Child malnutrition in Democratic Republic of the Congo: How strong is the maternal education effect?

Jacques Be-Ofuriyua EMINA[1] and Ngianga-Bakwin KANDALA[2]

[1] African Population and Health Research Center, Shelter Afrique Centre, Nairobi, Kenya

[2] Clinical Sciences Research Institute, Warwick Medical School, University of Warwick, Coventry, UK.

Correspondence to:

Jacques Be-Ofuriyua EMINA, PhD

African Population and Health Research Center,

Shelter Afrique Centre, Longonot Road,

P.O.Box 10787,

00100 G.P.O. Nairobi – Kenya,

Tel: +254(0)20-27-20-400

Fax: +254(0)20-27-20-380

Email: jemina@aphrc.org

Abstract

Using data from the 2001 DRC-Multiple Indicators Cluster Survey (MICS), this study assesses the effect of maternal education on child malnutrition among under-five children in the Democratic Republic of the Congo (DRC). Findings show that although maternal education is a key variable for child nutritional promotion in DRC, this effect depends on the general context (political stability, household living standard, and general women's education…). These results highlight the role of social context in understanding the impact of maternal education on child health outcomes.

Introduction

Relying on a large body of social science research that demonstrates a strong correlation between maternal education and child health, public policy discourse has increasingly assumed that investing in women's education is a key intervention strategy for promoting child health.

However, in the Democratic Republic of the Congo (DRC), while the proportion of women with a secondary or higher education increased (from 16% in 1984 to 30% in 2001) and that of no-educated women decreased from 50% to 20%, the increases have not been translated to gains in child health. In fact, health indicators among under-five children have got worse or remained stable. Prevalence of wasted rose from 10% in 1995 to 16% in 2001 while prevalence of stunted decrease from 34% in 1995 to 31% in 2001. Likewise, Infant mortality rate rose from 137 per 1000 live births in 1984 to 148 in 1995 (Congo, 2002; Zaire 1996).

The objective of this paper is to assess the impact of maternal education on child malnutrition in DRC, and identify the mediating as well as moderating factors. The first section of this paper describes the theoretical considerations. The second section presents methodology (data and methods of analysis). The third section reports the principal findings of this study and the last section discusses reports and argues the principal findings of this study.

1. Analytical framework

The analysis for this study focuses on three kinds of variables: exposure variable (maternal education level), dependent variable (nutritional status of children); and control variables (province of residence, place of residence (urban or rural), mother's marital status, mother's relationship to the head of household, household Wealth Index). These variables are chosen on the basis of their associations with the likelihood of women's

education and child nutrition status as observed in previous studies in Sub-Saharan Africa (Desai and Alva, 1998; Smith and Haddad, 2000; Pongou et al., 2006a and 2006b).

Malnutrition is defined as having two standard deviations or more below the median weight-for-age (underweight) and/or height-for-age (stunting) and/or weight-for-height (wasting) of the NCHS/CDC/WHO international reference population. This indicator known as *"Classification of Children with Anthropometric failure" (CIAF)* is a composite index of anthropometric failure; and provides a single, aggregated figure of the number of undernourished children in a population (Nandy et al., 2005). This variable distinguishes two categories of children: (1) children who don't suffer from any anthropometric failure; and (2) children who suffer from one anthropometric failure measure (stunting, wasting, and underweight). This variable is coded "yes" or "no" for malnourishment.

Maternal education is defined as the highest level of schooling attended, but not necessary completed. This variable has three categories: no education, primary, and secondary or more.

2. Data and Methods

The data used in this study come from the 2001 DRC Multiple Indicators Cluster Survey (MICS2), a nationally representative investigation of children and women. The sample constitutes 9820 children[1] aged 0-59 months during the survey. It is a representative sample of the whole country. It covered all the 11 provinces, the 28 Districts and all the principal cities (province and territorial capital city). In addition, out of 143 municipalities ("territories"), 128 were included in the sample. The questionnaire was in

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[1] Some time the total is less than 9820 due to missing values.

French although interview was done in local language. Fieldworkers were trained on how to interpret questions in local language.

Evaluation of the completeness and/or heaping or digit preference of child age, child weight and child height (indicators used to calculated child nutritional status), and evaluation the completeness of maternal education and control variables assume that the data used are of good quality. The proportions of missing values for all the keys variables are under 2%. However, there is some tendency to heaping on a number ending in 0 or ending in 5 with reference to child age, child weight and child height although these heaping is not observed at the level of anthropometric indicators (height-for-age, weight-for-age and weight-for-age). Details on sampling, questionnaires, fieldwork operations and evaluation of data quality are reported elsewhere (Congo, 2002; http://www.childinfo.org/mics2_drc.html).

Table 1 displays the distribution of children by mother's education according to the main covariates used in the study. Background characteristics by mother's education, according to the selected control variables, show a higher proportion of children from the most educated women (secondary or higher education) in urban areas, in Kinshasa-capital city capital, among single mothers, and among children living in richest households. By contrast, the proportion of children from the most educated mothers is lower in all provinces under war in 2001 (Equateur, Orientale, Nord-Kivu, Sud-Kivu and Maniema). It might be possible that majority of most educated women with higher socioeconomic status had left these provinces because of war and economic hardship.

[Table 1, about here]

To assess the impact of maternal education on child nutritional status, we use descriptive methods (frequency distribution), chi-square and multivariate analysis based on the Logit Generalized Estimating Equation (GEE) with exchangeable correlation covariance matrix. This method has the ability to produce estimates of regression coefficients and standard errors that are efficient and robust, by accommodating clustering or correlation in data. In fact, data used contain more than one child per household, and/or per woman. These women are clustered within their community and/or province of residence.

3. Results and discussion

3.1 Principal findings

According to the 2001 DRC-MICS data, fifty-two percent of children under five years in the DRC are malnourished (stunted and/or wasted or underweight). Among children who are suffering from anthropometric failure, 48% are suffering from one anthropometric problem, while 52% are suffering from multiple anthropometric failures (figure 1).

[Figure 1, about here]

Children suffering from all anthropometric failure (underweight, stunting, wasting) represent 7% of all children with anthropometric failure, while children suffering from chronic malnutrition (stunting) represented the majority of all children with anthropometric failure.

Consistent with previous studies, analysis by maternal education shows a statistically significant and consistent negative relationship[2] between maternal education and the prevalence of child malnutrition. In fact, the prevalence of malnutrition decreases by around 6 percentage points from mothers with no education to mothers with primary education. Likewise around 12 percentage points separate children whose mother had a primary education and those whose mother had a secondary or higher education (table 2).

[Table 2, about here]

Analysis of the association between maternal education and prevalence of malnutrition among under-five children by selected socio-demographic variables shows globally a negative relationship as observed at bivariate analysis (table 3). Overall highest prevalence of malnutrition is observed among children whose mother is no educated while the lowest prevalence is observed among children of the most educated mothers. However, the effect of maternal education ceases to be significant for children living in Nord-Kivu, Sud-Kivu and Maniema, provinces that have been under war from 1996 to now. Also, considering the household Wealth Index, it appears that the effect of maternal education is significant only in the extremes cases (poor and very rich). The difference is not significant in the intermediate categories (middle and rich).

[Table 3, about here]

Findings from multivariate analysis (table 4) confirm the positive association commonly found in population research between maternal education and child health. Children of educated mothers have a lower probability of being malnourished. However, education differentials observed in Model 1 (after controlling for the province of residence, household living standard) are lower than the effect observed in the unadjusted model. The effect of educational level has been attenuated by the adjustment. In fact, the risk of malnutrition among children from mothers with no education compared with educated mothers is lower (OR:1.10) in the multivariate analysis compared with 2.77 in the

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[2] This negative relationship between maternal education and the CIAF indicator is also observed (not presented in this paper) between maternal education and each anthropometric failure separately (stunting, wasting and underweight).

unadjusted model. Likewise, the risk of malnutrition for children whose mother has had primary education decreases from 1.58 to 1.05 after controlling for mother and household characteristics.

In addition findings show that maternal education affects the impact of some covariates on child nutritional status (table 4, models 2-4). For example, the effect of household' Wealth Index disappears if mothers are uneducated or have only a primary education. Likewise, the impact of province of residence is not significant for children whose mothers have a secondary or higher education.

However, child's age is the most important variable regardless of the model. The risk of malnutrition increases with child's age. The relationship of malnutrition with age indicates a combination of several factors such as breastfeeding, colostrums feeding at birth of child, calendar of initiation of feeding (solid and liquids) to the child. It might be also because of poor or inadequate nutritional patterns during the early childhood when the child's immune system is not sufficiently developed to protect him or her from contamination by bacteria as reported by more previous studies (Larrea and Kawachi, 2005; Kandala, 2006; Kandala et al., 2006a and 2006b).

[Table 4, about here]

Other significant variables associated with children nutritional status regardless of maternal education level are the place of residence (rural or urban) and whether the child had suffered from diarrhoea or not. The risk to be malnourished is higher in rural areas compared with urban areas and among children who had suffered from diarrhoea the last two weeks prior to the survey in the 4 models. In fact, urban infrastructure increases the availability of food as well as drinking water and healthcare, and this may explain the lower prevalence of malnutrition observed in the rural areas regardless of maternal education. Similar findings were reported in Ecuator and in Cameroon (Larrea and Kawachi, 2005; Pongou et al., 2006a).

The effect of diarrhoea passes through dehydration, because during diarrhoea, the body loses water and electrolytes in the form of liquid stool. Diarrhoea may result in a decrease in food intake or nutrient absorption and an increase in nutrient requirements which often combine to cause weight loss and retarded growth. When a child's nutritional status declines, any pre-existing malnutrition becomes worse. In turn, a child with malnutrition can experience diarrhoea that is more severe, more prolonged and more frequent than a non-malnourished child.

3.2. Discussion

In light of this study, it appears that maternal education has a strong and significant effect on child nutritional status in the DRC. None of the control variables were found to be confounders of the association between maternal education and child's nutritional status. In fact, none of them explain fully the variation in the prevalence of child malnutrition by mother's education.

Two factors could explain these findings. First, schooling provides women with knowledge about health issues, increases their power in intra-household decisions, and makes their use of healthcare services more effective. In addition, the most educated women are less exposed to traditional norms with negative effects on health (Reed et al., 1996; Desai and Alva, 1998). Second, the most educated women live in higher socioeconomic households or good environment, and then breakdown logistical, geographical and financial barriers to healthcare utilization. In DRC among children whose mother has a secondary education, 70% live in urban area and 52% in richest households. These proportions correspond respectively to 11% and 3% for children whose mothers are not educated.

However, why does maternal education not have an impact on child nutritional status in Eastern provinces or with children living in households of middle living standards? Three factors could explain these findings. First, the most educated women living in household with higher socioeconomic living standard may have left the conflict province (Nord-

Kivu, Sud-Kivu and Maniema). Second, it is possible that educated mothers fail to realize the full advantage of their education if they live in conflict affected areas and/or lower education clusters. The proportion of children whose mother has secondary education is lower in the three provinces (Nord-Kivu, Sud-Kivu and Maniema). This observation is consistent with the fact that the health facilities and economic devastations brought by conflicts will affect anyone living in these provinces regardless of education level (Pongou et al., 2006a).

> *"In rural areas the absence of such community factors exposes children born to educated and low-educated mothers to similar community poverty (e.g. lack of health care facilities or potable water, seasonal shortages of food, unhygienic environment, etc.)"* (Pongou et al., 2006:654).

In contrast, the lower difference between children of uneducated mothers compared to those of most educated in Kinshasa confirms this effect. This was observed in most developing countries (Desai and Alva, 1998; Smith and Haddad, 2000). In addition, these studies pointed out that the association between maternal education and child nutritional status is especially weak in context where female school enrolment rates are high as it is the case in Kinshasa compared to other provinces.

Third, education had a positive effect in the richer and poorer segments of the population through choices. In fact, in the context of scarce resources or of abundance, maternal education could make a difference by empowering mothers (decision on type of nutrition and/or use of preventive medicine). These findings corroborate those observed in Cameroon (Pongou et al., 2006a) where the advantage associated with maternal education increased during the 1990s crises particularly in urban areas. In fact, urban infrastructure increases the availability of food and health care, and provides potential for improved environmental conditions; and then allows the more educated mothers to have higher access to alternative choices. This may explain why differential trends in malnutrition among children of different maternal educational groups are entirely explained by household socioeconomic factors and geographical factors.

Conclusion

During the past 15 years, the DRC is facing severe under-five malnutrition problems and mortality due to the devastating conflict and socioeconomic crisis. Malnutrition and mortality rates are now amongst the worst in Sub Saharan Africa. While this has been sufficiently documented by humanitarian and non governmental agencies, the reasons behind it are still poorly understood. This paper helped to address this gap by applying the Generalized Estimating Equation (GEE) with exchangeable correlation covariance matrix to household data from the 2001 MICS. This method has the ability to depict the role of mother's educational attainment in improving children nutritional status, taking into account the clustering of children in family, household and conflict/non-conflict affected provinces.

Although this paper identifies mother's educational attainment as a key determinant of child malnutrition in DRC independent of control variables (province of residence, place of residence (urban or rural)) this might not be the whole truth.

First, between 1984 and 2001, increase in proportion of educated women contrasts with proportion of malnourished children at macro-level; while negative association between maternal education and child malnutrition is observed at individual level. Geographical and/or temporal comparisons of the effect of maternal education on child health should be done with caution taking into account the level of analysis (macro, household, mother, or child level).

Second, maternal education does not impact child nutritional status in certain socioeconomic strata among which the conflict affected Eastern provinces and/or intermediate living standards household. Though largely consistent with findings from other malnutrition studies, our results with respect to the conflict Eastern provinces are influenced by many confounding factors related to conflicts such as the lack of food, economic hardship and lack of health care. Actions to promote food security and income

growth and increase access to education should be part of the DRC's post conflict reconstruction programme.

Efforts to achieve the MDG-4 target of reducing child mortality rates by two-third between 1990 and 2015 and post conflict reconstruction should be holistic and comprehensive. Parallel investments in programs aimed at addressing the basic human needs of food, poverty eradication, universal primary education, accessibility to drinking water and healthcare service, and women's empowerment can accelerated the achievement of the MDG-4.

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