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Review Article

Observational Approach for Assessing the Impact of a Subsidized Care-Based Program on Maternal and Neonatal Health in the North Cameroon Region

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Abstract

Background: Maternal and neonatal mortality, which is high in the North Cameroon region remains a public health problem.

Objective: This study aimed at assessing the impact of the "Chèque Santé" program on maternal and neonatal health in the rural and urban contexts of the North Cameroon region.

Design: We conducted a repeated cross-sectional study over 4 consecutive years (2016, 2017, 2018 and 2019) in the Garoua 1, Garoua 2 and Figuil health districts (HD) of the North Cameroon region. Pregnant women, mothers and newborns received in the health facilities of

the said HD during the said 4 years were included. Trends in maternal and neonatal health indicators according to calendar years and study's HD were assessed using paired two-tailed Chi-2 test.

Results: Between 2016 and 2019, respectively in Garoua 1 HD, Garoua 2 HD and Figuil HD, the values of maternal and neonatal health indicators had increased as follows: 17.40% to 30.00%, 29.00% to 37.80% and 19.20% to 49.30% ($p < 0.05$) of pregnant women actually attending at least one antenatal care visit, respectively; 10.50% to 23.00%, 23.40% to 30.70% and 9.70%% to 32.20% ($p < 0.05$) of pregnant women actually delivering in a maternity ward; 9.10% to 38.80%, 12.90% to 58.40% and 10.90% to 74.70% ($p < 0.05$) of mothers actually receiving at least once postnatal follow-up; 9.70% to 37.60%, 13.40% to 58.20% and 11.30% to 74.00% ($p < 0.05$) of newborns actually receiving at least once postnatal follow-up.

Conclusion: Following implementation of the "Chèque Santé" program, access to healthcare for pregnant women, mothers and newborns had improved in the North Cameroon region. However, the performance of maternal and neonatal health indicators remained sub-optimal. It is therefore necessary to explore the determinants of health service usage by pregnant women, mothers and newborns in a context of health care subsidies such as the "Chèque Santé" program.

Keywords: Maternal and Neonatal Health Indicators; Impact; "Chèque Santé" Program

Introduction

In 2020, around 287,000 women died during or after pregnancy or childbirth [1,2]. In 2019, the number of newborn deaths worldwide was estimated at 2.4 million [3,4]. The higher number of maternal deaths in some regions reflects inequalities in access to quality health services and highlights the gap between rich and poor settings [5]. In fact, almost 95% of maternal deaths, most of which could have been avoided, occurred in low- and middle-income countries. The maternal mortality rate in low-income countries was 430 per 100,000 live births, compared with 12 per 100,000 live births in high-income countries. An estimated 87% (253,000) of maternal deaths worldwide occurred in sub-Saharan Africa. Women die from complications during and after pregnancy and childbirth [6]. Skilled care before, during and after childbirth saves lives of women and newborns [3,6]. Maternal and newborn health are closely linked, as women who benefit from continuity of care delivered by qualified healthcare providers have a lower risk of losing their child.

Over 60% of the global maternal deaths occur in the postpartum period [7-9] and 74.3% of neonatal deaths occur within the first 4 weeks of life [7]. Three-fourths of the maternal mortality occur within the first week of delivery. The first 6 weeks (42 days) after giving birth is known as the postpartum period [10], which is an intense time requiring much care for women and newborn babies. Early postnatal care refers to healthcare services provided to the mother and newborn baby by healthcare professionals within the first weeks after giving birth. WHO recommends that all mothers and newborns should receive postnatal care from a skilled health provider within the first 24 hours of birth irrespective of the place of birth, and they should also receive at least three additional postnatal check-ups within the postpartum period [7,11]. Routine postnatal visits for a mother typically involve early detection, treatment and prevention of complications including postpartum hemorrhage, eclampsia and puerperal sepsis, and support and advice on emotional wellbeing [7,10]. Moreover, healthcare providers discuss with mothers the importance of exclusive breastfeeding for at least six months, the proper dietary and nutritional needs of the child as well as the need to sleep under insecticide bed nets to prevent mosquito bites [12]. It is during postnatal care sessions that the child's birth register is complemented, while mothers are encouraged to ensure that the child receives a full complement of immunization [13]. The WHO further recommends that all mothers seek postnatal care within the first two days after childbirth because, the first week of life is critical to the survival of the newborn [7]. Despite these recommendations, globally about 40% women do not receive postnatal visits [14] and only less than half of women receive care within 24 hours of birth [15,16].

In Cameroon, the maternal mortality rate was estimated at 406 maternal deaths per 100,000 live births-years in 2018 [17]. On the other hand, national neonatal mortality had been estimated at 28 deaths per 1,000 live-birth-years, and that of the Nord region at 39 deaths per 1,000 livebirth-years in the same year. Several public health programs had been implemented by the Ministry of Public Health to improve maternal and neonatal health during the perinatal period, in particular the "Chèque Santé" program, based on subsidized obstetric and neonatal care, and implemented in the country's northern regions (Adamaoua, Far North and North) [18]. However, despite the efforts made by the Cameroonian government with the support of its development partners, maternal and neonatal mortality in Cameroon remains high, particularly in the North Cameroon region. Very few studies have assessed the influence of the "Chèque Santé" program on the evolution of maternal and neonatal health.

Objective

This study aimed at assessing the impact of the "Chèque Santé" program on maternal and neonatal health in rural and urban contexts in the North Cameroon region.

Methods

Description of public health intervention: "Chèque Santé" program

The "Chèque Santé" program, also known as "Bon d'achat", is a pre-payment system for obstetric and neonatal care, designed to improve access to care and reduce mortality among mothers and their newborns [18]. This is a Cameroon government initiative launched in May 2015 in Cameroon's three northern regions (Adamaoua, Far-North and North). It is financed by the "Agence Française de Développement" (AFD) and the German Development Bank (Entwicklungsbank (Kfw)). It consists of financing a defined set of obstetric and neonatal health care services delivered in accredited health facilities: pregnancy care, simple or complicated deliveries, post-partum and family planning care, neonatal care within the postpartum period, transfer of a woman in labor from her home to the nearest health facility, transfer from the integrated health center to the district hospital or from the district hospital to the regional hospital.

Study design

In line with the WHO which recommends repeated cross-sectional surveys to measure the dynamics of health phenomena [19], we conducted a retrospective repeated cross-sectional study, intended to draw maternal and neonatal health data in the health districts (HD) of the North Cameroon region, over consecutive years

before and after the "Chèque Santé" program launch in 2015. Thus, the observation period for this study was to be precised after data collection.

Setting and study population

The study population included pregnant women, mothers and newborns received in health facilities in the health districts (HD) of the North Cameroon region during the consecutive years relating to the study. Study participants were selected using 2-stage sampling. In the first stage, the HD with available data in line with the study's objective were selected. In the second stage, pregnant women, mothers and newborns attending health facilities in the selected HD during the study period were enumerated.

Data collection and measurements

Data relating to maternal, perinatal and neonatal health during the study's observation period were extracted from the database drawn from activities reports in the HD services; this database is hosted in District Health Information Software-2 (DHIS-2). An extraction grid had been developed for this purpose. It was used to collect statistics in relation with the target populations (pregnant women, mothers and newborns). The data collected were relating to maternal and neonatal health, that is attendance to at least one antenatal care visit, delivery in a maternity, delivery-related maternal deaths during the postnatal period, neonatal death during the postnatal period, maternal postnatal care and neonatal postnatal care. Calendar year and study HD were used to analyze the evolution of maternal and neonatal health indicators. Thus, the following maternal and neonatal health indicators were estimated according to calendar year and study health district

- Proportion of pregnant women attending at least one antenatal care visit.
- Proportion of pregnant women delivering in a maternity;
- Cumulative incidence of delivery-related maternal deaths during the postnatal period.
- Cumulative incidence of neonatal deaths during the postnatal period.
- Proportion of mothers receiving postnatal care follow-up at least once.
- Proportion of newborns receiving postnatal care follow-up at least once.

The denominator for each of these indicators was the expected pregnant women's numbers (or newborns) in the North region disaggregated by HD and, drawn from the document relating to Cameroonian target populations for health programs in 2020 [20]. For this purpose, we hypothesized that the population structure did not vary significantly during the study observation period and remained similar to the 2020 one.

Data analysis

Trends in maternal and neonatal health indicators according to calendar year and study's HD were assessed using two-tailed paired chi-2 test. Data were analyzed using SPSS software.

Ethical considerations

Prior to the start of this study, an ethical clearance was signed by the Regional Research Ethics Committee for Human Health in the North. The confidentiality of the secondary data collected was guaranteed by the anonymization of the information.

Results

Study population and sites

Of the fifteen HD in the North Cameroon region, only two urban HD (Garoua 1 HD and Garoua 2 HD) and one rural HD (Figuil HD), which had the complete data required to achieve the set objective during 4 consecutive years (that is 2016, 2017, 2018 and 2019), were involved in this study (Table 1). The study population therefore included pregnant women, mothers and newborns received in the health facilities of the study's HD during the 4 consecutive years of the study (2016, 2017, 2018 and 2019). Noteworthy, relevant data disaggregated by HD were not available before 2016.

Trends in the frequency of pregnant women attending at least one antenatal care visit

The numbers of pregnant women who actually attended at least one antenatal care visit in Garoua 1 HD, Garoua 2 HD and Figuil HD were 2508, 4318 and 919 in 2016; 3362, 5200 and 2080 in 2017; 3726, 5311 and 2304 in 2018; 4320, 5635 and 2363 in 2019, respectively (Table 1). Among the 14411, 14901 and 4790 pregnant women expected in Garoua 1 HD, Garoua 2 HD and Figuil HD, the proportion of those who had actually attended at least one antenatal care visit between 2016 and 2019 had increased from 17.40% to 30.00% ($p < 0.05$), from 29.00% to 37.80% ($p < 0.05$) and from 19.20% to 49.30% ($p < 0.05$), respectively.

Trends in the frequency of maternity delivery

The number of pregnant women who actually gave birth in maternity wards in Garoua 1 HD, Garoua 2 HD and Figuil HD were 1510, 3480 and 465 in 2016; 2524, 4171 and 1196 in 2017; 2663, 4158 and 1411 in 2018; 3328, 4580 and 1546 in 2019, respectively (Table 1). Among the 14411, 14901 and 4790 pregnant women expected in Garoua 1 HD, Garoua 2 HD and Figuil HD, the proportion of those who actually gave birth in maternity wards between 2016 and 2019 had increased from 10.50% to 23.00% ($p < 0.05$), from 23.40% to 30.70% ($p < 0.05$) and from 9.70% to 32.20% ($p < 0.05$), respectively.

Trends in the cumulative incidence of delivery-related maternal deaths during the postnatal period

The cumulative incidences of delivery-related maternal deaths in Garoua 1 HD, Garoua 2 HD and Figuil HD were 0.007%, 0.000% and 0.000% in 2016; 0.062%, 0.007% and 0.000% in 2017; 0.000%, 0.007% and 0.000% in 2018; 0.000%, 0.000% and 0.000% in 2019, respectively (Table 1).

Trends in the cumulative incidence of neonatal deaths during the postnatal period

The cumulative incidences of neonatal deaths during the perinatal period in Garoua 1 HD, Garoua 2 HD and Figuil HD were 0.03%, 0.05% and 0.00% in 2016; 0.10%, 0.03% and 0.04% in 2017; 0.01%, 0.02% and 0.04% in 2018; 0.01%, 0.03% and 0.04% in 2019, respectively (Table 1).

Trends in the frequency of postnatal follow-up for mothers

The numbers of mothers who actually received postnatal follow-up at least once in the Garoua 1 HD, Garoua 2 HD and Figuil HD were 1313, 1936 and 524 in 2016; 2129, 3710 and 1964 in 2017; 4078, 2739 and 2765 in 2018; 5595, 8713 and 3580 in 2019, respectively (Table 1). Among the 14411, 14901 and 4790 mothers expected in Garoua 1 HD, Garoua 2 HD and Figuil HD, the proportion who actually received postnatal follow-up at least once between 2016 and 2019 had increased from 9.10% to 38.80% ($p < 0.05$), from 12.90% to 58.40% ($p < 0.05$) and from 10.90% to 74.70% ($p < 0.05$), respectively.

Trends in the frequency of postnatal follow-up for newborns

The number of newborns who actually received postnatal follow-up at least once in the Garoua 1 HD, Garoua 2 HD and Figuil

Health district	Year/Percentage (%)				P
	2016	2017	2018	2019	
Percentage of pregnant women attending at least one antenatal care visit					
Garoua 1 HD, N = 14411	17.400	23.300	25.900	30.000	< 0.05
Garoua 2 HD, N = 14901	29.000	34.900	35600	37800	< 0.05
Figuil HD, N = 4790	19.200	43400	48100	49300	< 0.05
Percentage of pregnant women delivering in a maternity					
Garoua 1 HD, N = 14411	10500	17500	18500	23000	< 0.05
Garoua 2 HD, N = 14901	23400	28000	27900	30700	< 0.05
Figuil HD, N = 4790	9700	25000	29400	32200	< 0.05
Cumulative incidence of delivery-related maternal deaths during the postnatal period					
Garoua 1 HD, N = 14411	0.007	0.062	0.000	0.000	NA
Garoua 2 HD, N = 14901	0.000	0.007	0.007	0.000	NA
Figuil HD, N = 4790	0.000	0.000	0.000	0.000	NA
Cumulative incidence of neonatal deaths during the postnatal period					
Garoua 1 HD, N = 14411	0.030	0.100	0.010	0.010	NA
Garoua 2 HD, N = 14901	0.050	0.030	0.020	0.030	NA
Figuil HD, N = 4790	0.000	0.040	0.040	0.040	NA
Percentage of mothers receiving postnatal care follow-up at least once					
Garoua 1 HD, N = 14411	9.100	14.700	28.200	38.800	< 0.05
Garoua 2 HD, N = 14901	12.900	24.800	18.200	58.400	< 0.05
Figuil HD, N = 4790	10.900	41.000	57.700	74.700	< 0.05
Percentage of newborns receiving postnatal care follow-up at least once					
Garoua 1 HD, N = 14411	9.700	14.700	27.400	37.600	< 0.05
Garoua 2 HD, N = 14901	13.400	24.800	28.400	58.200	< 0.05
Figuil HD, N = 4790	11.300	40.900	50.000	74.000	< 0.05

Table 1: Trends in maternal and neonatal health indicators from 2016 to 2019 in 3 health districts in the North Cameroon region (Garoua 1, Garoua 2, Figuil).

%: Percentage; p: paired two-tailed Chi-2 test; HD: Health District. NA: Not Applicable since the numerator of this indicator, as collected, was underestimated because the approach to collecting data from the health facilities in the study districts did not capture deaths of pregnant women and newborns not received at any time in these structures.

HD were 1399, 2007 and 522 in 2016; 2131, 3709 and 1963 in 2017; 3957, 4232 and 2399 in 2018; 5421, 8682 and 3547 in 2019, respectively (Table 1). Among the 14411, 14901 and 4790 newborns expected in Garoua 1 HD, Garoua 2 HD and Figuil HD, the proportion who actually received postnatal follow-up at least once between 2016 and 2019 had increased from 9.7% to 37.60% ($p < 0.05$), from 13.70% to 58.20% ($p < 0.05$) and from 11.30% to 74.00% ($p < 0.05$), respectively.

Discussion

This study showed a statistically significant improvement in the performance of maternal and neonatal health indicators from 2016 to 2019, following the "Chèque Santé" program launch in 2015, in the 3 selected health districts of the North Cameroon region. Whilst relevant data disaggregated by HD were not available before 2016, no other program had been implemented to strengthen maternal and neonatal health in the North Cameroon region apart from the routine strategies implemented in relation to maternal and neonatal health. At the start of the "Chèque Santé" program, data from the national information system seemed to indicate that between 2011 and 2015, "the number of deliveries in both intervention and control health facilities remained practically stationary" [18]. Thus, the improvement in maternal and neonatal health indicators could be partly explained by increased access to reproductive and neonatal health services induced by subsidized care through the "Chèque Santé" program.

This study had methodological limitations, notably the absence of a control group, which significantly limited the ability to attribute observed changes in maternal and neonatal health indicators directly to the "Chèque Santé" program. Without a comparative group not exposed to the intervention, it was difficult to establish a causal link between the program and the observed improvements. Unfortunately, relevant data relating to more other HD in the North Cameroon region were not available when considering the study observation period. Other contextual factors (e.g., changes in healthcare policies, socioeconomic factors, or concurrent initiatives) may have contributed to these trends. Noteworthy, the socioeconomic and political context remained globally. Moreover, data drawn from the DHIS-2 did not included sufficient details in order to fit multivariable regression models and control for confounders that could influence maternal and neonatal health indicators over time. The low cumulative incidence of maternal delivery-related deaths and neonatal deaths did not take into account deaths of pregnant women and newborns not received at any time in the health facilities of the study HD.

Noteworthy, following the "Chèque Santé" program, the proportions of pregnant women attending at least one antenatal care visit had significantly increased to 30.00%-49.30%. Likewise, combined community and facility systems strengthening interventions in Uganda led to increased first antenatal visits by pregnant women [21]. However, the performance of this indicator was lower than the 2018 national estimate of 65% for a more stringent indicator, that is the proportion of pregnant women who attended at least 4 antenatal care visits [17]. It is therefore necessary to explore the determinants of pregnant women's usage of reproductive health services, which remains sub-optimal in the North Cameroon region despite a context of healthcare subsidies such as the "Chèque Santé" program.

There was a significant increase in the proportion of pregnant women delivering in maternity wards to 23.00%-32.20%. Similarly in Uganda, interventions including community-based health promotion combined with provision of delivery kits had induced a higher significant rise in the proportion of pregnant women delivering in the health facility, from 55.2% to 99.3% during the 2009-2010 period [21]. The finding also showed that the prevalence of postnatal care services usage among mothers had significantly increased to 38.8%-74.7%. These performances were higher than the estimate in Southern Ethiopia (23.3%) [22] and South Sudan (11.4%) [23].

Considering the health district's urban or rural location, we found that implementation of the "Chèque Santé" program had a similar influence on the performance of maternal and neonatal health indicators. This result contrasted with the national trend, characterized by a better performance of maternal and neonatal health indicators in urban areas than in rural areas [17].

The fact that the study population was selected from only three of the fifteen HD in the North Cameroon region could induce a selection bias, preventing generalization of the results obtained. However, such a bias could be mitigated by the fact that the 3 HD selected for this study were socioculturally representative of the North Cameroon region.

Conclusion

This study showed an increased access to healthcare for pregnant women, mothers and newborns in the North Cameroon region following the "Chèque Santé" program launch in 2015. However, the performance of maternal and neonatal health indicators remained

sub-optimal compared with national trends, necessitating further exploration of the determinants of sub-optimal health service attendance by pregnant women, mothers and newborns despite a health care subsidy context such as the "Chèque Santé" program. Community-based health promotion should be an important recommendation to increase health care service usage among women.

Declarations

Ethics Approval and Consent to Participate

Prior to the start of this study, an ethical clearance was issued by the North Regional Research Ethics Committee for Human Health. Since anonymized secondary data were retrospectively collected from a software, consent to participate was derogated.

Competing Interests

The authors declare that they have no competing interests.

Funding

No funding was provided for this study.

Authors' Contributions

FAN participated in the study design and conception, the data analysis, the study coordination and the manuscript writing. JRA participated in the study design and conception, the data collection and analysis, and the manuscript writing. MA participated in the study design and conception, the data analysis, the study coordination and the manuscript writing. AF participated in the study design and conception, the data analysis and the manuscript writing. JPYAN participated the manuscript writing. JN participated in the manuscript writing. ECNA participated in the manuscript writing. BT participated in the manuscript writing. EK participated in the manuscript writing. ZYA participated in the manuscript writing. LESW participated in the study coordination. POKN participated in the manuscript writing. A-CZ-KB participated in the manuscript writing. FN participated in the manuscript writing. JA participated in the manuscript writing. All authors read and approved the final manuscript.

Consent for Publication

Not applicable for this section.

Availability of Data and Materials

All the data collected during the study will be available with researchers who provide a methodologically sound proposal, to achieve aims in the approved proposal. Proposal should be directed to "atebfranc@gmail.com". To gain access, data requestors will need to sign a data access agreement.

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