



International Journal of Development and Sustainability

Online ISSN: 2168-8662 – www.isdsnet.com/ijds

Volume 2 Number 4 (2013): Pages 2402-2413

ISDS Article ID: IJDS13042303



Special Issue: Development and Sustainability in Africa – Part 3

An analysis of regional inequality in underweight in Nigeria

Sunday Adewara *, Elizabeth Oloni

Department of Economics, University of Ilorin, Nigeria

Abstract

In this paper, we considered change in health inequalities among the six geo-political zones in Nigeria. The two periods of our analysis covered pre and post transition era in the country. Our results confirmed the existence and persistence of within and between regional inequality in being underweight in the country. We also noticed that greater variation in regional inequality in being underweight subsequent to transition political transition in the country in 1999. The regions in the northern part of the country are however worse-off based on our results. We therefore suggest that the federal government should put appropriate policies in place to reduce regional health inequality in the country in order to evenly distribute the benefits of democracy to all citizens.

Keywords: Health inequality, Underweight, Concentration index, Regional, Children

Copyright © 2013 by the Author(s) – Published by ISDS LLC, Japan

International Society for Development and Sustainability (ISDS)

Cite this paper as: Adewara, S. and Oloni, E. (2013), "An analysis of regional inequality in underweight in Nigeria", *International Journal of Development and Sustainability*, Vol. 2 No. 4, pp. 2402-2413.

* Corresponding author. E-mail address: oladewara02@gmail.com

1. Introduction

Inequality in health exists both within and between developing and developed countries across the globe. While previous studies focused on health inequality between countries, studies on within health inequality are rare due to the general aggregate nature of available data. However, recent studies in developed countries show that while between health inequalities may be low; within health inequality may be comparably high and inimical to human capital development. Nigeria is a heterogeneous country and the most populous Black Country in the world with over 160 million people. Regionalism seems to be stronger in the country above nationalism since the colonial era. The first democratic rule was truncated by the military with the sole aim of fighting for regional interest. The subsequent 1967-1970 civil war was primarily due to regional rivalry among the four regions then in the country. In an attempt to break regional interest in the country, the military government further decentralised the country into twelve states which was further gradually increased to 36.

Since the inception of the present democratic rule in the country in 1999, regional political lineage and clamouring has resurfaced. Political offices are distributed not on the basis of merit but rather on the basis of regions. Budgetary allocations and implementations are also based on regional politics and rivalry. The implication of regional politics and policies is that public policies are based on regional manipulations rather than needs. The danger in unhealthy regional politics is that inequality in the country may be increasing both between and within the six geo-political zones under the present democratic rule. In order to promote equity analysis of regional disparity especially in health with the aim of recommending policies to be put in place by the political leaders to reduce regional inequality and indirectly calm the current regional tension in the country is necessary. There are series of accusation of regional marginalisation by the various regions without an empirical evidence to either substantiate or repudiate these accusations.

It is hope that this study will clearly show the level of within and between regional inequality in health in the country with the aim of suggesting measures to ensuring equity for all citizens under the present democratic era.

2. Regionalism and political competition in Nigeria

Nigeria's political history since independence in 1960 has been plagued with ethnic politics, greediness and bitter struggles to gain political power by politicians with the sole aim of controlling government resources for themselves and their associates. Rather than aiming to serve the interests of citizens, politicians aim to enrich themselves and their supporters on assumption of power. Therefore, most of the elections are not credible as various political parties engaged in excessive electoral malpractice and persecution of the opposition (including assassinations) in their main political strongholds. Different tactics, including appeals to religion and ethnicity are often employed to gain political support and blackmail political opponents in the country. In 1960, there were three main political parties in the country, namely: the Northern people's Congress (NPC), the Action Group (AG) and the National Convention of Nigerian Citizens (NCNC). These three

political parties dominated political activities in the Northern region, Western region and Eastern region respectively. In addition, these political parties' membership was predominantly Hausa (NPC), Yoruba (AG) and Ibo (NCNC) ethnic groups, which are the main ethnic groups in the country. As observed by Falola and Matthew (2008), the fear of domination of the country by rival regional groups was one of the main concerns in 1960.

Within the regions, the fear of domination also pervaded the various ethnic groups, so political power was seen as the main source of acquiring power to enrich both selves and associates. Between 1960 and 1965, there were several crises, both within and between the regions, related to politicians with the sole aim of dominating political power for personal benefit (Falola and Matthew, 2008). In the midst of these political crises in the country, the first military coup took place in the early hours of January 15, 1965. The coup plotters claimed they were motivated by the level of corruption and ethnic politics in the country. The politics of grabbing national resources and bitter rivalry under democratic rule, however, persisted under military leadership. Rivalry among the military officers resulted in a civil war that claimed nearly 3 million lives between 1967 and 1970. The discovery of oil gave much hope of better life to citizens. However, the expansion of the petroleum industry did not benefit ordinary citizens much, contrary to all expectations, as the wealth benefited mainly people with access to political power. The military remained in power between 1966 and 1979 after several coups and counter coups by military officers. In 1979, five political parties, the Unity Party of Nigeria (UPN), National Party of Nigeria (NPN), Nigerian Peoples Party (NPP), Great Nigeria People's Party (GNPP) and People's Redemption Party (PRP) were registered and cleared to contest the general elections. Ironically, most of the parties were dominated by the old politicians responsible for the collapse of the first republic. Regional politics still persist in Nigeria till date.

In this paper, we examine the extent of regional inequality in being underweight in Nigeria between 1999 and 2008. Growing interest in health inequality in recent times, as opposed to income inequality measures used in the past, is due to limitations in research using the latter: One major reason for the recent emphasis on health related inequality is that deprivation of capabilities, or the failure of certain basic functioning, is not adequately captured by either income or expenditure data as noted by Sen and Hawthorn (1989) and Pradhan et al. (2003).

3. Definition, methods and measurement of childhood underweight

We used the recently anthropometric measures of underweight scores (Low Weight for Z-Score (WAZ)) of children in Nigeria for our analysis. We are using this method which has been judged in the literature as the most objective measure of health especially as measures of child health (Kabubo-Mariara et al., 2009; WHO-Anthro, 2009; Wagstaff, 2002). This indicator is also suitable for health comparisons across time and location. Data from the Demographic and Health Survey (DHS) on Nigeria also enables us to have access to much needed anthropometric measures of children in 1999 and 2008 in the country.

In this paper, we measure WAZ of children aged 0-36 months in Nigeria in 1999 and 2008 respectively. The 1999 DHS contains information about children below 37 months in the country for the two periods. Thus

we are able to carry out a comparison of child being underweight for the six regions. We focus on the problem of being underweight, which we measure by using negative weight-for-age z-scores of children between ages 0-35 months. Negative z-scores convey important information on the severity of being underweight rather than the probability of whether a child will be underweight. We then multiply the negative z-scores by -1 for the purpose of our analysis, following trends in the literature (O'Donnell, et al., 2008; Wagstaff et al., 2003; Skoufias, 1998). Based on the WHO recommendation, children with z-scores lower than -6 are excluded from our analysis method (Meng et al., 2005; Goesling and Firebaugh, 2004; Pradhan et al., 2003).

For us to be able to measure regional inequality in being underweight between the rich and poor for the two periods, we first use Principal Component Analysis (PCA) to measure households' asset indices, due to the non-availability of income and expenditure information in the DHS dataset. Recent studies show that asset indices derived from PCA are good predictors of health outcomes as well as a good alternative to income and expenditure data (Sahn and Stifel, 2003; Filmer and Pritchett, 2001). The asset index is also used here to group households into five asset quintiles, from the poorest group to the richest group.

4. Measurement of inequality in being underweight using the concentration index

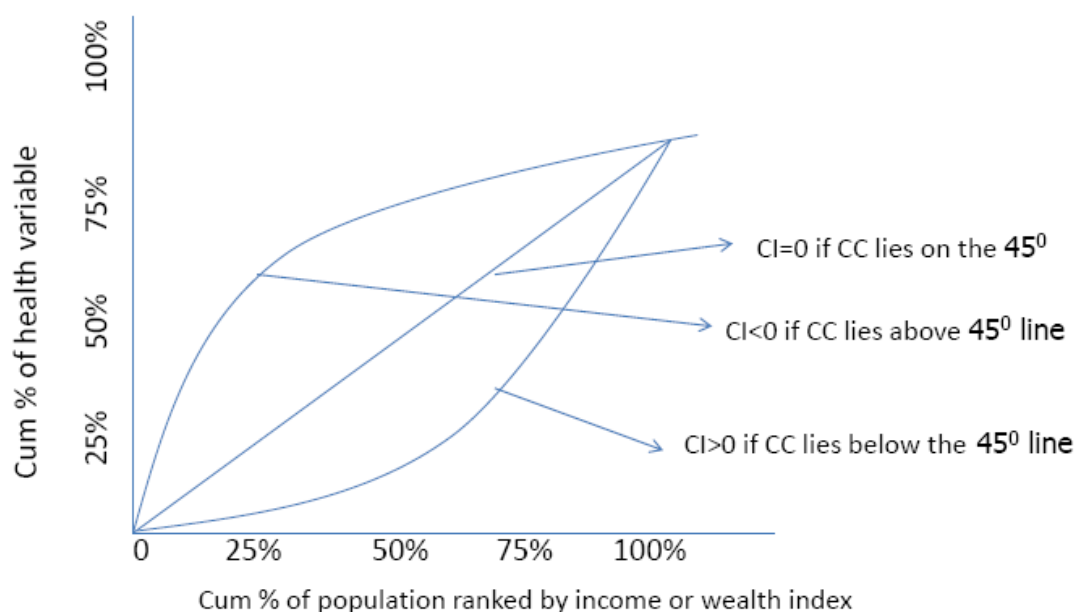
We used concentration indices to determine whether regional inequality exists in being underweight among children aged 0-36 months in Nigeria. This is the first step in our analysis of inequality in being underweight. The Concentration index is twice the area between the concentration curve and the line of equality (O'Donnell et al., 2008). The concentration index is equal to zero at any point along this line, meaning that there is no inequality between the poor and the rich in the distribution of the variable under consideration.

Households are ranked based on their socioeconomic status, and the concentration index is then computed to determine the group where the health variable of interest is severe, the variable in our case being underweight. If being underweight is severe amongst the poor, the index takes a negative value but if being underweight is severe amongst the rich, the index value is positive. Because being underweight is an indicator of ill health, a negative value of the concentration index means that ill health is severe or intense amongst the poor. If there is no inequality in the health variable under consideration, the index will be equal to zero. If the index is positive, then the variable under consideration is prevalent amongst the rich. A comparison of the concentration index between the two periods will show whether inequality in ill health between the poor and the rich has been reduced or become worse. We used the well known Kakwani et al. (1997) method to compute inequality in being underweight, in 1999 and 2008 respectively. The index is given as;

$$C = \frac{2}{\mu} \sum y_i R_i - 1 \quad (1)$$

where; C is the concentration index, which is a measure of relative inequality, like the Gini coefficient. μ is the mean of y, y is the health variable. R is the fractional rank of the ith person in the income distribution.

In the illustrated graph in Figure 1, below, the 45° line is the line of equity between the poor and the rich. The concentration index is equal to zero at any point along this line, meaning that there is no inequality between the poor and the rich in the distribution of the variable under consideration. If the curve lies above the line, the variable is concentrated amongst the poor and the value of the index will be negative.



CI denotes concentration index while CC represents concentration curve

Figure 1. Graphical Illustration of the Concentration Index

On the other hand, if the curve lies below the line, then the variable is concentrated amongst the rich and the value of the concentration index in this case will be positive. Households are ranked based on their socioeconomic status, and the concentration index is then computed to determine the group where the health variable of interest is severe, the variable in our case being incidences of stunting and being underweight. If stunting or being underweight is severe amongst the poor, the index takes a negative value but if stunting and being underweight is severe amongst the rich, the index value is positive. Because stunting and being underweight are indicators of ill health, a negative value of the concentration index means that ill health is severe or intense amongst the poor. If there is no inequality in the health variable under consideration, the index will be equal to zero. If the index is positive, then the variable under consideration is prevalent amongst the rich. A comparison of the concentration index between the two regimes will show whether inequality in ill health between the poor and the rich has been reduced or become worse.

Therefore, doubling of the score for every individual's health does not affect the concentration index but rather leaves the index unchanged. The concentration index value is bounded between -1 and 1. We used DHS datasets on Nigeria for 1999 and 2008 to measure all relevant variables for our analysis. Age of the child was measured in months from 0-35 months old. We limit our analysis to 36 months for easy comparison, because the 1999 survey only measured children aged 0-35 months.

5. Presentation and analysis of results

Table1 presents summary statistics of national being underweight by quintile in 1999 and 2008 respectively. The figures indicate that in the poorest quintile mean being underweight was higher than in the richest quintiles.

In the case of being underweight as presented in Table1 in 1999, that is, when the country was under military rule, the poorest and the poor quintiles had the highest mean underweight scores of 2.32 and 2.06 respectively. In the same year, mean underweight scores for the middle, rich and the richest quintiles were 1.86, 1.76 and 1.67 respectively. In 2008, mean underweight scores for children ages 0-35 months was reduced in all the quintiles, but the rich and the richest benefited the most in this regard. Mean underweight scores for the rich and the richest quintiles, was reduced by 12.3 and 16.8 respectively, compared to a 0.5 and 5.6 reductions in mean underweight scores for children in the poor and poorest quintiles. The mean underweight scores remained unchanged between 1999 and 2008 for the middle quintile. Our summary statistics in Table1 clearly show that the problem of stunting and being underweight are severe amongst the poor in 1999 and in 2008.

Table 1. Summary statistics of children Being Underweight in Nigeria

Quintiles	1999		2008		
	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
Poorest	2.32	1.63	2.19	1.39	-5.6
Poor	2.06	1.43	2.05	1.41	-0.5
Middle	1.86	1.39	1.86	1.33	0
Rich	1.79	1.27	1.57	1.16	-12.3
Richest	1.67	1.37	1.39	1.13	-16.8
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

At the regional levels in Table 2, mean underweight was higher in the poorest household in the North Central (NC) region in both 1999 and 2008. We however noticed that national mean being underweight was higher than the region mean being underweight for the two periods. While there was an increase of about 7.2 and 12.5 per cent in mean being underweight in the poorest and the poor households respectively in the region, there was a decrease of about 14.8 and 4.3 per cent respectively in the rich and the richest

households within the same periods. The results indicate that standard of living was better for the rich within 1999 and 2008 but worse-off for the poor in the region.

Table 2. Summary statistics of Being Underweight in the North Central for 1999 and 2008

Quintiles	1999		2008		
	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
poorest	1.80	1.17	1.93	1.5	7.2
Poor	1.60	1.22	1.80	1.4	12.5
middle	1.56	1.17	1.65	1.3	5.8
Rich	1.69	1.30	1.44	1.2	-14.8
richest	1.39	1.05	1.33	1.16	-4.3
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

In Table3, the mean being underweight in the North Eastern (NE) region was worse compared to the national and the North Central mean underweight in 1999 and 2008. Mean underweight was higher than 2 in all the five quintiles in 1999 in the region. Though mean underweight in the region was still high in 2008, the incidence was however reduced in all the quintiles with the exception of middle group. From the table, mean underweight reduced by 17.2, 16.7, 16.7 and 17.2 in poorest, poor, rich and richest households respectively in the region between 1999 and 2008.

Table 3. Summary statistics of Being Underweight in the North East for 1999 and 2008

Quintiles	1999		2008		
	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
poorest	2.50	1.60	2.07	1.29	-17.2
Poor	2.51	1.64	2.09	1.32	-16.7
middle	2.01	1.50	2.10	1.32	4.5
Rich	2.27	1.48	1.89	1.14	-16.7
richest	2.04	1.52	1.69	1.17	-17.2
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

From Table 4, the rate of being underweight in North Western (NW) region was higher than the national mean underweight for the periods of our analysis. The mean being underweight for the poorest at 2.55 and 2.49 are the highest in the country in 1999 and 2008. Noticeable reduction in mean being underweight was recorded in the middle, rich and the richest quintiles at 4.2, 12 and 5.1 per cent respectively between 1999 and 2008.

In the South Eastern (SE) zone in Table 5, children in the poorest quintile are worse-off between 1999 and 2008. Mean underweight rose from 1.39 to 1.6 which is about 15.1 per cent increase within the two periods.

However, children in the other quintiles are better-off within the two periods. Mean underweight reduced by 15.8, 5.5, 29.6 and 29.3 in the poor, middle, rich and richest quintiles respectively.

Table 4. Summary statistics of Being Underweight in the North West for 1999 and 2008

1999			2008		
Quintiles	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
poorest	2.55	1.80	2.49	1.48	-2.4
Poor	2.19	1.31	2.40	1.5	9.6
middle	2.36	1.57	2.26	1.43	-4.2
Rich	2.25	1.47	1.98	1.27	-12
richest	1.98	1.81	1.88	1.30	-5.1
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

Table 5. Summary statistics of Being Underweight in the South East for 1999 and 2008

1999			2008		
Quintiles	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
poorest	1.39	1.13	1.60	1.18	15.1
Poor	1.52	1.29	1.28	1.09	-15.8
middle	1.45	1.11	1.37	1.09	-5.5
Rich	1.86	1.01	1.31	1.09	-29.6
richest	1.64	1.63	1.16	1.01	-29.3
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

In Table 6, mean being underweight in the South-South (SS) region reduced between 1999 and 2008 for children in the poor, middle, rich and the richest quintiles. However, the richest quintile recorded highest reduction of about 29.1 per cent within the period. On the other hand, children in the poorest quintile are marginally worse-off by about 3.1 per cent increase in their mean being underweight.

Table 6. Summary statistics of Being Underweight in the South-South for 1999 and 2008

1999			2008		
Quintiles	mean underweight	standard deviation	mean underweight	standard deviation	%Δ
poorest	1.60	1.37	1.65	1.19	3.1
Poor	1.82	1.37	1.47	1.18	-19.2
middle	1.46	1.01	1.28	1.05	-12.3
Rich	1.69	1.31	1.41	1.04	-16.6
richest	1.65	1.47	1.17	0.98	-29.1
%Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

From Table 7, all children in the South West (SW) region are better-off between 1999 and 2008. Mean being underweight in the region reduced by 34.8, 4.2, 23.8, 12 and 26.3 per cent respectively in the poorest, poor, middle, rich and richest quintiles respectively within the two periods. It is very important to also note that children in the poorest quintile benefited most from the reduction in being underweight in this region compared to children in other five regions in the country.

Table 7. Summary statistics of Being Underweight in the South West for 1999 and 2008

Quintiles	1999		2008		
	mean underweight	standard deviation	mean underweight	standard deviation	% Δ
poorest	2.21	1.73	1.44	0.97	-34.8
Poor	1.65	1.08	1.58	1.15	-4.2
middle	1.93	1.43	1.47	0.97	-23.8
Rich	1.50	0.94	1.32	0.02	-12
richest	1.56	1.14	1.15	0.94	-26.3
% Δ is the percentage quintiles' change in being underweight between 1999 and 2008					

6. Regional concentration indices of being underweight in Nigeria

The use of a concentration index is more appropriate for a better understanding of socioeconomic inequality in being underweight between two periods. In this section we present our analysis and comparison of inequality in being underweight for children below the age of 36 months in Nigeria for the years 1999 and 2008. As earlier explained, when the value of the concentration index is positive, being underweight is severe or prevalent amongst the rich but when it is negative it is more severe amongst the poor. Note also that the value of the index lies between 1 and -1. The closer the concentration index is to zero, the lower the inequality in the variable under consideration. Understanding this relationship is crucial to an understanding of our analysis of inequality in being underweight as presented in the rest of this paper.

There was a considerable variation in the prevalence and changes in our measure of malnutrition, that is, being underweight among children in the six geo-political zones in the Country. From our analysis of the concentration index shown in table 8, childhood being underweight in the country was disproportionately concentrated amongst children living in poor households in 1999 and 2008. The results indicate that children in poor households were worse-off in the first ten years of democratic rule in the country. Inequality in children being underweight rose by 20.9 per cent or from -0.067 in 1999 to a peak of -0.081 in 2008. Our measure of malnutrition shows that the gap between rich and poor still persists in the country, as indicated by the increase in the severity of childhood being underweight amongst the poor households.

The six regions vary in terms of pre-colonial traditions, post colonial political ideologies, religion and in natural resources endowment. As shown in Table 8, in the North Central (NC) geo-political zone, socioeconomic inequality in being underweight rose by 250 per cent in poor households from -0.02 in 1999

to -0.07 in 2008. Therefore, the poor are worse-off in the NC zone between 1999 and 2008. In addition, incidence of being underweight was 250 per cent higher in the poor households in 2008 than rich households in comparison with 1999 figures.

The situation in the North West (NW) geo-political zone was mixed for the poor. In addition, inequality in the concentration of being underweight was higher among the poor by 66.7 per cent from -0.03 in 1999 to -0.05 in 2008. It is very important to emphasise that malnutrition still concentrated amongst poor households in the NW zone in 2008.

Table 8. Concentration Indices of Being Underweight by regions in Nigeria

Underweight inequality			
Regions	1999	2008	%Δ
National CI	-0.067	-0.081	20.9
	(0.011)	(0.004)	
North central CI	-0.02	-0.07	250
	(0.026)	(0.01)	
North east CI	-0.04	-0.02	-50
	(0.017)	(0.007)	
North west CI	-0.03	-0.05	66.7
	(0.024)	(0.006)	
South east CI	0.05	-0.05	200
	(0.045)	(0.017)	
South south CI	0.00	-0.05	5
	(0.035)	(0.014)	
South west CI	-0.05	-0.07	40
	(0.026)	(0.01)	
%Δ is the percentage change in inequality while the standard errors of the concentration indices are in parentheses			

In the South East (SE) geo-political zone, inequality in the distribution of being underweight rose by 200 per cent between 1999 and 2008, to the disadvantage of poor households. In the South-South (SS) geo-political zone, inequality in the incidence of being underweight rose by 5 per cent, to the disadvantage of poor children.

Lastly, in the South West (SW) geo-political zone, inequality in the incidence of being underweight rose by 40 per cent, from -0.05 in 1999 to -0.07 in 2008, to the disadvantage of poor children. As at 2008, inequalities in being underweight therefore, concentrated in poor households in all six geo-political zones in the country. However, the highest inequality in being underweight was jointly shared by the North Central and South West geo-political zones.

7. Conclusion

We have considered regional inequality in being underweight in Nigeria in this paper. Our results confirmed the existence of both within and between regional variations in inequality in being underweight both from our descriptive and concentration index analysis. The three zones in the northern part of the countries have high incidences of being underweight from our study. This is a clear confirmation of inequality in the country and an increasing tension within the polity. Already, there are cases of violence and terrorists attacks in the region which many claimed to be an extreme response of the citizens to the increasing gap between the rich and the poor in the northern part of the country.

Our study empirically shows that regional inequality is a real problem in the country. To reduce the continuous clamour for regional autonomy and possible disintegration of the country, it is necessary for the federal government to put policies in place to address regional inequality in the country in order to reduce tension and bitter rivalry amongst the six geo-political regions in Nigeria.

References

- Falola, T. and Heaton M.M. (2008), *A History of Nigeria*, Cambridge University Press, UK.
- Filmer, D. and Pritchett L.H. (2001), "Estimating Wealth Effects without Expenditure Data or Tears: An Application to Education Enrolments in States of India", *Demography*, Vol. 38 No.1, pp. 115-32.
- Goesling, B. and Firebaugh G. (2004), "The trend in international health inequality," *Population and Development Review*, Vol. 30 No. 1, pp. 131-146.
- Kabubo-Mariara, J., Ndenge, G.K. and Mwabu D.K. (2009), "Determinants of Children's Nutritional Status in Kenya: Evidence from Demographic and Health Surveys", *Journal of African Economies*, Vol. 8 No.3, pp. 363-387.
- Kakwani, N.C., Wagstaff, A. and van Doorslaer, E.(1997), "Socioeconomic Inequalities in Health: Measurement, Computation and Statistical Inference", *Journal of Econometrics*, Vol. 77 No.1, pp.87-104.
- Meng, X., Xin, M. and Qian, N. (2005), "The Long Run Health and Economic Consequences of Famine on Survivors: Evidence from China's Great Famine," *Yale University Working Paper*, 2005.
- O'Donnell, O., van Doorslaer, E., Wagstaff, A. and Lindelow, M. (2008), *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation*, *World Bank*, Washington, D.C.
- Pradhan, M., D.E. Sahn, and S.D. Younger (2003), "Decomposing world health inequality", *Journal of Health Economics*, Vol. 22 No. 2, pp. 271-293
- Sahn, D.E. (2003), "Urban-Rural Inequality in Living Standards in Africa", *Journal of African Economies*, Vol.12, pp. 564-97.
- Sen, A. (2002), "Why health equity?", *Health Economics*, Vol.11 No.8, pp. 659-666
- Skoufias, E. (1998), "Determinants of Child Health during the Economic Transition in Romania", *World Development*, Vol. 26 No.11, pp. 2045-56.

Wagstaff, A, (2002), "Inequalities in health in developing countries - swimming against the tide", Working Paper, Policy Research, No. 2795, World Bank, Washington, D.C., 2002.

Wagstaff, A., van Doorslaer, E. and Watanabe, N. (2003), "On Decomposing the Causes of Health Sector Inequalities, with an Application to Malnutrition Inequalities in Vietnam", *Journal of Econometrics*, Vol. 112 No.1, pp. 219-27.

WHO-Anthro (2009), "The WHO Anthro software for PC: Child Growth Standard", <http://www.who.int/childgrowth/software/en/>(Accessed in January, 2010).