerability Estimation Result with α=0,25

Variables	Coefficient		
	Vulnerability due to poverty	**Risk vulnerability**	**Total vulnerability**
Household with electric iron	-0.0535***	0.0423***	
Number of children of male head of household	0.0113***	-0.00701***	0.00480***
Car Cleaning	-0.0846***	0.0595***	
Number of female children of the head of household	0.0129***	-0.00522***	0.00846***
Cleaning with TV	-0.0191***	0.0470***	0.0212***
Household size excluding children of the head of household	0.0104***	-0.00494***	0.00579***
Computer cleaning	-0.0603***	0.0510***	
Fridge/freezer cleaning	-0.0431***	0.0348***	
Floor made of final materials	-0.0137***	0.0215***	
Head of Household Diploma	-0.00460***	0.00582***	
Cleaning with elec/gas stove	-0.0319***	0.0595***	
Religion of the head of the household	0.00481***		0.00855***
Branch of activity of the head of household	-0.00462***	0.0129***	0.00791***
Age of the head of household	-0.000269***		
Roof made of permanent materials	-0.0129***		
Occupancy accommodation	0.00255***		0.00533***
Set-top box/antenna household	-0.0111***		
Residential setting		-0.0414***	-0.0441***
Natural covariant shock		-0.0267***	-0.0224***
Nationality of the head of household		-0.0638***	-0.0586***
Economic covariant shock		0.0133***	
Wall made of permanent materials		0.0155***	0.0149***
Gender of Head of Household		0.0132***	0.0163***
Socio-professional category of the head of household			-0.0165***
Constant	1.165***	-0.979***	0.182***
F	294.4	129.5	60.16
Prob>F	0.000	0.000	0.000

Note: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

Table 2: Vulnerability Estimation Result with α=0,50

Variables	Coefficient		
	Vulnerability due to poverty	**Risk vulnerability**	**Total vulnerability**
Household with electric iron	-0.0891***	0.0641***	
Number of children of male head of household	0.0232***	-0.0111***	0.0123***
Cleaning with TV	-0.0427***	0.0741***	
Number of female children of the head of household	0.0263***	-0.00876***	0.0187***
Car Cleaning	-0.141***	0.0833***	-0.0710***
Household size excluding children of the head of household	0.0206***	-0.00788***	0.0123***
Floor made of final materials	-0.0309***	0.0365***	
Computer cleaning	-0.0934***	0.0667***	
Fridge/freezer cleaning	-0.0677***	0.0504***	
Head of Household Diploma	-0.00928***	0.00888***	
Branch of activity of the head of household	-0.0119***	0.0217***	0.0113***
Age of the head of household	-0.000585***		
Religion of the head of the household	0.00837***	0.00883***	0.0155***
Cleaning with elec/gas stove	-0.0527***	0.0788***	
Occupancy accommodation	0.00495***		0.00796***
Economic covariant shock	-0.0113***	0.0201***	
roof in permanent materials	-0.0257***		
Demographic Idiot Shock	-0.0119***		
Gender of Head of Household	0.0135***	0.0191***	0.0267***
Socio-professional category of the head of household	-0.0152***		-0.0298***
Set-top box/antenna household	-0.0195***		
Residential setting		-0.0642***	-0.0712***
Natural covariant shock		-0.0432***	-0.0376***
Nationality of the head of household		-0.0950***	-0.0894***
Wall made of permanent materials		0.0256***	0.0201***
Constant	1.542***	-1.217***	0.315***
F	237.2	132.9	62.95
Prob>F	0	0	8.50E-158

Note: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

The number of children in a household, regardless of gender, is significantly positively associated with vulnerability due to poverty regardless of the level of risk. In other words, the more children a household has, the more vulnerable it is to poverty. This relationship can be explained by the fact that children represent an additional cost for the family, in terms of the basic needs to be met by the parents (food, housing, health, education, etc.). The increase in the number of children therefore increases the financial pressure on the household, which increases the risk of vulnerability. This vulnerability is all the more pronounced as the level of risk of risk increases.

In terms of risk-related vulnerability, a higher number of children, whether male or female, has a negative effect on vulnerability. This means that more children could be associated with increased resilience to certain risks, due to the activation of family solidarity mechanisms, mutual support strategies, or diversification of income sources in populated households. The effect is more pronounced as the household takes more risk. In other words, in a context of high risk-taking, households with more children are likely to be more resilient in coping with risks.

Table 3: Vulnerability Estimation Result with α=0,75

Variables	Coefficient		
	Vulnerability due to poverty	**Risk vulnerability**	**Total vulnerability**
Number of children of male head of household	0.0476***	-0.0183***	0.0300***
Cleaning with TV	-0.111***	0.119***	
Number of female children of the head of household	0.0544***	-0.0152***	0.0416***
Car Cleaning	-0.246***	0.131***	-0.153***
Household size excluding children of the head of household	0.0410***	-0.0136***	0.0253***
Household with electric iron	-0.156***	0.109***	-0.0838***
Floor made of final materials	-0.0701***	0.0629***	
Head of Household Diploma	-0.0188***	0.0150***	
Fridge/freezer cleaning	-0.113***	0.0795***	
Branch of activity of the head of household	-0.0275***	0.0369***	
Computer cleaning	-0.151***		
Age of the head of household	-0.00118***		
Religion of the head of the household	0.0154***	0.0162***	0.0276***
Economic covariant shock	-0.0263***	0.0315***	
Occupancy accommodation	0.0107***		0.0151***
Demographic Idiot Shock	-0.0264***		
Roof made of permanent materials	-0.0528***		
Gender of Head of Household	0.0304***	0.0306***	0.0532***
Socio-professional category of the head of household	-0.0350***		-0.0597***
Household with electric/gas stove	-0.0890***	0.118***	
Residential setting		-0.101***	-0.115***
Natural covariant shock		-0.0689***	-0.0698***
Nationality of the head of household		-0.138***	-0.147***
Wall made of permanent materials		0.0396***	
Constant	2.133***	-1.547***	0.608***
F	232.9	145.5	78.33
p	0.000	0.000	0.000

Note: * $p < 0.10$, ** $p < 0.05$ and *** $p < 0.01$.

The effect of the number of children on total vulnerability follows a similar logic to that observed for poverty-related vulnerability. The number of children positively influences

vulnerability, thus absorbing the effect of risk-related vulnerability. This result indicates that as a household has more children, its overall vulnerability increases. Indeed, the increase in the number of children inevitably leads to increased pressure on household resources and an increase in vulnerability as a whole. The high number of children thus generates a greater demand on available resources and creates greater dependence of households on external resources (State social assistance, community solidarity, etc.), especially when the risks are great. These results confirm several studies in the literature (Behrman 1996; Buchmann and Hannum 2001; Schultz 1981; Duflo 2003; Brown 2002; Boinet et al., 2024; Dimova and Fielding 2024).

4. Conclusion

The main objective of this study is to analyze the influence of fertility on household vulnerability in Benin. The study proposes a theoretical framework that breaks down economic vulnerability into vulnerability due to household poverty and vulnerability due to general risks and idiosyncrasy. The empirical application uses data from the Harmonized Survey on Household Living Conditions (EHCVM) of Benin 2021/22. The results show that the number of children positively influences vulnerability, thus absorbing the positive effect on risk-related vulnerability. These results suggest that incentives for parental responsibility should be put in place and social protection systems should be strengthened for vulnerable low-fertility households.

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