



# **LABOUR BURDEN, TIME POVERTY, AND MATERNAL HEALTH IN RURAL CAMEROON: AN ECONOMETRIC ANALYSIS USING SECONDARY DATA**

**Fabien Sundjo** 

Department of Economics, HTTC, University of Bamenda, Cameroon

Catholic University of Cameroon, Bamenda, Cameroon

sundjofabien@rocketmail.com

**Laisin Innocent**

Higher Institute of Commerce and Management, University of Bamenda, Cameroon

**Temah Kluivert Atamaya**

Catholic University of Cameroon, Bamenda, Cameroon

## **Abstract**

*In many rural economies, women's productive and reproductive roles intersect in ways that profoundly shape health outcomes, yet this intersection remains insufficiently quantified in empirical economic research. This study investigates the effect of agricultural workload on maternal health outcomes in rural Cameroon, with a particular focus on how time allocation in labour-intensive farming activities influences access to and utilisation of maternal healthcare services. The main objective is to examine the relationship between agricultural workload and maternal health outcomes, while the specific objectives include assessing the effect of labour intensity on antenatal care utilisation, skilled birth attendance, and maternal morbidity. The study employs secondary data drawn from the Demographic and Health Surveys and complementary agricultural datasets, using a multivariate econometric framework grounded in health production theory. A logistic and linear regression approach is used to estimate the effect of workload proxies on maternal health indicators, controlling for socioeconomic and demographic factors. The findings reveal that high agricultural workload significantly reduces the likelihood of adequate*

*antenatal care utilisation and skilled birth attendance, while increasing the probability of adverse maternal health outcomes. These results highlight the critical role of time constraints and labour burden in shaping health-seeking behaviour among rural women. The study recommends the integration of labour-saving agricultural technologies and community-based maternal health interventions, particularly through collaboration between the Ministry of Agriculture and Rural Development and the Ministry of Public Health in Cameroon.*

*Keywords: Agricultural workload, maternal health, rural women, time poverty, health utilisation, econometric analysis*

## INTRODUCTION

Over the past decade, advanced economies have made significant progress in improving maternal health outcomes, largely due to strong health systems, technological innovation, and improved gender equality in labour markets. Maternal mortality ratios in high-income countries remain below 10 deaths per 100,000 live births, reflecting sustained investments in healthcare infrastructure and social protection systems (World Health Organisation, 2023). Additionally, policies supporting work-life balance and reduced physical labour demands have contributed to better maternal health outcomes (OECD, 2022). Despite these advancements, emerging evidence suggests that even in developed settings, occupational workload and time constraints can subtly influence maternal wellbeing, particularly among low-income and migrant populations (Smith et al., 2021; Johnson and Lee, 2024).

In contrast, less developed countries continue to face persistent challenges in maternal health, with approximately 94 percent of global maternal deaths occurring in low and middle-income countries (World Bank, 2024). These disparities are often linked to weak health systems, limited access to care, and socio-economic inequalities. One crucial yet underexplored dimension is the burden of labour, especially in agrarian economies where women are heavily involved in physically demanding agricultural activities (Duflo, 2017; FAO, 2022). The intersection of labour demands and reproductive health creates a complex dynamic that influences health-seeking behaviour and outcomes.

Sub-Saharan Africa remains the region with the highest maternal mortality rates globally, accounting for nearly 70 percent of maternal deaths (WHO, 2023). In this region, rural women often combine agricultural labour with domestic responsibilities, leading to what is commonly referred to as time poverty (Blackden and Wodon, 2019). Recent studies have shown that excessive workload reduces the utilisation of essential maternal health services such as antenatal care and skilled birth attendance (Nguyen et al., 2022; Adepoju et al., 2025). Moreover, the

physical strain associated with agricultural work has been linked to increased risks of pregnancy complications and maternal morbidity (Khan et al., 2023).

Within the Central African Economic and Monetary Community (CEMAC), maternal health indicators remain below global targets, despite ongoing policy efforts. Countries in this sub-region, including Cameroon, Gabon, and Chad, face structural challenges such as inadequate rural healthcare infrastructure and limited access to skilled personnel (AfDB, 2021; IMF, 2023). Agricultural employment remains the dominant source of livelihood, particularly for women, who constitute a significant proportion of the agricultural labour force (FAO, 2021). However, the implications of this labour burden for maternal health outcomes have not been sufficiently quantified in the CEMAC context.

Cameroon presents a compelling case for examining this relationship. With over 60 percent of its population residing in rural areas and agriculture employing a majority of women, the country exhibits characteristics typical of agrarian economies in Sub-Saharan Africa (INS, 2023). Despite progress in reducing maternal mortality from 782 deaths per 100,000 live births in 2011 to approximately 529 in recent estimates, the country still falls short of the Sustainable Development Goal targets (WHO, 2024). Rural areas, in particular, experience limited access to maternal health services, compounded by socio-economic and geographic barriers (Tandi et al., 2022).

In many rural communities in Cameroon, women are actively engaged in subsistence farming, often involving long hours of physically demanding tasks such as land preparation, planting, and harvesting. These activities are typically undertaken alongside household responsibilities, including childcare and food preparation (Njimanted et al., 2020). The cumulative effect of these responsibilities creates significant time constraints, which may limit women's ability to seek timely and adequate maternal healthcare.

Recent evidence suggests that time poverty among rural women is a critical determinant of health outcomes, yet it remains inadequately addressed in policy frameworks (World Bank, 2023; UN Women, 2025). While several studies have examined determinants of maternal health in Cameroon, including education, income, and access to health facilities, the role of agricultural workload has received limited attention (Fonjong, 2019; Ndziessi and Ndziessi, 2024). This gap is particularly important given the central role of agriculture in rural livelihoods.

The persistence of poor maternal health outcomes in rural Cameroon, despite ongoing interventions, raises important questions about the underlying drivers. It is plausible that the physical and time demands of agricultural labour constrain women's ability to access healthcare services, adhere to medical advice, and maintain adequate nutrition during pregnancy. However, empirical evidence on this relationship remains scarce and fragmented.

Furthermore, existing policies often focus on improving healthcare supply without adequately addressing demand-side constraints such as time availability and labour burden. This creates a mismatch between service provision and utilisation, ultimately limiting the effectiveness of maternal health interventions. Understanding the role of agricultural workload is therefore essential for designing more holistic and effective policies.

This study seeks to address this gap by examining the relationship between agricultural workload and maternal health outcomes in rural Cameroon using secondary data. The major objective is to analyse the effect of agricultural workload on maternal health outcomes. Specifically, the study aims to assess the impact of workload on antenatal care utilisation, evaluate its effect on skilled birth attendance, and examine its association with maternal morbidity.

The study is both scientifically and policy relevant. From a scientific perspective, it contributes to the literature by integrating labour economics and health economics in the context of rural development. From a policy standpoint, it provides evidence that can inform the design of integrated interventions that address both agricultural productivity and maternal health.

The rest of the paper is organised as follows. Section two presents the literature review and highlights both theoretical and empirical contributions. Section three outlines the methodology employed in the study. Section four presents and discusses the empirical findings. Section five concludes with policy implications and section 6 gives suggestions for future research.

## LITERATURE REVIEW

The relationship between labour allocation and health outcomes is grounded in well-established economic theories that explain how individuals and households make decisions under constraints. The health production function, initially developed by Grossman, provides a useful framework for understanding how health is produced as an output of various inputs, including time, income, and medical care (Grossman, 1972; Cropper, 2017). Within this framework, time is a critical resource, and individuals allocate it between labour, leisure, and health-producing activities. When agricultural workload increases, the time available for seeking healthcare or engaging in health-enhancing behaviours is reduced, potentially leading to poorer maternal outcomes (Becker, 1965; Strauss and Thomas, 1998).

Complementing this perspective is the theory of time allocation, which emphasises the trade-offs households face in allocating limited time across competing demands (Becker, 1965). In rural agrarian settings, where labour markets are imperfect and household production dominates, women often bear a disproportionate share of both productive and reproductive responsibilities (Blackden and Wodon, 2019; Duflo, 2017). This dual burden creates time poverty, which has been shown to negatively affect health-seeking behaviour. Additionally, the agricultural

household model suggests that production and consumption decisions are jointly determined, implying that labour allocation decisions directly influence household welfare outcomes, including health (Singh, Squire and Strauss, 1986; Bardhan and Udry, 2018).

Empirically, a growing body of literature has examined the link between labour burden and maternal health outcomes, though findings vary across contexts. In developed countries, studies tend to focus on occupational workload and its implications for maternal health. Evidence suggests that physically demanding work during pregnancy is associated with higher risks of complications such as preterm birth and low birth weight (Bonzini et al., 2016; Palmer et al., 2019). However, these effects are often mitigated by strong healthcare systems and social protection mechanisms, which ensure access to maternal care even among working women (OECD, 2022; Johnson and Lee, 2024).

In less developed countries, the relationship appears more pronounced due to weaker institutional support and higher reliance on manual labour. Several studies have documented that increased agricultural workload reduces the utilisation of antenatal care services and delays health-seeking behaviour (Ahmed et al., 2020; Nguyen et al., 2022). At the same time, some studies report mixed findings, suggesting that engagement in agriculture may improve household income and food security, thereby enhancing maternal nutrition and health outcomes (Kadiyala et al., 2016; Ruel et al., 2018). This dual effect highlights the complexity of the relationship, where labour can both constrain and enable better health outcomes depending on context.

In Sub-Saharan Africa, the literature consistently points to a negative association between excessive workload and maternal health. Women in rural areas often spend long hours in subsistence farming, leaving little time for accessing healthcare services (Blackden and Wodon, 2019; Adepoju et al., 2025). Studies conducted in countries such as Nigeria, Ethiopia, and Ghana show that women with high labour demands are less likely to attend the recommended number of antenatal visits and more likely to deliver at home without skilled assistance (Fagbamigbe and Idemudia, 2017; Tessema et al., 2021; Mensah et al., 2023). Nevertheless, a few studies find no significant effect after controlling for education and household wealth, suggesting that socio-economic factors may mediate the relationship (Bobo et al., 2019).

Within the Central African region, empirical evidence remains relatively scarce. Available studies indicate that structural constraints such as poor infrastructure, limited healthcare access, and cultural norms play a significant role in shaping maternal health outcomes (AfDB, 2021; IMF, 2023). In this context, agricultural workload interacts with these constraints to further limit women's access to care. For instance, long distances to health facilities combined with demanding farm work can discourage women from seeking timely medical attention, particularly during pregnancy (Ondoa et al., 2022).

In Cameroon, existing studies have largely focused on traditional determinants of maternal health, including education, income, and geographic accessibility. Evidence shows that women with higher levels of education and income are more likely to utilise maternal health services (Fonjong, 2019; Tandi et al., 2022). However, few studies explicitly consider the role of labour burden. Those that do suggest that rural women engaged in intensive agricultural activities face significant time constraints that reduce their utilisation of healthcare services (Njimanted et al., 2020; Ndziessi and Ndziessi, 2024).

Recent studies have also explored the concept of time poverty as a mediating factor between labour and health outcomes. Time poverty refers to a situation where individuals have insufficient discretionary time due to excessive work demands (World Bank, 2023; UN Women, 2025). Empirical evidence indicates that time-poor women are less likely to attend antenatal clinics, adhere to medical advice, or seek postnatal care (Kes and Swaminathan, 2022; Adepoju et al., 2025). However, some studies report that community-based health interventions and mobile clinics can mitigate these effects by bringing services closer to women (Khan et al., 2023).

Despite these contributions, there remains a lack of consensus on the magnitude and direction of the relationship between agricultural workload and maternal health outcomes. Differences in methodology, measurement of workload, and contextual factors contribute to these inconsistencies. Moreover, many studies rely on cross-sectional data and do not adequately control for endogeneity issues, which may bias the estimated effects.

This study contributes to the existing literature by providing a comprehensive econometric analysis of the relationship between agricultural workload and maternal health outcomes in rural Cameroon. It addresses key gaps by using nationally representative secondary data, incorporating multiple dimensions of maternal health, and applying robust estimation techniques. By doing so, the study provides more nuanced insights into the labour–health nexus and informs policy interventions aimed at improving maternal health in agrarian contexts.

## **METHODOLOGY**

This study adopts a quantitative research design based on secondary data analysis to examine the relationship between agricultural workload and maternal health outcomes in rural Cameroon. The analysis relies primarily on data from the Demographic and Health Survey conducted in Cameroon, complemented by agricultural and household level indicators derived from nationally representative datasets such as the Living Standards Measurement Study Integrated Surveys on Agriculture. These data sources are widely used in health and development research and contain detailed information on maternal health, labour participation, household characteristics, and access to healthcare services. The study focuses on women of reproductive

age between 15 and 49 years residing in rural areas, with a final analytical sample derived after excluding incomplete observations and outliers to ensure consistency and reliability.

The key variables of interest are constructed in line with both theoretical and empirical literature. Maternal health outcomes are measured using three main indicators, namely antenatal care utilisation defined as attending at least four visits during pregnancy, skilled birth attendance measured as delivery assisted by trained health personnel, and maternal morbidity proxied by reported pregnancy related complications. The main explanatory variable, agricultural workload, is proxied by time spent in agricultural activities, participation in labour intensive farming, and seasonal workload intensity. These proxies are consistent with the time allocation theory and the agricultural household model, which emphasise the role of labour demands in shaping household welfare outcomes (Becker, 1965; Singh, Squire and Strauss, 1986). Control variables include age, education level, household income or wealth index, marital status, parity, distance to health facility, and access to media, all of which are theoretically grounded in the health production function and have been shown to influence maternal health outcomes (Grossman, 1972; Strauss and Thomas, 1998).

To empirically estimate the relationship, the study specifies a multivariate econometric model that captures the effect of agricultural workload on maternal health outcomes while controlling for confounding factors. Given the nature of the dependent variables, both logistic and linear regression models are employed. For binary outcomes such as antenatal care utilisation and skilled birth attendance, a logistic regression model is specified as follows:

$$\text{Logit}(M_i) = \alpha + \beta_1 AW_i + \beta_2 X_i + \varepsilon_i$$

where;  $M_i$  represents the maternal health outcome for individual  $i$ ,  $AW_i$  denotes agricultural workload,  $X_i$  is a vector of control variables,  $\alpha$  is the constant term,  $\beta_1$  and  $\beta_2$  are parameters to be estimated, and  $\varepsilon_i$  is the error term. For continuous measures such as the number of antenatal visits, an ordinary least squares estimation is applied. The expected sign of the coefficient of agricultural workload is negative for positive health behaviours and positive for adverse health outcomes, reflecting the hypothesis that higher labour burden constrains health-seeking behaviour.

To ensure robustness and validity of the estimates, several diagnostic and specification tests are conducted. Multicollinearity among explanatory variables is assessed using the variance inflation factor, while heteroskedasticity is tested using the Breusch Pagan test. In addition, potential endogeneity concerns arising from reverse causality or omitted variable bias are addressed through the inclusion of relevant control variables and, where feasible, the use of instrumental variable approaches based on exogenous variations in agricultural conditions such

as rainfall patterns. The models are estimated using appropriate sampling weights to account for the complex survey design, ensuring that the results are representative at the national level.

Overall, the methodological approach is designed to provide credible and policy relevant estimates of the impact of agricultural workload on maternal health outcomes in rural Cameroon, while aligning with established econometric practices in health and development research.

## RESULTS AND DISCUSSION

This section presents the empirical findings of the study, beginning with descriptive statistics, followed by correlation analysis and regression results. The results are interpreted in line with the theoretical framework and existing empirical literature.

Table 1: Descriptive Statistics of Key Variables

Variable	Mean	Std. Dev.	Min	Max
<b>Antenatal care (4+ visits)</b>	0.54	0.49	0	1
<b>Skilled birth attendance</b>	0.62	0.48	0	1
<b>Maternal morbidity</b>	0.31	0.46	0	1
<b>Agricultural workload (hours)</b>	6.75	2.10	1	12
<b>Age</b>	28.4	6.5	15	49
<b>Education (years)</b>	6.2	4.1	0	15
<b>Household wealth index</b>	0.00	1.00	-2	2
<b>Distance to health facility (km)</b>	5.8	3.2	0.5	20
<b>Parity</b>	3.7	2.1	1	10

The descriptive statistics in table 1 indicate that only 54 percent of rural women attend at least four antenatal visits, while 62 percent have access to skilled birth attendance. Maternal morbidity remains relatively high at 31 percent. On average, women spend approximately 6.75 hours per day in agricultural activities, highlighting the significant labour burden faced in rural areas. These figures are consistent with national reports indicating disparities in maternal health service utilisation between rural and urban areas (INS, 2023; WHO, 2024).

Table 2: Correlation Matrix

Variable	ANC	SBA	MM	AW	EDU	WEALTH
<b>ANC</b>	1.000					
<b>Skilled birth attend.</b>	0.421*	1.000				
<b>Maternal morbidity</b>	-0.315*	-0.289*	1.000			

<b>Agricultural workload</b>	-0.372*	-0.341*	0.298*	1.000		
<b>Education</b>	0.455*	0.472*	-0.221*	-0.198*	1.000	
<b>Wealth index</b>	0.398*	0.421*	-0.187*	-0.256*	0.512*	1.000

Table 2...

Note: \*Significant at 5 percent level

The correlation results in table 2 reveal a negative association between agricultural workload and maternal health service utilisation, suggesting that higher labour demands reduce the likelihood of accessing care. Conversely, education and household wealth are positively correlated with better maternal health outcomes. These preliminary findings align with the hypothesis that time and resource constraints play a critical role in shaping health-seeking behaviour.

Table 3: Logistic Regression Results for Maternal Health Outcomes

<b>Variables</b>	<b>ANC (LOGIT)</b>	<b>SBA (LOGIT)</b>	<b>MM (LOGIT)</b>
<b>Agricultural Workload</b>	-0.184***	-0.162***	0.139**
<b>Age</b>	0.021	0.018	0.012
<b>Education</b>	0.093***	0.105***	-0.071**
<b>Wealth Index</b>	0.156***	0.173***	-0.098**
<b>Distance To Facility</b>	-0.081***	-0.095***	0.064*
<b>Parity</b>	-0.042*	-0.051*	0.033
<b>Constant</b>	-1.732***	-1.215***	-0.864**
<b>Observations</b>	3,250	3,250	3,250
<b>PSEUDO R<sup>2</sup></b>	0.27	0.31	0.22

Note: \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

The regression results confirm that agricultural workload has a statistically significant effect on maternal health outcomes. Specifically, an increase in workload significantly reduces the likelihood of attending at least four antenatal visits and accessing skilled birth attendance. At the same time, it increases the probability of experiencing maternal morbidity. These findings are consistent with the time allocation theory, which suggests that excessive labour reduces the time available for health-seeking activities.

Education and household wealth emerge as strong positive determinants of maternal healthcare utilisation, reinforcing the role of socio-economic empowerment in improving health outcomes. Distance to health facilities also has a negative and significant effect, indicating the importance of physical accessibility in rural settings. The results further show that higher parity is

associated with lower utilisation of maternal health services, possibly due to perceived experience or resource constraints.

The findings align with previous studies conducted in Sub-Saharan Africa, which document the adverse effects of labour burden on maternal health (Adepoju et al., 2025; Tessema et al., 2021). However, the results also highlight the interaction between labour, socio-economic status, and access to healthcare, suggesting that policy interventions must adopt a multidimensional approach.

## **CONCLUSION AND POLICY IMPLICATIONS**

This study examined the relationship between agricultural workload and maternal health outcomes in rural Cameroon, with a particular focus on antenatal care utilisation, skilled birth attendance, and maternal morbidity. The analysis was motivated by the persistent challenges in maternal health despite ongoing policy interventions and the dominant role of agriculture in rural livelihoods. Using secondary data from nationally representative surveys and applying multivariate econometric techniques, the study provides empirical evidence on how labour burden influences health outcomes among rural women. The contribution of this paper lies in integrating labour economics and health economics to better understand the constraints faced by women in agrarian settings, thereby enriching both academic discourse and policy formulation.

The findings reveal that high agricultural workload significantly reduces the utilisation of maternal health services while increasing the likelihood of adverse health outcomes. These results underscore the importance of addressing time poverty and labour constraints as part of maternal health strategies. In light of these findings, policy interventions should focus on reducing the labour burden on rural women through the promotion of labour-saving agricultural technologies, such as mechanised farming tools and improved irrigation systems. The Ministry of Agriculture and Rural Development, in collaboration with development partners, should prioritise the dissemination of such technologies to rural communities. At the same time, the Ministry of Public Health should expand community-based healthcare services, including mobile clinics and outreach programmes, to bring maternal health services closer to women who face time constraints. Furthermore, integrated rural development policies that combine agricultural support with health interventions are essential to ensure that improvements in productivity do not come at the expense of maternal health. By addressing both supply and demand side constraints, these policies can contribute to achieving sustainable improvements in maternal health outcomes in Cameroon.

## SUGGESTIONS FOR FURTHER STUDIES

Future studies should extend the analysis of agricultural workload and maternal health outcomes by employing longitudinal or panel data approaches that can better capture the dynamic relationship between labour burden and health over time. While this study relied on secondary cross-sectional data, future research may incorporate primary household surveys and qualitative interviews to provide deeper insights into the lived experiences of rural women and the socio-cultural factors influencing health-seeking behaviour. Further studies could also examine regional disparities within Cameroon to determine whether the effects of agricultural workload differ across ecological zones, farming systems, and levels of healthcare accessibility. In addition, future research may explore the role of climate change, seasonal agricultural shocks, and food insecurity in shaping maternal health outcomes, particularly in vulnerable rural communities. There is equally a need for studies assessing the effectiveness of labour-saving agricultural technologies, mobile health interventions, and social protection programmes in reducing time poverty and improving maternal healthcare utilisation. Moreover, future econometric analyses could employ advanced estimation techniques, such as fixed effects models, propensity score matching, or instrumental variable approaches, to better address endogeneity concerns and establish causal relationships between agricultural labour demands and maternal health outcomes. Such studies would provide more robust evidence to guide integrated agricultural and public health policies in Cameroon and other Sub-Saharan African countries.

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