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Children's health status: examining the effect of mothers' preventive health care use

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ABSTRACT

Introduction: Several mechanisms come into play for the child to have good health. This study aimed to examine the effect of mothers' preventive health care use for themselves and their children on their children's health status.

Methods: For this study, data come from the end-line survey conducted to evaluate the impact of Performance-Based Financing program in Burkina Faso. Multivariate Ordered logistic regression analysis was used to identify factors associated with children health status. Odds ratios (ORs) and adjusted odds ratios (AORs) were estimated to assess the strength of associations and used 95% confidence intervals for significance tests. A multivariate multinomial logistic regression analysis was also used to calculate the predicted probability of

being each children health status at each level of coverge of preventive health care. Data were cleaned, coded and analysed using Stata software in version 16.1.

Results: Skilled attendant at birth was a favorable factor for being in the good health (OR 1.16; 95% CI 1.10-1.31). Received skilled antenatal care and received skilled postnatal care (OR 1.09; 95% CI 0.99-1.18 and OR 1.88; 95% CI 1.80-1.97) were positively correlated with children health status. children vaccination against measles (MSL), was positively correlated with children health status (OR 1.85; 95% CI 1.73-1.99). Modern contraceptive methods use, vaccination for children against diphtheria-pertussis-tetanus and tuberculosis did not affect children health status.

Conclusion: activities aimed to increase knowledge and awareness of the importance of skilled antenatal care, skilled attendant at birth, child immunization, skilled postnatal care and other preventive measures for child health should be conducted with women of childbearing age.

KEYWORDS: Health care use, Preventive health care, Children's health, Burkina Faso

INTRODUCTION

Several mechanisms come into play for a child to have good health. Previous studies have shown that the mother's education and high household socioeconomic status are associated with healthy behaviours for their children. High socioeconomic status of the household positively influences most health behaviours [1]. For example, a mother living in a household with a high socioeconomic status would perform at least one antenatal consultation and her children would be vaccinated within a timeframe consistent with the vaccination schedule [2,3]. Many authors have shown that most educated mothers are less likely to give birth to underweight new-borns and there is less chance of their losing their child in the first year after birth [2,4–6].

One of the ways in which the mothers' education could improve their children's health is the use of preventive health care such as prenatal care, skilled birth attendants at delivery, immunisation, well-child visits, etc. [7]. For example, the more educated a woman is, the more

aware she will be of the importance of monitoring her pregnancy [3,4]. These results confirm Karlsen et al.'s (2011) finding, according to which educated mothers derive greater benefit from the advantages of modern medicine than their illiterate counterparts [8].

The efficient use of health resources is recognised as one of the factors influencing children's health [1,9,10]. Previous studies have used indicators such as antenatal care visit, immunisation, place of delivery, well-child visits, breastfeeding practices and health care seeking practices in case of child illness to highlight the means adopted by mothers to preserve their children's health [1,3].

Indeed, maternal antenatal care use has been shown to be associated with the place of delivery, well-child visits, children's immunisation within a timeframe consistent with the immunisation schedule and healthy children [3,7,11,12]. We could admit that mothers whose first visit took place during the first three months are better informed about the requirement of antenatal care visits and that they are more open to modern health care, whereas those whose first antenatal care visit has taken place later may have been forced to do so by the difficulties associated with their pregnancy [1].

Regarding well-child visits, most of the preventive health care steps for children are administered during these visits. Well-child visits are important for children's health, as they can track children's growth, diagnose disease, ensure vaccine administration, and provide education on nutrition, safety and other important health issues [11,13].

New-borns are endowed with passive immunity against several diseases which they inherit from the mother. However, due to the transience of this passive immunity, it is important for the child to acquire active immunity through immunisation in order to cope with the most common infectious diseases [1,14]. Previous findings have shown that a large number of illnesses, hospitalisations and deaths have been prevented through childhood immunisation [14–16].

As for breastfeeding, it should be remembered that it provides several advantages for survival in childhood. Breastfeeding strengthens and prolongs the immunological protection that the infant obtains from its mother [1,17–19]. Longer breastfeeding is generally beneficial for child survival [17,18,20,21].

The main objective of this study was to examine the effect of mothers using preventive and curative health care for themselves and their children, on their children's health status. Beyond the importance of maternal health care use and its impact on maternal morbidity and mortality, analysing the associations between children's health status and mothers' preventive or curative health care use is likely to have implications for programs and policies aimed at improving appropriate health care services' use for children.

METHODS

Data sources

To achieve the objectives of this study, the end-line survey data for the impact evaluation of Performance-Based Financing (PBF) conducted in Burkina Faso in 2017 was used. The PBF impact assessment was a blocked-by-region cluster random trial based on a pre–post comparison design. This process of random allocation seeks to ensure that the different study groups are comparable in terms of observed and unobserved characteristics that could affect treatment outcomes, thereby allowing average differences in outcomes to be causally attributed. The aim was to compare the indicators between intervention and control areas over a period before and after the intervention. The sample was derived through a three-stage cluster sampling procedure, described in detail elsewhere [22].

The end-line survey collected data on household characteristics and household members, the health status of each household member and the use of health services, perception of the quality of services, antenatal care, postnatal care, immunisation of children and use of the services of community health workers. This survey also provides information on the evaluation of the health facility, the interviews at the exit of the consultation for children under 5 years and women seen in antenatal care and the distance between the home and the health facilities.

Study population and sample size

The source populations for the study were all permanently resident women of the study area who had given live birth at least once in the two years immediately preceding the end-line survey, and their children. Women of childbearing age who had not given live birth at least once in the two years prior to this survey and/or had been residing in the study area for less

than six months were excluded from this study. The analysis focuses on responses from 14,407 women who had given birth at least once in the two years preceding the survey, irrespective of the outcome of the delivery.

Selected variables

Outcome variable

In this study, the outcome variable was children's health status. During the end-line survey, the following question was asked of the mothers: "How has your health / the health of your child been during the past 12 months?" to gather their perception of their own and their children's health status. The information collected was coded as follows: 1 = Excellent, 2 = Good, 3= Fair, 4 =Poor and 5 = Very poor. This variable was re-coded in three categories with values of 1=Good, 2=Fair and 3=Poor.

Explanatory variables

The independent variables are those that report on mothers' practices in preventive health care. Based on the prior literature and the database used in this study, we selected six preventive health care measures which have been shown to reduce child mortality from the major causes of under-five deaths [23,24]. The preventive health care measures included were family planning needs satisfied (FPS), skilled birth attendants at delivery (SBA), at least one antenatal care visit with a skilled provider before the three first months (ANCS), well-child visits (WCV), breastfeeding and vaccination for children against diphtheria-pertussis-tetanus (DPT3, three doses), measles (MSL) vaccination and tuberculosis (BCG) vaccination.

The coverage of these preventive health care measures was summarised using the CCI, which is based on the weighted average of the six preventive health care measures, calculated as follows:

$$\mathrm{CCI} = \frac{1}{3}\left(\mathrm{FPS} + \frac{\mathrm{SBA+ANCS}}{2} + \frac{\mathrm{2DPT3+MSL+BCG}}{4}\right) \quad (1)$$

The CCI is a composite measure. The CCI gives equal weight to family planning as well as maternal and new-born care and immunisation, and has been proposed as an effective way to summarise and compare coverage of preventive health care across HDs and over time [23,25].

With regard to the individual characteristics of the mother's social identification, this study retained maternal age at childbirth, parity, educational level and occupation [25,26]. To better

determine the impact of the social and household environment, we used the household wealth index and place of residence.

Statistical analysis

Most of the information collected on children's health status focused on events that occurred in the two years immediately prior to the date of the end-line survey. Variables that operationalise mothers' preventive health-care practices (contraceptive methods used, vaccination, antenatal care, place of delivery and an attendant at delivery) were captured only for women who had had a live birth in the two years immediately preceding the survey.

For this study we conducted two sets of analyses. The first analytical phase consists mainly of the multivariate ordered logistic regression analysis used to identify factors associated with children's health status. Ordered logistic regression model is used to model ordered outcome variables. Odds ratios (ORs) and adjusted odds ratios (AORs) were estimated to assess the strength of associations and 95% confidence interval was used for significance tests. A second set of analyses was implemented using the multivariate multinomial logistic regression analysis. The predicted probability of the children being of a particular health status at each level of coverge of preventive health care was calculated. Data were cleaned, coded and analysed using Stata software version 16.1.

RESULTS

The analyses included data for 14,407 women who had given live birth at least once in the two years immediately preceding the end-line survey, and their children. Overall, 77.63%, 20.03% and 2.34% of the children were in good, fair and poor health, respectively.

The bivariate analysis shows that the variables skilled attendant at birth and received skilled antenatal care may be associated with children's health status ($p<0.05$). Modern contraceptive methods use, vaccination for children against diphtheria-pertussis-tetanus, measles and tuberculosis (BCG) may not be correlated with children's health status ($p>0.05$) (Table 1).

Table 1: Sample size, percentage of children health status according to preventive health care, Burkina Faso

Characteristics	N	Children health status			P-value
		Good (%)	Fair (%)	Poor (%)	
Modern contraceptive methods use					
No	8,880	77.83	20.02	2.15	0.163
Yes	5,527	77.31	20.05	2.64	
Skilled attendant at birth					
No	3,304	77.42	19.40	3.18	0.001
Yes	11,103	77.69	20.22	2.09	
Received skilled antenatal care					
No	6,006	78.69	19.35	1.96	0.007
Yes	8,401	76.87	20.52	2.61	
BCG					
No	8,191	77.39	20.28	2.33	0.698
Yes	6,216	77.94	19.71	2.35	
DTP3					
No	9,075	77.49	20.15	2.36	0.868
Yes	5,332	77.87	19.82	2.31	
MSL					
No	10,139	77.30	20.29	2.42	0,289
Yes	4,268	78.42	19.42	2.16	
All Respondents	14,407	77.63	20.03	2.34	

Source: Authors' own calculations from end-line survey data for the impact evaluation of Performance-Based Financing (PBF) in Burkina Faso

Table 2 shows the results as to the influence of mother's preventive health care use, other maternal and household factors on the children's health status and models good to poor child health as the dependent variable. Skilled attendant at birth was a favourable factor for being in good health (OR 1.16; 95% CI 1.10-1.31). Received skilled antenatal care and received skilled postnatal care (OR 1.09; 95% CI 0.99-1.18 and OR 1.88; 95% CI 1.80-1.97) were positively

correlated with children's health status. Children's vaccination against measles (MSL) was positively correlated with children's health status (OR 1.85; 95% CI 1.73-1.99). Duration of breastfeeding (OR 0.88; 95% CI 0.77-1.00), mother's age (20-24 and 25-29, OR 0.87; 95% CI 0.74-1.01 and OR 0.87 95% CI 0.74-1.01 respectively) and parity (six children and above OR 0.83; 95% CI 0.74-0.94) were negatively correlated with children's health status. Mothers who worked (OR 1.48; 95% CI 1.37-1.61) and mothers who had primary and above education level (OR 1.22; 95% CI 1.01-1.50) were likely to have their children in good health. In addition, household wealth index was positively correlated with children's health status. Nevertheless, Modern contraceptive methods use, vaccination for children against diphtheria-pertussis-tetanus and tuberculosis did not affect children's health status (Table 2).

Table 2: Odds ratios (OR) and 95% Confidence Intervals of children health status according to preventive health care, maternal and household-level covariates

Characteristics	N	Children health status, OR (95% CI)
Modern contraceptive methods use		
No	8880	1.00
Yes	5527	1.02 (0.93-1.11)
Skilled attendant at birth		
No	3304	1.00
Yes	11103	1.16** (1.10-1.31)
Received skilled antenatal care		
No	6006	1.00
Yes	8401	1.09** (0.99-1.18)
BCG		
No	8191	1.00
Yes	6216	1.01 (0.86-1.19)
DTP3		
No	9075	1.00
Yes	5332	1.10 (0.90-1.33)
MSL		
No	10139	1.00

Characteristics	N	Children health status, OR (95% CI)
Yes	4268	1.85** (1.73-1.99)
Received skilled postnatal care		
No	4416	1.00
Yes	9991	1.88** (1.80-1.97)
Duration of breastfeeding		
Less than 6 months	3318	1.00
6 months or more	11089	0.88** (0.77-1.00)
Mother's age		
15-19	1357	1.00
20-24	3167	0.87** (0.74-1.01)
25-29	3640	0.87** (0.74-1.01)
30-34	2986	0.89 (0.76-1.04)
35-39	1952	0.94 (0.79-1.12)
40-44	908	1.06 (0.86-1.31)
45-49	397	0.91 (0.70-0.94)
Mother's occupation		
No working	9238	1.00
Working	5169	1.48*** (1.37-1.61)
Mother's education level		
No education	13869	1.00
Primary &+	538	1.22** (1.01-1.50)
Parity		
1+3	5891	1.00
4-5	4121	0.94 (0.84-1.05)
6 & +	4395	0.83*** (0.74-0.94)
Household wealth index		
Poorest	2539	1.00
Poorer	2743	0.95 (0.84-1.07)
Middle	2853	1.90* (1.79-2.08)

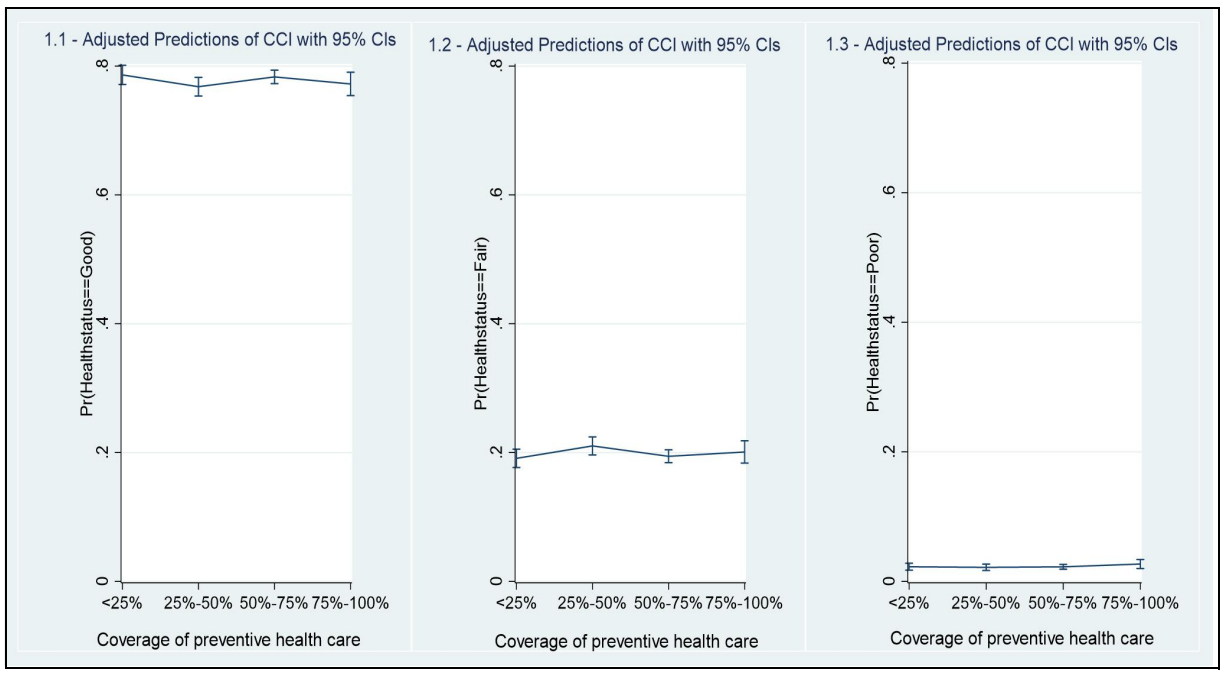
Characteristics	N	Children health status, OR (95% CI)
Richer	3179	1.79*** (1.70-1.90)
Richest	3093	1.80*** (1.70-1.90)

*** p<0.001, ** p<0.01, * p<0.05, OR: Odds Ratios, CI: confidence interval, N = number of observations

Source: Authors' own calculations from end-line survey data for the impact evaluation of Performance-Based Financing (PBF) in Burkina Faso

The predicted probability of children being at a particular health status at each level of CCI was calculated by multinomial logistic regression, based on the probabilities that were saved for each case record, as presented in Figure 1. The results show that CCI is a good predictor of children's health status.

Figure 1. Predicted probability of being each children health status at each level of coverge of preventive health care



Source: Authors' own calculations from end-line survey data for the impact evaluation of Performance-Based Financing (PBF) in Burkina Faso

DISCUSSION

This study demonstrates relationships between maternal preventive health care use and children's health status in Burkina Faso. Preventive health care factors and the variables related to the household and the mother were associated with children's health.

On average, an increase in the level of CCI was associated with an increase in the probability of predicting each child's health status, but this trend was not consistent. These results suggest that other factors not taken into account here may also influence the health status of children. Further, the CCI is a composite measure, and a low level of the CCI may reflect a low level of one of the components, while other components may have high levels. We were not able to assess the predicted probability of the influence of each component of the CCI on children's health status, but it is likely that some components are more strongly associated than others. For example, the results of the analysis presented in Table 2 show that modern contraceptive methods' use was not associated with children's health.

This study shows that several of the preventive health care factors linked to the mother are associated with their children's health status. The variables skilled attendant at birth and received skilled antenatal care were positively correlated with children's health status. This result was consistent with the study conducted by Ghimire et al. (2019) in Nepal in 2019, which showed that family planning interventions as well as the promotion of universal skilled antenatal care (at least two doses of the tetanus vaccine) are essential in helping improve child survival in Nepal [27]. Skilled attendant at birth was also found to be associated with children's health status. This finding is consistent with previous studies conducted by Walker et al. (2013) in 71 countries on the patterns of maternal, newborn and child health coverage, showing that substantial reduction in child deaths is possible, but only if intensified intervention efforts, e.g. for SBA, are implemented successfully in every country [28].

It appears that improvement in mothers' preventive health care practices, including having a skilled attendant at birth and receiving skilled antenatal care interventions, is key to improving children's health in sub-Saharan Africa [29]. It has been suggested that effective implementation of cost-effective preventive health care interventions for mothers (skilled antenatal care, SBA and child vaccination) can improve children's health status in low-income countries [24,27,30–32].

CONCLUSION

This study found that children who had received vaccination against measles, whose mothers had received a skilled attendant at birth of the child, those who had received skilled antenatal care and received skilled postnatal care had greater odds of being in good health in Burkina Faso. This finding indicates that activities should be conducted among women of childbearing age, aimed at increasing knowledge and awareness of the importance of skilled antenatal care, skilled attendant at birth, child immunisation, skilled postnatal care and other preventive measures for child health.

Authors' contributions: HB developed the detailed plans for the fieldwork, designed the data collection instruments, implemented and supervised the fieldwork. HB and AS conceived and designed the paper and developed the analysis strategy. HB analysed the data and wrote the first draft. All authors reviewed, provided input to and approved the final paper. AS is the overall guarantor and the corresponding author.

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Ethics and consent: There are no constraints or restrictions weighing on the autonomy and independence of the study or the publication of its results. The Ethics Committee of the Medical Faculty of the University of Heidelberg (Protocol number S-272/2013) and Burkina Faso National Ethics Committee (Protocol number 2013-7-06) have approved the study.

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