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Arlette Simo Fotso

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Child Disability and Siblings' Healthcare Expenditures in a Context of Child Fostering

Arlette Simo Fotso*
University Cheikh Anta Diop, Dakar
French Institute for Demographic Studies(Ined), Paris

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Abstract: Many studies have assessed the impact of disability on healthcare expenditure on the disabled child, but practically none has considered the externalities of a child's disability in terms of healthcare expenditure on siblings. This study, conducted in Cameroon, therefore seeks to measure the impact of a child's disability on healthcare expenditure on all of the children in the household. The assessment is based on data from the 2011 Demographic and Health and Multiple Indicator Cluster Survey (DHS-MICS) in Cameroon and on a two-part model. It led to the result that disability significantly increases average monthly healthcare expenditure on a child but has no impact on healthcare expenditure on the other children in the household. For foster children, being disabled increases the monthly health expenditure by XAF 684. Whereas disability of biological children of the head of household is a source of health spending XAF 138 lower. An explanation for this is that disabled children who remain living with their biological families tend to be less severely disabled.

Keywords: Disability, foster children, healthcare expenditure, two-part model.

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*contact: arlette.simo-fotso@ined.fr / simofotsoarlette@yahoo.fr

Introduction

The direct cost of illness refers to the resources spent on prevention, diagnosis and treatment. Healthcare expenditure thus accounts for the bulk of this cost. Disability as a functional limitation, may generate considerable additional health care expenditure, both for the disability itself and for concomitant diseases. This thinking makes sense when good health is considered as a consumption commodity, as suggested by Grossman (16). That theoretical intuition has prompted empirical verification, mainly in developed countries, where healthcare systems differ considerably from those in developing countries (10, 24, 9, 30, 7, 35).[1]

Conversely, disabled people might not have higher healthcare expenditure than others. This could be envisaged if we considere that health could be demanded as an investment commodity as in Grossman's pure investment model of health (16) and by later developments, such as Becker and Tomes' investment model when children's endowments differ (3). Indeed, if we consider disability as a reduction in a child's endowment, and healthcare spending as an investment in human capital, then, according to Becker and Tomes (3), the household head (HH) may invest more in the children with better initial endowments at the expense of less well endowed children. Some studies, such as that by Zan and Scharff (35), have found that some disabilities have no impact on the healthcare expenditure on the children concerned. Parish et al. (29) found lower healthcare expenditures disabled children in single-parent families. However, none of the studies considers that it could be due to healthcare expenditure choices parents may make between disabled children and their siblings.

This study therefore seeks to assess the impact of a child's disability on healthcare expenditure of that child and its effect on healthcare expenditure of the other children in the household, by focusing on families' out-of-pocket spending on healthcare. In other words, it proposes testing the hypothesis of "rivalry" between disabled and non-disabled siblings in terms of healthcare expenditure. This hypothesis suggests that parents favour some kinds of children when the households face resources constraints in order to ensure the return of their investments.

This study makes a contribution at several levels. Firstly, it acknowledges that healthcare expenditure on the children in a household may be interdependent and therefore assesses for the first time how disability make interract the healthcare expenditure of the disabled child and his/her siblings. Secondly, the analysis takes the local social context into account, and differentiates between the biological children of the HH and other children living in the household. In Cameroon, as in many African countries, it is common for parents to foster children out to other households. Thirdly, although accurate measurement of families' healthcare expenditure on children with

[1] In Cameroon as in many African developing countries the health insurance coverage is around 1% (27)

disabilities has important policy implications, few such measurements have been done in developing countries. This study therefore seeks to fill in that information gap.

The rest of the chapter is organised as follows: section 1 is a detailed literature review, section 2 describes the methodology used, and section 3 presents and discusses the results.

1 Literature review

1.1 Review of the theoretical literature

The starting point for understanding the impact of disability on healthcare expenditure is probably the human capital model of the cost of illness. According to that model, any health problem is likely to generate various costs for the individual concerned, his/her family and/or society, including a direct cost consisting of the additional healthcare expenditure generated by the ill health. The disability of a child may have various causes and may also lead to concomitant health problems, such as pain, pressure ulcers, obesity and depression. Disabled children are therefore more likely to be in a poor state of health than other children.

If we reason according to Grossman's model (16) which considers good health as pure consumption, as a consumption commodity that enters into individuals' preference function (and poor health as a source of disutility), we assume that the welfare of children enters into the parents' utility function. The parents will therefore respond to the disutility generated by the disability by increasing their demand for "good health". It will have the effect of increasing healthcare expenditure on the disabled child. That increase in healthcare expenditure on the disabled child could reduce the share of the resources available for the other children in the household (1). The result could therefore be a decrease in healthcare expenditure on the other children in the household. Alternatively, it is possible that the parents' constant contact with the healthcare system to meet the medical needs of the disabled child would generate positive externalities for the other children in the household; healthcare expenditure on the siblings of disabled children would thus be higher than on children who do not have a disabled sibling.

From an altogether different perspective, we could consider health as an investment, as does Grossman (16), and reason within the framework of the investment model when children's endowments differ proposed by Becker and Tomes (3). That model explains how parents' expenditure on healthcare may vary in accordance with the endowments of their children. Becker and Tomes highlight differences in endowments and preferences between children. They assume that parents have neutral preferences between their children, in terms of the marginal utility of an improvement in the quality of each child would be the same if the children had the same endowments.

If the respective costs of adding to the quality of each child were equal, the parents

would invest more in the disabled (less well endowed) children in order to compensate for quality even if the initial endowments of the children were different. This is a "wealth" effect. However, in the case of disability, a difference in cost can stem from a need for specialist medical care or the high cost of transport for the most severely disabled children. The average cost of non-disabled children may also be lower than that of their disabled peers because they are expected to generate higher returns in the future. Parents would therefore invest more in the best endowed child with a risk of reinforcing the initial differences. That is a "price effect".

1.2 Empirical review

1.2.1 Disabled children and evidence for an increase in healthcare expenditure

Using American data, Newacheck et al.(26) find that healthcare expenditure on disabled children is much higher than on non-disabled children ($2,669 versus $676). However, their finding is based on descriptive statistics and is therefore not controlled for other observable characteristics. Sharpe and Baker (33) conducted a study of the determinants of financial issues in families that have child with autism. They found that these families' financial problems were positively associated with use of medical interventions, having high out-of-pocket or unreimbursed medical or therapy expenses, and having lower incomes. Their study is very narrow, however, because it focuses on autistic children and does not include determinant elements such as the parents' educational level. It also uses a subjective measure of the financial impact of disability.

As well as using those subjective variables to assess the financial problems experienced by families that have children with special healthcare needs in the United States, Kuhlthau et al. (18) examined differences in out-of-pocket expenditures and found that 40% of these families experienced financial-related burden. Lukemeyer et al. (19) considered disabled and chronically ill children in poor families and distinguish between the type of direct costs. According to their study, only 38% of those families did incur non-child-care expenditure as a result of their child's disability. Among those who did have expenses, medical out-of pocket medical expenses were the most common (23%), but only 6% of familly incurred medical costs exceeding $100 per month. They found a strong association between severity of the disability and the non-child-care costs incurred by disability. One of the weaknesses of the study is that it only covers poor families, so cannot be generalised to the total population.

In their study, Busch and Barry (7) attempted to determine the economic burden of caring for a child with a mental health care need compared with other special health care needs. By taking the type of insurance system into account, they found that, in the United States, a child's mental health disorder does not represent a significant financial burden for children covered by private health insurance. However, because

the financial variables of the study are binary, it is not possible to assess the size of the costs.

1.2.2 Does disability lead to an increase in healthcare expenditure? Yes, but not always

In their study, Zan and Scharff (35) sought to measure the out-of-pocket financial costs of caring for children with chronic conditions by focusing on healthcare expenditures in the United States. The authors measured the financial burden in four different ways. The first two measures reflect the financial burden for families and the latter two measures indicate the external burden and the burden for society.

They reached the conclusion that different health problems have different costs. Conditions such as epilepsy, migraine, asthma, ADHD/ADD, allergies and ear infections have a positive financial cost regardless of the measure used. They also found that some types of disability, such as speech impairment and mental retardation/Down syndrome, had no impact on the out-of-pocket medical costs of the children concerned. However, the authors did not provide an explanation for this and did not extend their analysis to the other members of the household, probably because the data used were only collected for one child in each household.

Parish et al. (29) found that average monthly spending on disabled children in single-parent families ($179) was lower than average monthly spending on non-disabled children in single-parent families ($250) where there is no disabled child. The authors attribute this to the fact that single-parent families use low-cost care. However, as in the previous study, their data only provide information about one child selected randomly per household, which does not make it possible to extend the analysis beyond that child.

Only Altman et al. (1) have attempted to assess the impact of a disabled family member on healthcare expenditure on other family members. They found that having a disabled child had no impact on the number of medical visits and the amount of healthcare expenditure on non-disabled siblings. However, their study did not examine the healthcare expenditure of the disabled individual, so provides only a partial picture of the issue and does not capture interactions. Moreover, their study too is based on US data.

1.2.3 Evidence for an inter-relationships between siblings in terms of investment in human capital

An abundant economics literature has nevertheless highlighted differentiated investment allocations between siblings based on their initial endowments. Berhman et al. (4), who examined differences in general endowments by comparing identical and non-identical twins, show that allocations of schooling by parents tend to reinforce dif-

ferences in initial endowments. Morduch (25) and Garg and Morduch (14) analyse the allocation of resources from the perspective of the children's gender. Morduch shows that in Tanzania, a child's human capital accumulation is positively correlated with the number of sisters. Garg and Morduch (14) show that in Ghana children who have all sisters will have health indicators that are 25%-40% better than children who have all brothers. In a study conducted in Ethiopia, Ayalew (2) shows that the parents, through their allocations of health inputs, compensate for children's different initial health endowments.

By using the term endowments, most of these studies do not refer directly to disability. Fletcher and Wolfe (12), however, show that the presence of a child with behavioural problems in a household influences investments in the educational capital of the other children, to which they attribute the lack of an education differential between children with certain mental health disabilities and healthy children. The present study proposes to extend the existing literature by assessing the impact of disability on healthcare expenditure on both the disabled child and on the other children in the household.

2 Methodology

2.1 Study data

The data used for this research comes from the 2011 Demographic and Health and Multiple Indicator Cluster Survey (DHS-MICS) conducted by Cameroon's National Statistics Institute (INS), with support from UNFPA, UNICEF, the World Bank and USAID. The survey disability modules were administered to half of the households: 17,864 children aged under 18 were identified and constitute the sample used in this chapter.

The children selected for the healthcare expenditure module were asked to self-report disease, chronic conditions or injuries experienced in the 30 days prior to the survey. A total of 91.74% reported not having been ill. Data on healthcare expenditure was collected from individuals who reported having been ill in the month before the survey. Of that group, 12.87% reported not having used healthcare or having benefited from free healthcare. In other words, 92.8% of the children in the sample had zero healthcare expenditure.

The healthcare expenditure taken into account in this study comprises spending on self-medication, consultations, tests, drugs, hospitalisation, transport to medical services and hospitalisation. The healthcare expenditure taken into account here is not specific to disability but is general healthcare expenditure, which may include expenditure linked directly or indirectly to disability.

The disability measure used in this study comes from the disability module in the

Table 1: Financing of healthcare expenditure

	Total sample		Biological children of HH		Foster children	
	Mean	SD	Mean	SD	Mean	SD
Expenditure financed by HH	0.766	0.424	0.851	0.357	0.525	0.5
Expenditure financed by persons outside household	0.132	0.339	0.098	0.297	0.23	0.421
Observations	1,286		951		335	

Note: Author's calculations based on data from the 2011 DHS-MICS.

DHS-MICS. In this module, all the individuals in the selected households were asked whether they had any disabilities, such as missing limbs or extremities, deformation, serious vision, hearing and/or speech impairments, and mental health disorders. They were then asked if the disability was partial or total. However, in order to estimate healthcare expenditure, since few individuals had positive healthcare expenditure and therefore the small numbers of disabled children, no distinction by severity of disability was made. Then the *disabled* variable takes the value 1 if the child is disabled and 0 if not.

Because of the hypothesis that the disability of a child in the family can affect the resources allocated to healthcare expenditure on other children in the household, an *other disabled child* variable was introduced to indicate, for each child, the presence of another child carrying a disability in the household. But the foster and biological children could have different sources of healthcare financing (see 1) ; in order to refine the analysis to "true" siblings, the *disabled sibling* variable indicates whether a biological child of the HH has a disabled sibling living in the household. In this research, a distinction is made between biological and foster children. Unlike Oni (28) and Bledsoe et al. (5) , who define a foster child as a child who does not live with his/her mother, this study defines a foster child as as a child who is not the biological child of the HH. This definition is justified by the fact that this study looks at healthcare expenditure and in many cases, the person considered as the head of household is usually the breadwinner and contributes to household expenditure, as shown in Table 1.

Table 2 shows that average monthly healthcare spending is XAF 958, with a very large standard deviation (XAF 8,404). Healthcare expenditure is thus highly skewed. Some 66% of the children in the sample are related to the HH . On average, healthcare expenditure on the children of the HH is higher than healthcare expenditure on foster children, as we might expect.

Table 2: Means and standard deviations of the variables

	Total sample		Biological children of HH		Foster children	
	Mean	SD	Mean	SD	Mean	SD
Healthcare expenditure	957.599	8,404.19	1,059.53	9,208.37	758.707	6,553.09
Healthcare expenditure >0	0.072	0.258	0.081	0.272	0.055	0.229
Disabled	0.024	0.153	0.024	0.152	0.024	0.153
Disabled sibling			0.069	0.254		
Severity of illness ∓						
Mild	0.313	0.464	0.34	0.474	0.239	0.427
Moderate	0.415	0.493	0.401	0.49	0.457	0.499
Severe	0.271	0.445	0.26	0.439	0.304	0.461
Age	7.689	4.988	7.459	4.868	8.138	5.184
Boy	0.502	0.5	0.505	0.5	0.494	0.5
Biological child of HH	0.661	0.473				
Health facility∓						
Public	0.363	0.481	0.340	0.474	0.430	0.496
Private	0.186	0.389	0.192	0.394	0.167	0.374
Other	0.451	0.498	0.468	0.499	0.403	0.491
Educational level of HH						
No education	0.261	0.439	0.256	0.437	0.272	0.445
Primary education	0.396	0.489	0.393	0.488	0.402	0.49
Secondary or higher education	0.343	0.475	0.351	0.477	0.326	0.469
Place of residence						
Provincial capital	0.192	0.394	0.202	0.401	0.173	0.378
Other town	0.229	0.42	0.209	0.407	0.266	0.442
Rural area	0.579	0.494	0.589	0.492	0.561	0.496
Household size	8.142	4.537	8.027	4.173	8.366	5.166
Economic well-being						
Poorest	0.206	0.405	0.249	0.432	0.124	0.329
Poor	0.238	0.426	0.221	0.415	0.272	0.445
Average	0.217	0.412	0.2	0.4	0.249	0.433
Affluent	0.183	0.387	0.177	0.382	0.194	0.396
Most Affluent	0.156	0.363	0.153	0.36	0.161	0.368
Observations	17,864		11,811		6,053	

Note: Author's calculations based on data from the 2011 DHS-MICS. ∓ Reference sample: children with healthcare expenditure greater than zero. SD: standard deviations.

2.2 Method

The healthcare expenditure data present several specific features requiring particular treatment. Firstly, (i) the number of individuals i with zero health expenditure $Y_i = 0$ is very high, so cannot be ignored. Secondly, (ii) the observations are always positive $Y_i \geq 0$. And thirdly (iii) the empirical distribution of non-zero observation are positively skewed (23). The debate over the appropriate model for this type of data has long fuelled the health economics literature (11, 17, 31, 32, 20, 13). Based on the criteria for choosing a model suggested by Madden (20), Manning and Mullahy (23) and Buntin and Zaslavsky (6) and a series of tests not presented here, this study uses a two-part model. The first stage models the probability of having positive healthcare expenditure using a logistic model. The second stage uses a generalised linear model (GLM) with gamma family and log link to estimate predicted expenditure conditional on non-zero expenditure. In this case, the unconditional spending is obtained as follows:

$$E(Y_i|X_i) = Pr(Y_i > 0|X_i) * E(Y_i|Y_i > 0, X_i) \tag{1}$$

The estimated equation, inspired by equation 1, takes the following form:

$$E(Y_i|D_i, x_i) = Pr(Y_i > 0|D_i, x_i) * E(Y_i|Y_i > 0, H_i, x_i) \tag{2}$$

and its extended version: :

$$E(Y_i|D_i, D_{s_i}, x_i) = Pr(Y_i > 0|D_i, D_{s_i}, x_i) * E(Y|Y_i > 0, D_i, D_{s_i}, x_i) \tag{3}$$

Where Y_i represents the healthcare expenditure on individual i , D_i the disability status of individual i , D_{s_i} the disability status of the siblings of individual i, and x_i all the control variables. In order to factor in intra-group correlations that may exist between children in the same family, the results presented will use robust standard errors of the clusters at family level.

3 Results

3.1 Impact of a child's disability on healthcare expenditure

Table 7 presents the two-part model of healthcare expenditure on children. The logistic regression in the first stage examines the probability of having positive healthcare expenditure, while the GLM in the second stage estimates the impact of disability on healthcare expenditure conditional on positive healthcare expenditure. The first column gives the results for all individuals, regardless of whether they are the biological children of the HH or not. It shows that disability significantly increases the probability of a child having positive healthcare expenditure and has a positive but not significant

impact on the amount of healthcare expenditure conditional on positive healthcare expenditure. Where an interaction variable is introduced in order to assess whether this effect depends on whether or not the child is the biological child of the HH (column 2), the effect of disability of foster children is significant on both the probability of positive spending and the amount of expenditure. The unconditional marginal effects are shown in Table 3. The second column shows that, a disability of a foster child significantly increases healthcare expenditure on that child (by XAF 681).

Factors specific to the HH are also likely to influence the amount of healthcare expenditure on a child. This is especially true of the educational level of the HH. Compared with a child living in a household where the HH has no education, an additional XAF 143 on average is spent on a child when the HH has secondary or higher education, and an additional XAF 62 when the HH has primary education. Healthcare expenditure on children increases significantly with the household's economic well-being. We thus observe an increase in healthcare spending of XAF 210 on a child living in a household in the most affluent economic well-being quintile compared with a child living in a household in the poorest quintile. The type of health facilities chosen and the severity of illness are also important determinants of the amount of healthcare expenses.

Other characteristics specific to the children also have a significant impact on healthcare expenditure. Firstly, the age of the child. Every additional year reduces the amount of healthcare expenditure on the child by XAF 18, reflecting the low probability of morbidity among older children. Being a boy does not have a significant impact on healthcare expenditure. Thus, like the study by Ayalew (2) in Ethiopia, this study highlights an absence of parental preference for boys in terms of investment in health capital. Lastly, the child's relationship to the HH is a determinant factor in healthcare expenditure. All other things being equal, an average of XAF 69 more is spent on the HH 's biological children than on foster children. This seems to confirm Bledsoe et al. (5), who find intra-household discrimination regarding foster children's access to healthcare.

However, the observed impact of disability of HH's biological children seems somewhat counter-intuitive. While being a biological child of the HH increases healthcare expenditure overall, disability of biological children of the HH is a source of health spending XAF 138 lower compared to foster children. This may be attributable to decisions about the allocation of healthcare resources between biological children that would lead the parents to invest more in their children with the best endowments (i.e. their non-disabled children). These preferences would be less likely to come into play with foster children, who may benefit more from resources provided by persons outside the household, as mentioned earlier. This possible explanation warrants further exploration when assessing the impact of the disability of a child on the other children in the household.

Table 3: Marginal effects of the two-part model of healthcare expenditure

	(1)	(2)
	Coef.	Coef.
Disabled	282.199**	680.865*
Biological child of HH	59.961**	69.359***
Age	-17.448***	-17.727***
Boy	-12.375	-15.332
Educational level of HH (No education)		
Primary	65.615**	61.870**
Secondary or higher	150.125***	142.966***
Place of residence (Rural)		
Regional capital	54.029	52.878
Other town	-23.711	-23.921
Household size	-9.386**	-9.262**
Economic well-being (poorest)		
Poor	6.947	12.103
Average	42.729	45.786
Affluent	126.073***	132.641***
Plus Riche	199.384***	210.441***
Severity of illness (Mild)		
Moderate	106.736***	109.214***
Severe	376.512***	374.518***
Health facility (Public)		
Private	-22.354	-41.827
Other	-682.590***	-682.669***
Disabled*Biological child of HH		-137.807**
Observations	17864	17864

Note: Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

3.2 Extending the model to the other children in the household

Table 8 presents the extended two-part model of healthcare expenditure aimed at assessing the impact of living with a disabled child on healthcare expenditure on the other children in the household. Table 4, which shows the marginal effects, indicates that living in a household where there is a disabled child does not affect the healthcare expenditure on the other children. Thus, although disability increases overall healthcare expenditure on the disabled child, it does not significantly alter the healthcare expenditure allocated to the other children. This might mean that when there is a disabled child in the household, the HH adjusts other items of household expenditure to meet the increase in healthcare expenditure, but this hypothesis cannot be verified here, since the data do not provide any information about other items expenditures of household expenditure.

However, the impact measured here is fairly rough, because the disabled child living in the household may or may not be the HH's biological child. If the disabled child is a foster child, the disability might not have any impact on the allocation of healthcare resources to the other children, since their healthcare expenditure is not financed by the same source. To refine the analysis, we would therefore need to analyse the impact of a child's disability on healthcare expenditure on his/her "true" siblings. Since the survey does not provide any information about the siblings of foster children, this analysis is conducted only on the biological children of the HH.

Tables 9 and 5 show the possible impact of a child's disability on healthcare expenditure on his/her siblings. They indicate that having a disabled sibling has no impact on a child's healthcare expenditure, regardless of the household's level of economic well-being . Disability therefore does not create any "sibling rivalry" in terms of healthcare expenditure within families.

However, this does not explain why, contrary to intuition, disability does not created higher healthcare expenditure for the HH's disabled children. This could be explained by the difference in characteristics between disabled children who remain in their biological families and those who are fostered out.

3.3 Evidence for a selection of disabled foster children

The differences in characteristics between fostered disabled children and disabled children who remain with their biological families offer a plausible explanation for the lack of impact of disability on healthcare expenditure on the HH's biological children, even though it increases healthcare expenditure on foster children. As Table 10 shows, disabled foster children tend to be older, live in households with high economic well-being and have severe disabilities. The relative wealth of the foster households, and

Table 4: Marginal effects of the extended two-part model of healthcare expenditure

	(1)	(2)
	Coef.	Coef.
Disabled	281.282**	683.819*
Other disabled child	-4.898	-8.053
Biological child of HH	59.765**	69.241***
Age	-17.359***	-17.628***
Boy=1	-12.298	-15.186
Educational level of HH (No education)		
Primary	66.461**	62.977**
Secondary or higher	150.021***	142.860***
Place of residence (Rural)		
Regional capital	54.211	52.879
Other town	-23.360	-23.503
Household size	-9.236**	-9.062**
Economic well-being (poorest)		
Poor	6.585	11.712
Average	42.059	44.981
Affluent	125.692***	132.128***
Plus Riche	198.084***	209.036***
Severity of illness (Mild)		
Moderate	106.715***	109.140***
Severe	376.434***	374.391***
Health facility (Public)		
Private	-28.322	-48.528
Other	-685.961***	-686.680***
Disabled*Biological child of HH		-138.482***
Observations	17864	17864

Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

Table 5: Marginal effects of the extended two-part model of healthcare expenditure on HH's biological children

	Overall ME	Poor ME	Affluent ME
	Coef.	Coef.	Coef.
Disabled	157.165	-10.380	847.959**
Disabled sibling	-22.513	27.634	-166.857
Age	-20.519***	-10.707***	-44.861***
Boy	-44.807	-22.314	-81.309
Educational level of HH (No education)			
Primary	83.315***	40.726*	236.977***
Secondary or higher	198.210***	88.311**	459.673***
Place of residence (Rural)			
Regional capital	45.658	-49.587	205.338*
Other town	-32.452	-28.675	24.857
Household size	-5.774	-1.767	-13.094
Economic well-being (poorest)			
Poor	-47.393	-25.174	
Average	50.218	71.581*	
Affluent	143.434**		
Plus Riche	284.754***		178.845**
Severity of illness (Mild)			
Moderate	110.194***	55.164***	289.833***
Severe	465.533***	233.194***	897.387***
Health facility (Public)			
Private	-148.071	116.231	-809.335***
Other	-887.442***	-473.127***	-1829.426***
Observations	11811	7906	3905

Note: Author's calculations based on data from the 2011 DHS-MICS. ME: Marginal effects. Coef.: coefficient. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

Table 6: Logistic estimation of the probability of a disabled child being fostered out

		ME
	Coef.	SE
Severely Disabled	0.178***	(0.061)
Severity of illness (Mild)		
Moderate	-0.147	(0.091)
Severe	-0.030	(0.095)
Age	0.011**	(0.005)
Boy	-0.025	(0.045)
Educational level of HH (No education)		
Primary	-0.007	(0.062)
Secondary or higher	-0.060	(0.070)
Place of residence (Rural)		
Regional capital	-0.077	(0.073)
Other town	-0.066	(0.065)
Household size	0.004	(0.006)
Economic well-being (poorest)		
Poor	0.142**	(0.057)
Average	0.237***	(0.068)
Affluent	0.172**	(0.085)
Plus Riche	0.305***	(0.102)
Observations		426

Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient, SE: standard error. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

the severity of their disability would thus explain why the disability of foster children significantly increases their own healthcare expenditure compare to children living with their biological families.

That intuition is supported by the results of the logistic model of the probability of a disabled child being fostered presented in Table 6. Those results show that the probability of being fostered increases with age, which is exactly the result found by Grant and Yeatman (15). Similarly, the probability of a disabled child being fostered increases with the level of economic well-being of the foster family, in line with the results of studies of the determinants of fosterage (8, 22, 21, 34). But above all, these results show that having a severe disability significantly increases a child's probability of being fostered. Families thus appear to foster out the most severely disabled children, which would explain why the (milder) disability of children who remain with their biological families does not increase a lot their healthcare expenditures

Conclusion

The aim of this study was to measure the impact of a child's disability on healthcare expenditure on all the children in the household. The overall result obtained is that disability significantly increases healthcare expenditure on the disabled child, compared

with a non-disabled child, but it does not affect healthcare expenditure on the other children living in the household. There is therefore no "rivalry" between disabled and non-disabled children living in the same household in terms of healthcare expenditure, which suggests that adjustments are made on other items of household expenditure. However, when we take into account the child's relationship to the HH , we realise that this result buries a degree of heterogeneity.

Indeed, although, overall, average expenditure is higher for the biological children of the HH, disability of biological children of the head of household is a source of health spending XAF 138 lower compare to disabled foster children, for whom being disabled increases monthly healthcare spending by XAF 684. This difference could be attributed to differences in the characteristics between the two populations of disabled children. The probability of a disabled child being fostered increases significantly (by 18%) with the severity of the disability.

This study nevertheless has some limitations. First, the healthcare expenditure available in the database was that disbursed in the 30 days prior to the survey, which therefore excludes some exceptional disability-related healthcare expenditures by the household, and thus underestimates the actual costs incurred by families with disabled children. Next, it would have been interesting to know about other household expenditure because healthcare is far from being the only source of additional expenditure generated by the disability of a child. Moreover, given that households are not making spending adjustments on healthcare, it would have been interesting to assess the impact of the increase in healthcare expenditure on other items of household expenditure. Lastly, information about household income would have made it possible to evaluate the relative burden of child disability on the family well-being.

However, the present study contributes to the literature in several ways. It measures, for the first time, the impact of the disability of a child on healthcare expenditure on the disabled child and on the siblings of a disabled child. This was made possible by the database used, which contains information about all the children living in the household. Next, the same analyses were performed according to the child's relationship to the HH . This highlights the heterogeneity between fostered disabled children and disabled children living with their biological family. Lastly, this is the first study of its kind in an African developing country. It therefore offers an excellent base for formulating various economic policy recommendations for those countries.

In terms of economic policy, this study suggests that existing policies of free healthcare are not sufficient to offset the increased cost generated by a child's disability in the families concerned; more effort therefore needs to be made in terms of free healthcare provision. The study also shows that free healthcare policies should be shaped in a way to target fostered disabled children, who are more at risk.

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Appendix

Table 7: Two-part model of healthcare expenditure

	(1)				(2)			
	logit		glm		logit		glm	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Disabled	0.749***	(0.157)	0.194	(0.191)	0.535*	(0.319)	0.962***	(0.320)
Biological child of HH	0.314***	(0.074)	0.001	(0.110)	0.304***	(0.076)	0.056	(0.114)
Age	-0.085***	(0.007)	-0.002	(0.008)	-0.085***	(0.007)	-0.003	(0.008)
Boy=1	-0.066	(0.059)	0.003	(0.082)	-0.066	(0.059)	-0.010	(0.083)
Educational level of HH (No education)								
Primary	0.265**	(0.106)	0.168	(0.150)	0.265**	(0.106)	0.138	(0.154)
Secondary or higher	0.513***	(0.112)	0.307**	(0.144)	0.513***	(0.112)	0.263*	(0.147)
Place of residence (Rural)								
Regional capital	0.002	(0.123)	0.220*	(0.129)	0.002	(0.123)	0.215*	(0.129)
Other town	-0.016	(0.107)	-0.102	(0.115)	-0.016	(0.107)	-0.102	(0.115)
Household size	-0.058***	(0.013)	0.010	(0.013)	-0.058***	(0.013)	0.011	(0.013)
Economic well-being (poorest)								
Poor	0.051	(0.122)	0.000	(0.182)	0.051	(0.122)	0.036	(0.180)
Average	0.129	(0.136)	0.142	(0.176)	0.129	(0.136)	0.166	(0.175)
Affluent	0.453***	(0.154)	0.222	(0.188)	0.453***	(0.153)	0.263	(0.188)
Plus Riche	0.451***	(0.163)	0.463**	(0.205)	0.452***	(0.163)	0.515**	(0.205)
Disabled*Biological child of HH					0.290	(0.366)	-1.117***	(0.373)
Severity of illness (Mild)								
Moderate			0.474***	(0.095)			0.482***	(0.095)
Severe			1.143***	(0.113)			1.138***	(0.112)
Health facility (Public)								
Private			-0.027	(0.120)			-0.051	(0.118)
Other			-1.709***	(0.099)			-1.704***	(0.099)
Constant	-2.263***	(0.169)	8.738***	(0.202)	-2.256***	(0.169)	8.706***	(0.199)
Observations			17864				17864	

Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient, SE: cluster robust standard error. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

Table 8: Extended two-part model of healthcare expenditure

	(1)				(2)			
	logit		glm		logit		glm	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Disabled	0.745***	(0.156)	0.197	(0.192)	0.532*	(0.318)	0.970***	(0.320)
Other disabled child	0.059	(0.118)	-0.074	(0.177)	0.058	(0.118)	-0.088	(0.180)
Biological child of HH	0.314***	(0.074)	0.000	(0.110)	0.304***	(0.076)	0.056	(0.113)
Age	-0.085***	(0.007)	-0.002	(0.008)	-0.085***	(0.007)	-0.003	(0.008)
Boy	-0.066	(0.059)	0.004	(0.082)	-0.066	(0.059)	-0.009	(0.083)
Educational level of HH (No education)								
Primary	0.263**	(0.106)	0.175	(0.148)	0.264**	(0.106)	0.146	(0.151)
Secondary or higher	0.512***	(0.112)	0.310**	(0.143)	0.512***	(0.112)	0.266*	(0.146)
Place of residence (Rural)								
Regional capital	0.003	(0.123)	0.220*	(0.129)	0.003	(0.123)	0.215*	(0.129)
Other town	-0.015	(0.107)	-0.101	(0.115)	-0.015	(0.107)	-0.101	(0.114)
Household size	-0.059***	(0.013)	0.011	(0.012)	-0.059***	(0.014)	0.012	(0.012)
Economic well-being (poorest)								
Poor	0.051	(0.122)	-0.002	(0.181)	0.051	(0.122)	0.034	(0.180)
Average	0.130	(0.136)	0.137	(0.175)	0.130	(0.136)	0.161	(0.174)
Affluent	0.454***	(0.154)	0.219	(0.188)	0.453***	(0.153)	0.259	(0.188)
Plus Riche	0.452***	(0.163)	0.458**	(0.203)	0.453***	(0.163)	0.509**	(0.203)
Disabled*Biological child of HH					0.288	(0.366)	-1.125***	(0.371)
Severity of illness (Mild)								
Moderate			0.475***	(0.095)			0.483***	(0.095)
Severe			1.145***	(0.112)			1.140***	(0.112)
Health facility (Public)								
Private			-0.034	(0.118)			-0.060	(0.117)
Other			-1.716***	(0.097)			-1.712***	(0.097)
Constant	-2.263***	(0.169)	8.737***	(0.201)	-2.256***	(0.170)	8.704***	(0.199)
Observations			17864				17864	

Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient, SE: cluster robust standard error. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

Table 9: Extended two-part model of healthcare expenditure on HH's biological children

	Overall				Poor				Affluent			
	logit		glm		logit		glm		logit		glm	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Disabled	0.845***	(0.182)	-0.224	(0.190)	0.600**	(0.258)	-0.608**	(0.287)	1.147***	(0.274)	0.121	(0.236)
Disabled sibling	0.002	(0.155)	-0.089	(0.225)	0.001	(0.194)	0.180	(0.282)	-0.026	(0.264)	-0.354	(0.269)
Age	-0.093***	(0.009)	0.004	(0.009)	-0.095***	(0.012)	0.011	(0.012)	-0.091***	(0.012)	-0.009	(0.011)
Boy	-0.055	(0.070)	-0.119	(0.084)	-0.004	(0.094)	-0.155	(0.113)	-0.117	(0.107)	-0.058	(0.109)
Educational level of HH (No education)												
Primary	0.399***	(0.131)	0.116	(0.157)	0.396***	(0.144)	-0.021	(0.167)	0.460	(0.348)	0.613***	(0.234)
Secondary or higher	0.739***	(0.139)	0.240	(0.164)	0.656***	(0.167)	0.037	(0.193)	0.887***	(0.337)	0.720***	(0.212)
Place of residence (Rural)												
Regional capital	-0.054	(0.141)	0.206	(0.154)	0.023	(0.246)	-0.422*	(0.232)	-0.026	(0.198)	0.422**	(0.180)
Other town	0.050	(0.127)	-0.174	(0.134)	-0.053	(0.177)	-0.164	(0.192)	0.121	(0.202)	-0.043	(0.180)
Household size	-0.041**	(0.017)	0.014	(0.012)	-0.039*	(0.022)	0.023	(0.016)	-0.042*	(0.024)	0.010	(0.015)
Economic well-being (poorest)												
Poor	-0.015	(0.139)	-0.305	(0.186)	0.009	(0.138)	-0.225	(0.171)				
Average	-0.006	(0.154)	0.259	(0.186)	0.044	(0.160)	0.402**	(0.188)				
Affluent	0.351**	(0.175)	0.292	(0.205)								
Plus Riche	0.426**	(0.186)	0.595***	(0.220)					0.061	(0.127)	0.297***	(0.115)
Severity of illness (Mild)												
Moderate			0.431***	(0.100)			0.398***	(0.138)			0.567***	(0.129)
Severe			1.186***	(0.131)			1.120***	(0.178)			1.213***	(0.161)
Health facility (Public)												
Private			-0.151	(0.151)			0.185	(0.253)			-0.475***	(0.163)
Other			-1.834***	(0.102)			-1.762***	(0.136)			-1.932***	(0.143)
Constant	-2.128***	(0.185)	8.895***	(0.215)	-2.132***	(0.223)	8.823***	(0.258)	-1.917***	(0.410)	8.690***	(0.303)
Observations	11811				7906				3905			

Note: Author's calculations based on data from the 2011 DHS-MICS. Coef.: coefficient, SE: cluster robust standard error. * significant at 10%, ** significant at 5%, *** significant at 1%. The variables between parentheses are the reference values.

Table 10: Test of the difference between means of the characteristics of disabled children by relationship to HH

	Mean foster child	Mean biological child	Δ Mean	SE
Serious condition	0.055	0.061	-0.006	0.024
Age	10.466	9.529	0.937**	0.467
Boy	0.521	0.532	-0.012	0.051
Secondary or higher education	0.336	0.35	-0.014	0.049
Large town	0.164	0.161	0.004	0.038
Household size	7.863	7.654	0.209	0.408
Affluent	0.589	0.493	0.096*	0.051
Severely disabled	0.253	0.146	0.107**	0.042
Observations	426			

Note: Author's calculations based on data from the 2011 DHS-MICS. Δ Mean represents the difference between the means or proportion between disabled foster children and disabled biological children of the HH, SE: standard error of the mean differences. * significant at 10%, ** significant at 5%, *** significant at 1%.