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## Impact of Out-of-Pocket Fees on Under-5 Infant Mortality in Cameroon

Amelie Olga Mafotsing Fopoussi  
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# Walden University

College of Health Professions

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Amelie Olga Mafotsing Fopoussi

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Walden University  
2021

Abstract

Impact of Out-of-Pocket Fees on Under-5 Infant Mortality in Cameroon

by

Amelie Olga Mafotsing Fopoussi

MPH, University of Michigan, 2011

BS, University of Missouri-Columbia, 2009

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

August 2021

## Abstract

Health facilities in Cameroon charge fees for treatment and services, which can affect health outcomes for those unable to pay for services. Some studies have shown that the removal of user fees had a positive impact on child health outcomes in selected African countries. The aim of this quantitative, cross-sectional study was to understand whether there is a link between out-of-pocket expenses and under-5 mortality in Cameroon. The study was guided by the social ecological framework. Secondary data from the 2011 Cameroon Demographic Health Survey were used in the study. Chi-square, binary logistic regression, and multicollinearity analyses were used to analyze the data. Results indicated that out-of-pocket expenses were not associated with under-5 mortality when controlling for other significant variables. However, delivery in private hospitals, maternal age, and respondents from the Grassfield, the Bamilike/Bamoun, and the Kako/Meka/Pygmé ethnic group were associated with under-5 mortality. In addition, region was not found to be significantly associated with under-5 mortality when controlling for confounding variables. Based on the results, educating younger women, advocating for health coverage that will reduce barriers to accessing health services, and understanding the different culture of each ethnic group and region and how it may influence a woman's ability to care for herself and her children are important for interventions to promote positive social change and to reduce under-5 mortality in Cameroon and meet the sustainable development goal of ensuring healthy lives and promote well-being for all at all ages.

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## Dedication

Thank you to my friends and family who have encouraged me from the start. Especially my mother who abandoned her activities in Cameroon to come assist with the kids, giving me enough room to pursue another degree.

Thank you for my loving husband Florent who has been my number one motivator. Thank you for your understanding, your support, your love, and for containing the kids when it was time to study.

Thank you for my sisters, Gisele, Solange, Judith, Nadege, and Isabelle, who have always known what to say to encourage me when I was feeling overwhelmed with the workloads from combining work and school.

To the wonderful classmates whom I have had the privilege to know along the way, thank you for your encouragements, especially Myra Jonhson and Dainelle Clark. We developed a wonderful relation and periodically checked on one another to push each other and not give up. Words cannot describe my gratitude. I praise the Lord each day for surrounding me with incredible individuals who strive to making an impact in the community we live in. I am looking forward to our continued friendship and collaboration.

For my children, Berekia, Yoan, Lena, and Harmony, to whom I can be an inspiration tomorrow, this degree is to show you that anything is possible with a right mind set. I did it!

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## Section 1: Foundation of the Study and Literature Review

Cameroon faces a significant shortage in the health workforce. The shortage differs geographically. Some regions have a higher number of physicians (per person) than others leading to poor health outcomes across the regions (Tandi et al. 2015); 70 % of regions have a density of health personnel-to-population per 1,000 that is less than 1.5, implying an acute shortage of health personnel (Tandi et al., 2015). This unequal distribution of the workforce has influenced the under-5 infant mortality rate in Cameroon (Tandi et al., 2015) along with inequitable distribution of facilities, untrained staff, attitude of health workers toward community, and poor quality of offered services (Shrivastava et al., 2014). Human resource in health care has also been associated with maternal, infant, and under-5 mortality rates (Anand & Barnighausen, 2004). Thus, health care workers, with the proper motivation and adequate training, are important in improving and reducing maternal health and child mortalities.

Another challenge in Cameroon's health care is that many health facilities charge prices for services. Cameroon allocates about 4.1% of its budget to health, with about 70% of the total health expenditure paid by households (Health Analytic Profile Cameroon [HAPC], 2016). Further, Cameroon's household contribution is the third highest in Sub-Saharan Africa (SSA), where the average is 34% (Nde et al., 2019). But about 64% of households in Cameroon cannot access health care because the perceived cost of care is too high (Nde et al., 2019). As many people survive on less than two dollars per day, which has led to many deaths due to lack of medical care when unable to pay for services (McTavish et al., 2015; Soh, 2013). A free care policy has been

implemented for some common diseases such as malaria, HIV/AIDS, tuberculosis, immunization, and support services for specific target populations (children under 5, pregnant women). However, this free health care policy is not systematically applied due to a lack of formal compensation mechanisms (HAPC, 2016). As a result, many pregnant women delay seeking maternal health services, including skilled attendance at childbirth due to the cost. Additional barriers include the availability of services, distance to the services, lack of transportation, sociocultural factors, and lack of knowledge (Alam et al., 2015). Therefore, using the 2011 Cameroon Demographic Health Survey (CDHS), this study addressed the influence of out-of-pocket expenses on under-5 infant mortality in Cameroon and the differences between regions in Cameroon.

Section 1 contains the problem statement, the purpose of the study, research questions (RQs) and hypotheses, theoretical foundation of the study, and the nature of the study. The section also covers literature review strategies and the literature review. The section ends with definitions, assumptions, scope and delimitations, significance, and a summary.

### **Problem Statement**

The World Health Organization (WHO, 2019) estimated that in 2017, thousands of women died around the world from conditions that could have been prevented. Furthermore, approximately 80% of the world's under-5 mortality occurred in SSA and South Asia (Ghimire et al., 2019). As maternal and child health is an indication of a country's health system performance, Cameroon's maternal mortality is among the highest in SSA (World Bank, 2019a). From 2002 to 2015, the maternal mortality rate in

Cameroon experienced a decline; however, it has not decreased as fast as other SSA countries, averaging an annual decrease of 1.63%

(<https://www.macrotrends.net/countries/CMR/cameroon/maternal-mortality-rate>).

Although Cameroon's maternal mortality rate fell to 529 deaths in 2017 (an 11.2% decrease) from the 596 reported in 2015, it is still considerably high (World Bank, 2019a). It is far from reaching the 40 deaths per 1,000 livebirths set by Millennial Development Goal 4 or the 25 deaths per 1,000 live births set by sustainable development goals (Van Malderen et al., 2019). Additionally, 2018 Cameroon's under-5 mortality rate was 76.1 deaths per 1,000 live births, which is 2.44% (78 deaths) lower than SSA (UNICEF, n.d.; The World Bank, 2019b).

Cameroon also suffers regional disparities in health and nutrition outcomes, with the three northern regions and the East region performing considerably worse than the national averages ([https://www.globalfinancingfacility.org/sites/gff\\_new/GFF-Annual-report/republic-of-cameroon.html](https://www.globalfinancingfacility.org/sites/gff_new/GFF-Annual-report/republic-of-cameroon.html)). For example, UNICEF (n.d.) indicated that in 2017, the neonatal mortality rate in rural areas (36 deaths per 1,000 live births) was 44% higher than in urban areas (25 deaths per 1,000 live births). Furthermore, the neonatal mortality rate was higher among the poorest households (39 deaths per 1,000 live births) compared to the rate among the richest households (29 deaths per 1,000 live births). The proportion of girls between ages 15 and 19 who have begun childbearing also shows disparities, with 44.2% in the East region and 23.4% in the Far North Region, whereas in the capital, Yaoundé, the rate is only 7.6%

([https://www.globalfinancingfacility.org/sites/gff\\_new/GFF-Annual-report/republic-of-](https://www.globalfinancingfacility.org/sites/gff_new/GFF-Annual-report/republic-of-)

cameroon.html). Similarly, these four regions experience under-5 stunting rates that are higher than the national average (32%): 42% in the Far North Region, 34% in the North Region, 38% in the Adamaoua Region, and 36% in the East region ([https://www.globalfinancingfacility.org/sites/gff\\_new/GFF-Annual-report/republic-of-cameroon.html](https://www.globalfinancingfacility.org/sites/gff_new/GFF-Annual-report/republic-of-cameroon.html)). Disparities in the coverage of care for newborn have also been identified. The North and Far North regions present lower coverage in newborn post-natal care, weighed at birth, early initiation of breastfeeding, and exclusive breastfeeding, compared to the other regions.

Many factors are contributing to these mortality rates and health disparities. Contributors to the high rates include lack of education, place of residence, pregnancy complications, hypertension, infections, poverty, lack of antenatal care, poor nutrition, low birth weight, preterm birth complications, pneumonia, intrapartum-related complications, diarrhea, and malaria (Van Malderen et al., 2019). The government of Cameroon, in attempting to reduce maternal mortality and reaching the targeted goal of 350 deaths per 100,000 livebirths of the millennium development goals, provides free treated mosquito nets for pregnant women and a reduction of obstetric costs (Nguenda Anya & Yene, 2016). However, the high cost of health care remains a barrier to accessing essential health services (Nguenda Anya & Yene, 2016).

Because of the extreme poverty often observed in low-income countries, user fees represent a significant barrier to accessing essential health services. With no insurance, medical costs can represent an important proportion of household income, but it is difficult to plan due to uncertainty of birth outcomes (Dzakpasu et al., 2014). Although



user fees were introduced through the Bamako Initiative to address financial issues related to primary health care and to improve quality and increase community involvement in African countries (Hatt et al., 2013), many have questioned its effectiveness. User fees have provided additional resources, but it poses a cost burden on poor households (Dzakpasu et al., 2014). Numerous African countries have adopted policies abolishing or reducing user fees for maternal health services, which has improved health care use (Lagarde & Palmer, 2008; Leone et al., 2016). However, findings are inconsistent, with some studies showing no significant in removing payment (Ansah et al., 2009), and others showing that out-of-pocket expenses contributed to infant deaths (Flores-Huerta et al., 2019).

Though most studies examined out-of-pocket fees as a barrier to accessing maternal and infant health services, few studies have addressed the impact of user fees on health outcomes (Dzakpasu et al., 2014). Fewer studies exist on the role of out-of-pocket expenses and under-5 infant mortality, especially in Cameroon. Therefore, the present study aimed at exploring the role of out-of-pocket expenses on under-5 mortality after controlling for poverty (wealth index), age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, access to clean water, sanitation, antenatal visit, delivery methods, infant weight at birth, and marital status. The findings of the study may help determine whether out-of-pocket expenses are an indirect contributor to infant mortality in Cameroon. Furthermore, findings of this study may help the legislature consider appropriate decisions toward eliminating user fees and potentially accelerate the adoption of universal health coverage as Cameroon has initiated reflection toward

establishing universal health coverage for its population (Nde et al., 2019). This effort could improve Cameroon's health outcomes, especially maternal and infant health outcomes, helping Cameroon to meet the millennium and sustainable development goals.

### **Purpose of the Study**

The purpose of the study was to investigate the role of out-of-pocket fees on under-5 mortality. I conducted a quantitative study where I performed a multivariate regression analysis that allowed me to examine whether there is a statistically significant association between out-of-pocket fees and under-5 mortality after controlling for other variables (poverty, education, maternal age, religion, place of residence, immunization, malaria prophylaxis, health insurance, antenatal visit, infant weight at birth, and marital status) based on data from the 2011 CDHS. Since disparity in health exists between the regions of Cameroon, I also assessed possible differences in this association between the Northern and Southern parts of Cameroon while controlling for the same variables. This project addresses an area that lacks empirical evidence in Cameroon. The potential public health implications of this study are that the information obtained from the study may improve maternal and infant health outcomes in Cameroon by informing government officials as they implement strategies to alleviate barriers to maternal and child health services, especially for those with lower income and those living in remote areas.

### **Research Questions and Hypotheses**

I developed two questions to understand the impact of out-of-pocket expenses on under-5 mortality in Cameroon.

RQ 1: What is the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of aged 15–49 years controlling for poverty, maternal age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, antenatal visit, infant weight at birth, and marital status?

*H<sub>01</sub>*: Out-of-pocket expenses are not associated with under-5 mortality after controlling for confounding variables.

*H<sub>11</sub>*: Out-of-pocket expenses are associated with under-5 mortality after controlling for confounding variables.

RQ 2: Does the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of childbearing age vary by the regions after controlling for confounding variables (poverty, maternal age, education, religion, place of residence, maternal nutrition, child nutrition, health insurance, immunization, malaria prophylaxis, access to clean water, sanitation, antenatal visit, infant weight at birth, and marital status)?

*H<sub>02</sub>*: The relationship between out-of-pocket expenses and under-5 mortality does not vary by region after controlling for confounding variables.

*H<sub>12</sub>*: The relationship between out-of-pocket expenses and under-5 mortality varies by region after controlling for confounding variables.

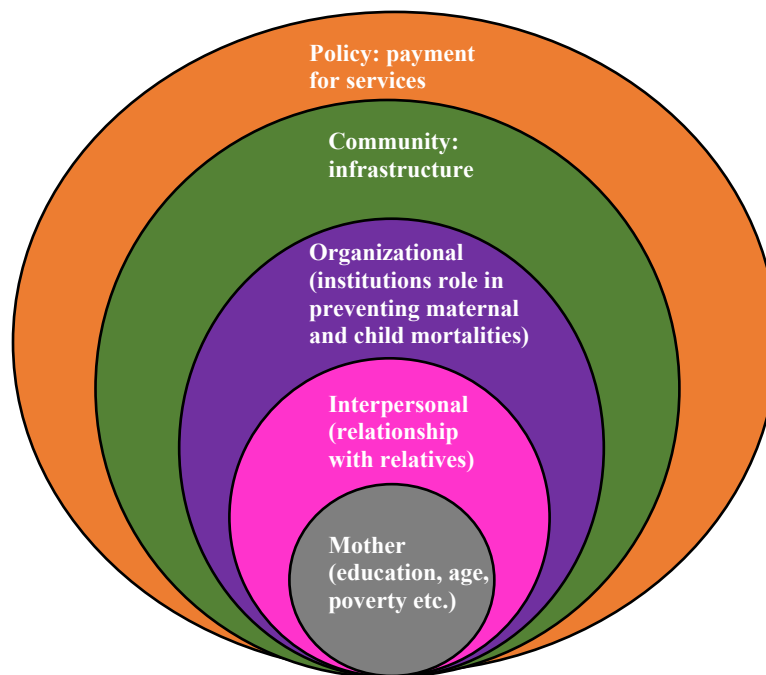
### **Theoretical Foundation**

The theoretical framework for this study was the social-ecological model (SEM). derived from Bronfenbrenner's ecological theory developed in the 20th century (Kilanowski, 2017; Tudge & Rosa, 2020). The SEM shifted the focus from the

environment to directly focusing on behaviors (Sallis & Owens, 2015). Bronfenbrenner's ecological theory contains three critical constraints that the environment influences: the microsystem that consists of interactions among family members or groups; the mesosystem that includes physical family, school, and work setting; and the exosystem, which consists of the vast system of economics, culture, and politics (Kilanowski, 2017; Sallis & Owens, 2015). The model has also been modified by McLeroy et al. (1988) to include five levels of influences for health-related behaviors and conditions widely used in public health intervention programs. The five levels include the individual level, the interpersonal level, the organization level, the community level, and the public policy level (Figure 1).

### Figure 1

#### *Social Ecological Model*



Adapted from “The Social-Ecological Model: A Framework for Prevention,” by Centers for Disease Control and Prevention

(<https://www.cdc.gov/violenceprevention/publichealthissue/social-ecologicalmodel.html>). In the public domain

The SEM is a theory-based framework for understanding the multilevel and interactive effects of personal and environmental factors that determine behaviors (Kaiser et al., 2019; Kilonowski, 2017; Shahabuddin et al., 2017). The individual level is at the center, in which personal factors may contribute or hinder an individual’s ability to pay for services at health facilities. These individual characteristics include knowledge, attitudes, poverty, age, marital status, and education (Mcleroy, 1998; National Cancer Institute, 2005). Personal beliefs, lack of authority, poverty, age, and parity can hinder women from seeking maternal and child health services, which could have devastating outcomes for both the mother and the baby. Furthermore, lack of knowledge on the importance of finding maternal and childcare services when necessary and the causes and risks of under-5 infant mortality may lead to delaying seeking appropriate care.

The interpersonal level includes the interpersonal relationships with family, friends, and those within close social networks (Mcleroy, 1998; National Cancer Institute, 2005, Nyambe et al., 2016). This level has a critical influence on a woman’s behavior toward a healthy pregnancy and infant mortality preventive measures. At this level, marital status, women’s autonomy, previous interactions with health care facility staff, and community health workers may influence women’s decision to seek care.

The community level involves relationships among community organizations, institutions (schools, churches, health clinics), village associations, community leaders, and transportation networks. Thus, urban versus rural residence, distance to health services, transport availability, and the quality and availability of services may influence women's maternal and childcare seeking behaviors. Other factors may include the culture and norms of the community. For example, cultural beliefs and lack of means may prevent women from seeking care at a health facility. They may prefer traditional medicine or self-medication that is often less costly. Furthermore, believing in witchcraft may play an essential role in women's actions towards their infants' health. For example, it is commonly believed in Cameroon that pregnancy status should not be disclosed for fear of being bewitched or that a disease status should not be disclosed for fear of being stigmatized (Andrew et al., 2014). As a result, this may lead to missing early diagnoses that may have happened in the early stages of the disease or pregnancy, leading to complications and sometimes even death.

The organization level involves the role institutions play in preventing maternal and child mortality. Prevention strategies related to policy in place and resource allocation to remove barriers to receiving proper maternal and childcare, especially to the population in remote areas, may improve maternal and child health outcomes. For example, increases in health expenditure and lessening household health expenses may influence maternal and child health-seeking services. Because of the fees, many delay care or skip treatment, which can damage health.

The public policy level consists of local, state, and federal policies and laws. Related to this study, this includes policies regarding the allocation of resources that will allow a better quality of care, better transportation network, more access to health facilities for proper diagnoses and care of diseases as well as pregnancy-related complications. A correct implementation must be in place to ensure equal distribution of resources.

The SEM can help develop a more comprehensive understanding of the factors that influence women's behavior toward maternal and child health services and what might be necessary to change those that may influence health outcomes (Sallis & Owens, 2015). The SEM has previously been used concerning health care utilization and maternal and child health. For example, studies have used the SEM to understand barriers to accessing health services and the causes of infant mortality in the population (Alio et al., 2010; Gombachika et al., 2012; Genowska et al., 2015). Gombachika et al. (2012) showed that using the SEM can shed light on some of the barriers facing HIV-infected married couples to accessing reproductive and health services at every level using a qualitative methodology. Similarly, the SEM was used to understand disparities in infant mortality among Black and White communities (Alio et al., 2010) and the environmental and socioeconomic determinants of infant mortality in Poland such as racism and socioeconomic status (Genowska et al., 2015). These studies indicate that different levels of the environment can influence infant health outcomes. Studies have also included the SEM to frame factors influencing maternal care-seeking behaviors. For example, Kaiser et al. (2019) and Shahabuddin et al. (2017) found that health-seeking actions can be

affected at numerous levels of the environment. Both studies found that the interpersonal and family levels play an essential role in the use of maternal health services.

The SEM was appropriate for the current study because it offers a justification of multilevel analyses of personal characteristics, community norms, and social factors that influence women's behaviors related to maternal and child health-seeking services in Cameroon. The SEM helped examine the influences of out-of-pocket fees (set at the policy level) and expenses at the individual level on infant mortality. It also took into account the mother's age, education, income, marital status, poverty, place of residence, the region of residence as all of these factors have been identified as barriers to access to maternal health services (Nguenda Anya & Yene, 2016). In other words, the SEM helped determine whether spending incurred contributed to the death of an infant in the household.

### **Nature of the Study**

A quantitative research approach was used for this study. Secondary data analysis was performed using a cross-sectional design. In the cross-sectional design, participants are selected based on inclusion and exclusion criteria for the study, and outcomes and their associations are measured (Setia, 2016). The data for this study were analyzed using SPSS. The first part of the analysis included a description of the study population. The study population included children of eligible women aged 15–49 years of the 2011 CDHS data. Descriptive statistics of the independent, dependent, and confounding variables were used to characterize the population. Descriptive statistics represent the basic feature of the data in the study and provide simple summaries about the sample



(Trochim, 2006), which involves methods such as frequencies and measures of tendency (mean and median, accompanied with a standard deviation, which measures the variability around the mean).

The independent variable in the study was out-of-pocket payments. The dependent variable was under-5 mortality, and the controlled variables were poverty, education, religion, place of residence, maternal nutrition, maternal age, health insurance, immunization, malaria prophylaxis, antenatal visit, infant weight at birth, and marital status. In addition to descriptive statistics, inferential statistics were performed to determine whether there was a relationship between the selected variables. Regression models, a linear model assessing the relationship between the predictor and outcomes, and a multilinear regression model considering confounding variables were also used.

### **Literature Search Strategies**

Databases used to search the literature included the Walden University database were PubMed/Medline, CINAHL, and ProQuest. The Walden University databases included multidisciplinary and subject specific databases that contained journal articles that address the topic of this study. PubMed/Medline is a medical library database, the ProQuest library is a multidisciplinary database, and the CINAHL database contains articles about nursing, allied health, biomedicine, and health care. This database comprised numerous journal articles related to the study. I also used Google and Google scholar to expand the search. Google scholar was linked to Walden library database to allow easy access to articles if available in the database. This review primarily includes articles published from the year 2015 to the present.

Selected articles relating to the removal of out-of-pocket fees (user fees) and maternal and infant health outcomes were examined. Examples of the keywords searched include *user fee in Cameroon and maternal mortality, user fee and maternal health, out-of-pocket fee and maternal health, user reform and Cameroon, out-of-pocket reform and Cameroon, Health insurance in Cameroon; out-of-pocket payment and/or fees and maternal mortality, Out-of-pocket medical expenses AND Under-5 mortality, and Out-of-pocket expenditures AND infant mortality*. Other terms included *Healthcare AND expense or expenditure or spending or cost AND mortality or mortality rate or death or death rate AND low-income or poverty or low socioeconomic status or poor or low income AND infant or child or maternal AND Cameroon or sub-Saharan Africa*. Finally, terms included *out-of-pocket or user AND fee or expense or expenditure or spending or cost AND infant mortality or infant mortality rate or death or death rate AND low-income or poverty or low socioeconomic status or poor or low income AND infant or child or maternal AND Cameroon or sub-Saharan Africa*.

### **Literature Review Related to Key Variables**

This section presents a synthesis of the literature related to the key variables in this study. The section presents findings about user fees or out-pocket payment. This section also presents literature about the Bamako Initiative, infant mortality, health spending and infant mortality, user fee and infant mortality, and universal health coverage and infant mortality.

### **User Fee or Out-Of-Pocket Payment**

Many African countries rely on user fee or out-of-pocket expenses to fund health services. Out-of-pocket payment was designed and adopted by African nations to financially boost health centers. Out-of-pocket payments account for between 50% and 80% of total health expenditure in Africa (Masiye et al., 2016). Out-of-pocket payments by family include fee for consultations, cost of drugs, travel and supplies, cost-sharing and informal payments, both in kind and in cash, but it excludes payments by a third-party payer (Wagstaff et al., 2018). Because of the different costs involved, families have been struggling to afford services and are forced to make hard choices. In addition, out-of-pocket expenses expose poor families to risks of catastrophic expenditures and become impoverished if spending exceeds between 20% to 40% of household incomes (Robert & Riddle, 2013). For example, Nigeria had the highest incidence of catastrophic effect of out-of-pocket payment at 10% threshold of total household consumption and at the 40% threshold of non-food consumption compared to other African nations such as Ghana, Kenya, Senegal, Zambia and Swaziland (Arhegbeshola & Khan, 2018). Similarly, the global incidence of catastrophic health spending has kept increasing from 9.7% in 2000, 11.4% in 2005, to 11.9% in 2010 (Wagstaff et al., 2018). In Cameroon, about 70% of health expenditure is covered by household out-of-pocket expenses (Nde et al., 2019). However, many families live below the poverty line and survive on less than \$2 per day. Hence, out-of-pocket payments serve as a barrier to care as families are faced with the hard choices of paying for health care services or feeding themselves (Soh, 2013).

## **The Bamako Initiative**

Out-of-pocket payments for health services were implemented by many African countries following the Bamako Initiative in the late 1980s. It was sponsored by the WHO and UNESCO to improve health access by revitalizing primary health care by capturing a fraction of the funds households were already spending in the informal sector and combining them with government and donor funding, thus improving their quality and providing equity of health services (The Bamako Initiative, n.d.; Klein et al., 2016; Ridde, 2011). Initially, the initiative was meant to exempt the poorest who were unable to pay; however, appropriate measures were never applied (Ridde, 2011). This contributed to worsening health outcomes, as user fees can lower health facility attendance (Watson et al., 2016).

Due to the impact of user fees on health care use, about 80% of countries in Africa (37 of the 41 countries that had use fees) have implemented reforms to reduce or eliminate user fees (Cotlear & Rosemberg, 2018). However, lack of proper implementation of the user fee reform policy leads to continued requests payments where fees have been abolished or when services are free, hindering the achievement of universal health coverage and the third sustainable development goal (Ridde & Yameogo, 2018). This lack of proper implementation makes it difficult for women and families to distinguish between free services and those requiring payment. Pregnant women in Mali may pay for malaria treatment during pregnancy, receive it free, or both at different times (Klein et al., 2016), and women in rural Northern Ghana are still impacted by fees for services despite its reform (Dalinjong et al., 2017, 2018). Furthermore, health centers

often charge a lump sum for antenatal care visits that includes both free and fee-based drugs and services (Klein et al., 2016), and in some African countries, patients are detained in the hospital because they cannot pay for care (Yates et al., 2017). As a result, women are sometimes obliged to sell their assets, borrow money from family members, or use their life savings to pay for services (Dalinjong et al., 2017, 2018).

Strategies that some nations have used to mitigate financial barriers to maternal care include abolition of user fees, community health insurance for obstetric care, and vouchers, among others (Richard et al., 2010). But Cameroon is still charging fees for services at health facilities. Malaria prevention is one of the services that are provided free of charge for pregnant women and their child. However, women may still pay for malaria treatment and drugs during pregnancy services. This user fee for services may contribute as a significant barrier affecting the health outcomes of the population of Cameroon.

### **Under-5 Infant Mortality**

Child mortality rates are often used to measure the health of a country. In Cameroon, under-5 mortality fell 144 deaths between 1990 and 2004 to 103 deaths per 1,000 live births between 2011 and 2014 (HAPC, 2016). Since 2014, under-5 mortality rates continued to decline from 92.9 deaths per 1,000 live births to 74.8 deaths per 1,000 live births in 2019 (UNCEF, n.d.). These numbers are slightly lower than the whole of SSA with a rate of 75.8 deaths per 1,000 live births in 2019 (The World Bank, 2020b). But access to health service, women health seeking behaviors, and the use of health services can indirectly lead to deaths.

The different regions in Cameroon experience different rates of under-5 mortality, as access to and the use of health services differ. For example, Yaoundé, the political capital, experienced 70 fewer deaths between 1990 and 2004 and 2011 to 2014 (HAPC, 2016). The Southwest, East, and South regions experienced 66, 60, and 54 fewer deaths per 1,000 live births between the same periods, respectively (HAPC, 2016, pp.18–19), whereas the Adamaoua regions experienced only nine fewer deaths compared to other regions in the same periods (HAPC, 2016, pp.18–19). The disparity observed with the rates in each area is caused by the lack of well-equipped facilities in urban regions, lack of access to care, the lack of the use of health services, and a shortage of well-trained health care workers in rural zones. Health care workers prefer metropolitan cities for better opportunities (Tandi et al., 2015).

### ***Causes of Under-5 Mortality***

Under-5 mortality is often due to preventable causes. Poor sanitation and unsafe drinking water causing diarrheal disease in infants have been considered one of the leading causes of death in children. Safe sanitation and clean water could prevent 90% of diarrhea cases and reduce the incidence of diarrhea by 40%; it could also reduce the other leading causes of death, such as nutrition and pneumonia (Alemu, 2017). But many households in Cameroon, especially in rural areas, do not have access to safe sanitation, though open defecation has decreased from 17% to 12% over a 25-year period (Gorham et al., 2017). Often, the toilet is built behind the house with no latrines; thus, in the event of heavy rainfall, the stools get wash away, contaminating crops that will be consumed and the wells used as a source for drinking water (Gorham et al., 2017).

In addition to diarrheal disease, pneumonia, and poor diet as the dominant causes of child mortality, malaria is also a leading cause. Malaria remains a problem in Cameroon and is responsible for 10% of deaths in children under 5 (Severe Malaria Observatory, 2020). Malaria is the leading cause of mortality in a local health district of the Southwest region of Cameroon (Agborndip et al., 2020; Alemu, 2017). Although efforts to control malaria, such as the distribution of long-lasting insecticidal nets have been effective, free treatment for uncomplicated and severe malaria for children under-5 and drug resistance remains a problem. For example, in Cameroon there was a decrease in a combination therapeutic efficacy from 97% to 90% between 2006 to 2016 (Antonio-Knondjio et al., 2019). Reduction in efficacy is affected by mutations in the gene of the mosquito parasite *P. falciparum* (Cheruiyot et al., 2014). Different genes mutations have been recorded a high frequency across Cameroon's regions. It is essential that the government monitors the evolution of drug resistance that could jeopardize the elimination of the disease in the country. In addition, fake drugs and counterfeit antimalarial medication of low quality, which represent more than half of drugs sold in the market or in some private health care units, are responsible for the deaths of thousands of people (Antonio-Knondjio et al., 2019). Vaccines are a simple and effective way of preventing children from infectious diseases. In Cameroon, it is reported that the majority of infants between the age of 0 to 11 months complete their immunization, yet mortality rate remains (Chiabi et al., 2017).

Other factors in under-5 mortality include the experiences women may have had at health facilities such as bad interactions with health care workers, long waiting time,

and poor quality of care, leading women to deliver at home in the absence of a skilled attendant in case of complications (Kyei-Nimakoh et al., 2017). Moreover, women's lack of autonomy and self-esteem, shyness and fear or shame, especially among teenage mothers, stigma, lack of health literacy, geographic accessibility, and cultural and religion beliefs may impede seeking obstetric care (Kyei-Nimakoh et al., 2017). For instance, home delivery is a favorite practice due to being more comfortable, having close relatives nearby, and not being willing to see a male doctor (Kyei-Nimakoh et al., 2017).

Furthermore, cultural beliefs, religious norms, and traditional treatments over medical services could lead to infant mortality. For example, women in some regions of Cameroon perceive sorcery and angry ancestors' spirits due to lack of sacrifices in their honor and bad nutrition are the causes of children diseases (Nudelman et al., 2018). They believe that going to the hospital may worsen the child's condition or even cause deaths, as the disease does not like injections or the Western treatment. Some women also perceive that malaria is caused by eating raw vegetables and sour milk and is a seasonal disease that will eventually pass not requiring the need to access a health facility (Nudelman et al., 2018). Thus, cultural beliefs and lack of autonomy and authority may sometimes prevent women from making decisions regarding their child's health as the decision has to come from the head of the household (Huda et al., 2016).

As a result of these practices and beliefs, coupled with lack of clean sanitation and clean water, child mortality can increase if care is not sought immediately following the disease's onset. In addition, traditional beliefs may lead many women to choose to give



birth at home with traditional birth attendants who are familiar, well respected members of the community, which may result in mother or infant mortality or both if complications arise due to not having required tools, training, and treatments outside of the hospitals. Though diarrheal diseases and poor nutrition are among the leading causes of child mortality in Cameroon, other factors may also contribute to children death.

### ***Other Factors Associated with Under-5 Mortality***

Other factors have also been attributed to under-5 mortality. Previous studies have linked the socioeconomic status of the mother to children health outcomes. Differences in rates of mortality are observed among women with different background information (residence, household wealth, mother's age, and mother's education) in Cameroon. For instance, the infant mortality rate in rural areas is 36 deaths per 1,000 live births and 25 deaths per 1,000 live births in urban areas (UNICEF, 2019). Different rates have also been observed among families with different wealth status. The rate among the poorest households is 39 neonatal deaths per 1,000 live births, compared to 29 deaths per 1,000 live births among the wealthiest families (UNICEF, 2019).

Previous studies have also linked maternal age to infant mortality in other nations, though there is a lack of data linking maternal age and infant mortality in Cameroon (UNICEF, 2019). But based on data from 45 low- and middle-income countries, children born to adolescent mothers are at higher risk of dying even after adjusting for socioeconomic, demographic, and health service utilization (Neal et al., 2018). Similarly, data from 55 low- and middle-income countries showed that children born to first time adolescent mothers are more likely to die and have poor health outcomes, whereas

children born to first time mother less than 26 years have a higher risk of having a child who has stunting, diarrhea, and moderate or severe anemia (Finlay et al., 2011). Poor nutrition may explain poor health outcomes of children born to young mothers as younger adolescents may still be requiring additional nutrients for energy thus competing for food with the fetus during pregnancy (Neal et al., 2018).

**Nutrition and Low Birth Weight.** Proper maternal nutrition during pregnancy is crucial for the development of the baby. Poor nutrition not only impairs in utero development but also post-natal growth characterized by low birth weight and impaired birth length (Hambidge & Krebs, 2018). Low birth weight can be a predictor of developmental delay and infant mortality (Agency for Healthcare Research and Quality, n.d.). In Cameroon, low birth weight is a concern for infant mortality. Infant mortality is the highest among infant born with birth weigh less than 2500g and less than 37 weeks of gestation in a referral hospital in Cameroon (Mungyeh et al., 2014). In another sub-urban area of Cameroon, neonates with low birth weight were more likely to have neonatal asphyxia, fetal distress, respiratory distress, and neonatal death (Njim et al., 2015). Nutrition education plus multi-micronutrient supplements, iron ad folic acid supplements, oral supplements of Vitamin A, low dose calcium, and zinc during pregnancy has decreased the risk of low birth weight (Hambidge & Krebs, 2018).

**Marital Status.** No recent studies were found examining the relationship between marital status and infant mortality with the search method used. However, Arntzen et al. (1996) found that infant mortality was higher among children of unmarried women, as they tend to be younger and have less education and income than married women.

Bennett (1992) also found a variation by race and age in the relationship between marital status and birth outcomes. Infant mortality rates had a higher impact among White unmarried women aged 20 and over and among married teens. Although these studies found a connection between marital status and infant mortality, confirmation of such association with recent data is needed.

**Prenatal Care.** The lack of prenatal care is a risk factor for infant mortality. Studies suggest that women seeking prenatal care are more likely to give birth to a healthy baby and less likely to experience infant death (Makate & Makate, 2017). Makate and Makate (2017) found that a good quality of prenatal care reduces the risk of infant mortality in Zimbabwe. Furthermore, women who received information about pregnancy complications during pregnancy, had their blood pressure check, and received tetanus shot are less likely to experience infant death (Makate & Makate, 2017). Similarly, Tekelab et al. (2019) in their systematic review found that the utilization of at least one prenatal care visit by a skilled attendant during pregnancy reduces by 39% the risk of infant mortality in Sub Saharan countries.

In Cameroon, the highest percentage of prenatal and postnatal care are observed in the urban areas. In rural areas, 47% of women made at least four prenatal care visits and 49 percent delivered with skilled attendant compared to 76%, and 88 %, respectively, in the urban areas (UNICEF, 2019). Furthermore, only 57% of infant in rural areas received postnatal care compared to 88% in urban areas (UNICEF, 2019). The low percentage of prenatal and postnatal in the rural area of Cameroon may contribute to the rate of infant mortality.

**Education.** Moreover, children born to an educated mother are more likely to survive than children born to non-educated mothers. According to UNICEF (2019) infants born to mother who have receive low level of education are more likely to die during their first month than those born to mothers with higher education. Policy aiming at providing mother health education, especially non-educated mothers, could help in reducing the gaps in morality between these two groups. For example, Bado and Susuman (2016) found that in selected countries between 1990 and 2015, child mortality lessened as years progressed. This reduction in the gap may have been caused by the mother's awareness and increase education about infant health and hygiene, resulting in a decline in mortality (Bado & Susuman, 2016).

More studies have shown the relationship between mother's education and child mortality. Koffi et al. (2017) and Van Malderan et al. (2017) confirmed high mortality of children born to less educated mothers, married at a younger age, poor mothers, the age of the child, and places of residence in Nigeria and selected countries in Sub Saharan Africa. The lack of education may also contribute to infant mortality (Koffi et al., 2015). Therefore, it is critical to stress mothers' education as an essential indicator of children health outcomes as they will know what practices to adopt for their infants' care.

**Insurance.** A lack of insurance can be a factor associated with infant mortality. Health insurance is an effective way of paying for medical expenses if one is sick or injured. However, experts tell us that only 1% of the population in Cameroon is insured, therefore exposing a large number of the community to out-of-pocket expenses (Nazah & Molua, 2019). This lack of insurance can lure people into seeking traditional medicine or

medicine sold in the market, which may not be controlled, to evade the high cost of drugs set by health facilities, and could be fatal to the infant's health (Antonio-Nkondjio et al., 2019). Over 50% of the population in Cameroon get their drug from the market or private healthcare units (Antonio-Nkondjio et al., 2019). Therefore, improving insurance coverage or reducing cost of care, increasing education, improving social status may reduce infant mortality rates.

These studies indicate a possible connection between maternal age, education, wealth index, place of residence, religion, marital status, mother receiving prenatal, post-natal visits, place of delivery, infant weight at birth and infant mortality in Cameroon.

### **Health Spending and Under-5 Mortality**

Health expenditure is another factor that contributes to under-5 mortality in Cameroon. It is the government's responsibility to protect the health of its people. The lack of resources and infrastructure makes it difficult to reach health goals. Therefore, spending the right and desirable amount on health should have a positive impact on health outcomes. Experts have shown that an increase in health spending raises health outcomes. For example, Akinlo and Sulola (2019), Bein et al. (2017), Dhrifi (2018), and Novignon and Lawanson (2017) found that increased spending on health reduces child mortality in SSA Countries and in developed countries. However, Dhrifi (2018) found this relationship to be impactful in upper-middle and high-income countries, but not so much in lower-middle-income countries. This may be explained by the fact that health expenditure has a positive effect on child mortality when it exceeds a certain threshold, which is generally assumed to have been reached in emerging and developed countries

(Dhrifi, 2018). Furthermore, higher incomes lead to improved public health infrastructure such as water and sanitation, better nutrition, better housing, and the ability to pay for health care.

Whereas in lower- and lower- middle-income countries, health systems are still unable to offer medical services to all segments of society, and spending may not have beneficial effects in terms of reducing mortality (Dhrifi, 2018). Limited resources are allocated to the provision and maintenance of health-related infrastructure affecting health infrastructure and the workforce (Dhrifi, 2018). The absence of significant effects from health expenditures in these less developed countries may also be explained by the rising costs of medical technology, while another reason for the difference between developed and developing countries may be inefficiency in health care spending (Dhrifi, 2018). Moreover, corruption is more common in these less developed countries, and the priority given to health spending is fairly low (Akinlo & Sulola, 2019).

Households in developing countries are often trapped into poverty, which contributes to their poor health status (Dhrifi, 2018). Older studies argued that child mortality should be reduced by emphasizing economic growth, poverty reduction, income equality, and increasing the level of women's education rather than increasing public health expenditures (Wagstaff et al., 2003). Children born into low-income households are more likely to experience health problems from birth and to accumulate health risks as they grow older (Robert & Bogg, 2004).

Akinlo and Sulola (2019), Bein et al. (2017), and Novignon and Lawanson (2017) found similar results in their studies conducted in selected countries in SSA. Although

Akinlo and Sulola (2019) found government health expenditure to have to have a positive effect on under-5 mortality, health care expenditures have not been translated to improvement in under-5 mortality in sub-Saharan countries. This may be explained by the high level of corruption and fungibility of public health expenditure in those countries (Akinlo & Sulola, 2019). However, Akinlo and Sulola (2019), Bein et al. (2017), Dhrifi (2018), and Novignon and Lawanson (2017) used robust methodologies such as regression analyses to come to these findings, the availability of data in SSA countries limited Novignon & Lawanson's results. Nonetheless, all studies found that a slight increase in health expenditure can lead to child mortality reduction.

Low spending on health is among the factors to contribute to poor health outcomes in. For example, Cameroon only allocates 5% of its budget to health (HAPC, 2016, p 6), which is extremely low for its about 25 million population. Seventy percent of the people contribute via out-of-pockets payment to Cameroon's health spending, plunging the people more into more poverty as they must find ways to pay for health services. As Cameroon relies on different sources for funding, investing in public health expenditure may benefit its population as public health expenditure has been shown to have a more significant effect on child mortality (Dhrifi, 2018; Kiross et al., 2020). However, this investment should be continuous if the objectives are to improve child health outcomes.

Emphasis should be put on reducing or removing out-of-pocket spending to reduce infant mortality in Cameroon. In the event of a severe illness, poor people are put out of the labor market, and the household cannot afford the costs associated with care.

Therefore, it is imperative to consider the user fees and their effect on health outcomes in Cameroon.

### **User Fees and Under-5 Mortality**

Because user fees have been seen as barriers to accessing healthcare services, the existing literature heavily focused on the impact of removing user fees on healthcare access and utilization. For example, significant increases in maternal health services utilization and deliveries at health facilities were observed in selected Sub Saharan African countries after the removal of user fees. Leone et al. (2016), Ravit et al. (2018), McKinnon et al. (2015), and Ibrahim et al. (2016) found that the utilization of facilities for deliveries and the rate of Caesarean section (C-section) delivery increased in countries that removed use fees compared to countries with no use fee reforms in place. Leone et al. (2016) using a quasi-experimental statistical analysis and keys informant interviews assessed the impact of user fee reforms on the probability of giving birth in an institution or undergoing C-section in Ghana, Burkina Faso, Zambia, Cameroon, and Nigeria for the poorest strata of the population. Ghana and Burkina Faso were the countries with user fee reform in place while Zambia, Cameroon, and Nigeria did not have a reform. Although the user fee reforms were associated with significant increase in access to health facilities, the increase in C-section procedure was moderate (Leone et al. 2016). The reforms also benefited the non-educated women and those from the rural areas but not women from the poorest strata in Burkina Faso (Leone et al., 2016). The difference observed between Ghana and Burkina Faso may be attributed to the speed and the quality of the implementation (Leone et al, 2016). Ravit et al. (2018) using the difference-in



difference approach also found increases in C-section deliveries after the removal of user fees comparing Mali and Benin, two countries with the user fee exemptions policy, to Cameroon and Nigeria, two countries with no user fee exemption on service utilization and maternal and child health outcomes. The policy may also contribute to the reduction of neonatal mortality (Ravit et al., 2018). Mckinnon et al. (2015) also used the difference-in-difference regression to evaluate the causal effect of a policy change abolishing user fees on three outcomes: neonatal death, delivery by Caesarean section, and delivery in a health facility comparing countries with user fee reforms to countries without user fee reform. Countries with the policy reform experienced an increase in facility delivery and a decrease in neonatal mortality compared to those with no policy reform. Ibrahim et al. (2016) compared the mortality among infants delivered during user fees and the national health insurance scheme in Ghana. They found that more children died during the user fees era compared to national health insurance scheme.

These results indicate the user fee may have a negative impact on maternal and child health outcomes in Cameroon as it has been used as a control country in many studies. Furthermore, women in Cameroon perceived cash payments required to access services at health facilities as a barrier to improving maternal and child health (Mbuli et al., 2018).

The removal of user fees appeared to have a positive impact on children health outcomes in selected African countries; however, the findings are mixed. For example, in their randomized control trial, Anshah et al. (2009) found that the removal of out-of-pocket payments for health care had an impact on health care seeking behavior but not on

anemia and mortality in Ghanaian children. While Lamichhane et al. (2017), McKinnon et al. (2015) and Steele et al. (2019) found a decrease in mortality after the removal of user fees in Nepal, in 10 selected African countries and Lesotho, respectively. Ibrahim et al. (2016) also found a significant increase in infant deliveries in health facilities and a decrease in children mortality in the national health insurance scheme compared to the period with user fees (Cash for service) in Ghana. However, the lack of proper implementation of the reform policy in some regions in Africa resulted in women still having to sell their assets or use their life savings to pay for maternal health services (Dalinjong et al., 2017); Dalinjong et al., 2018). Removing user fees improved maternal and child health outcomes in many African countries. Similar studies have not been conducted to determine if there is an association between under-5 mortality and user fees in Cameroon.

### **Universal Health Coverage and Under-5 Mortality**

The global health community has considered numerous strategies to remove user fees. Universal health coverage is among those strategies to increase access to health services for the poor. National health insurance schemes or targeted fee exemptions are at the core of most universal health strategies (Garchitorena et al., 2017). It aims to increase access to health services, decrease out-of-pocket payment, and reduce health inequities (Celhay et al., 2019). Studies have found an increase in healthcare service utilization and a decrease in child mortality in countries with national health insurance service scheme compared to out-of-pocket fees for services In Ghana (Ibrahim et al., 2016).

Similarly, Celhay et al. (2019) also found the same trend in infant mortality in Mexico. They reported better health status and lower incidence of infectious diseases such as influenza and diarrheal disease in children who have been under the national health insurance scheme. The 2016 Organization for Economic Co-operation and Development report revealed that Thailand has experienced and decreased in infant mortality among the poor since the introduction of the universal health insurance scheme. Furthermore, universal health coverage has the potential of providing insurance for all.

Mbuli et al. (2018) found that only a subset of the study population (25%) of reproductive age were enrolled in a health insurance scheme (Community-based health insurance scheme, faith-based health insurance scheme, and private insurance) in a region of Cameroon. While some women perceived health insurance as affordable, some did not know which maternal health services were covered by their health insurance and some women were dissatisfied with the complicated benefits procedures (Mbuli et al., 2018). Lack of information about the existence, the importance, and the cost of insurance service prevented women from enrolling in health insurance schemes (Mbuli et al., 2018). Furthermore, some women have admitted that having insurance have made maternal health services more affordable to them (Mbuli et al. 2018). In addition, health insurance was found to influence the utilization of family planning services, but not antenatal care and delivery in health facilities, after examining the influence of health insurance on the usage of maternal health care services in Kumba Health District in Cameroon (Mbuli et al., 2018). Women with health insurance were more likely to attend at least one prenatal visit and deliver in health facilities. The evidence supports the possibility of a similar

connection between health insurance enrollment and maternal and child health outcomes in Cameroon. However, the proper implementation of such strategies must consider adequate management supervision to ensure that user fees are not replaced by informal user fees charged by health care workers. Previous studies revealed that this was still a problem in countries where the removal of user fees was not correctly implemented, resulting in women delaying seeking care or selling their assets to access maternal health care services. The government of Cameroon has considered universal health coverage as a strategy to reduce infant mortality and attain the third sustainable developmental goal by the year 2035.

### **Conceptual Definitions**

*User fees or out-of-pocket payment:* *User fees* can encompass any combination of drug *costs*, supply and medical material *costs*, entrance *fees* or consultation *fees* typically paid for each visit to a *health* service provider, although in some cases follow-up visits for the same episode of illness can be covered by the initial payment (Lagarde & Palmer, 2008). In this study, user fee or out-of-pocket payment will correspond to any cost spent during health care facility visits, drugs (over the counter or street medicines), consultations, and transportation.

*Maternal health:* This refers to the health of women during, pregnancy, childbirth, and postnatal period; and the stages should be a positive experience to ensure that the mother and the baby reach their full potential for health and well-being ([https://www.who.int/health-topics/maternal-health#tab=tab\\_1](https://www.who.int/health-topics/maternal-health#tab=tab_1)).

*Infant mortality:* The probability of a child to die between birth and the first birthday. Its rate is expressed as the number of deaths per 1,000 live births.

*Under-5 mortality:* The likelihood of a child to die between birth and the fifth birthday. Its rate is also expressed as the number of deaths per 1,000 live births.

*Health disparity:* Disparity in health is observed when health outcome is seen to a greater or lesser extent between populations.

*Universal health coverage:* This is health insurance coverage from a health care system in which all residents of a particular country or region are ensured access to health care. This ensures that people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, while also ensuring that the use of these services does not expose the user to financial hardship ([https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-\(uhc\)](https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc))). The purpose of the universal health coverage is to (1) promote equity ensuring that all who need services can get them not just those who can pay for them; (2) The quality of services should be acceptable to improve health outcomes of those receiving services; (3) People should be protected against financial risk, ensuring that the cost of using services does not put people at risk of financial harm ([https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-\(uhc\)](https://www.who.int/news-room/fact-sheets/detail/universal-health-coverage-(uhc))).

### **Assumptions**

The study assumes that the data collected was conducted in a non-biased and ethical manner. It was assumed that the data have gone through extensive quality control measures of editing and data verification during collection to minimize discrepancies

(Meh, 2017), and contain enough cases and variables of interests (antenatal visits, out-of-pocket expenses, health insurance, region, age, education, wealth quintile (poverty), marital status, place of residence, health insurance, employment status) for what I intended to understand. It was also assumed that participants in the study answered the questions truthfully and were willing to participate throughout the data collection process/period.

### **Scope and Delimitations**

The study aimed at examining the relationship between out-of-pocket fees and under-5 mortality in Cameroon, and whether the association differs by regions of Cameroon after controlling for maternal age, marital status, poverty, education, religion, place of residence, antenatal visit, and infant weight at birth. This was a quantitative study with data from the CDHS conducted in 2011. Furthermore, secondary data limits how variables were captured, and I only included variables that are of interest. I did not include other variables that may be related to the topic. Also, there were no control groups and no direct observation.

Due to the nature of the secondary data analysis, out-of-pocket fees was determined as any expenses incurred related to an injury or hospitalization the last 30 days before the start of data collection. Under-5 mortality was identified as any child deceased the previous 30 days before the start of data collection to better estimate. All other variables not addressed in the study were considered beyond the scope of this investigation.

### **Significance**

The result of the study was the first to provide evidence on the influence of out-of-pocket expenses on under-5 mortality in Cameroon. Many African countries have opted for the removal of out-of-pocket expenses to improve health outcomes because it was seen as a barrier to seeking maternal and child health services. However, Cameroon does not have a current policy on cancelling out-of-pocket expenses. Numerous empirical studies have elaborated on the relationship pertaining to out-of-pocket expense and increase of tertiary care and maternal care in different countries (Qin et al., 2019). Previous studies have attempted to explore the association between out-of-pocket expenses and infant mortality in other low-income countries (Lamichhane et al., 2017; McKinnon et al., 2015). Little was known about the influence of out-of-pocket payment on under-5 mortality in Cameroon as its under-5 mortality rate remains one of the highest in SSA. This study was the first to explore this association.

The potential for positive social change is that the study might provide useful information to better understand the influence of fees on the health outcomes of Cameroonian children. Furthermore, the finding might be useful in supporting the need to target interventions to improve health status of children and increase longevity in particular regions where the rates are most high and/or areas where out-of-pocket fees seem to have strongest impact on rates. The finding may also support the need for interventions for reducing health inequalities in most affected areas or regions as out-of-pocket have been demonstrated to worsen health outcomes.

This may lead to steps towards meeting the third sustainable development goal. It may also accelerate thinking in strategies to adopt universal health coverage as it ensures access to quality access health care services without financial hardship. Evidence demonstrated that the introduction of universal health coverage decreased infant deaths among the poor in some Low- to middle-income countries (Organization for Economic Co-operation and Development, 2016). Furthermore, universal health coverage was also demonstrated to improve the life expectancy at birth and healthy life expectancy (Ranabhat et al., 2018). As Cameroon has a life expectancy below that of comparable countries in Africa, the finding of the study may provide supporting needs for interventions aiming at improving life expectancy. This may happen because the adaption of program such as universal health coverage may alleviate the financial burden associated with health-related out-of-pocket expenses (Qin et al., 2019).

The availability of additional funds through the elimination of out-of-pocket expenses will create positive social change by providing means to improve nutrition, the ability to access clean water and sanitation, and promote health equity, especially to families and region that will be the most affected. Furthermore, the funds will allow for families to better take care of themselves and make healthier choices in both their lifestyle and their food. Furthermore, the funds will also permit families to send their children to school as many were forced to sell their assets or use the money dedicated to school to pay for medical services (Kruk et al., 2009). Children in turn could share the knowledge acquired in school with family to prevent certain conditions and improve quality of life, thus contributing toward increasing life expectancy.



## Summary

Experts recognize out-of-pocket expenses as a significant barrier to seeking health services in some countries in Sub Saharan Africa. Initially adopted after the Bamako initiative, out-of-pocket expenses aimed to replenish the funds of local health centers by imposing fees on patients to pay for services and drugs. The outcome drove many women away from health care facilities. Because of the lack of money, some families are forced to sell assets and borrow money from friends and relatives to cover the costs incurred from a severe disease or injury. Previous studies have shown that removing out-of-pocket expenses increased seeking maternal health services. However, little is known about the impact of out-of-pocket fees on infant health outcomes, especially in Cameroon. Many studies in Africa, including Cameroon, have shown that women perceived costs as one of the barriers to seeking health services. In addition to the lack of money, other factors such as cultural beliefs can cause women to delay going to health facilities in case of illness onset.

This study intended to explore the influence of out-pocket expenses on under-5 infant mortality in Cameroon. The study also looked at the variation of the influence by regions, taking into account the mother's poverty level, mother's age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, antenatal visit, infant weight at birth, and marital status. The SEM was used as the theoretical framework to guide the study. I conducted a secondary cross-sectional analysis to understand the influence of out-of-pocket expenses on under-5 infant mortality and whether it varies by regions of Cameroon. The data provided from the 2011 CDHS will serve as the basis of

the study. Although the data is older, it contained all the variables of interest for the analysis. The analysis was limited to the variables of interest. Furthermore, the DHS had gone through extensive quality control measures of editing and data verification during collection to minimize biases making this dataset appropriate for the study.

Section 1 provided the introduction, the problem statement, and the purpose of the study. It continued with the theoretical framework, the RQs, and hypothesis, a brief statement about the nature of the study, and a description of the literature search strategy. It also provided a review of the literature related to the variables of interest, discussed the study assumptions, scope and delimitations, significance of the study. The next section will describe the research design and data collection that include the research design and rationale, the methodology, threats to validity, and summary.

## Section 2: Research Design and Data Collection

Despite the numerous efforts and interventions to mitigate maternal and child mortality, out-of-pocket expenses remain barriers to accessing maternal and child health services. As Cameroon continues to experience high maternal and infant mortality rates, this study was conducted to investigate the role of out-of-pocket expenses on infant mortality rate using the 2011 CDHS. I examined the influence of out-of-pocket expenses or fees on under-5 mortality, controlling for poverty (wealth index), maternal age, education, religion, place of residence, birth weight, health insurance, marital status, prenatal and postnatal care, and immunization. Because of the disparity in Cameroon's regions' mortality rates, I also examined the differences in this association between the regions of Cameroon, again controlling for the same variables. The study results may inform government officials as they accelerate and implement strategies to alleviate barriers to maternal and child health services in Cameroon.

In this section I describe the research design and rationale as well as the variables. Then I describe the methodology used in the study, including the study population's description, the procedure for collecting secondary data, subject recruitment strategy, sampling, and the data collection instrument used. Finally, I describe threats to external and internal validity and how to resolve them. Ethical concerns with the study are also addressed.

### **Research Design and Rationale**

The purpose of the study was to explore the influence of the out-of-pocket, level of education, socioeconomic status, religion, place of residence, nutrition, birth weight,

health insurance, marital status, prenatal and postnatal care, and immunization on under-5 mortality. A quantitative research approach was the methodology used for this study. Data are numerical or can be converted into numbers and are used to determine the relationship between the independent variable (out-of-pocket expenses) and the dependent or outcome variable (under-5 mortality) within a population (Sheard, 2018; University of Southern California Libraries, 2020). Furthermore, quantitative methods emphasize objective measurements and the statistical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques (University of Southern California Libraries, 2020).

Following a quantitative approach, secondary data analysis using data from the 2011 CDHS was performed using a cross-sectional design. In the cross-sectional design, participants are selected based on the inclusion and exclusion criteria set for the study (Setia, 2016). These designs are helpful for population-based surveys and exploring associations between the variables (Setia, 2016). Participants are not followed in a cross-sectional design because they are measured for exposure and outcomes simultaneously (Setia, 2016). With this design, I sought to explore the association between out-of-pocket expenses (independent variable) and under-5 infant mortality (dependent variable). Since women of childbearing age in Cameroon were surveyed at a point of time, this design allowed me to address the RQs and determine the association between the two variables based on numeric information on out-of-pocket expenses and under-5 infant mortality. Statistical analysis was used to provide descriptions of the study variables (frequencies and summary statistics), and logistic regression analysis was used to test the hypotheses.

Thus, this study results may provide valuable information for local leaders as they are taking actions to eliminate or improve barriers to maternal and child health services.

### **Variable Description and Measurement**

The independent variable was out-of-pocket expenses incurred in the last 30 days before the survey for households with a child less than 5 who was sick or injured. The dependent variable was under-5 mortality. Other variables that may impact the association included poverty (wealth index), maternal age, maternal education, religion, place of residence (urban vs. rural), region, health insurance, immunization, malaria prophylaxis, antenatal visit, infant weight at birth, and marital status. The variable wealth index was obtained using information on household ownership of consumer items, ranging from a television to a bicycle, materials used for housing construction, and whether a member of the household hold a bank account as described in the CDHS (2011a). The variable malaria prophylaxis included whether the mother and child sleep under a mosquito net and whether the mother has received malaria pills, iron pills, and tetanus shot during pregnancy due to these being risk factors for mortality (Agborndip et al., 2020; Wirsiy et al., 2019).

The measurement scales of variables in the study were categorical and continuous. The independent variable, out-of-pocket expenses, and the dependent variable, under-5 mortality, are categorical. Additional categorical variables included wealth index, region, place of residence, maternal education, health insurance, immunization, malaria prophylaxis, antenatal visit, and marital status. Maternal age and infant birth weight represent the continuous variables in the study. These variables also

served to describe the population under study. The study variables and measurement scales are listed in Appendix A.

## **Methodology**

### **Study Area and Population**

Cameroon has 10 regions (Adamawa, Center, East, Far North, Littoral, North, Northwest, West, South, and Southwest), 360 districts, 360 municipalities, and 14 major city councils that made an estimated global population of over 25,000,000 inhabitants in 2018 (The World Bank, 2020; WHO, 2020). But infant mortality remains a public health concern despite the various intervention measures implemented by Cameroon's government to combat the high rate. The under-5 mortality rate significantly decreased between 1990 to 2017, from 142 per 1,000 livebirths to 84 per 1,000 live births (Agborndip et al., 2020). However, disparities persist in regions of Cameroon. Between 1998 and 2004, only three regions (Adamaoua, Center, Far North) experienced a decrease in under-5 mortality, but the East, Littoral, West, South, and Southwest regions experienced a rise, and in the North and Northwest regions, the rate remained relatively constant (Agborndip et al., 2020).

The data for this study comes from the 2011 CDHS, which targeted individuals in households throughout the country. A national sample of 15, 050 households were selected and stratified to provide adequate representation of both urban and rural areas as well as the 12 areas of study, corresponding to the 10 administrative regions, including the cities of Douala and Yaounde, for which there are estimates for all key indicators (CDHS, 2011a). All women aged 15–49 years living in the household or present the night

before the start of the survey were eligible. The sample population used to estimate the association between out-of-pocket expenses and under-5 mortality consisted of households that reported out-of-pocket expenses in the last 30 days before data collection and households reported under-5 deaths. Out-of-pocket expenses was identified in the survey as any costs associated with transportation to health facilities, consultations, prescriptions, or any costs toward the injury or illness.

The study population consisted of 14,214 households successfully surveyed. However, 50% of households were selected to provide information on out-of-pocket health expenses, handicap, and HIV testing. For women 15–49 years, 15,426 were interviewed and provided information on pregnancy, birth, nutrition, and other topics beyond the study's scope. Thus, the study sample included the subset of households (7,177 households) that reported health related out-of-pocket expenses and women (aged 15–49) from those households from which information about reproduction, pregnancy, prenatal care and postnatal care, child health, among others were collected.

### **Data and Sampling Methods**

The data for this study came from the 2011 CDHS, which is nationally representative household questionnaires, using four types of model questionnaires (Household, Women's, Men's, and Biomarker). It provides data for a wide range of monitoring and impacts evaluation indicators in the areas of population, health, and nutrition (DHS, n.d.). The Cameroon survey was implemented between January and August 2011 by the National Institute of Statistics. The samples collected were obtained through 2-stage stratified sampling. Households were selected proportionally to the size

with adequate coverage of all ten regions in Cameroon, including the two major cities: Yaoundé and Douala (CDHS, 2011b). About 580 clusters comprising of 289 from the rural areas and 291 from the urban areas were selected from the 2005 general Census on population and housing (CDHS, 2011b), representing the first sampling stage. The second stage consisted of selecting households from each cluster to form the sampling unit using systematic sampling with equal selection probability (CDHS, 2011b). Initially, 15,050 homes were selected; however, 14,354 households were identified, and 14,214 were successfully surveyed with a 99% response rate with subsamples of 15,426 women (aged 15–49) and 7,191 men (aged 15–59) with a 97% and 96% response rate, respectively (CDHS, 2011b).

The DHS is publicly available data that requires special permission to access and download the data. Registration is required for first-time users to access the data. During registration, personal information including name, address, name of the institution, and phone number was provided. Additionally, a brief study's description for the data request, including the title of the study/project, the purpose was provided. After registration, the user can access data by logging in with the username and password created at registration. I initiated a request for data access on June 9th, 2019, and permission was granted on June 11th, 2019. The data were not accessed until after approval of Walden University's Institutional Review Board (IRB).

### **Power Analysis**

The researcher must ensure that the sample size provides sufficient power to investigate the RQs (Boo & Froelicher, 2013). Power is the likelihood of rejecting the



null hypothesis when it should be rejected and is related to type II error (Balkin, 2008). Power calculation requires four parameters: the alpha level, the power ( $1-\beta$ ), the sample size, and the effect size (Boo & Froelicher, 2013). By convention, producing a power of 80%, which is deemed sufficient for social science research, will necessitate the alpha (type I error) to be set at 0.05 and the  $\beta$  (type II error) at 0.20 (Balkin, 2008; Boo & Froelicher, 2013). Power of at least 80% enables rejection of the null hypothesis confidently, balancing the power of the study (Oliver & Walker, 2014; University of Texas, n.d.). A larger sample size increases the chance of finding statistically significant differences, thus increasing statistical power (Balkin, 2008). Furthermore, a larger sample size can provide valid estimates of the population characteristics and better representativeness of the population (Schutt, 2015). However, it is essential to be mindful of the effect of overpower. Overpowered studies waste resources and can be considered unethical when human or animals are involved (University of Texas, n.d.). Type I error increases as the power increases.

The sample size constitutes 15,060 households surveyed. From this sample, 14,354 homes were identified, and 14,214 were interviewed successfully. Fifty percent of the households (7,177) reported out-of-pocket expenses during the interview. Similarly, within the selected 14,214 households interviewed, 15,852 eligible women (ages 15–49) were identified, and 15,426 were interviewed successfully. Although all women provided information on maternal and child health, only women from households with out-of-pocket expenses were considered in the analysis.

### **Variable Measurement or Manipulation**

The variable out-of-pocket expenses was calculated based on the questions asked about health-related spending following an injury or a sickness. For example, out-of-pocket expenses were listed as “yes” if there as an amount listed for purchasing self-medication medicines, total transport expenses, total expenses for consultation and medical care, prescriptions medicines, labs tests and other products, and the total expenses due to a hospital admission, including transportation to the hospital. Out-of-pocket expenses were also listed as “yes” if there had been expenses associated with a second admission. Such expenses included total expenses for hospitalization, medicines, lab tests, other products, consultations, and transportation to the hospital during the second hospitalization.

Malaria prophylaxis was calculated and given a “yes” if there is a “yes” to any of the following questions: during pregnancy took fansidar for malaria, during pregnancy took chloroquine/nivaquine for malaria, during pregnancy took amodiaquine/flavoquin/camoquin for malaria, during pregnancy took quinine/quinimax for malaria, during pregnancy took coartem for malaria, during pregnancy took other drug for malaria, and whether children under 5 slept under mosquito bed net.

Under-5 mortality was determined by whether children age 0–59 months were alive. As both out-of-pocket expenses and under-5 mortality were categorical variables, the chi-square test was used to determine the relationship between the dependent and the independent variables. Since two or more variables may be correlated, a multicollinearity

analysis was also considered. Table 1 shows a summary of how variables were measured and tested with the corresponding statistical test.

**Table 1***Variables Measured and Tested*

Research Question	Variables Interest	Corresponding Survey Items	Variable type	Level of Measurement	Statistical Test
RQ 1: What is the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of aged 15-49 years controlling for poverty, age, education, religion, place of residence, nutrition, health insurance, immunization, malaria prophylaxis, access to clean water, sanitation, antenatal visit, delivery methods, infant weight at birth, and marital status?	a. out-of-pocket fees b. under-5 mortality c. poverty (wealth index) d. age e. education f. religion g. place of residence h. nutrition i. sanitation j. health insurance k. immunization l. prenatal care m. place of delivery	a. SH706, SH708, SH712, SH713, SH714, SH715, SH716, SH717, SH718, SH720, SH721, SH722, SH723, SH724, SH725 b. B5 c. HV206-216; HV221-226; HV238-247 d. V012 e. V106 f. V130 g. V102 h & i. V113, V116 j. V481 k. H10 l. M1, M14, M49A-F, M49X m. M15	a. independent variable b. dependent variable c-m. confounding variables	a. categorical b. Categorical c. Categorical d. Continuous e. Categorical f. Categorical g. categorical i. categorical j. categorical k. categorical l. categorical m. categorical	Chi-Square test  Binary logistic regression analysis
RQ2: Does the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of childbearing age vary by the regions after controlling for confounding variables (poverty, education, religion, place of residence, nutrition, age, health insurance, immunization, malaria prophylaxis, access to clean water, sanitation, antenatal visit, delivery methods, infant weight at birth, and marital status)?	a. out-of-pocket fees b. under-5 mortality c. Region d. poverty e. age f. education g. religion h. place of residence i. nutrition and sanitation j. health insurance k. immunization l. prenatal care m. place of delivery	a. SH706, SH708, SH712, SH713, SH714, SH715, SH716, SH717, SH718, SH720, SH721, SH722, SH723, SH724, SH725 b. B5 c. HV206-216; HV221-226; HV238-247 d.V190 e. V012 f. V106 g. V130 h. V102 i. V113, V116 j. V481 k. H10 l. M1, M14, M49A-F, M49X m. M15	a. independent variable b. Dependent variable c-l. Confounding variables	a. categorical b. Categorical c. Categorical d. Continuous e. Categorical f. Categorical g. categorical i. categorical j. categorical k. categorical l. categorical m. categorical	Chi-square test  Binary logistic regression analysis

## Data Analysis Plan

The data for this study was analyzed using the IBM SPSS statistics version 27 tool. This tool has been recommended with the academic program because of its ability to handle and decipher survey data. Furthermore, this tool forecast modules allowing analysts to predict trend and develop forecast quickly without being an expert in statistics.

The questions tested in the study are the following:

RQ 1: What is the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of aged 15-49 years controlling for poverty, maternal age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, antenatal visits, infant weight at birth, and marital status?

*H<sub>01</sub>*: Out-of-pocket expenses are not associated with under-5 mortality after controlling for confounding variables

*H<sub>11</sub>*: Out-of-pocket expenses are associated with under-5 mortality after controlling for confounding variables.

RQ 2: Does the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of childbearing age vary by the regions after controlling for the same confounding variables?

*H<sub>02</sub>*: The relationship between out-of-pocket expenses and under-5 mortality does not vary by region after controlling for confounding variables.

*H<sub>12</sub>*: The relationship between out-of-pocket expenses and under-5 mortality varies by region after controlling for confounding variables.

Since variables of interest were found in the different datasets, I started by merging the dataset of interest to regroup all variables in the same dataset. Dataset of interest includes the following unit of analyses the household, household members, the individual women's de facto women interviewed, birth, and children under-5 born to a woman interviewed. Data cleaning involved appropriate coding variables based on measurement scales and consider other elements of data quality, such as missing data that could alter the results if not adequately addressed. Categorical variables such as region (10 regions) were recoded using dummy variables to show the difference between region.

Upon completing the cleaning process, the first part of the analysis included a description of the study population (Simpson, 2015). Descriptive statistics represent the basic feature of the data in the study and provide simple summaries about the sample and the measure (Trochim, 2006), and uses methods such as frequencies and measures of tendency (mean and median, accompanied with a standard deviation, which measures the variability around the mean). For continuous variables, descriptive statistics that display the mean and the standard deviation were used. Frequency distributions were employed as descriptive statistics for categorical variables. Descriptive statistics of the independent variable, the dependent as well as the confounding variables were first presented to characterize the population.

In addition to descriptive statistics, inferential statistics were performed to determine whether there is a relationship between the selected variables. Since there is a dependent and independent variable, a binary logistic regression model was used as a statistical test. Regression analysis measures the association between an outcome variable

and the predictor variables (Simpson, 2015). Regression also considers the influence of multiple predictors on an outcome at the same time (Simpson, 2015). I assessed the association between out-of-pocket payment and under-5 mortality in Cameroon, while considering other factors such as poverty, maternal age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, antenatal visits, infant weight at birth, and marital status. Thus, making the selected test appropriate to answer the proposed questions.

Furthermore, a multicollinearity analysis was considered as many variables may be correlated. If not taken into consideration, the power can be weakened and the coefficient estimates inaccurate, affecting the results (Frost, 2020). A variance inflation factor and the tolerance statistic, reviewing the correlation matrix for predictor variables that correlate highly, and computing values was used to assess multicollinearity in the regression model (Frost, 2020; <https://methods.sagepub.com/dataset/howtoguide/multicollinearity-hse-2002>). These tests consist of identifying whether there is a correlation between the independent variables and the strength of the correlation (Frost, 2020). As the variance inflation factor starts at 1 and has no upper limit, a value of 1 indicated no correlation between the independent variable and any other variables (Frost, 2020). A value between 1 and 5 indicated a moderate correlation; a value greater than 5 represented a critical level of correlation that may affect the p-value and the coefficient estimates (Frost, 2020). Using the IBM SPSS statistical software allowed to test all three simultaneously.

For the first RQ; “Is there a relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of aged 15-49 years who were surveyed in the 2011 CDHS?” The chi square test was used to determine a direct relationship between the out-of-pocket expenses (categorical variable) and under-5 mortality (categorical variable) making the chi square the appropriate test to use to compute and compare the strength of the association. To compute the association controlling for confounding variables, a binary logistic regression and a multicollinearity test were performed. Regression analysis measures the association between an outcome variable and the predictor variables and considers the influences of multiple predictors on the outcome at the same time (Simpson, 2015). Multicollinearity ensures that variables that are correlated do not impede the true of the association.

For the second RQ; dummy variables were created for the variable region to assess the relationship between out-of-pocket and under-5 mortality by region. A chi-square to determine the association by regions, and a binary logistic regression as well as a multicollinearity test to determine the difference between region of out-of-pocket expenses and under-5 mortality in Cameroon taking into account confounding variables were performed.

A comparison of the p-value against the predetermined level of significance of 0.05 helped answer the RQs. This procured one in twenty chances that the observation is wrong (Simpson, 2015). The hypothesis was accepted or rejected depending upon the values of the p-value. If the p-value was less than 0.05, then the result was statistically significant, thus, rejecting the null hypothesis. Rejecting the null hypothesis meant that



the findings are unlikely to have arisen by chance and rejecting the idea that there is no association between out-of-pocket expenses and under-5 mortality in Cameroon (Gupta, 2012). Furthermore, rejecting the null also meant that there is no variation between out-of-pocket expenses and under-5 mortality in the regions of Cameroon. If the p-value is greater than 0.05, then there was not enough evidence to reject the null hypothesis.

Additionally, confidence intervals were also used to help answer the RQ.

Confidence interval is defined as a range of values for a variable constructed so that this range has a specified probability (confidence level) of including the true value of the variable (Gupta, 2012). The confidence level is set at 95%. That is, there will be 95% insurance that the truth is somewhere between the 95% confidence interval. It is also important to note that statistical significance can be assessed from the confidence interval (Gupta, 2012). If the confidence interval captures the value, this means that it is not statistically significant. However, if the confidence interval does not enclose the value reflecting 'no effect,' it means that it is statistically significant (Gupta, 2012).

### **Threats to Validity**

The study's validity addresses how well the study participants' results represent accurate findings among similar individuals outside of the study (Patino & Ferreira, 2018). Internal and external validity and external validity are two critical domains of validity that can influence the study results if not carefully considered. Internal validity is the extent to which the observed results represent the truth in the studied population and are not due to methodological errors (Patino & Ferreira, 2018). Furthermore, internal validity is concerned with establishing a causal relationship between the independent and

dependent variables (Frankfort-Nachmias & Nachmias, 2008). A study's internal validity can be threatened by many factors, including errors in measurement or participants' selection in the study (Patino & Ferriera, 2018). Furthermore, other explanations for the effects of the independent variable on the dependent variable can threaten internal validity. Thus, controlling for the possible effects of confounding variables can protect the internal validity of the study. The CDHS selected households using systematic sampling with equal selection probability, limiting internal validity threats.

Small sample size can also threaten the validity of a research study. In this study, approximately 15,000 households were surveyed. Over 14,000 eligible women aged 15–49 were interviewed, with more than 5,000 children under the age of five reported having been sick or injured at least 30 days before the start of the survey. This presents a considerable sample size, thus limiting threats to internal validity. External validity refers to whether results can be replicable in a different setting or not. As this study relies on secondary data, the overall threats to validity might be associated with secondary data limitations. One of the limitations includes the available data collected may not address the RQ or test the hypothesis. Thus, the researcher has no control over what is already in the dataset (Cheng & Phillips, 2014).

### **Ethics**

The DHS maintains strict standards for protecting respondents' and households' privacy in the survey (DHS, n.d.). Questionnaires, procedures, and protocols have been reviewed and approved by both the International Classification of Functioning IRB and Cameroon's IRB (DHS, n.d.). Furthermore, informed consent was collected before each

interview providing details about the purpose of the interview, the interview duration, interview procedures, risk and benefits to respondents, contact information to provide additional information about the interview, and the ability to opt-out at any time during the interview. Confidentiality was maintained as interviews were not conducted in the presence of another respondent. Personal identification information was omitted, and respondents were identified by a series of numbers such as household numbers and individual numbers. Thus, the study poses no ethical threats to respondents. To further protect the respondents' privacy, I requested access to the data to be used in the study. I submitted the request to access datasets from the DHS website on June 9th, 2019 and received an authorization on June 11th, 2019. Additional approval was obtained through Walden University IRB to advance in the study. The data for this study was not shared with another party.

### **Summary**

Section 2 explained the study rationale, methodology, and internal and external validities. A cross-sectional design was used in this quantitative study. Data came from the 2011 CDHS and included all the variables of interest. The study population comprises households surveyed in the DHS. Within the homes, eligible women aged 15–49 years of age provided information on nutrition, birth, pregnancy, infant mortality, and other topics. The variables of interest are categorical and continuous. The independent variable, out-of-pocket expenses, and the dependent variable, under-5 mortality, are categorical variables. Descriptive statistics were performed after the data had been cleaned, and missing data had been considered. Regression analyses were performed to determine the

relationship between the independent and the dependent variables. A p-value was compared against the predetermined level of significance of 0.05 to answer the RQs. The confidence level was set at 95%. The study's internal validity can be threatened by errors and the effects of confounding variables of the independent variables on the dependent variable. Controlling for the possible effects of confounding variables can protect the internal validity of the study. The study poses no ethical threats as IRB has been obtained through International Classification of Functioning Disability and Health and from Cameroon's IRB. Furthermore, IRB from Walden University was granted before proceeding with the study. The next section will discuss the analysis and results of the study.

### Section 3: Presentation of the Results and Findings

The purpose of this study was to examine the relationship between out-of-pocket expenses and under-5 mortality of the children of eligible Cameroonian women aged 15–49 years old controlling for poverty (wealth index), age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, antenatal visits, place of delivery, infant weight at birth, and marital status. The study focused on regions of Cameroon. In this section, the analysis process is discussed, and the research findings is presented.

#### **Data Collection of Secondary Data Set and Representativeness of Sample**

This study used data from the 2011 CDHS. The survey was implemented between January and August 2011 by the National Institute of Statistics and is available to the public. However, special permission is required for accessing and downloading the data. The data were accessed after obtaining this permission as well as approval from Walden University's IRB.

The 2011 CDHS contains the most recent available data on out-of-pocket expenses of household members seeking healthcare in Cameroon. According to the Central Intelligence Agency (CIA) report book, as of July 2020, Cameroon's population is estimated at 27.7 million. This study was based on a national sample of 15,050 households selected and stratified to provide adequate representation of both urban and rural areas as well as the 12 areas of study (CDHS, 2011). Households were sampled through a 2-stage stratified sampling process using a systematic sampling with equal selection probability, which led to 14,214 households successfully interviewed. Fifty

percent of the selected households provided information on out-of-pocket health expenses, handicap, and HIV testing. A total of 1,339 households were identified with out-of-pocket expenses. 50.5% of eligible women resided in urban areas and 49.5 in the rural, making the sample representative of the population.

### **Descriptive Statistics**

The final data used for analysis included responses from households who reported out-of-pocket healthcare expenses. Table C1 presents the frequencies, means and standard deviations of the study's variables (see Appendix C). Overall a total of 1,339 participants reported out-of-pocket expenses. These participants reported 542 children under the age of 5 among which 24.3% (316) were deceased. The mean out-of-pocket expenses for a recent illness or injury of a child was 45,752 CFA (~\$84;  $SD = 102,827$  CFA [~\$188]). The mean age of women in the household was 30.9 years ( $SD = 9.2$ ). Ninety six percent of respondents did not have health insurance. About 76% of the sample was Christian, 46.8 % was classified as rich in the wealth index (defined as the household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities, etc.), 31.8% was poor, 41.9 % had secondary education, only 4.7% had completed higher education, and 77.8% were either married or living with a partner.

### **Results**

The data were analyzed using IBM SPSS version 27. To examine the RQs, Pearson's chi-square for association and binary logistic regression tests were performed. The chi-square compares the categorical independent variable with the categorical

dependent variable. The binary logistic regression was used to predict the relationship between the independent variable (out-of-pocket expenses) and the dependent variable (under-5 mortality) where the dependent variable is binary (yes/no). Because of the abundance of confounding variables, each variable was tested separately in a binary logistic regression. The variables that were statistically significant when examined individually were included in another binary logistic regression. This led to not examining for multicollinearity as previously mentioned. Significance  $p$  was set at a value of 0.05 with a confidence interval set at 95%.

### **RQ 1**

RQ 1: What is the relationship between out-of-pocket healthcare fees and under-5 mortality among Cameroonian children of women of aged 15–49 years controlling for poverty, maternal age, education, religion, place of residence, health insurance, immunization, malaria prophylaxis, place of delivery, antenatal visits, infant weight at birth, and marital status?

*H<sub>0</sub>*: Out-of-pocket expenses are not associated with under-5 mortality after controlling for confounding variables

*H<sub>1</sub>*: Out-of-pocket expenses are associated with under-5 mortality after controlling for confounding variables

I first performed a chi-square test of independence to solely examine the association of the out-of-pocket expenses and under-5 mortality. The association between these variables was not statistically significant ( $X^2 = 2.674$ ,  $p = 0.263$ , [CI: 0.255, 0.272]). I also performed a binary logistic regression to examine the association between

out-of-pocket expenses after controlling for confounding variables. Because of the abundance of confounding variables, I ran the test with the variables separately to better assess the influence of each variable. Appendix D includes tables that show the relationship between out-of-pocket expenses and under-5 mortality for each of the confounding variables when examined individually. Although there was no association between out-of-pocket expense and under-5 mortality after controlling for confounding variables separately, delivery in private hospitals is associated with decreased odds of under-5 mortality (OR = 0.531,  $p = 0.049$ , [CI: 0.283-0.998]). Furthermore, age was significantly associated with under-5 mortality. As age of the mother increases, odds of under-5 mortality decreases (OR = 0.933,  $p < 0.005$ , [CI: 0.911-0.956]). Additionally, respondents from the Grassfield, the Bamilike/Bamoun, and the Kako/Meka/Pygmé ethnic group, had 41.3% (OR = 0.413,  $p = 0.021$ , [CI: 0.195-0.873]), 44% (OR = 0.440,  $p = 0.017$ , [CI: 0.224-0.863]), and 21.1% (OR = 0.211,  $p = 0.013$ , [CI: 0.061-0.722]) lower odds of under-5 infant mortality compared to those of the Arab-Choa/Peulh/Haoussa/Kanuri ethnic groups, respectively. Moreover, I found that the odds of under-5 mortality to be 67% higher in Muslim respondents compared to Christian respondents (OR = 1.674,  $p = 0.018$ , [(CI: 1.093-2.565)]).

The variables that were significant when examined individually were included in the overall binary logistic regression to further examine the level of association between out-of-pocket expense and under-5 mortality. When included in this revised model only maternal age (OR = 0.871,  $p < 0.05$ , [CI: 0.835-0.908]) and delivery at private hospital (OR = 0.377,  $p = 0.027$ , [CI: 0.158-0.896]) remained significant as shown in Table 2.



Furthermore, out-of-pocket expenses were not associated with under-5 mortality when controlling for other significant variables. Therefore, the null hypothesis was retained.

**Table 2**

*Association Between Out-of-Pocket Expenses and Under-5 Mortality After Controlling for Confounding Variables*

Variables	<i>B</i>	<i>p</i>	<i>OR</i>	95% CI	
Low Expenses (ref)	.260	.416	1.297	.694	2.426
Medium Expenses	.006	.986	1.006	.540	1.872
High Expenses					
Place of delivery					
Respondent's home (ref)Government hospital	-.184	.585	.832	.429	1.611
Private Hospital	-.976	.027	.377	.158	.896
Respondent's current age	-.139	.000	.871	.835	.908
Ethnicity					
Arab-Choa/Peulh/Haoussa/Kanuri (ref)					
Biu-Mandara	-.040	.941	.961	.333	2.770
Adamaoua-Oubangui	-.602	.287	.548	.181	1.658
Bantoïde South-West	.221	.828	1.248	.170	9.149
Grassfields	-.274	.675	.760	.212	2.731
Bamilike/Bamoun	-.301	.593	.740	.245	2.233
Côtier/Ngoe/Oroko	.157	.858	1.170	.210	6.518
Beti/Bassa/Mbam	.405	.494	1.499	.470	4.782
Kako/Meka/Pygmé	-1.170	.188	.311	.054	1.770
Stranger / other	-.198	.818	.820	.152	4.427
Religion					
Christian (ref)					
Muslim	.104	.789	1.110	.518	2.377
Other	.659	.296	1.933	.562	6.653
None	.444	.577	1.559	.328	7.406

**RQ 2**

RQ 2: Does the relationship between out-of-pocket fees and under-5 mortality among Cameroonian children of women of childbearing age vary by the regions after controlling for confounding variables (poverty, education, religion, place of residence, age, health insurance, immunization, malaria prophylaxis, place of delivery, antenatal visit, infant weight at birth, and marital status)?

*H<sub>0</sub>2*: The relationship between out-of-pocket expenses and under-5 mortality does not vary by region after controlling for confounding variables.

*H<sub>1</sub>2*: The relationship between out-of-pocket expenses and under-5 mortality varies by region after controlling for confounding variables.

As mentioned, the tables in Appendix D show the level association between out-of-pocket expenses and under-5 mortality after controlling for each variable separately. However, when looking at the variable region of residence, only one region was statistically significant. The odds of under-5 mortality in the West region are 41.1% lower (OR = 0.411,  $p = 0.042$ , [(CI: 0.175-0.967)]) compared to that of the Adamaoua region as shown Table 3.

**Table 3**

*Association Between Out-of-Pocket Expenses and Under-5 Mortality After Controlling for Region*

Variables	<i>B</i>	<i>p</i>	<i>OR</i>	95% CI	
Low expenses (ref)					
Medium expenses	.244	.285	1.277	.816	1.997
High expenses	-.104	.635	.901	.586	1.385
Region					
Adamaoua (ref)	-.205	.642	.815	.343	1.932
Centre	-.424	.470	.654	.207	2.065
Douala	-.956	.061	.385	.142	1.043
East	-.017	.969	.984	.422	2.295
Far-North	-.780	.103	.458	.179	1.171
Littoral	-.248	.591	.781	.316	1.927
North	-.550	.230	.577	.235	1.417
Northwest	-.889	.042	.411	.175	.967
West	-.376	.451	.687	.258	1.825
South	-.095	.845	.909	.350	2.359
Southwest Yaoundé	-.755	.129	.470	.177	1.247

When the model was run with variables that were significant or with at least one level of category that was significant, only age remained significant (OR = 0.867,  $p < 0.05$ , [CI: 0.829-0.906]) as shown in Table 4. Furthermore, the region was not found to be significantly associated with under-5 mortality when controlling for expenses and other confounding variables. Therefore, the null hypothesis is for this RQ was retained.

**Table 4**

*Association Between Out-of-Pocket Expenses and Under-5 Mortality After Controlling for Significant Confounding Variables*

Variables	<i>B</i>	<i>p</i>	<i>OR</i>	95% C.I.	
<b>Expenses</b>					
Low Expenses (ref)					
Medium Expenses	.259	.433	1.295	.679	2.471
High Expenses	-.074	.826	.929	.481	1.794
<b>Place of delivery</b>					
Respondent's Home (ref)					
Government Hospital	-.087	.807	.917	.458	1.838
Private Hospital	-.863	.068	.422	.167	1.066
Respondent's current age	-.143	.000	.867	.829	.906
<b>Ethnicity</b>					
Arab-Choa/Peulh/Haoussa/Kanuri (ref)					
Biu-Mandara	-.205	.721	.815	.264	2.513
Adamaoua-Oubangui	-.526	.377	.591	.184	1.899
Bantoïde South-West	-.508	.702	.601	.045	8.125
Grassfields	-.733	.493	.480	.059	3.915
Bamilike/Bamoun	.783	.347	2.188	.428	11.195
Côtier/Ngoe/Oroko	.943	.380	2.568	.312	21.118
Beti/Bassa/Mbam	1.182	.159	3.261	.629	16.912
Kako/Meka/Pygmé	-.460	.690	.631	.066	6.063
Stranger / other	-.288	.770	.749	.109	5.166
<b>Region</b>					
Adamaoua (ref)					
Centre	-.338	.695	.713	.131	3.871
Douala	-.619	.551	.538	.070	4.132
East	-.232	.793	.793	.140	4.493
Far-North	.526	.431	1.692	.458	6.257
Littoral	-1.236	.177	.290	.048	1.747
North	.877	.196	2.404	.636	9.092
North-West	.852	.448	2.343	.259	21.192
West	-.840	.365	.432	.070	2.655
South	.023	.981	1.023	.151	6.935
South-West	1.542	.149	4.673	.576	37.885
Yaoundé	-.521	.566	.594	.100	3.515
<b>Religion</b>					
Christian (ref)					
Muslim	.256	.527	1.292	.584	2.860
Other	.684	.311	1.982	.528	7.440
None	.658	.419	1.932	.391	9.550

## Summary

In this section, I completed descriptive statistics on each of the categorical and continuous variables of interest. delivery in private hospitals, age, and respondents from the Grassfield, the Bamilike/Bamoun, and the Kako/Meka/Pygmé ethnic group were associated with under-5 mortality. A two-by-two chi-square was conducted to determine a direct association between out-of-pocket expenses and under-5 mortality for the first RQ. Binary logistic regressions were conducted to test the hypotheses for both RQ1 and RQ2. For RQ1, out-of-pocket expenses were not found to be associated with under-5 mortality when controlling for other significant variables therefore the null hypothesis was retained. Region was not found to be significantly associated with out-of-pocket expenses when controlling for expenses and other confounding variables therefore, the null hypothesis for RQ2 was retained. The key findings, social change implications, theoretical framework alignment, study limitation, and application to professional practice are presented in section 4.

#### Section 4: Application to Professional Practice and Implications for Social Change

The purpose of the study was to examine whether there is a statistically significant association between out-of-pocket fees and under-5 mortality after controlling for other variables (poverty, education, age, religion, place of residence, immunization, malaria prophylaxis, sanitation, health insurance, antenatal visit, infant weight at birth, and marital status) from the 2011 CDHS data. The association between out-of-pocket expenses and under-5 mortality was also examined between the regions of Cameroon after controlling for the same confounding variables. Chi-square and binary logistic regression were used to test the hypotheses. The findings indicated that out-of-pocket expenses were not associated with under-5 mortality. There was also no association between out-of-pocket expenses and under-5 mortality across the regions of Cameroon.

#### **Interpretation of Findings**

Out-of-pocket expenses continue to serve as barrier to health care services despite their removal from public health care in some African countries (Kaonga et al., 2019). As Cameroon does not have a current policy in place eliminating out-of-pocket fees, 70% of the population contributes to health spending through out-of-pocket payments (Nde et al., 2019). The risk of financial hardship is higher in poorest families or those residing further from the health facilities, and most have developed diverse mechanisms to finance health care, such as risk-share arrangements between close relatives, which are not limited by geographical boundaries and space (Kaonga et al., 2019; Ojong, 2019). People must often borrow or sell assets or ask friends for help to pay for the medical bills in case of a child's serious illness or injury (Kaonga et al., 2019). But because of financial hardship,



families may often delay seeking care and sometimes this may lead to death (Kagabo et al., 2019).

### **RQ 1**

The findings of the study revealed no association between out-of-pocket expenses and under-5 mortality. However, after controlling individually for confounding variables, age of the mother was found to be significantly associated with under-5 mortality. As age of the mother increases, under-5 mortality decreases. This result is consistent with previous studies (Neal et al., 2018; Sinha et al., 2016). Women who give birth at a younger age may not have the financial stability or the power to access health facilities to care for themselves or the infant, especially in an event of a serious illness or injury since insurance is virtually non-existent in Cameroon (less than 1% of the population have health insurance). Thus, not only women who marry at a young age but young women in general are at higher risk of dying and losing their baby during childbirth (Raj et al., 2010).

In addition to maternal age, delivery in private hospitals was also associated with a decrease in under-5 mortality. This finding is also consistent with previous studies in Ghana (Ibrahim et al., 2016) and Bangladesh (Pal, 2015). Research has also indicated that deliveries at health facilities reduces neonatal mortality by 29% in low- and middle-income countries (Tura et al., 2013). Despite the data suggesting lower rates of mortality associated with hospital birth, research suggests that women prefer to deliver at home due to having a relative nearby for support, home deliveries as favorite practice, discomfort

around a male doctor, and not being able to assume the birthing position (Kyei-Nimakoh et al., 2017).

Disparities among ethnic groups in Cameroon have also been observed. The Grassfield, the Bamilike/Bamoun, and the Kako/Meka/Pygmé ethnic groups had a higher risk of under-5 mortality. The findings contradict research that determined that the Baka pygmies are characterized by low infant and juvenile mortalities and high fertility at early life (Rozzi, 2018). However, the study confirms statistically significant differences in under-5 mortality within ethnic groups in more than two-third of all African countries studied (Victora et al., 2020). In Cameroon, a large majority of the rural population are less educated, lack transportation and access to health facilities, and depend on traditional remedies to treat diseases (Abia et al., 2015; Coughlin et al., 2019). For example, the Pygmies or forest people in Southeastern Cameroon prefer traditional medicine than modern medicine for the treatment of common illnesses (Pemunta, 2019). Traditional medicine is available and administered by traditional healers who live near local residents, making traditional medicine the most preferred cost-efficient treatment for rural people (Kasika et al., 2016). This may contribute to under-5 mortality, as serious illnesses may be inappropriately treated. This highlights the need of intervention targeting ethnic groups to understand the trends and combating disparities which will move forward attaining the third sustainable development goal.

## **RQ 2**

For the second RQ, there was an association between the West region of Cameroon and under-5 mortality compared to the Adamaoua region. This extends

knowledge in the discipline, as previous similar studies were not identified. Other studies have focused on the cause of under-5 mortality in Cameroon. For example, Agborndip et al. (2020) and Libwea et al. (2019) both examined the main causes of under-5 mortality in the Southwest region of Cameroon and the city of Yaounde, respectively. Both studies suggest infectious diseases as the major cause of under-5 mortality in these regions.

However, similar studies are needed in other regions of Cameroon to confirm or refute such causes of under-5 mortality. Though the current study did not examine the cause of under-5 mortality in Cameroon, the presence of infectious disease in particular regions may impact the different rates of under-5 mortality. Malaria, pneumonia, and diarrheal diseases, among others have been listed as major causes of under-5 mortality in regions of Cameroon (Agborndip et al., 2020).

### **Alignment with the Theoretical Framework**

The core components of the SEM focus on the levels of influence and health-related behaviors and outcomes, which I sought to examine in the study. Based on the results of the analysis, age and ethnicity are characteristics that may affect health-related behaviors leading to under-5 mortality as suggested by the individual level of the SEM. The results suggest that younger age of mothers is a risk factor for under-5 mortality in Cameroon, also confirming the individual level of SEM as personal characteristics that may impede health outcomes. Though out-of-pocket expenses was an individual level factor that was not found to be associated with under-5 mortality, other studies suggest that lack of financial resources to care for the children in the event of a serious injury or disease may lead to negative outcomes. Other factors such as maternal education, marital

status, place of residence (urban vs. rural), antenatal visits, child's birth weight, and religion are personal characteristics that may influence a person's decision to pursue treatments.

The results also suggest that giving birth at a private health facility compared to home delivery decreases under-5 mortality. However, attending a private hospital requires the capacity to pay for services, which may influence health seeking at the community level as further suggested by the SEM. Other factors that may influence health services at the community level are prices for services set at health facilities. The prices, if high, may drive away women who cannot afford to pay.

At the interpersonal level, friends and families as well as previous experiences with the health facilities may influence the decision of where to give birth. Furthermore, the findings also suggest that living in the West Region is associated with under-5 mortality. Living in a particular region may interfere with health seeking behaviors as different regions may have different cultures and norms within the community. Therefore, future studies may examine in-depth these relationships on health outcomes.

### **Limitations of the Study**

The limitations that come with using secondary data were unavoidable in this study. As a characteristic of secondary data, the DHS data was not designed to answer the RQs in this study, so some variables had to be re-categorized. For example, as each household had multiple responses, the process of recategorization of out-of-pocket and mortality may not have captured all responses. This may have underestimated the number of mortalities and the number of respondents reporting out-of-pocket expenses.

Furthermore, out-of-pocket expenses were collected 30 days preceding the arrival of the interviewer in the household. This may have led to omitting families that have reported out-of-pocket health care expenses before the time period, impacting the total number of families with out-of-pocket expenses. One thousand three hundred and thirty-nine families reported out-of-pocket expenses, which may not be representative of the rest of population. Whereas only 9.4% of the study sample reported out-of-pocket expenses, yet 99% of the population does not have health insurance (Nde et al., 2019) suggests that the study sample may differ from the population of Cameroon in some ways and this may have impacted the outcomes of the study. Moreover, the data used for this study was several years old and therefore, may not be representative of the current under-5 mortality rates and average out-of-pocket medical expenses in Cameroon. In addition, infectious diseases that have been listed as one of the major causes of under-5 mortality were not accounted for as controlling variables in this study. Studies have found 28% and 18% respectively of under-5 mortality may be due to infectious diseases (malaria) (Agborndip et al., 2020; Libwea et al., 2019). The original study did not collect data on cause of death therefore, it was not possible to include it as a control variable in this study.

### **Recommendations**

This study engaged a quantitative cross-sectional design aiming at examining the association between out-of-pocket healthcare expenses and under-5 mortality. The study did not include infectious diseases such as malaria, which has been listed as one of the leading causes of under-5 mortality in Cameroon. Therefore, it is recommended that future research consider infectious disease as additional variables when examining under-

5 mortality in Cameroon. Furthermore, out-of-pocket expenses were collected 30 days preceding the arrival of the interviewer in the household. It is recommended that out-of-pocket healthcare expenses be collected at the start of the collection process to better capture its overall representation. Out-of-pocket expenses should be measured as any expenses related to a child's illnesses before his death. This study was performed on survey data that were collected in 2011. Therefore, future studies should be performed on most current datasets and perhaps utilize a different study design such as a longitudinal design to better assess the needs of the population as it is changing over time.

No association was found between out-of-pocket expenses and under-5 mortality. However, after adjusting for confounding variables, the age of mothers was found to be significantly associated with under-5 mortality. Therefore, it is recommended that programs aiming at educating and empowering young women about reproductive health and the proper care of an infant be developed. It is also essential that these reproductive health programs be available and accessible to women in remote areas as they are more at risks of marrying at a younger age compared to those living in the city (Yaya et al., 2019). Moreover, it is critical to target interventions allowing easier and affordable access to health facilities and promoting family planning and contraception among young women.

As delivery in health facilities decreases the risk of under-5 mortality, it is recommended that health facilities be accessible and free of charge to all women of reproductive age. Furthermore, it is also recommended to expand health facilities to inaccessible areas, provide more health professional to be dispatched to remote areas, and

promote the utilization of those health facilities during childbirth where home delivery is a common practice (Tura et al., 2013).

Out-of-pocket expenses have been demonstrated as a major barrier to quality health care service (Tahsina et al. 2017). Although out-of-pocket expenses were not associated with under-5 mortality in this study, 1339 households reported out-of-pocket expenses as a result of an injury or a serious illness of a child. It is recommended that universal health coverage be supported as an option to mitigate household out-of-pocket expenses.

As under-5 mortality was significant in some ethnic groups and regions of Cameroon, it is recommended that further studies be performed within ethnic groups and in the West region to determine factors that may contribute to under-5 mortality for those groups. Furthermore, more recent data in Cameroon as it relates to out-of-pocket expenses, under-5 mortality, maternal health is needed to better assess health and or needs.

### **Implications for Professional Practice and Social Change**

#### **Professional Practice**

As under-5 mortality in Cameroon remains one of the highest in SSA, public health professionals need to further identify the root causes and put into action practices that can mitigate this phenomenon. Actions should address both the individual and community levels.

At the individual level it is critical that patient-physician communication be improved to empower younger women to delay early parenting. Previous studies have

identified negative experiences and distrust of physicians as barriers to quality health services (Lazar and Davenport, 2018). Trust and communication were demonstrated to be positively related to patient satisfaction and perceived quality of health care services in terms of better following medical advice in both developed and developing countries (The American College of Obstetricians and Gynecologists, 2014; Chandra et al., 2018; Ha & Longnecker, 2010). Therefore, improving patient-physician relationships may contribute to increasing the uptake of health facility services by women. In addition, providing physicians training in the art of better communicating with patients may improve counselling of women particularly those of a younger age. Emphasis should be put on women living in rural places who have limited access to health facilities, are less educated and often forced into early marriage to care for themselves (Yaya et al., 2019). Professional trainings, compensation packages, and medical resources may be made available to encourage physicians to practice in rural areas as many leave those areas for the cities for better opportunities. Educating women about the lowered risk associated with giving birth at a later age is crucial for meeting public health metrics. In communicating with younger women, physicians may also elaborate the benefits of delivering in health facilities.

Furthermore, to improve the difference by regions, it is important that physicians from a particular area or belonging to a particular ethnic group communicate with that ethnic group/region as they will be more receptive to the several educations given. In addition, counseling a person related to the community may lead to understanding what difficulties people are facing in using health services and caring for their children and



provide solutions using a community-based approach to alleviate those barriers.

Furthermore, regular analyses of ethnic disparities are essential for monitoring trends, targeting, and assessing the impact of health interventions (Victora et al., 2020). Such analyses will contribute to the effort towards leaving no one behind, which is essential to the sustainable development goals (Victora et al., 2020). Therefore, all these efforts may contribute to attaining the third sustainable development goal in Cameroon.

### **Positive Social Change**

The findings of this study suggest that young mothers are at higher risk of children dying before the age of five than women who give birth at a later age or deliver in a private hospital. Being from the Grassfield, the Bamilike/Bamoun, and the Kako/Meka/Pygmé ethnic groups and being from the west region increases under-5 mortality. The findings of this research may contribute to social change by helping policymakers to instill robust intervention programs that will educate about health, factors contributing to infant mortality and provide young girls with opportunities to thrive. Similar intervention programs specific to each ethnic group will be implemented to alleviate such contributing factors to under-5 mortality. In the creation of such programs, an integrated strategy should be part of a comprehensive approach involving the community to be a meaningful part in the programs. This will allow trust and better assessment of the recurrent barriers faced in the community. An increase in knowledge and capacity building will empower people in the community with the understanding that they can use available resources and engage in promoting healthy behaviors to reduce infant mortality.

Furthermore, engaging with communities may allow to examine in-depth disparities observed within ethnic groups and the regions of Cameroon. Findings from this study also suggest that delivery in health facility is crucial to avoid under-5 mortality. This may further help policymakers to engage in efforts to adopt universal health coverage as an additional way to encourage birth in private hospitals which was found to impact under-5 mortality. As universal health coverage ensures access to quality access health care services without financial hardship, it has also been shown to decrease infant deaths among the poor in some low- to middle-income countries, improve life expectancy at birth and healthy life expectancy (Organization for Economic Co-operation and Development, 2016); Ranabhat et al., 2018). Thus, universal health coverage could improve Cameroon's life expectancy at birth. Findings further suggest that living in the west region of Cameroon increases the risk of under-5 mortality. This may further help policymakers to develop interventions specific to the region using subject matter experts from the region to increase program acceptance and examine in depth factors contributing to such outcome thus improve under-5 mortality in the region of Cameroon.

### **Conclusion**

The study did not find any association between out-of-pocket expenses and under-5 mortality. However, age of mother, delivery at a private facility, the Grassfield, the Bamilike/Bamoun, the Kako/Meka/Pygmy ethnic groups, and the west region were associated with under-5 mortality. The findings demonstrate that the younger the mother, the higher the risk of under-5 mortality. It is important that policymakers partner with communities to better understand the needs, tailor interventions, and provide necessary

resources. For example, a program that emphasizes educating younger women about factors that may contribute to under-5 mortality may improve outcomes. Furthermore, additional programs that will allow women to be financially independent may contribute to lessen the risk of under-5 mortality as most access to health facilities require payment before service. In addition, advocating for universal health coverage will eliminate the burden of out-of-pocket expenses which may encourage women to increase health service utilization and limit mortalities. Future studies may explore the disparities in under-5 mortality across ethnic group as Cameroon counts over 300 ethnic groups. Each ethnicity has a different culture as culture may play a critical role in health-related behaviors. Under-5 mortality is one of Cameroon's key health metrics. Educating younger women, advocating for health coverages that will eliminate barriers to accessing health services, understanding the different culture of each ethnic group and region and how it may influence a woman's ability to care for herself and her children could be key interventions to reduce under-5 mortality in Cameroon and perhaps meet the third sustainable development goal.

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## Appendix A: Outline of Variables

Important variables and corresponding survey question numbers analyzed in the study

Variable Name	Label	Question Number	Level of Measurement
SH705	Sickness serious, moderate or light	No. 206	categorical
SH708	Amount for the purchase of medicines for the self-medication	No. 311	continuous
SH712	Total transport expenses	No. 207	continuous
SH713	Total expenses for consultations and medical cares	No. 207	continuous
SH714	Total expenses for medicines, lab tests and other products	No. 207	continuous
SH715	Admitted in the hospital	No. 208	categorical
SH716	Total expenses for the hospitalization	No. 211	continuous
SH717	Total expenses for transport of this hospitalization	No. 211	continuous
SH718	Had a second consultation	No. 212	categorical
SH720	Transport expenses for the second consultation	No. 215	continuous
SH721	Total expenses for second consultations and medical cares	No. 215	continuous
SH722	Total expenses for medicines, lab tests and other products for the second time	No. 215	continuous
SH723	Admitted in hospital for the second time	No. 216	categorical
SH724	Total expenses for the hospitalization for the second time	No. 217	continuous
SH725	Total expenses for transport of this hospitalization for the second time	No. 217	continuous
HV206-216 (V190)	Has electricity/Has radio/Has television /Has refrigerator/Has bicycle/Has motorcycle/scooter/Has car/truck/Main floor material /Main wall material/Main roof material /Number of rooms used for sleeping	No.110-123	categorical
HV221-226 (V190)	Has telephone (land-line)/Share toilet with other households /Type of cooking fuel		
HV238-247 (V190)	Number of households sharing toilet/Food cooked on stove or open fire/Household has a chimney, hood or neither/Food cooked in the house/ separate building/ outdoors/Household has separate room used as kitchen/Has mobile telephone/Has watch/Has animal-drawn cart/Has boat with a motor/Owns land usable for agriculture/Hectares of agricultural land (1 decimal)” /Owns livestock, herds or farm animals5 /Owns cattle/Owns cows/ bulls/Owns horses/ donkeys/ mules/Owns goats /Owns sheep/Owns chickens /Has bank account		
V130	Religion	No. 113	categorical
V131	Ethnicity	No. 114	categorical
V106	Highest educational level	No. 105	categorical
V101	Region	identification section country specific	categorical

V102	Type of place of residence	identification section country specific	categorical
V012	Respondent's current age	No. 103	continuous
M14	Number of antenatal visits during pregnancy	No. 412	categorical
M19	Birth weight in kilograms (3 decimals)	No. 432	categorical
M49	During pregnancy drugs for malaria	No. 424	
M49A	During pregnancy took: SP/fansidar for malaria	No. 425	categorical
M49B	During pregnancy took: chloroquine/nivaquine for malaria	No. 425	categorical
M49C	During pregnancy took: amodiaquine/flavoquin/camoquin for malaria	No. 425	categorical
M49D	During pregnancy took: quinine/quinimax for malaria	No. 425	categorical
M49E	During pregnancy took: coartem for malaria	No. 425	categorical
M49F	NA - During pregnancy took: CS drug for malaria	No. 425	categorical
M49X	During pregnancy took: other drug for malaria	No. 425	categorical
M1	during pregnancy Tetanus shot	No. 418	categorical
M45	during pregnancy took Iron tablets	No. 422	categorical
M15	Place of delivery	No. 434	categorical
H10	Ever had vaccination	No. 505	categorical
V501	Current marital status	No. 603	categorical
V113	Source of drinking water	No. 101	categorical
V116	Type of toilet facility	No. 107	categorical
V460	Children under 5 slept under mosquito bed net last night	No. 126	categorical
V480	Covered by health insurance	No. 1009	categorical
V481	Main type of insurance	No. 1010	categorical
B5	Child is alive	No. 454	categorical

### Appendix B: Questions and Coding Categories

This section shows subsets of the household, inpatient and outpatients health expenditures, and women questionnaires for the variables of interest in the study.

HOUSEHOLD CHARACTERISTICS			
NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	How often does anyone smoke inside your house? Would you say daily, weekly, monthly, less than monthly, or never?	DAILY ..... 1 WEEKLY ..... 2 MONTHLY ..... 3 LESS THAN MONTHLY ..... 4 NEVER ..... 5	
102	What is the main source of drinking water for members of your household?	PIPED WATER PIPED INTO DWELLING ..... 11 PIPED TO YARD/PLOT ..... 12 PUBLIC TAP/STANDPIPE ..... 13 TUBE WELL OR BOREHOLE ..... 21 DUG WELL PROTECTED WELL ..... 31 UNPROTECTED WELL ..... 32 WATER FROM SPRING PROTECTED SPRING ..... 41 UNPROTECTED SPRING ..... 42 RAINWATER ..... 51 TANKER TRUCK ..... 61 CART WITH SMALL TANK ..... 71 SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/ IRRIGATION CHANNEL) ..... 81 BOTTLED WATER ..... 91  OTHER _____ 96 (SPECIFY)	→ 105      → 105
103	Where is that water source located?	IN OWN DWELLING ..... 1 IN OWN YARD/PLOT ..... 2 ELSEWHERE ..... 3	→ 105
104	How long does it take to go there, get water, and come back?	MINUTES ..... <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW ..... 998	
105	Do you do anything to the water to make it safer to drink?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8	→ 107
106	What do you usually do to make the water safer to drink?  Anything else?  RECORD ALL MENTIONED.	BOIL ..... A ADD BLEACH/CHLORINE ..... B STRAIN THROUGH A CLOTH ..... C USE WATER FILTER (CERAMIC/ SAND/COMPOSITE/ETC.) ..... D SOLAR DISINFECTION ..... E LET IT STAND AND SETTLE ..... F  OTHER _____ X (SPECIFY) DON'T KNOW ..... Z	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP																					
107	What kind of toilet facility do members of your household usually use? (3)	FLUSH OR POUR FLUSH TOILET FLUSH TO PIPED SEWER SYSTEM ..... 11 FLUSH TO SEPTIC TANK ..... 12 FLUSH TO PIT LATRINE ..... 13 FLUSH TO SOMEWHERE ELSE ..... 14 FLUSH, DON'T KNOW WHERE ..... 15 PIT LATRINE VENTILATED IMPROVED PIT LATRINE ..... 21 PIT LATRINE WITH SLAB ..... 22 PIT LATRINE WITHOUT SLAB/ OPEN PIT ..... 23 COMPOSTING TOILET ..... 31 BUCKET TOILET ..... 41 HANGING TOILET/HANGING LATRINE ..... 51 NO FACILITY/BUSH/FIELD ..... 61 OTHER _____ 96 (SPECIFY)	→ 110																					
108	Do you share this toilet facility with other households?	YES ..... 1 NO ..... 2	→ 110																					
109	How many households use this toilet facility?	NO. OF HOUSEHOLDS IF LESS THAN 10 ..... <input type="text" value="0"/> <input type="text"/> 10 OR MORE HOUSEHOLDS ..... 95 DON'T KNOW ..... 98																						
110	Does your household have: (4) Electricity? A radio? A television? A mobile telephone? A non-mobile telephone? A refrigerator? [ADD ADDITIONAL ITEMS. SEE FOOTNOTE 4.]	<table border="0"> <thead> <tr> <th></th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr> <td>ELECTRICITY .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>RADIO .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>TELEVISION .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>MOBILE TELEPHONE .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>NON-MOBILE TELEPHONE ...</td> <td>1</td> <td>2</td> </tr> <tr> <td>REFRIGERATOR .....</td> <td>1</td> <td>2</td> </tr> </tbody> </table>		YES	NO	ELECTRICITY .....	1	2	RADIO .....	1	2	TELEVISION .....	1	2	MOBILE TELEPHONE .....	1	2	NON-MOBILE TELEPHONE ...	1	2	REFRIGERATOR .....	1	2	
	YES	NO																						
ELECTRICITY .....	1	2																						
RADIO .....	1	2																						
TELEVISION .....	1	2																						
MOBILE TELEPHONE .....	1	2																						
NON-MOBILE TELEPHONE ...	1	2																						
REFRIGERATOR .....	1	2																						
111	What type of fuel does your household mainly use for cooking?	ELECTRICITY ..... 01 LPG ..... 02 NATURAL GAS ..... 03 BIOGAS ..... 04 KEROSENE ..... 05 COAL, LIGNITE ..... 06 CHARCOAL ..... 07 WOOD ..... 08 STRAW/SHRUBS/GRASS ..... 09 AGRICULTURAL CROP ..... 10 ANIMAL DUNG ..... 11 NO FOOD COOKED IN HOUSEHOLD ..... 95 OTHER _____ 96 (SPECIFY)	→ 114																					

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
112	Is the cooking usually done in the house, in a separate building, or outdoors?	IN THE HOUSE ..... 1 IN A SEPARATE BUILDING ..... 2 OUTDOORS ..... 3  OTHER _____ 6 (SPECIFY)	<input type="checkbox"/> → 114
113	Do you have a separate room which is used as a kitchen?	YES ..... 1 NO ..... 2	
114	MAIN MATERIAL OF THE FLOOR. (3)  RECORD OBSERVATION.	NATURAL FLOOR EARTH/SAND ..... 11 DUNG ..... 12 RUDIMENTARY FLOOR WOOD PLANKS ..... 21 PALM/BAMBOO ..... 22 FINISHED FLOOR PARQUET OR POLISHED WOOD ..... 31 VINYL OR ASPHALT STRIPS ..... 32 CERAMIC TILES ..... 33 CEMENT ..... 34 CARPET ..... 35  OTHER _____ 96 (SPECIFY)	
115	MAIN MATERIAL OF THE ROOF. (3)  RECORD OBSERVATION.	NATURAL ROOFING NO ROOF ..... 11 THATCH/PALM LEAF ..... 12 SOD ..... 13 RUDIMENTARY ROOFING RUSTIC MAT ..... 21 PALM/BAMBOO ..... 22 WOOD PLANKS ..... 23 CARDBOARD ..... 24 FINISHED ROOFING METAL ..... 31 WOOD ..... 32 CALAMINE/CEMENT FIBER ..... 33 CERAMIC TILES ..... 34 CEMENT ..... 35 ROOFING SHINGLES ..... 36  OTHER _____ 96 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP																					
116	MAIN MATERIAL OF THE EXTERIOR WALLS. (3)  RECORD OBSERVATION.	NATURAL WALLS NO WALLS ..... 11 CANE/PALM/TRUNKS ..... 12 DIRT ..... 13 RUDIMENTARY WALLS BAMBOO WITH MUD ..... 21 STONE WITH MUD ..... 22 UNCOVERED ADOBE ..... 23 PLYWOOD ..... 24 CARDBOARD ..... 25 REUSED WOOD ..... 26 FINISHED WALLS CEMENT ..... 31 STONE WITH LIME/CEMENT ..... 32 BRICKS ..... 33 CEMENT BLOCKS ..... 34 COVERED ADOBE ..... 35 WOOD PLANKS/SHINGLES ..... 36  OTHER _____ 96 (SPECIFY)																						
117	How many rooms in this household are used for sleeping?	ROOMS ..... <input type="text"/> <input type="text"/>																						
118	Does any member of this household own:  A watch? A bicycle? A motorcycle or motor scooter? An animal-drawn cart? A car or truck? A boat with a motor?	<table border="0"> <thead> <tr> <th></th> <th>YES</th> <th>NO</th> </tr> </thead> <tbody> <tr> <td>WATCH .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>BICYCLE .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>MOTORCYCLE/SCOOTER ...</td> <td>1</td> <td>2</td> </tr> <tr> <td>ANIMAL-DRAWN CART .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>CAR/TRUCK .....</td> <td>1</td> <td>2</td> </tr> <tr> <td>BOAT WITH MOTOR .....</td> <td>1</td> <td>2</td> </tr> </tbody> </table>		YES	NO	WATCH .....	1	2	BICYCLE .....	1	2	MOTORCYCLE/SCOOTER ...	1	2	ANIMAL-DRAWN CART .....	1	2	CAR/TRUCK .....	1	2	BOAT WITH MOTOR .....	1	2	
	YES	NO																						
WATCH .....	1	2																						
BICYCLE .....	1	2																						
MOTORCYCLE/SCOOTER ...	1	2																						
ANIMAL-DRAWN CART .....	1	2																						
CAR/TRUCK .....	1	2																						
BOAT WITH MOTOR .....	1	2																						
119	Does any member of this household own any agricultural land?	YES ..... 1 NO ..... 2	→ 121																					
120	How many hectares of agricultural land do members of this household own?  IF 95 OR MORE, CIRCLE '950'.	HECTARES ..... <input type="text"/> <input type="text"/> <input type="text"/>  95 OR MORE HECTARES ..... 950 DON'T KNOW ..... 998																						
121	Does this household own any livestock, herds, other farm animals, or poultry?	YES ..... 1 NO ..... 2	→ 123																					



NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP												
122	<p>How many of the following animals does this household own?  <b>(5)</b>                      IF NONE, ENTER '00'.                      IF 95 OR MORE, ENTER '95'.                      IF UNKNOWN, ENTER '98'.</p> <p>Cattle?</p> <p>Milk cows or bulls?</p> <p>Horses, donkeys, or mules?</p> <p>Goats?</p> <p>Sheep?</p> <p>Chickens?</p>	<p>CATTLE .....</p> <p>COWS/BULLS .....</p> <p>HORSES/DONKEYS/MULES .....</p> <p>GOATS .....</p> <p>SHEEP .....</p> <p>CHICKENS .....</p> <table border="1" data-bbox="1214 468 1295 764"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>													
123	Does any member of this household have a bank account?	YES ..... 1 NO ..... 2													

INPATIENT HEALTH EXPENDITURES

201	CHECK COLUMN 22 IN HOUSEHOLD SCHEDULE: ONE OR MORE INPATIENTS <input type="checkbox"/> NO INPATIENTS <input type="checkbox"/>	→ 301		
202	CHECK COLUMN 22 IN HOUSEHOLD SCHEDULE: ENTER THE LINE NUMBER AND NAME OF EACH HOUSEHOLD MEMBER WHO WAS AN INPATIENT. Now I would like to ask some questions about the household members who stayed overnight in a health facility in the last six months. (IF THERE ARE MORE THAN 3 INPATIENTS, USE ADDITIONAL QUESTIONNAIRE).			
203	LINE NUMBER FROM COLUMN 22 IN HOUSEHOLD SCHEDULE	INPATIENT LINE NUMBER <input type="text"/>	INPATIENT LINE NUMBER <input type="text"/>	INPATIENT LINE NUMBER <input type="text"/>
204	NAME FROM COLUMN 2 IN HOUSEHOLD SCHEDULE	INPATIENT NAME _____	INPATIENT NAME _____	INPATIENT NAME _____
205	Where did (NAME) most recently stay overnight for health care?	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)  PRIVATE MEDICAL SECTOR PVT. HOSPITAL/CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)  OTHER _____ 96 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)  PRIVATE MEDICAL SECTOR PVT. HOSPITAL/CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)  OTHER _____ 96 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)  PRIVATE MEDICAL SECTOR PVT. HOSPITAL/CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)  OTHER _____ 96 (SPECIFY)
206	What was the main reason for (NAME) to seek care this most recent time?	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)
207	How much money was spent on treatment and services (NAME) received during the most recent overnight stay? We want to know about all the costs for the stay, including any charges for laboratory tests, drugs, or other items.	COST <input type="text"/>  NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST <input type="text"/>  NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST <input type="text"/>  NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998
208	Did (NAME) stay overnight at a health facility another time in the last six months?	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←

	NAME FROM COLUMN 2 IN HOUSEHOLD SCHEDULE	INPATIENT NAME _____	INPATIENT NAME _____	INPATIENT NAME _____
209	Where did (NAME) stay the next-to-last time he/she stayed overnight for health care?	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR ____ 26 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR ____ 26 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR ____ 26 (SPECIFY)
		PRIVATE MEDICAL SECTOR PVT. HOSPITAL/ CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR ____ 36 (SPECIFY)	PRIVATE MEDICAL SECTOR PVT. HOSPITAL/ CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR ____ 36 (SPECIFY)	PRIVATE MEDICAL SECTOR PVT. HOSPITAL/ CLINIC . . . . . 31 OTHER PRIVATE MED. SECTOR ____ 36 (SPECIFY)
		OTHER _____ 96 (SPECIFY)	OTHER _____ 96 (SPECIFY)	OTHER _____ 96 (SPECIFY)
210	What was the main reason for (NAME) to seek care this next-to-last time?	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER ____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER ____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER ____ 06 (SPECIFY)
211	How much money was spent on treatment and services(NAME) received during the next-to-last overnight stay? We want to know about all the costs for the stay, including any charges for laboratory tests, drugs, or other items.	COST [ ][ ][ ][ ][ ] NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST [ ][ ][ ][ ][ ] NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST [ ][ ][ ][ ][ ] NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998
212	Besides the two stays you have told me about, did (NAME) stay overnight in a health facility another time in the last six months?	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←

	NAME FROM COLUMN 2 IN HOUSEHOLD SCHEDULE	INPATIENT NAME _____	INPATIENT NAME _____	INPATIENT NAME _____
213	Where did (NAME) stay the second-to-last time he/she stayed overnight for health care?	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)	PUBLIC SECTOR GOVT HOSPITAL . 21 GOVT HEALTH CENTER . . . . . 22 GOVT HEALTH POST . . . . . 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)
214	What was the main reason for (NAME) to seek care this second-to-last time?	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)	PREGNANCY/ DELIVERY . . . . . 01 ILLNESS . . . . . 02 ACCIDENT/INJURY . 03 OTHER _____ 06 (SPECIFY)
215	How much money was spent on treatment and services (NAME) received during the second-to-last overnight stay? We want to know about all the costs for the stay, including any charges for laboratory tests, drugs, or other items.	COST <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998	COST <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NO COST/ FREE . . . . . 00000 IN KIND ONLY . 99995 DON'T KNOW . 99998
216	Besides the three stays you have told me about, did (NAME) stay overnight in a health facility another time in the last six months?	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←	YES . . . . . 1 NO . . . . . 2 (GO TO 218) ←
217	In total, how many times did (NAME) stay overnight in a health facility in the last six months?	NUMBER OF INPATIENT VISITS <input type="text"/> <input type="text"/>	NUMBER OF INPATIENT VISITS <input type="text"/> <input type="text"/>	NUMBER OF INPATIENT VISITS <input type="text"/> <input type="text"/>

	NAME FROM COLUMN 2 IN HOUSEHOLD SCHEDULE	INPATIENT NAME _____	INPATIENT NAME _____	INPATIENT NAME _____
218	Is (NAME) covered by any health insurance?	YES ..... 1 NO ..... 2 (SKIP TO 220) ← DON'T KNOW ... 8	YES ..... 1 NO ..... 2 (SKIP TO 220) ← DON'T KNOW ... 8	YES ..... 1 NO ..... 2 (SKIP TO 220) ← DON'T KNOW ... 8
219	What is (NAME)'s main type of health insurance?	MUTUAL HEALTH ORGANIZATION/ COMMUNITY BASED HEALTH INSURANCE ... 1 HEALTH INSURANCE THROUGH EMPLOYER ..... 2 SOCIAL SECURITY ..... 3 OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE ... 4 OTHER ..... 6 DON'T KNOW ... 8	MUTUAL HEALTH ORGANIZATION/ COMMUNITY BASED HEALTH INSURANCE ... 1 HEALTH INSURANCE THROUGH EMPLOYER ..... 2 SOCIAL SECURITY ..... 3 OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE ... 4 OTHER ..... 6 DON'T KNOW ... 8	MUTUAL HEALTH ORGANIZATION/ COMMUNITY BASED HEALTH INSURANCE ... 1 HEALTH INSURANCE THROUGH EMPLOYER ..... 2 SOCIAL SECURITY ..... 3 OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE ... 4 OTHER ..... 6 DON'T KNOW ... 8
220		GO BACK TO 205 IN NEXT COLUMN; OR, IF NO MORE INPATIENTS, GO TO 301	GO BACK TO 205 IN NEXT COLUMN; OR, IF NO MORE INPATIENTS, GO TO 301	GO TO 205 IN FIRST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE INPATIENTS, GO TO 301



OUTPATIENT HEALTH EXPENDITURES

301 CHECK COLUMN 25:  
 ONE OR MORE ELIGIBLE OUTPATIENTS  NO ELIGIBLE OUTPATIENTS  → 311

**TABLE FOR SELECTION OF OUTPATIENT WHO PAID FOR CARE THE LAST TIME SOUGHT CARE IN THE LAST FOUR WEEKS**

LOOK AT THE LAST DIGIT OF THE HOUSEHOLD QUESTIONNAIRE SERIAL NUMBER ON THE COVER PAGE. THIS IS THE ROW NUMBER YOU SHOULD GO TO. CHECK THE TOTAL NUMBER OF ELIGIBLE OUTPATIENTS (COLUMN 25) IN THE HOUSEHOLD SCHEDULE. THIS IS THE COLUMN NUMBER YOU SHOULD GO TO. FOLLOW THE SELECTED ROW AND COLUMN TO THE CELL WHERE THEY MEET AND CIRCLE THE NUMBER IN THE CELL. THIS IS THE NUMBER OF THE PERSON SELECTED FOR THE OUTPATIENT QUESTIONS FROM THE LIST OF ELIGIBLE OUTPATIENTS IN COLUMN 25 OF THE HOUSEHOLD SCHEDULE. WRITE THE NAME AND LINE NUMBER OF THE SELECTED OUTPATIENT IN Q302.

EXAMPLE: THE HOUSEHOLD QUESTIONNAIRE SERIAL NUMBER IS '716' AND THE HOUSEHOLD SCHEDULE COLUMN 25 SHOWS THAT THERE ARE THREE ELIGIBLE OUTPATIENTS IN THE HOUSEHOLD (LINE NUMBERS 02, 04, AND 05). SINCE THE LAST DIGIT OF THE HOUSEHOLD SERIAL NUMBER IS '6' GO TO ROW '6' AND SINCE THERE ARE THREE ELIGIBLE OUTPATIENTS IN THE HOUSEHOLD, GO TO COLUMN '3'. FOLLOW THE ROW AND COLUMN AND FIND THE NUMBER IN THE CELL WHERE THEY MEET ('2') AND CIRCLE THE NUMBER. NOW GO TO THE HOUSEHOLD SCHEDULE AND FIND THE SECOND OUTPATIENT WHO IS ELIGIBLE FOR THE OUTPATIENT QUESTIONS (LINE NUMBER '04' IN THIS EXAMPLE). WRITE THE NAME AND LINE NUMBER OF THE SELECTED OUTPATIENT IN Q302.

LAST DIGIT OF THE HOUSEHOLD QUESTIONNAIRE SERIAL NUMBER	TOTAL NUMBER OF ELIGIBLE OUTPATIENTS IN HOUSEHOLD SCHEDULE COLUMN 25							
	1	2	3	4	5	6	7	8
0	1	2	2	4	3	6	5	4
1	1	1	3	1	4	1	6	5
2	1	2	1	2	5	2	7	6
3	1	1	2	3	1	3	1	7
4	1	2	3	4	2	4	2	8
5	1	1	1	1	3	5	3	1
6	1	2	2	2	4	6	4	2
7	1	1	3	3	5	1	5	3
8	1	2	1	4	1	2	6	4
9	1	1	2	1	2	3	7	5

302 NAME OF SELECTED OUTPATIENT \_\_\_\_\_ HH LINE NUMBER OF SELECTED OUTPATIENT

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
303	Now I would like to ask some questions about health care that (NAME IN 302) received in the last four weeks, without having to stay overnight. Where did (NAME) get care most recently without staying overnight?	PUBLIC SECTOR GOVERNMENT HOSPITAL ..... 21 GOVERNMENT HEALTH CENTER ..... 22 GOVERNMENT HEALTH POST ..... 23 MOBILE CLINIC ..... 24 FIELDWORKER ..... 25 OTHER PUBLIC SECTOR _____ 26 (SPECIFY) PRIVATE MEDICAL SECTOR PRIVATE HOSPITAL/CLINIC ..... 31 PHARMACY ..... 32 PRIVATE DOCTOR ..... 33 MOBILE CLINIC ..... 34 FIELDWORKER ..... 35 OTHER PRIVATE MEDICAL SECTOR _____ 36 (SPECIFY) OTHER SOURCE SHOP ..... 41 TRADITIONAL PRACTITIONER ..... 42 OTHER _____ 46 (SPECIFY)	
304	How much money was spent on treatment and services (NAME) received from (NAME OF PROVIDER IN 303)? Please include the consulting fee and any expenses for other items including drugs and tests.	COST ..... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW ..... 99998	
305	What was the main reason for (NAME) to seek care this most recent time?	FAMILY PLANNING ..... 01 ANTENATAL CARE/ DELIVERY/ POSTNATAL CARE ..... 02 MALARIA ..... 03 FEVER ..... 04 DIARRHEA ..... 05 HIV/AIDS/STD ..... 06 OTHER ILLNESS ..... 07 CHECK-UP/ PREVENTIVE CARE ..... 08 ACCIDENT/INJURY ..... 09 OTHER _____ 96 (SPECIFY) MISSING/DK ..... 98	
306	Did (NAME) get care another time in the last four weeks from a health provider, a pharmacy, or a traditional healer, without staying overnight?	YES ..... 1 NO ..... 2	→ 309
307	How many other times did (NAME) get care in the last four weeks?	NUMBER OF OUTPATIENT VISITS ..... <input type="text"/> <input type="text"/>	
308	How many times was money spent?	NUMBER OF OUTPATIENT VISITS PAID MONEY ..... <input type="text"/> <input type="text"/>	

309	Is (NAME) covered by any health insurance?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8	<input type="checkbox"/> → 311
310	What is (NAME)'s main type of health insurance?	MUTUAL HEALTH ORGANIZATION/ COMMUNITY BASED HEALTH INSURANCE ..... 1 HEALTH INSURANCE THROUGH EMPLOYER ..... 2 SOCIAL SECURITY ..... 3 OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE ... 4 OTHER ..... 6 DON'T KNOW ..... 8	
311	Sometimes people buy vitamins, medicines, and herbal remedies without consulting with a health provider, pharmacy, or traditional healer. They may also buy other health-related items such as band-aids/plasters, thermometers, or other medical devices, and so on without a consultation. In the last four weeks, how much money was spent on these types of health-related items for members of your household?	COST ..... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> NONE ..... 00000 IN KIND ONLY ..... 99995 DON'T KNOW ..... 99998	



3 Jan 2012

DEMOGRAPHIC AND HEALTH SURVEYS  
MODEL WOMAN'S QUESTIONNAIRE

[NAME OF COUNTRY]  
[NAME OF ORGANIZATION]

IDENTIFICATION (1)					
PLACE NAME _____					
NAME OF HOUSEHOLD HEAD _____					
CLUSTER NUMBER .....	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
HOUSEHOLD NUMBER .....	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
NAME AND LINE NUMBER OF WOMAN _____					

INTERVIEWER VISITS								
	1	2	3	FINAL VISIT				
DATE	_____	_____	_____	DAY <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
INTERVIEWER'S NAME	_____	_____	_____	MONTH <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
RESULT*	_____	_____	_____	YEAR <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
NEXT VISIT: DATE	_____	_____		INT. NUMBER <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
TIME	_____	_____		RESULT <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>				
				TOTAL NUMBER OF VISITS <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td></tr> </table>				
*RESULT CODES: 1 COMPLETED      4 REFUSED 2 NOT AT HOME      5 PARTLY COMPLETED      7 OTHER _____ (SPECIFY) 3 POSTPONED      6 INCAPACITATED								

COUNTRY-SPECIFIC INFORMATION: LANGUAGE OF QUESTIONNAIRE, LANGUAGE OF INTERVIEW, NATIVE LANGUAGE OF RESPONDENT, AND WHETHER TRANSLATOR USED

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY								
NAME _____ <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>			NAME _____ <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>			<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>			<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> </table>		

(1) This section should be adapted for country-specific survey design.

Note: Questions with blue highlighting in the question number column are HIV related questions that may be deleted in some circumstances (see footnotes). Questions with pink highlighting in the question number column are malaria related questions that may be deleted in some circumstances (see footnotes). Questions with yellow highlighting in the question number column are other questions that may be deleted in some circumstances (see footnotes).

SECTION 1. RESPONDENT'S BACKGROUND

INTRODUCTION AND CONSENT

**INFORMED CONSENT**

Hello. My name is \_\_\_\_\_. I am working with (NAME OF ORGANIZATION). We are conducting a survey about health all over (NAME OF COUNTRY). The information we collect will help the government to plan health services. Your household was selected for the survey. The questions usually take about 30 to 60 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.

Do you have any questions? May I begin the interview now?

SIGNATURE OF INTERVIEWER: \_\_\_\_\_ DATE: \_\_\_\_\_

RESPONDENT AGREES TO BE INTERVIEWED ... 1      RESPONDENT DOES NOT AGREE TO BE INTERVIEWED ... 2 → END

↓

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
101	RECORD THE TIME.	HOUR ..... <input type="text"/> <input type="text"/> MINUTES ..... <input type="text"/> <input type="text"/>	
102	In what month and year were you born?	MONTH ..... <input type="text"/> <input type="text"/> DON'T KNOW MONTH ..... 98 YEAR ..... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW YEAR ..... 9998	
103	How old were you at your last birthday? COMPARE AND CORRECT 102 AND/OR 103 IF INCONSISTENT.	AGE IN COMPLETED YEARS <input type="text"/> <input type="text"/>	
104	Have you ever attended school?	YES ..... 1 NO ..... 2	→ 108
105	What is the highest level of school you attended: primary, secondary, or higher? (1)	PRIMARY ..... 1 SECONDARY ..... 2 HIGHER ..... 3	
106	What is the highest (grade/form/year) you completed at that level? (1) IF COMPLETED LESS THAN ONE YEAR AT THAT LEVEL, RECORD '00'.	GRADE/FORM/YEAR ..... <input type="text"/> <input type="text"/>	
107	CHECK 105: PRIMARY <input type="checkbox"/> SECONDARY OR HIGHER <input type="checkbox"/>		→ 110

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
108	Now I would like you to read this sentence to me.  SHOW CARD TO RESPONDENT. (2)  IF RESPONDENT CANNOT READ WHOLE SENTENCE, PROBE: Can you read any part of the sentence to me?	CANNOT READ AT ALL ..... 1 ABLE TO READ ONLY PARTS OF SENTENCE ..... 2 ABLE TO READ WHOLE SENTENCE ..... 3 NO CARD WITH REQUIRED LANGUAGE ..... 4 (SPECIFY LANGUAGE) BLIND/VISUALLY IMPAIRED ..... 5	
109	CHECK 108:  CODE '2', '3' OR '4' <input type="checkbox"/> CIRCLED ↓ CODE '1' OR '5' CIRCLED <input type="checkbox"/> → 111		
110	Do you read a newspaper or magazine at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK ..... 1 LESS THAN ONCE A WEEK ..... 2 NOT AT ALL ..... 3	
111	Do you listen to the radio at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK ..... 1 LESS THAN ONCE A WEEK ..... 2 NOT AT ALL ..... 3	
112	Do you watch television at least once a week, less than once a week or not at all?	AT LEAST ONCE A WEEK ..... 1 LESS THAN ONCE A WEEK ..... 2 NOT AT ALL ..... 3	
113	COUNTRY-SPECIFIC QUESTION ON RELIGION, IF APPROPRIATE.		
114	COUNTRY-SPECIFIC QUESTION ON ETHNICITY, IF APPROPRIATE.		
115 (3)	In the last 12 months, how many times have you been away from home for one or more nights?	NUMBER OF TIMES ..... <input type="text"/> <input type="text"/> NONE ..... 00 → 201	
116 (3)	In the last 12 months, have you been away from home for more than one month at a time?	YES ..... 1 NO ..... 2	

- (1) Revise according to the local education system.
- (2) Each card should have four simple sentences appropriate to the country (e.g., "Parents love their children.", "Farming is hard work.", "The child is reading a book.", "Children work hard at school."). Cards should be prepared for every language in which respondents are likely to be literate.
- (3) The question may be considered for deletion in countries with a very low HIV prevalence.

SECTION 4. PREGNANCY AND POSTNATAL CARE

401	CHECK 224: ONE OR MORE BIRTHS IN 2005 (1) OR LATER <input type="checkbox"/> NO BIRTHS IN 2005 (1) OR LATER <input type="checkbox"/> → 556			
402	CHECK 215: ENTER IN THE TABLE THE BIRTH HISTORY NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2005 (1) OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).  Now I would like to ask some questions about your children born in the last five years. (We will talk about each separately.)			
403	BIRTH HISTORY NUMBER FROM 212 IN BIRTH HISTORY	LAST BIRTH BIRTH HISTORY NUMBER <input type="text"/> <input type="text"/>	NEXT-TO-LAST BIRTH BIRTH HISTORY NUMBER <input type="text"/> <input type="text"/>	SECOND-FROM-LAST BIRTH BIRTH HISTORY NUMBER <input type="text"/> <input type="text"/>
404	FROM 212 AND 216	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/>	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/>	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/>
405	When you got pregnant with (NAME), did you want to get pregnant at that time?	YES ..... 1 (SKIP TO 408) ← NO ..... 2	YES ..... 1 (SKIP TO 430) ← NO ..... 2	YES ..... 1 (SKIP TO 430) ← NO ..... 2
406	Did you want to have a baby later on, or did you not want any (more) children?	LATER ..... 1 NO MORE ..... 2 (SKIP TO 408) ←	LATER ..... 1 NO MORE ..... 2 (SKIP TO 430) ←	LATER ..... 1 NO MORE ..... 2 (SKIP TO 430) ←
407	How much longer did you want to wait?	MONTHS ..1 <input type="text"/> <input type="text"/> YEARS ..2 <input type="text"/> <input type="text"/> DON'T KNOW ... 998	MONTHS ..1 <input type="text"/> <input type="text"/> YEARS ..2 <input type="text"/> <input type="text"/> DON'T KNOW ... 998	MONTHS ..1 <input type="text"/> <input type="text"/> YEARS ..2 <input type="text"/> <input type="text"/> DON'T KNOW ... 998
408	Did you see anyone for antenatal care for this pregnancy?	YES ..... 1 NO ..... 2 (SKIP TO 415) ←		
409	Whom did you see? (2)  Anyone else?  PROBE TO IDENTIFY EACH TYPE OF PERSON AND RECORD ALL MENTIONED.	HEALTH PERSONNEL DOCTOR ..... A NURSE/MIDWIFE B AUXILIARY MIDWIFE ..... C OTHER PERSON TRADITIONAL BIRTH ATTENDANT D COMMUNITY/VILLAGE HEALTH WORKER ... E  OTHER _____ X (SPECIFY)		

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
410	<p>Where did you receive antenatal care for this pregnancy? (2)</p> <p>Anywhere else?</p> <p>PROBE TO IDENTIFY EACH TYPE OF SOURCE.</p> <p>IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE.</p> <p>_____</p> <p>(NAME OF PLACE(S))</p>	<p>HOME</p> <p>YOUR HOME ... A</p> <p>OTHER HOME ... B</p> <p>PUBLIC SECTOR</p> <p>GOVT. HOSPITAL C</p> <p>GOVT. HEALTH CENTER ... D</p> <p>GOVT. HEALTH POST ... E</p> <p>OTHER PUBLIC SECTOR</p> <p>_____ F</p> <p>(SPECIFY)</p> <p>PRIVATE MED. SECTOR</p> <p>PVT. HOSPITAL/ CLINIC ... G</p> <p>OTHER PRIVATE MED. SECTOR</p> <p>_____ H</p> <p>(SPECIFY)</p> <p>OTHER _____ X</p> <p>(SPECIFY)</p>		
411	<p>How many months pregnant were you when you first received antenatal care for this pregnancy?</p>	<p>MONTHS ... <input type="text"/> <input type="text"/></p> <p>DON'T KNOW ..... 98</p>		
412	<p>How many times did you receive antenatal care during this pregnancy?</p>	<p>NUMBER OF TIMES <input type="text"/> <input type="text"/></p> <p>DON'T KNOW ..... 98</p>		
413	<p>As part of your antenatal care during this pregnancy, were any of the following done at least once:</p> <p>Was your blood pressure measured?</p> <p>Did you give a urine sample?</p> <p>Did you give a blood sample?</p>	<p>YES NO</p> <p>BP ..... 1 2</p> <p>URINE ..... 1 2</p> <p>BLOOD ... 1 2</p>		
414	<p>During (any of) your antenatal care visit(s), were you told about things to look out for that might suggest problems with the pregnancy?</p>	<p>YES ..... 1</p> <p>NO ..... 2</p> <p>DON'T KNOW ..... 8</p>		
415	<p>During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is, convulsions after birth? (3)</p>	<p>YES ..... 1</p> <p>NO ..... 2</p> <p>(SKIP TO 418) ←</p> <p>DON'T KNOW ..... 8</p>		



NO.	QUESTIONS AND FILTERS	LAST BIRTH	NEXT-TO-LAST BIRTH	SECOND-FROM-LAST BIRTH
		NAME _____	NAME _____	NAME _____
416	During this pregnancy, how many times did you get a tetanus injection?	TIMES ..... <input type="text"/> DON'T KNOW ..... 8		
417	CHECK 416:	2 OR MORE TIMES <input type="checkbox"/> (SKIP TO 421) OTHER <input type="checkbox"/>		
418	At any time before this pregnancy, did you receive any tetanus injections?	YES ..... 1 NO ..... 2 (SKIP TO 421) ← DON'T KNOW ..... 8		
419	Before this pregnancy, how many times did you receive a tetanus injection?  IF 7 OR MORE TIMES, RECORD '7'.	TIMES ..... <input type="text"/>  DON'T KNOW ..... 8		
420	How many years ago did you receive the last tetanus injection before this pregnancy?	YEARS AGO ..... <input type="text"/> <input type="text"/>		
421	During this pregnancy, were you given or did you buy any iron tablets or iron syrup? (4)  SHOW TABLETS/SYRUP. (4)	YES ..... 1 NO ..... 2 (SKIP TO 423) ← DON'T KNOW ..... 8		
422	During the whole pregnancy, for how many days did you take the tablets or syrup? (4,5)  IF ANSWER IS NOT NUMERIC, PROBE FOR APPROXIMATE NUMBER OF DAYS.	DAYS <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW ... 998		
423	During this pregnancy, did you take any drug for intestinal worms?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8		
424 (6)	During this pregnancy, did you take any drugs to keep you from getting malaria?	YES ..... 1 NO ..... 2 (SKIP TO 430) ← DON'T KNOW ..... 8		
425 (6)	What drugs did you take?  RECORD ALL MENTIONED. IF TYPE OF DRUG IS NOT DETERMINED, SHOW TYPICAL ANTIMALARIAL DRUGS TO RESPONDENT.	SP/FANSIDAR ..... A CHLOROQUINE ... B  OTHER _____ X (SPECIFY) DON'T KNOW ..... Z		

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____						
434	<p>Where did you give birth to (NAME)? (2)</p> <p>PROBE TO IDENTIFY THE TYPE OF SOURCE.</p> <p>IF UNABLE TO DETERMINE IF PUBLIC OR PRIVATE SECTOR, WRITE THE NAME OF THE PLACE.</p> <p>_____</p> <p>(NAME OF PLACE)</p>	<p>HOME YOUR HOME ... 11 (SKIP TO 438) ←</p> <p>OTHER HOME ... 12</p> <p>PUBLIC SECTOR GOVT. HOSPITAL 21 GOVT. HEALTH CENTER ..... 22 GOVT. HEALTH POST ..... 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)</p> <p>PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC ..... 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)</p> <p>OTHER _____ 96 (SPECIFY) (SKIP TO 438) ←</p>	<p>HOME YOUR HOME ... 11 (SKIP TO 448) ←</p> <p>OTHER HOME ... 12</p> <p>PUBLIC SECTOR GOVT. HOSPITAL 21 GOVT. HEALTH CENTER ..... 22 GOVT. HEALTH POST ..... 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)</p> <p>PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC ..... 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)</p> <p>OTHER _____ 96 (SPECIFY) (SKIP TO 448) ←</p>	<p>HOME YOUR HOME ... 11 (SKIP TO 448) ←</p> <p>OTHER HOME ... 12</p> <p>PUBLIC SECTOR GOVT. HOSPITAL 21 GOVT. HEALTH CENTER ..... 22 GOVT. HEALTH POST ..... 23 OTHER PUBLIC SECTOR _____ 26 (SPECIFY)</p> <p>PRIVATE MED. SECTOR PVT. HOSPITAL/ CLINIC ..... 31 OTHER PRIVATE MED. SECTOR _____ 36 (SPECIFY)</p> <p>OTHER _____ 96 (SPECIFY) (SKIP TO 448) ←</p>						
434A	<p>How long after (NAME) was delivered did you stay there?</p> <p>IF LESS THAN ONE DAY, RECORD HOURS. IF LESS THAN ONE WEEK, RECORD DAYS.</p>	<p>HOURS 1 <table border="1" data-bbox="812 1003 898 1050"><tr><td></td><td></td></tr></table></p> <p>DAYS 2 <table border="1" data-bbox="812 1050 898 1096"><tr><td></td><td></td></tr></table></p> <p>WEEKS 3 <table border="1" data-bbox="812 1096 898 1142"><tr><td></td><td></td></tr></table></p> <p>DON'T KNOW ... 998</p>								
435	<p>Was (NAME) delivered by caesarean, that is, did they cut your belly open to take the baby out?</p>	<p>YES ..... 1 NO ..... 2</p>	<p>YES ..... 1 NO ..... 2</p>	<p>YES ..... 1 NO ..... 2</p>						
436	<p>I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health while you were still in the facility?</p>	<p>YES ..... 1 (SKIP TO 439) ←</p> <p>NO ..... 2</p>								
437	<p>Did anyone check on your health after you left the facility?</p>	<p>YES ..... 1 (SKIP TO 439) ←</p> <p>NO ..... 2 (SKIP TO 442) ←</p>								

NO.	QUESTIONS AND FILTERS	LAST BIRTH NAME _____	NEXT-TO-LAST BIRTH NAME _____	SECOND-FROM-LAST BIRTH NAME _____
452	For how many months after the birth of (NAME) did you not have sexual intercourse?	MONTHS ... <input type="text"/> <input type="text"/> DON'T KNOW ..... 98	MONTHS ... <input type="text"/> <input type="text"/> DON'T KNOW ..... 98	MONTHS ... <input type="text"/> <input type="text"/> DON'T KNOW ..... 98
453	Did you ever breastfeed (NAME)?	YES ..... 1 (SKIP TO 455) ← NO ..... 2	YES ..... 1 NO ..... 2	YES ..... 1 NO ..... 2
454	CHECK 404: IS CHILD LIVING?	LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (SKIP TO 460) (GO BACK TO 405 IN NEXT COLUMN; OR IF NO MORE BIRTHS, GO TO 501)		
455	How long after birth did you first put (NAME) to the breast?  IF LESS THAN 1 HOUR, RECORD '00' HOURS. IF LESS THAN 24 HOURS, RECORD HOURS. OTHERWISE, RECORD DAYS.	IMMEDIATELY ... 000  HOURS 1 <input type="text"/> <input type="text"/> DAYS 2 <input type="text"/> <input type="text"/>		
456	In the first three days after delivery, was (NAME) given anything to drink other than breast milk?	YES ..... 1 NO ..... 2 (SKIP TO 458) ←		
457	What was (NAME) given to drink?  Anything else?  RECORD ALL LIQUIDS MENTIONED.	MILK (OTHER THAN BREAST MILK) A PLAIN WATER ... B SUGAR OR GLUCOSE WATER ... C GRIPPE WATER ... D SUGAR-SALT-WATER SOLUTION ... E FRUIT JUICE ... F INFANT FORMULA G TEA/INFUSIONS ... H COFFEE ..... I HONEY ..... J  OTHER _____ X (SPECIFY)		
458	CHECK 404: IS CHILD LIVING?	LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 501)	LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO BACK TO 405 IN NEXT COLUMN; OR, IF NO MORE BIRTHS, GO TO 501)	LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO BACK TO 405 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE; OR, IF NO MORE BIRTHS, GO TO 501)



SECTION 5. CHILD IMMUNIZATION, HEALTH AND NUTRITION

501	ENTER IN THE TABLE THE BIRTH HISTORY NUMBER, NAME, AND SURVIVAL STATUS OF EACH BIRTH IN 2005(1) OR LATER. ASK THE QUESTIONS ABOUT ALL OF THESE BIRTHS. BEGIN WITH THE LAST BIRTH. (IF THERE ARE MORE THAN 3 BIRTHS, USE LAST 2 COLUMNS OF ADDITIONAL QUESTIONNAIRES).						
502	BIRTH HISTORY NUMBER FROM 212 IN BIRTH HISTORY	LAST BIRTH BIRTH HISTORY NUMBER	NEXT-TO-LAST BIRTH BIRTH HISTORY NUMBER	SECOND-FROM-LAST BIRTH BIRTH HISTORY NUMBER			
503	FROM 212 AND 216	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 553)	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT COLUMN OR, IF NO MORE BIRTHS, GO TO 553)	NAME _____ LIVING <input type="checkbox"/> DEAD <input type="checkbox"/> (GO TO 503 IN NEXT-TO-LAST COLUMN OF NEW QUESTIONNAIRE, OR IF NO MORE BIRTHS, GO TO 553)			
504	Do you have a card where (NAME)'s vaccinations are written down? (2) IF YES: May I see it please?	YES, SEEN ..... 1 (SKIP TO 506) ← YES, NOT SEEN ..... 2 (SKIP TO 509) ← NO CARD ..... 3	YES, SEEN ..... 1 (SKIP TO 506) ← YES, NOT SEEN ..... 2 (SKIP TO 509) ← NO CARD ..... 3	YES, SEEN ..... 1 (SKIP TO 506) ← YES, NOT SEEN ..... 2 (SKIP TO 509) ← NO CARD ..... 3			
505	Did you ever have a vaccination card for (NAME)? (2)	YES ..... 1 (SKIP TO 509) ← NO ..... 2	YES ..... 1 (SKIP TO 509) ← NO ..... 2	YES ..... 1 (SKIP TO 509) ← NO ..... 2			
506	(1) COPY DATES FROM THE CARD. (2) (2) WRITE '44' IN 'DAY' COLUMN IF CARD SHOWS THAT A DOSE WAS GIVEN, BUT NO DATE IS RECORDED.						
		LAST BIRTH DAY MONTH YEAR	NEXT-TO-LAST BIRTH DAY MONTH YEAR	SECOND-FROM-LAST BIRTH DAY MONTH YEAR			
	BCG		BCG	BCG			
	POLIO 0 (POLIO GIVEN AT BIRTH)		P0	P0			
	POLIO 1		P1	P1			
	POLIO 2		P2	P2			
	POLIO 3		P3	P3			
	DPT 1		D1	D1			
	DPT 2		D2	D2			
	DPT 3		D3	D3			
	MEASLES		MEA	MEA			
	VITAMIN A (MOST RECENT)		VIT A	VIT A			
507	CHECK 506:	BCG TO MEASLES ALL RECORDED (3) <input type="checkbox"/> (GO TO 511)	OTHER <input type="checkbox"/>	BCG TO MEASLES ALL RECORDED (3) <input type="checkbox"/> (GO TO 511)	OTHER <input type="checkbox"/>	BCG TO MEASLES ALL RECORDED (3) <input type="checkbox"/> (GO TO 511)	OTHER <input type="checkbox"/>

## SECTION 6. MARRIAGE AND SEXUAL ACTIVITY

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
601	Are you currently married or living together with a man as if married?	YES, CURRENTLY MARRIED ..... 1 YES, LIVING WITH A MAN ..... 2 NO, NOT IN UNION ..... 3	→ 604
602	Have you ever been married or lived together with a man as if married?	YES, FORMERLY MARRIED ..... 1 YES, LIVED WITH A MAN ..... 2 NO ..... 3	→ 612
603	What is your marital status now: are you widowed, divorced, or separated?	WIDOWED ..... 1 DIVORCED ..... 2 SEPARATED ..... 3	→ 609
604	Is your (husband/partner) living with you now or is he staying elsewhere?	LIVING WITH HER ..... 1 STAYING ELSEWHERE ..... 2	
605	RECORD THE HUSBAND'S/PARTNER'S NAME AND LINE NUMBER FROM THE HOUSEHOLD QUESTIONNAIRE. IF HE IS NOT LISTED IN THE HOUSEHOLD, RECORD '00'.	NAME _____  LINE NO. .... <input type="text"/> <input type="text"/>	
606 (1)	Does your (husband/partner) have other wives or does he live with other women as if married?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8	→ 609
607 (1)	Including yourself, in total, how many wives or live-in partners does he have?	TOTAL NUMBER OF WIVES AND LIVE-IN PARTNERS ..... <input type="text"/> <input type="text"/> DON'T KNOW ..... 98	
608 (1)	Are you the first, second, ... wife?	RANK ..... <input type="text"/> <input type="text"/>	
609	Have you been married or lived with a man only once or more than once?	ONLY ONCE ..... 1 MORE THAN ONCE ..... 2	
610	CHECK 609:  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <input type="checkbox"/> MARRIED/ LIVED WITH A MAN ONLY ONCE ↓ In what month and year did you start living with your (husband/partner)? </div> <div style="text-align: center;"> <input type="checkbox"/> MARRIED/ LIVED WITH A MAN MORE THAN ONCE ↓ Now I would like to ask about your first (husband/partner). In what month and year did you start living with him? </div> </div>	MONTH ..... <input type="text"/> <input type="text"/> DON'T KNOW MONTH ..... 98  YEAR ..... <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> DON'T KNOW YEAR ..... 9998	→ 612
611	How old were you when you first started living with him?	AGE ..... <input type="text"/> <input type="text"/>	
612	CHECK FOR THE PRESENCE OF OTHERS. BEFORE CONTINUING, MAKE EVERY EFFORT TO ENSURE PRIVACY.		
613	Now I would like to ask some questions about sexual activity in order to gain a better understanding of some important life issues.  How old were you when you had sexual intercourse for the very first time?	NEVER HAD SEXUAL INTERCOURSE ..... 00  AGE IN YEARS ..... <input type="text"/> <input type="text"/>  FIRST TIME WHEN STARTED LIVING WITH (FIRST) HUSBAND/PARTNER ..... 95	→ 628

## SECTION 10. OTHER HEALTH ISSUES

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1001	Now I would like to ask you some other questions relating to health matters. Have you had an injection for any reason in the last 12 months?  IF YES: How many injections have you had?  IF NUMBER OF INJECTIONS IS 90 OR MORE, OR DAILY FOR 3 MONTHS OR MORE, RECORD '90'.  IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS ... <input type="text"/> <input type="text"/>  NONE ..... 00	→ 1004
1002	Among these injections, how many were administered by a doctor, a nurse, a pharmacist, a dentist, or any other health worker?  IF NUMBER OF INJECTIONS IS 90 OR MORE, OR DAILY FOR 3 MONTHS OR MORE, RECORD '90'.  IF NON-NUMERIC ANSWER, PROBE TO GET AN ESTIMATE.	NUMBER OF INJECTIONS ... <input type="text"/> <input type="text"/>  NONE ..... 00	→ 1004
1003	The last time you got an injection from a health worker, did he/she take the syringe and needle from a new, unopened package?	YES ..... 1 NO ..... 2 DON'T KNOW ..... 8	
1004	Do you currently smoke cigarettes?	YES ..... 1 NO ..... 2	→ 1006
1005	In the last 24 hours, how many cigarettes did you smoke?	NUMBER OF CIGARETTES ..... <input type="text"/> <input type="text"/>	
1006	Do you currently smoke or use any (other) type of tobacco? (1)	YES ..... 1 NO ..... 2	→ 1008
1007	What (other) type of tobacco do you currently smoke or use? (1)  RECORD ALL MENTIONED.	PIPE ..... A CHEWING TOBACCO ..... B SNUFF ..... C  OTHER _____ X (SPECIFY)	
1008	Many different factors can prevent women from getting medical advice or treatment for themselves. When you are sick and want to get medical advice or treatment, is each of the following a big problem or not?  Getting permission to go to the doctor?  Getting money needed for advice or treatment?  The distance to the health facility?  Not wanting to go alone?	BIG NOT A BIG PROB- PROB- LEM LEM  PERMISSION TO GO ... 1 2  GETTING MONEY ... 1 2  DISTANCE ..... 1 2  GO ALONE ..... 1 2	
1009	Are you covered by any health insurance? (2)	YES ..... 1 NO ..... 2	→ 1011

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP								
1010	What type of health insurance are you covered by? <b>(2)</b>  RECORD ALL MENTIONED.	MUTUAL HEALTH ORGANIZATION/ COMMUNITY-BASED HEALTH INSURANCE ..... A HEALTH INSURANCE THROUGH EMPLOYER ..... B SOCIAL SECURITY ..... C OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE D OTHER _____ X (SPECIFY)									
1011	RECORD THE TIME.	HOUR ..... <table border="1" data-bbox="1198 562 1284 611"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> MINUTES ..... <table border="1" data-bbox="1198 611 1284 659"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>									

- (1) Add local terms.
- (2) If a health service prepayment plan or other types of plans are available in the country, add those types of plans to the question.

## Appendix C: Descriptive Statistics

**Table C1***Descriptive Statistics for Categorical Variables*

Variables	Frequency	Percent
Religion		
Christian	988	75.9
Muslim	229	17.6
None	31	2.4
Other	52	4
Wealth Index		
Poor	415	31.9
Middle	278	21.4
Rich	609	46.8
Education level		
No education	204	15.7
Primary	492	37.8
Secondary	545	41.9
Higher	61	4.7
Region		
Adamaoua	74	5.7
Centre	133	10.2
Douala	112	8.6
Est	70	5.4
Extrême-Nord	146	11.2
Littoral	122	9.4
Nord	83	6.4
Nord-Ouest	97	7.5
Ouest	137	10.5
Sud	107	8.2
Sud-Ouest	95	7.3
Yaoundé	126	9.7
Ethnicity		
Arab-Choa/Peulh/Haoussa/Kanuri	101	7.8
Biu-Mandara	115	8.8
Adamaoua-Oubangui	115	8.8
Bantoïde South-West	17	1.3
Grassfields	148	11.4
Bamilike/Bamoun	319	24.5
Côtier/Ngoe/Oroko	70	5.4
Beti/Bassa/Mbam	341	26.2
Kako/Meka/Pygmé	45	3.5
Stranger / other	26	2
Place of residency		
Urban	658	50.5
Rural	644	49.5
Health Insurance		
No	1250	96
Yes	51	3.9

*(table continues)*

Variables	Frequency	Percent
Birth Weight		
Low weight	33	2.5
Normal Weight	438	33.6
Heavy Weight	55	4.2
Marital Status		
Never Married	167	12.8
Married/Living Together	1008	77.4
Widowed	47	3.6
Divorced/Separated	80	6.1
Child Mortality		
Alive	226	17.4
Death	316	24.3
Antenatal Visits		
No Antenatal	69	5.3
Less than 4 visits	163	12.5
4+ Antenatal	490	37.6
Place of delivery		
Respondent's Home	198	15.2
Government Hospital	362	27.8
Private	172	13.2
Malaria Prophylaxis		
No	250	19.2
Yes	481	36.9
Iron Intake		
No	90	6.9
Yes	637	87.6
Tetanus Receive		
No	129	9.9
Yes	599	46
Vaccinated		
No	7	0.5
Yes	345	26.5
Slept under Bed Net		
No	885	68
Expenses categories		
Low Expenses	441	33.9
Medium Expenses	364	28
High Expenses	497	38.2

**Table C2***Descriptive Statistics for Continuous Variables*

Variables		Mean	SD
Expenses	1339		
Sum of Transportation	1333	2831.033	9726.7584
Sum of consults & care	1271	4954.698	17358.4938
Sum of meds & labs	1280	27310.38	58900.4845
Sum of first hospitalization	329	16875.15	47924.9831
Sum of transport for first hospitalization	332	5162.764	14212.7214
Sum of second hospitalization	38	13714.47	20608.0701
Sum of transport for 2 <sup>nd</sup> Hospitalization	33	8001.515	16398.7351
Sum of 2 <sup>nd</sup> consult	225	5061.964	15286.2996
Sum of transport for 2 <sup>nd</sup> consult	214	29858.59	68534.01861
All out-of-pocket Expenses	1339	45751.45	102826.783
Respondent's age	1302	30.9	9.2

## Appendix D: Logistic Regressions

Table 3-a: Association between out-of-pocket expenses and under-5 mortality after controlling for Tetanus shot received.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	-.010	.971	.990	.570	1.720
High Expenses	-.356	.203	.700	.405	1.211
Tetanus received	.181	.504	1.199	.704	2.041

Table 3-b: Association between out-of-pocket expenses and under-5 mortality after controlling for Antenatal visits.

<b>Variables</b>	<b>B</b>	<b>Sig</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.010	.971	1.010	.582	1.754
High Expenses	-.317	.258	.728	.420	1.262
No Antenatal (ref)					
Less than 4 visits	.432	.243	1.540	.746	3.179
4+ Antenatal	-.058	.861	.944	.496	1.799

Table 3-c: Association between out-of-pocket expenses and under-5 mortality after controlling for Birth weight.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.125	.737	1.133	.548	2.340
High Expenses	-.587	.089	.556	.283	1.093
Low weight (ref)					
Normal Weight	-.821	.339	.440	.082	2.371
Heavy Weight	-.348	.715	.706	.109	4.558

Table 3-d: Association between out-of-pocket expenses and under-5 mortality after controlling for Iron Intake.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
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Low Expenses (ref)					
Medium Expenses	-.008	.976	.992	.572	1.719
High Expenses	-.359	.200	.699	.404	1.209
Took Iron	-.055	.852	.946	.531	1.687

Table 3-e: Association between out-of-pocket expenses and under-5 mortality after controlling for immunization.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	-.313	.446	.732	.328	1.634
High Expenses	-.428	.281	.652	.299	1.420
Ever Vaccinated	.588	.527	1.800	.291	11.135

Table 3-f: Association between out-of-pocket expenses and under-5 mortality after controlling for malaria prophylaxis.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.060	.832	1.061	.611	1.843
High Expenses	-.290	.301	.748	.432	1.296
Malaria Prophylaxis	.307	.183	1.359	.865	2.135

Table 3-g: Association between out-of-pocket expenses and under-5 mortality after controlling for wealth index.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.246	.271	1.279	.825	1.983
High Expenses	-.080	.706	.923	.608	1.400
Poor (ref)		.150			
Middle	-.413	.062	.662	.429	1.021
Rich	-.268	.194	.765	.511	1.146

Table 3-h: Association between out-of-pocket expenses and under-5 mortality after controlling for marital status.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.203	.367	1.225	.789	1.901

High Expenses	-.112	.596	.894	.590	1.353
Never Married (ref)					
Married/Living Together	-1.926	.068	.146	.018	1.152
Widowed	-2.130	.056	.119	.013	1.058
Divorced/Separated	-1.378	.225	.252	.027	2.333

Table 3-h: Association between out-of-pocket expenses and under-5 mortality after controlling for place of delivery.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.010	.971	1.010	.582	1.755
High Expenses	-.292	.301	.747	.430	1.298
Respondent's Home (ref)					
Government Hospital	-.067	.794	.935	.565	1.549
Private	-.633	.049	.531	.283	.998

Table 3-i: Association between out-of-pocket expenses and under-5 mortality after controlling for Respondent's age.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.227	.323	1.255	.800	1.969
High Expenses	.020	.926	1.021	.665	1.566
Respondent's current age	-.068	.000	.934	.912	.957

Table 3-j: Association between out-of-pocket expenses and under-5 mortality after controlling for education level.

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.248	.267	1.282	.827	1.986
High Expenses	-.099	.639	.905	.598	1.371
No education (ref)					
Primary	-.328	.139	.721	.467	1.112
Secondary	-.298	.226	.742	.458	1.203
Higher	-.496	.499	.609	.145	2.566

Table 3-k: *Association between out-of-pocket expenses and under-5 mortality after controlling for Ethnicity.*

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.239	.296	1.270	.811	1.990
High Expenses	-.097	.655	.907	.592	1.390
Arab-Choa/Haoussa/Kanuri (ref)					
Biu-Mandara	-.243	.536	.785	.364	1.693
Adamaoua-Oubangui	-.738	.059	.478	.222	1.030
Bantoïde South-West	-.884	.248	.413	.092	1.850
Grassfields	-.885	.021	.413	.195	.873
Bamilike/Bamoun	-.821	.017	.440	.224	.863
Côtier/NGoe/Oroko	-.460	.372	.631	.230	1.735
Beti/Bassa/Mbam	-.559	.100	.572	.294	1.114
Kako/Meka/Pygmé	-1.558	.013	.211	.061	.722
Stranger/ Other	-.074	.912	.929	.251	3.438

Table 3-l: *Association between out-of-pocket expenses and under-5 mortality after controlling for place of residence.*

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.239	.284	1.270	.820	1.965
High Expenses	-.098	.641	.906	.600	1.370
Urban (ref)					
Rural	.133	.456	1.143	.804	1.623

Table 3-l: *Association between out-of-pocket expenses and under-5 mortality after controlling for health insurance.*

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.223	.318	1.250	.807	1.937
High Expenses	-.113	.592	.893	.590	1.351
Covered by health insurance	-.440	.348	.644	.257	1.616

Table 3-m: *Association between out-of-pocket expenses and under-5 mortality after controlling for Religion.*

<b>Variables</b>	<b>B</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% C.I. for EXP(B)</b>	
Low Expenses (ref)					
Medium Expenses	.256	.256	1.292	.830	2.010
High Expenses	-.083	.694	.920	.607	1.394
Christian (ref)					
Muslim	.515	.018	1.674	1.093	2.565
None	.655	.157	1.925	.777	4.768
Other	.376	.476	1.457	.517	4.107