FREE HEALTH CAREANDCHILD HEALTH INKENYA

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ABSTRACT

This article examines the impacts of free health care policy on child health. To assess the effects of interest, we utilize the provision of free health care in Kenya, which began in June 2013.We discovered that children who were exposed to the free health care intervention were healthier than those who were not. In particular,children exposed to the free health care intervention grow 0.223standard deviations taller for their age, weigh 0.198 standard deviations more for their age, and weigh 0.226 standard deviations more for their height. The resultssuggest that shifting toward free health care system could beespecially beneficial for children.

Keywords: Free Health Care, Health Outcomes, Child Health, Kenya

1 INTRODUCTION

In 2018, stunted children (those who are too short) and wasted children (those who are too thin) accounted for 22% and 7% of all children worldwide, respectively[1]. These figures show that poor child health is widespread across the world. In addition, poor early-life health can have long-term implications, such as cognitive impairment, lower educational achievement, and lower productivity and earnings [2, 3].Given these unfavorable private and social costs, improving child health has received a lot of attention, with healthcare policy being regarded as one of the most important solutions.

Several countries have taken steps to promote public health by making some or all health services free. These decisions were based on the observation that fees may limit health care utilization, leading to lower health outcomes, especially for poorer populations with higher price elastic of demand[4, 5, 6]. On the other hand, severalstudiessuggest that eliminating fees may not have the expected positive impacts due to quality degradation, health worker shortages, and medical supply depletion[7, 8].

This study contributes to the debate by documentingadditional evidence from Kenya's implementation of free health care, which began in June 2013.We analyze data from five nationally representative survey waves to quantify the impacts of free health care on child health.We found that children exposed to the free health care intervention are healthier compared to the unexposed ones. Quantitatively, those exposed to the free health care intervention grow 0.223 standard deviations taller for their age, weigh 0.198 standard deviations more for their age, and weigh 0.226standard deviations more for their height. Our heterogeneity analyses show that children of disadvantaged backgrounds (e.g. those born to uneducated and poor mothers) are affected more by the intervention. The results suggest that shifting toward free health care system could be especially beneficial for children.

The findings from previous studies have shown that poor health in childhood has negative impacts on adult health outcomes, educational attainment, and prospective wages. For children in poorer nations, the long-term implications of poor early childhood health may be more severe and long-lasting. Thus, our findings underline the relevance of free health care in improving economic and social conditions in emerging nations. Additionally, increasing health care accessibility might help in the achievement of the Millennium Development Goals 4 (reduce child mortality) and 5 (improve maternal health).

2 Background

Countries in Sub-Saharan Africa have struggled to create economically sustainable healthcare funding models that assure universal coverage of critical health services in the decades following the African independence movements. In the late 1980s, many African nations implemented user fees in public sector health facilities in response to financial limitations and external pressures to cut government spending. Kenya also implemented user fees in public health institutions in order to generate additional revenue to fund healthcare services. However, the government of

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Kenya determined that user fees are substantial obstacles to accesscritical health services, particularly among the poorest people [9].

On June 1, 2013, the newly elected Jubilee administration eliminated user fees in all public dispensaries and health institutions.The decision to abolish user fees was taken in response to concerns that poor health and high service-access costs were contributory factors hindering the achievement of poverty-eradication goals.The expectation was that more Kenyans would utilize public health services and that out-of-pocket health spending would decrease. The intervention was intended to enhance access to health services across the population, but especially among the poorwho could not afford health care.To address the difficulties encountered during the attempt to remove fees, the government set aside funds to reimburse health facilities for income losses caused by the elimination of user fees. For example, the national government allocated 700 million Kenyan shillings in the fiscal year 2013/2014 budgetfor this purpose alone.

Several studies have been conducted to assess the effectiveness of this free health care intervention.For instance, Maina and Kirigia[10]estimate that total outpatient services (both visits and re-attendance) in public facilities grew by 25% for children under five and 37% for the general population a year after the intervention.In addition, Calhoun et al. [11] document that women were 9% more likely to deliver at a public facility after the intervention.In this study, we investigate how free health care intervention affectsthe health outcomes of Kenyan children. We contribute to the body of knowledge byevaluating the less visible impacts of theintervention whereas other research tends to focus on the more visible implications at the aggregate level (e.g.the number of visits or the degree of utilization).

3 Empirical Methodology

To quantify the associationbetween the free health care intervention and childhealth, our estimating regression equation is as follows,

$$Y_{ijts} = \beta_0 + \beta_1 FHC_{jt} + \delta_j + \theta_t + \lambda_s + X'_{ijts}\Omega + \epsilon_{ijts} \quad (1)$$

where the subscripts *i*, *j*, *t*, and *s*correspond to the child, residential cluster, birthmonth-year, and survey month-year, respectively. The variable Y_{ijts}denotesdifferent child health measures including height-for-age, weight-for-age, and weight-for-height z-scores. Ourmain explanatory variable, FHC_{jt} (*Free Health Care*), takesa value of one if the child hasbeen exposed to free health care since birth, and zero otherwise. We also denote by δ_j, θ_t, and $\lambda_s$residential cluster, birth month-year, and survey month-year fixed effects, respectively. The vector X'_{ijts} is a covariate of mother's attributes (mother's age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator) and child's attributes (child's age in months,gender, birth order, plural birth indicator). Besides, we haveϵ_{ijts}as the error term. Standard errors are clustered at the residential cluster levelthroughout the analysis.

The coefficient of interest is $\beta_1$representing the quantified relationship betweenfree health care intervention and child health. Here, we estimate the effects of interest using the residential cluster fixed effects model. In this empirical design, we compare the health outcomes of children living in the same residential area, one of whom was exposed to the free health care intervention while the others were not. The model exploits the variation in exposure status across children born in the same place, which accountsfor unobserved heterogeneity across spatial units. The identifying assumption underlying this design is that the timing of the intervention is independent of unobserved circumstances within theresidential areathat might possibly impact child health.

4Data

The data on Kenyan child health comes from the Demographic and Health Survey (DHS). The KenyaDHS is part of the DHS initiative, which collects and disseminates nationally representative health and population data in developing nations. The DHS focuses on women of reproductive ages (15-49) and their children, allowing us to haveinformation on the health outcomes of the children. These outcomes include height-for-age, weight-for-age, and height-for-weight z-scores. To havethe estimation sample, we use the DHS waves wherechildhealth outcomesare available. With this restriction, we end up utilizingwaves 3, 4, 5, and 6 of the Kenya DHS covering children born between 1988 and 2014.

Our explanatory variable of interest, *Free Health Care*(FHC), is a zero-onevariabletakinga value of one if free health care policy was implemented before the child being born, and zero otherwise. Therefore, the Kenyanchildren bornin or afterJune 2013were exposed to the intervention (*Free Health Care = 1*).

Our final estimation sample consists of over30,000Kenyan children. Panels A and B of Table 1 provide summary statistics for the outcome and explanatory variables, respectively. As indicated in Panel A,the average height-for-age, weight-for-age, and weight-for-height z-scores are -1.108, -0.943, and -0.331 standard deviations, respectively.

Table 1: Summary Statistics

	Mean (1)	SD (2)	Obs. (3)
Panel A: Dependent Variables			
Height-for-age Z-score	-1.108	1.442	31,988
Weight-for-age Z-score	-0.943	1.257	31,988
Weight-for-height Z-score	-0.311	1.148	31,988
Panel B: Independent Variables			
Free Health Care	0.128	0.334	31,988
Mother's Age	28.51	6.562	31,988
Mother's Age at Birth	26.64	6.425	31,988
Mother's Years of Education	6.481	4.180	31,988
Poor Household	0.247	0.431	31,988
Male Household Head	0.714	0.452	31,988
Male Child	0.505	0.500	31,988
Child's Age in Months	27.91	16.77	31,988
Child's Birth Order	3.536	2.393	31,988
Being a Plural Birth	0.012	0.111	31,988

According to Panel B, about 12.8 percent of the children were subjected to the intervention. On average, mothers are 28.51 years old at the time of the survey and 26.64 years old at the time of birth. The mean educational years of mothers are 6.481. Roughly 24.7% of mothers areconsidered poor (placing at the bottom of the wealth quintile) and 71.4% of the households are headed by a male. Around 50.5 percent of the children are male. The average age of the children is 27.91 months. The average birth order is 3.536. Plural births account for around 1.2 percent of all births.

5Results

5.1Main Results

The estimated impacts of thefree health care intervention on child health are provided in Table 2. For each panel, each column represents a separate regression and the panel name indicates the outcome variable. Column 1 displays the estimates from the most parsimonious specification where we only control for our main explanatory variable, the indicator *Free Health Care*. In Column 2, we add birth month-year, survey month-year, and residential cluster fixed effects to the most parsimonious specification. In Column 3, we further control for mother characteristics (mother's age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator). Finally, Column 4 represents our most extensive specification where we account for child characteristics (child's age in months, squared-age in months, gender, birth order, and plural birth indicator), in addition to the fixed effects and mother characteristics.

According to Column 1 of Table 2, we find that children exposed to the intervention grow 0.726 standard deviations higher for their age, weigh 0.838 standard deviations more for their age, and weigh 0.540 standard deviations more for their height. However, the estimates from the most parsimonious specification only reflect the correlation between theintervention and child health as important factors that could jointly affect exposure status and child health are not accounted for.For example, children being born later are more likely to be exposed tobetter-quality health servicesand the intervention simultaneously.

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Table 2: Free Health Care and Child Health - Main Results

	(1)	(2)	(3)	(4)
Panel A: Y = Height-for-age Z-score				
Free Health Care	0.726***	0.706***	0.610***	0.223***
	(0.024)	(0.024)	(0.033)	(0.041)
Observations	31,988	24,106	24,106	24,106
Panel B: Y = Weight-for-age Z-score				
Free Health Care	0.838***	0.897***	0.752***	0.198***
	(0.020)	(0.024)	(0.031)	(0.036)
Observations	31,988	24,106	24,106	24,106
Panel C: Y = Weight-for-height Z-score				
Free Health Care	0.540***	0.629***	0.539***	0.226***
	(0.019)	(0.023)	(0.028)	(0.035)
Observations	31,988	24,106	24,106	24,106
Child Characteristics	.	.	.	X
Mother Characteristics	.	.	X	X
Fixed Effects	.	X	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the residential cluster level. Each column represents the coefficient in a separate regression. The dependent variables are height-for-age, weight-for-age, and weight-for-height z-scores in Panel A, B, and C, respectively. Mother Characteristics include mother's age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator. Child Characteristics include child's age in months, squared-age in months, gender, birth order, and plural birth indicator. Fixed Effects include survey month-year, birth month-year, and cluster fixed effects.

In Column 2, we include birth month-year, survey month-year, and residential cluster fixed effects to account for temporal and spatial heterogeneities such as the one mentioned above. In Column 3, we further account for the mother's attributes that may bias our results. For example, highly educated mothers tend to have better access to information and benefit more from the intervention [12].Finally, in the most extensive specification (Column 4), we control for the child's attributesin addition to the fixed effects and mother characteristics. We find that children exposed to the intervention grow 0.223 standard deviations higher for their age, weigh 0.198 standard deviations more for their age, and weigh 0.226 standard deviations more for their height.The estimates remain statistically significant.

5.2Heterogeneity Analysis

We proceed to analyze the heterogeneous impacts of the interventionacross four subgroups of the population. The estimating results provided in Table 3come from our most extensive specification (similar to the ones in Column 4 of Table 2). The panels indicate dimensions of heterogeneity. For each panel, each column represents a separate regression and the column headings indicate the outcome variables.

We first explore whether the impacts of intervention differ by the relative measure of household wealth. Panel A displays the results for children from poor households(defined as households belonging to the bottom quintile of the wealth index distribution). Panel B provides the results for children from non-poor households. The results suggest that the health effects of theintervention may be more beneficial among children from poor families than among children from wealthier families. The estimated impacts are 94%, 59%, and 43% higher in height-for-age, weight-for-age, and weight-for-height z-scores for children born to poor mothers.

Next, we show the heterogeneous effects of the intervention along the lines of mother's education. The results for children born to uneducated mothers (those who cannot read)are reported in Panel C. The findings for children born to educated mothers are shown in Panel D. We find evidence that children born to uneducated mothers tend to

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benefit more from the intervention compared to those born to educated mothers. The estimated impacts forheight-for-age, weight-for-age, and weight-for-height z-scores are 68%, 41%, and 9% higher for those born to uneducated mothers.

Table 3: Free Health Care and Child Health - Heterogeneity

	Height-for-age Z-score (1)	Weight-for-height Z-score (2)	Weight-for-age Z-score (3)
Panel A: Poor Mothers			
Free Health Care	0.298***	0.235***	0.265***
	(0.075)	(0.063)	(0.059)
Observations	7,676	7,676	7,676
Panel B: Non-poor Mothers			
Free Health Care	0.153***	0.148***	0.185***
	(0.048)	(0.042)	(0.043)
Observations	16,230	16,230	16,230
Panel C: Uneducated Mothers			
Free Health Care	0.320***	0.251***	0.238***
	(0.090)	(0.076)	(0.068)
Observations	6,200	6,200	6,200
Panel D: Educated Mothers			
Free Health Care	0.190***	0.178***	0.218***
	(0.045)	(0.041)	(0.043)
Observations	17,608	17,608	17,608
Child Characteristics	X	X	X
Mother Characteristics	X	X	X
Fixed Effects	X	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the residential cluster level. Each column represents the coefficient in a separate regression. Mother Characteristics include mother's age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator. Child Characteristics include child's age in months, squared-age in months, gender, birth order, and plural birth indicator. Fixed Effects include survey month-year, birth month-year, and cluster fixed effects.

5.3Robustness

In this section, we use several specifications to assess the sensitivity of our findings. To begin, we add the sampling weights to our regressions. Doing so does not largely change our main results. Panel A of Table 4 suggests that children exposed to the free health care intervention grow 0.216 standard deviations taller for their age, weigh 0.165 standard deviations more for their age, and weigh 0.173 standard deviations more for their height. In other words, our results are robust to the inclusion of sampling weights. We also note carefully that the use of sampling weights in regressions might not be desirable because weighting can lower efficiency and statistical power [13, 14, 15].

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Table 4: Free Health Care and Child Health - Robustness

	Height-for-age Z-score (1)	Weight-for-height Z-score (2)	Weight-for-age Z-score (3)
Panel A: Weighted Regression			
Free Health Care	0.216***	0.165***	0.173***
	(0.055)	(0.051)	(0.047)
Observations	24,106	24,106	24,106
Panel B: Excluding Teen Mothers			
Free Health Care	0.250***	0.194***	0.196***
	(0.044)	(0.038)	(0.037)
Observations	21,200	21,200	21,200
Child Characteristics	X	X	X
Mother Characteristics	X	X	X
Fixed Effects	X	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the residential cluster level. Each column represents the coefficient in a separate regression. Mother Characteristics include mother’s age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator. Child Characteristics include child’s age in months, squared-age in months, gender, birth order, and plural birth indicator. Fixed Effects include survey month-year, birth month-year, and cluster fixed effects.

Next, we remove adolescent mothers from our sample. It is because child health might be jeopardized when being born as a result of teen pregnancy.One could be worried that the estimated effects of free health care are being driven by adolescent mothers. As a result, we limit our sample to mothers aged 20 and above at the time of delivery. The results in Panel B demonstrate that excluding adolescent mothers has minimal influence on our main findings. Particularly, children being exposed to the intervention have their height-for-age, weight-for-age, and weight-for-height z-scores 0.250, 0.194, and 0.196 standard deviations higher.

Wealso employ different measures of child health to assess the robustness of our findings. Instead of z-score values, percentile metrics are utilized in Table 5. The percentiles for height-for-age, weight-for-age, and weight-for-height reflect where the child's anthropometric measures rank in comparison to the reference population. We continue to observe thepositiveassociation between free health care and child health. Specifically, the free health care interventionmakes children 4.923, 4.937, and 6.370 percentiles higher in height-for-age, weight-for-age, and weight-for-height rankings.

Table 5: Free Health Care and Child Health - Other Measures 1

	Height-for-age Percentile (1)	Weight-for-age Percentile (2)	Weight-for-height Percentile (3)
Free Health Care	4.923***	4.937***	6.370***
	(0.869)	(0.810)	(0.897)
Observations	24,106	24,106	24,106
Child Characteristics	X	X	X
Mother Characteristics	X	X	X
Fixed Effects	X	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the residential cluster level. Each column represents the coefficient in a separate regression. Mother Characteristics include mother’s age,

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squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator. Child Characteristics include child's age in months, squared-age in months, gender, birth order, and plural birth indicator. Fixed Effects include survey month-year, birth month-year, and cluster fixed effects.

Next, we generate three nutrition indicators from the three anthropometric z-scores.Stunting, underweight, and wasting are zero-one variables taking a value of one if height-for-age, weight-for-age, andweight-for-height z-scores are less than -2, respectively. These thresholds are based on WHO guidelines.According to Table 6, children exposed to the intervention are 6.8 percentage points less likely to be stunted, 3.7 percentage points less likely to be underweight, and 2.9 percentage points less likely to be wasted.

Taken together, our conclusion on the favorable relationship between free health care intervention and early childhood health stays intact when employing alternative model specifications and other frequently used measures of child health.

Table 6: Free Health Care and Child Health - Other Measures 2

	Stunt	Underweight	Wasting
	(1)	(2)	(3)
Free Health Care	-0.068***	-0.037***	-0.029***
	(0.012)	(0.011)	(0.007)
Observations	24,106	24,106	24,106
Child Characteristics	X	X	X
Mother Characteristics	X	X	X
Fixed Effects	X	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the residential cluster level. Each column represents the coefficient in a separate regression. Mother Characteristics include mother's age, squared-age, age at birth, squared-age at birth, years of education, poor household indicator, and male household head indicator. Child Characteristics include child's age in months, squared-age in months, gender, birth order, and plural birth indicator. Fixed Effects include survey month-year, birth month-year, and cluster fixed effects.

6Conclusion

Collectively, we have presented compellingevidence for the positive effects of free health careintervention on child health. Specifically, children exposed to the free health care intervention grow 0.223 standard deviations taller for their age, weigh 0.198 standard deviations more for their age, and weigh 0.226 standard deviations more for their height. Our heterogeneity analyses show that children of disadvantaged backgrounds (e.g. those born to uneducated and poor mothers)are affected more by the intervention. Employing various model specifications and differentoutcome measures yields the same conclusion.

There are at least twopossible explanations for the intervention's favorable effects on child health. First, it could be the case that the intervention may increase access to health inputs such as health supplements and services [10, 11]. Children receiving sufficient care tend to havegood health. Second, the intervention allows children to consume more food and essential nutrientsbecause their families are less burdened by health expenditure. Nutritional improvements have been shown to reduce the risk of children being unhealthy.

Our findings on the advantages ofthe free health careintervention are in line with prior studies on the impactsof various shocks on child health. For instance, favorable temperature and rainfall conditions can reduce the risk of malnutrition and sickness in children[16, 17, 18]. Food surpluses/shortages induced by food price variations have also been proven to significantly improve/worsen child nutritional conditions [19]. Besides, it has been discovered that children who live in areas free of armed conflicts and other types of political violence have better health results

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[20]. Various interventions on nutrition, health literacy, and cash transfers have also been shown to have favorable effects on child health [21, 22, 23].

The findings from previous studies have shown that poor health in childhood has negative impacts on adult health outcomes, educational attainment, and prospective wages. For children in poorer nations, the long-term implications of poor early childhood health may be more severe and long-lasting. Thus, our findings underline the relevance of free health care in improving economic and social conditions in emerging nations. Additionally, increasing health care accessibility might help in the achievement of the Millennium Development Goals 4 (reduce child mortality) and 5 (improve maternal health).

Data availability: The data underlying this study can be obtained at https://dhsprogram.com

Ethical approval: Ethics approval was not required for the current analysis, as the data were from publicly available Demographic and Health Surveys.

Author contributions: KL is responsible for collecting data, performing empirical analysis, and writing the paper.

Competing interest: None

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