BMJ Open

Effects of the free healthcare policy on health services' usage by children under 5 years in Burkina Faso: a controlled interrupted time-series analysis

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To cite: Debe S, Ilboudo PG, Kabore L, *et al*. Effects of the free healthcare policy on health services' usage by children under 5 years in Burkina Faso: a controlled interrupted time-series analysis. *BMJ Open* 2022;**12**:e058077. doi:10.1136/bmjopen-2021-058077

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2021-058077).

Received 20 October 2021
Accepted 21 September 2022

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ABSTRACT

Objectives This study aimed to analyse, at national level, the effects of the free healthcare policy for children on the use of health services by children under five in Burkina Faso. We hypothesised that this policy has led to an immediate and sustained increase in the use of health services for these children in the country.

Setting We conducted a controlled interrupted time series. Monthly data at district level, spanning from January 2013 to December 2018 and corresponding to 72 monthly data points (39 before and 33 after), were extracted from the Burkina Faso National Health Information System. The analysed dataset included data from all the 70 health districts of the country.

Participants The study consisted of aggregated data from children under five as the target for the policy with children aged between 5 and 14 years old as control group.

Intervention The intervention was the introduction of the free healthcare policy for women and children under 5 years from April 2016.

Outcome The primary outcome was the monthly mean rate of health services visits by children.

Results Among the children under five, the rate of visits increased of 57% (incidence rate ratio (IRR)=1.57; 95% CI 1.2 to 2.0) in the month immediately following the launching of the free healthcare policy. An increase in the rate of health facility visits of 1% (IRR=1.01; 95% CI 1.0 to 1.1) per month was also noted during postintervention. Compared with the control group, we observed an increase in the rate of visits of 2.5% (IRR=1.025; 95% CI 1.023 to 1.026) per month.

Conclusion Findings suggest that the free healthcare policy increased the use of health facilities for care in Burkina Faso immediately after the implementation of the policy with a small increase in the rate overtime. Strategies to maintain the policy effect over time are necessary.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The application of a controlled interrupted time-series analysis is a robust and appropriate approach to study the effects of the free healthcare policy in Burkina Faso on the use of services by children.
⇒ The availability, representativity and quality of routine data reinforce the validity of findings.
⇒ The likely changes in data processing might contribute to induce differences in the trends in usage in pre-policy and post-policy periods.
⇒ Effects of insecurity due to increasing terrorist attacks on quantity and quality of healthcare services were not captured in this study.

INTRODUCTION

Mortality in children under 5 years remains a major public health problem, especially in the sub-Saharan Africa region, with more than 5 million deaths each year.[1 2] Usage of health facilities is linked to a reduction in childhood morbidity and mortality.[3] The provision of high-quality care through health services is essential for preventing disease complications and mitigating the risk of death in the paediatric population.[3] Consequently, communities are strongly encouraged to visit health centres when the need for healthcare arises. However, in poorly resourced settings, particularly in Burkina Faso, user fees are an important barrier to the usage of health services.[3] Studies have shown that removing user fees leads to an increased usage of health services.[4–7] Thus, removal of user fees for children under 5 years and pregnant women has been suggested as a strategy to increase the uptake of high-impact interventions to achieve the Sustainable Development Goals and advance towards universal health coverage.[4] International organisations such as the African Union have called for scrapping the user fees for pregnant women and children, and several African countries have adopted this policy.[4–6 8] This ambitious programme, evaluated in several countries such as Kenya, Zambia, Ethiopia and Tanzania, resulted in an increase in the usage of public health facilities by pregnant

women[4–6 8–10] and sick children.[3] In April 2016, Burkina Faso launched a national free healthcare policy targeting pregnant women and children under 5 years; this policy consists of a total fee exemption for their health provider consultations, laboratory and radiological procedures, and medications in all government-owned health facilities nationwide.[11] Under this scheme, the costs of the aforementioned services are borne by health facilities (that are peripheral health centres, hospitals) which are then reimbursed by the Ministry of Health on submission of validated invoices, on a monthly basis.[12]

Most previous studies in Burkina Faso evaluated the effects of the '80% user fee exemption' (subsidy) for access to healthcare,[13 14] which was only limited to a few health districts. Only one study investigated the effects on health services of the total user fees exemption policy.[14] That study showed an increased access to public health facilities by children, but it was limited in the following aspects: (1) study outcome was limited to non-malaria febrile cases, (2) the setting was restricted to three private and urban health centres located in Ouagadougou (the capital), which are known for having better infrastructure and sufficient staff and (3) study period was short (January 2015 to December 2017). Therefore, the findings were less representative of the entire country's paediatric population. To date, no study has evaluated the effects of the free healthcare policy on the usage of health facilities in care-seeking for children at the country level. Our study therefore aimed to fill this knowledge gap by analysing at the national level the effect of this policy on the usage of health facilities by children under 5 years. Our findings are expected to inform decision-makers on the potential of such policies to sustainably reduce childhood morbidity and mortality in Burkina Faso.

METHODS

Study setting

Burkina Faso is a low-income country located in West Africa. In 2006 the country's population consists of approximately 20 million inhabitants, of which 18% are children younger than 5 years.[15] The total population of children and the number of healthcare facilities in the country, respectively increased by 17% and 18% from 2013 to 2018.[16–21]

There are 70 health districts covering a network of peripheral health centres, community-based health workers and referral hospitals. According to government statistics, the main causes of morbidity and mortality among children under the age of 5 are malaria (41.5%), respiratory infections (33.7%) and intestinal infections (6.4%),[22] with the mortality rate being 129 per 1000 births in 2019. The usage of health services increased from 0.87 to 1.22 contacts per habitant between 2015 and 2018,[22] and the workforce density of physicians and nurses increased by 44% and 34%, respectively.[16–21] Despite an increasing demand of healthcare services, the number of hospital facilities, average distance to health facilities, remained unchanged from 2013 to 2018.[16–21] Furthermore, the contribution of households to current healthcare expenditure remained high and unchanged at 30%, between 2013 and 2018.[22]

Study design

We applied interrupted time series techniques (a quasi-experimental design) to data collected retrospectively, to investigate the effects of the free healthcare policy. As this intervention was implemented nationwide right from inception, there was no comparison group for the same age range. Nevertheless, to reduce validity threats to this one group quasi-experimental, children aged 5–14 years old, not concerned by this current free healthcare policy were used as a non-equivalent dependent variable. The usage of healthcare by children aged 5–14 years old is chosen as a non-equivalent dependent variable because it is predicted not to change because of the free care policy but is expected to respond to some or all the contextually important internal validity threats (history or maturation) and confounding in the same way as the usage by children under five.

Data source

Monthly data were retrospectively extracted from the National Health Information System from January 2013 to December 2018. All the data were extracted on 7 May 2021 to 30 May 2021 and updated on 5 May 2022 to 12 May 2022. The dataset included observations on 39 months for the preintervention period and 33 months for the postintervention period for all 70 health districts in the country.

Study variables

Outcome variable

The outcome variable (Yt) was the monthly count of all-cause visits to health facilities by children under five.

Interrupted time series components

The analysis included the following independent variables:

1. T_t was the time elapsed since the start of the study and was coded sequentially from 1 to 72 months for each health district.
2. Xt was the dummy variable indicating the preintervention period (coded 0) or the postintervention period (coded 1).

Adjustment variables

Two confounders based on literature have been considered

1. The geographical accessibility variable was defined as the proportion of the population living less than 5 km from a health centre. This variable (P) was coded as 1 for facilities with low dispersion (more than half of the target population lived <5 km from the facility) meaning a high geographical accessibility and 0 otherwise (high dispersion). Here, the dispersion of the population was used as a proxy of distance, as previously suggested in other studies.[13]

2. Health workforce density was defined as the number of inhabitants divided by the number of health workers.[23] This variable (W) was coded 1 when the ratio was ≤5000 inhabitants per health worker (high density) and 0 otherwise (low density).[24]

Quality assurance

Data quality control is a key activity performed during data collection and reporting in the District Health Information Software (DHIS). Promptness, completeness, consistency and accuracy are recorded and regularly assessed for validation.[25] Only validated data are secured in the DHIS and thus authorised for exploitation. All study data were independently extracted by two data extractors and validated after comparison by the research team. Any discrepancy was resolved with the support of the department of health sector statistics (Direction des Statistiques Sectorielles de la Santé) of the Ministry of Health, Burkina Faso.

Data analysis

Summary statistics for each variable has been provided. The outcome variable was plotted over time to visualise temporal trends and seasonality.

We analysed the level and the trend changes in the outcome. We first performed a model for the intervention group and then used an interaction model to estimate the additional trend change in the intervention group over and above any change in the control group, while controlling for any difference in the preintervention trends of the two groups.

The effect of intervention was analysed by estimating the following segmented regression model: $Yt=\beta_0+\beta_1T_t+\beta_2Xt+\beta_3XtT_t+\beta_4Z+\beta_5ZT_t+\beta_6ZXt+\beta_7ZXtT_t+\beta_8XtP+\beta_9XtW$.[26]

where Yt is the number of visits at time t; β_0 is the baseline (initial) number of visits; β_1 represents the preintervention slope of visits (representing the underlying preintervention trend until the intervention); β_2 indicates the level change in the number of visits immediately after the introduction of the policy and β_3 is the slope change following the intervention, representing the effect of the intervention over time (using the interaction between time and intervention XtT).

Here Z is a dummy variable to denote the cohort assignment (treatment or control), and ZTt, ZXt and ZXtTt are all interaction terms among previously described variables. The coefficients β_0 to β_3, represent the control group, and the coefficients of the upper line, β_4 to β_7, represent values of the treatment group. More specifically, β_4 represents the difference in the level (intercept) of the outcome variable between treatment and controls prior to the intervention, β5 represents the difference in the slope (trend) of the outcome variable between treatment and controls prior to the intervention, β_6 indicates the difference between treatment and control groups in the level of the outcome variable immediately following introduction of the intervention and β_7 represents the difference between treatment and control groups in the slope (trend) of the outcome variable after initiation of the intervention compared with preintervention (akin to a difference-in-differences of slopes).

Coefficients β_8 and β_9 controlled for the geographical accessibility (the variable (P)) and workforce density (the variable (W)), respectively. We hypothesised that the policy induced a level change (immediate effect) and a trend change (long-term effect) in the attendance of health facilities.

The estimation of coefficients was adjusted for months and years to correct for seasonality. Fourier terms were used to adjust for seasonality and the autocorrelation was assessed using Cumby-Huizinga general test.[27] Due to overdispersion and the outcome being a count variable, the negative binomial regression model was performed. The incidence rate ratio (IRR) was computed to estimate the relative effect of the policy. The level of statistical significance was set at $p<0.05$. All analyses were conducted on Stata V.17 (StataCorp).

Patient and public involvement

Study participants or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

Preintervention and postintervention summary statistics of health facilities use in Burkina Faso, 2013–2018

The descriptive study data are presented in table 1. For children aged less than 5 years, the study comprised 5040 district months observations (2730 in preintervention vs 2310 in postintervention). In this age group the total number of health facility visits (HFV) performed was 16 676 932, including 3 928 315 for the preintervention

Table 1 Preintervention and postintervention summary statistics of health facilities use in Burkina Faso, 2013–2018 (raw data)

	Children <5 years		Children 5–14 years	
	Preintervention	Postintervention	Preintervention	Postintervention
Average of populations per month	50 766 (10 027 to 140 294)	51 025 (9708 to 138 534)	80 490 (21 000 to 241 566)	82 740 (24 241 to 259 562)
Total number of visits	3 928 315	12 748 617	7 586 366	9 444 189
Average of visits per month	1 439 (5 to 10316)	5 519 (603 to 23008)	2779 (322 to 24625)	4 088 (23 to 27897)
Average rate of visits per month (‰)	28 (0 to 390)	111 (14 to 584)	35 (3 to 175)	49 (0 to 232)

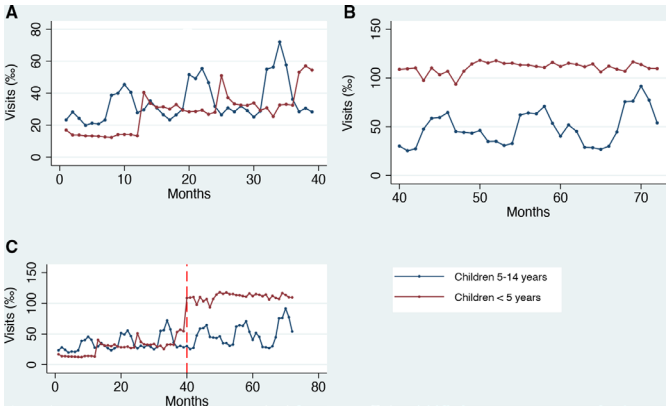

Figure 1 Trend of monthly visit rate in health facilities for care-seeking by children aged under 5 years compared with children aged 5–14 years in Burkina Faso from 2013 to 2018.

period and 12 748 617 for the postintervention period. The average number of HFV was 1439 for the preintervention period and 5519 for the postintervention period, thus showing an increase of almost four times. The monthly rate of visits was 28 per 1000 children before the intervention and 111 per 1000 children during the intervention, indicating a threefold increase.

In children aged 5–14 years, the study comprised 5040 district months observations (2730 in preintervention vs 2310 in postintervention). The total number of HFV was 17 030 555 including 7 586 366 visits and 9 444 189 visits, respectively in preintervention and postintervention period. The monthly average of HFV was 2779 before the policy versus 4088 after the policy. In this age group, the visits rate jumped significantly from 35 per 1000 to 49 per 1000 corresponding to 1.4-fold increase.

The number of health districts with high health workforce density was higher in the postintervention period (n=69 corresponding to 99%) compared with the preintervention period (n=61 corresponding to 86%) for both groups of age. The number of health districts with high geographical accessibility of the population increased from 66% (n=46) before the intervention to 71% (n=50) after the policy in both groups of age.

Trends in the monthly rate of visits in health facilities performed by children under 5 years and 5–14 years

Figure 1 presents the monthly trend of the rate of visits performed by under 5 years children compared with 5–14 years aged children from January 2013 to December 2018 showing a global increase in both groups. This increase was faster before the intervention (figure 1A) than after the intervention (figure 1B). In addition, from month 40, corresponding to the introduction of the free healthcare policy, the curve shifted to a higher level in the intervention group (figure 1C). However, the figures do not show any level change in the control age group during the study time. The rate of visits stayed higher in the under 5 years group compared with the control group over the time since the implementation of the policy.

Table 2 Effect of free healthcare policy on the use of healthcare services by sick children aged under 5 years in Burkina Faso (2013–2018)

	Children <5 years		
	IRR*	**P value**	95% **CI**
Policy	1.57	0.001	1.21 to 2.04
Time after the policy	1.01	0.000	1.004 to 1.016
Constant	0.0004	<0.001	–

*Model adjusted for health workforce and geographical accessibility.
IRR, incidence rate ratio.

Effect of free healthcare policy on the attendance of health facilities in under 5 years population

Table 2 depicts the effects of the free healthcare policy on the use of healthcare services by sick children under five. Comparing the rate of visits before the intervention to that immediately after the intervention, we observed a significant increase of 57% from the introduction of the free healthcare policy (IRR=1.57; 95% CI 1.21 to 2.04). After the implementation of this policy, the rate of visits increased of 1% on average per month (IRR=1.01; 95% CI 1.0004 to 1.016) over the study time. Table 3 depicts the effect of the free healthcare policy among under 5 years children comparing to 5–14 years children. Comparing to the control group, the rate of visits increased by 2.5% (IRR=1.025; 95% CI 1.023 to 1.026) among children aged less than 5 years since the implementation of the policy.

DISCUSSION

The aim of this study was to assess the nationwide effects of the free healthcare policy on attendance at health facilities for care-seeking by children under the age of 5 in Burkina Faso. To achieve this, the study relied on the controlled interrupted time-series design, which is an appropriate approach for evaluating health interventions occurring at various times and at the population level.

Our study showed a significant increase in the rate of visits by 57% immediately after the introduction of the policy and an increase of 12% per year over the policy time. It also showed a significant positive size effect of 2.5% per month comparing to non-beneficiary population (children aged 5–14 years). The results showed a larger immediate effect than the long-term effect, following the introduction of the policy in the beneficiary population. Contrary to findings of the study conducted in only three health centres of the capital by Sia *et al*,[14] the observed immediate increase in health service usage for children younger than five following the free healthcare policy is consistent with previous studies conducted in Burkina Faso[13 28] and in other African countries.[5–8 29 30] Rather than a gradual policy effect,[14] the effectiveness of political will, social mobilisation and media campaigns introduced to inform the target communities about the free healthcare policy during the month prior to

Table 3 Effect of free healthcare policy on the use of healthcare services by sick children aged under 5 years in Burkina Faso (2013–2018), compared with control group (5–14 years)

Independent variables	IRR*	P value	95% CI
Time before the policy (reference: control group)	1.018	<0.001	1.017 to 1.019
Time after the policy (reference: control group)	1.025	<0.001	1.023 to 1.026
Constant	0.0005	<0.001	–

*Model adjusted for health workforce and geographical accessibility.
IRR, incidence rate ratio.

its implementation could explain the rapid and wide positive effect of the policy. The population of Burkina Faso, living mostly in rural areas and in poverty conditions without health assurance, may have been enthusiastic about this relief policy.[22] This increase of the health services usage also confirms how user fees have long represented one of the most important barriers to access to healthcare in poorly resourced settings.[13 14 31–33] Moreover, this could indicate that eliminating financial barriers is effective in addressing previously unmet health needs.[13]

A sustained increase of visits during the implementation of the policy was observed in other studies.[13 14] We did not find any decline in the use of services over time, contrary to some studies that highlighted a gradual decline in the policy effects.[7 13 34–37] This decline can occur if the policy is not paralleled with sufficient strengthening of supply.[31] Consequently, a lack of adequate drugs, equipment, infrastructure and skilled human resources may inhibit facilities from providing qualified healthcare provisions to fulfil health needs.[31] The fact that the policy included medical treatment completely free of charge could have contributed to an increased and sustained uptake of services following the intervention.[14] In addition, free healthcare did not appear to affect the overall quality of care in Burkina Faso,[38 39] which remains a key factor in the use of healthcare services. However, the long-term effect of the policy was small (a monthly average of 1%), which raises concern about the challenges of maintaining such policy in the context of insecurity and financial limitations in the country. Indeed, Burkina Faso has faced many challenges over the past 4 years, and it seems likely that the positive impact of the policy could have been suppressed by these wider problems.[12] The free healthcare policy was implemented in the context of increasing security challenges and significant worker strikes leading probably to limit effects of this policy.[12] The United Nations High Commissioner for Refugees describes Burkina Faso as “experiencing a complex and unprecedented humanitarian crisis” which has resulted in significant internal displacement,[38] and current data identify over 1 million internally displaced persons.[39] In addition, trade union demands have hampered the functioning of health services.[12]

CONCLUSION

Our study showed that the free healthcare policy implemented in April 2016 had a significant effect on the use of healthcare facilities by children younger than 5 years in Burkina Faso. However, the rate of increase in usage of services appeared to be small over time. Further studies are therefore needed to explore the supplementary potential factors that could contribute to the improved sustainability of the effects of the free healthcare policy for infant health in Burkina Faso.

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Correction notice This article has been corrected since it published online to reflect the correct author name to Fati Kirakoya-Samadoulougou.

Acknowledgements Numerous people were involved in this assessment. The study was undertaken with the support of Université Libre de Bruxelles (ULB) through a fellowship from the Académie de Recherche et d’Enseignement Supérieur (ARES), Commission de la Coopération au Développement (CCD). We would like to thank the health authorities of Burkina Faso, especially Dr Assane Ouangare who is the Head of Direction des Statistiques Sectorielles (DSS) for facilitating data collection from the DHIS. We recognise all efforts made by Dr Bakiono Fidèle for the support in administrative tasks.

Contributors SD managed and analysed the data, implemented the methodology, interpreted the results and wrote the first draft of the manuscript. SD and PGI performed statistical analysis under the supervision of FKS. LK, NZ and AG participated in the acquisition of the data, interpreted the results and reviewed the first version of the manuscript. VDB, VR and FKS critically reviewed and edited the manuscript. FKS, the lead author, conceptualised, formulated research goals and objectives, contributed to the acquisition of project financial support, led methodology development and implementation, and interpretation of the results. FKS acted as guarantor. All authors have read and agreed to submit to the current journal, gave final approval of the version to be published and agreed to be accountable for all aspects of the work.

Funding The funders are 'Académie de Recherche et d’Enseignement Supérieur (ARES)' and Ministry of Health of Burkina Faso. There is no grant number.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by National Ethics Committee of Burkina Faso (Nº2021-07-162 on 7 July 2021). This study used secondary data extracted from the NHIS. These data did not include any personal information; thus, consent from the patients was not required. However, administrative authorisation was obtained before data analysis, and publication was approved by the National Ethics Committee of Burkina Faso (Nº2021-07-162 on 7 July 2021).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Extra data can be accessed via the Dryad data repository at http://datadryad.org/ with the doi: 10.5061/dryad.hx3ffbghq.

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