Chronic Poverty
Research Centre

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Growth incidence analysis for non-income welfare indicators: evidence from Ghana and Uganda

Edward Anderson

What is Chronic Poverty?

The distinguishing feature of chronic poverty is extended duration in absolute poverty.

Therefore, chronically poor people always, or usually, live below a poverty line, which is normally defined in terms of a money indicator (e.g. consumption, income, etc.), but could also be defined in terms of wider or subjective aspects of deprivation.

This is different from the transitorily poor, who move in and out of poverty, or only occasionally fall below the poverty line.

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Growth incidence analysis involves calculating the amount of growth in some welfare-indicator (e.g. income, life expectancy) at each quantile (e.g. quartile, decile, or percentile) of the distribution of that indicator. This information, and its graphical representation in the form of a growth incidence curve (GIC), gives a much fuller picture of changes in social welfare and poverty over any given period than can be provided by a single figure, such as the rate of per capita income growth, or the reduction in the poverty headcount. However, although it is now widely accepted that welfare and poverty are multi-dimensional, and cannot be reflected accurately by any one single indicator, the vast majority of GICs calculated to date have been based on growth rates in income (or expenditure).

This paper begins filling this gap by providing estimates of GICs for non-income welfare indicators in Ghana and Uganda. The main practical difficulty is that most of such indicators found in standard household surveys are discrete, as opposed to continuous, variables – i.e. their values are limited to a fixed number of categories (e.g. good, poor), rather than a very large number (e.g. units of local currency). This limits the range of values the GIC can take; in the extreme, it limits it to one of only two values: growth or no growth. The best way to address this problem is by expanding and improving the coverage of non-income welfare indicators in standard household surveys. This will require an initial 'bench-marking' exercise to establish best-practice and standardise as much as possible across surveys in different countries. In the meantime, an alternative approach is to calculate so-called 'conditional' GICs, which involves calculating the growth in non-income indicators among different groups of the population ranked by income (or expenditure).

From the household surveys for Ghana and Uganda in 1992 and 1999 it was possible to construct nine non-income welfare indicators, in the dimensions of education, health, household amenities (e.g. use of drinking water, sanitation and electricity), and household assets. The results show some significant and important differences across income and non-income welfare indicators, both in terms of aggregate trends and distributional patterns. In Ghana, despite relatively low rates of income growth at the lower end of the income distribution, there have been significant improvements and catching up in other non-income indicators, such as primary school enrolment, use of good drinking water, and the value of assets owned (in proportional if not always in absolute terms). In Uganda, despite reasonably high rates of income growth, particularly at the lower end of the income distribution, there has been a deterioration of other non-income indicators.

Overall, the analysis cautions against over-reliance on purely income-based measures of poverty and welfare. It also suggests the need to consider ways in which potential trade-offs between income and non-income welfare indicators can be incorporated into policy analysis.

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1 Introduction

Recent years have seen a re-emergence of debate about the distributional pattern of growth. Researchers and policy-makers are once again looking beyond the question of whether or not there has been growth in any particular context *on average*, to whether rates of growth has been higher for some members of society rather than others, and indeed to whether some members of society have failed to reap any growth at all. Some are particularly concerned with rates of progress for the 'poorest' or even the 'very poorest' – defined, for example, as the lowest 10% or 20% of the income distribution or poverty headcount, or as those households living below an extreme poverty line (e.g. 0.75 cents per day in 1993 US$ PPP).

One methodological innovation stemming from this debate has been the 'growth-incidence curve' (GIC). This is a line showing the growth in some welfare-indicator (e.g. income, life expectancy) at each quantile (e.g. percentile) of the distribution of that indicator. Two examples are shown in Figures 1 and 2, in which the welfare indicator is household expenditure per equivalent adult.

The great advantage of a GIC is that it allows one to assess the desirability of changes in a given welfare indicator under a variety of different normative approaches. The growth in the average value of a particular indicator will indicate the direction and magnitude of the change in social welfare (assuming other indicators remain constant) only if one is using a *utilitarian* approach (in which utility to gains/losses to all individuals are weighted equally), and under certain quite specific assumptions about the relationship between the observed indicator and unobserved welfare. By contrast, a GIC can indicate the direction and magnitude of social welfare if one is using a broader *welfarist* approach, in which case the change in social welfare is inferred from a weighted average of the growth at each quantile of the indicator. It can also indicate the direction and magnitude when using a *Rawlsian* approach, in which case the change in social welfare is inferred form the amount of growth at the lowest quantile.

A GIC can also be used to be used to calculate the mean rate of growth of the poor, which is the 'absolute' definition of pro-poor growth proposed by Ravallion and Chen (2003). A government or donor seeking to alleviate or eradicate poverty might justifiably consider this definition of the rate of pro-poor growth to be the ultimate yardstick by which policy interventions should be judged. The reason is that the mean rate of growth of the poor is equal to the rate of reduction in the Watts poverty index. Of all the various ways of measuring poverty (e.g. poverty headcount, poverty gap, squared poverty gap), the Watts index has been shown to have the largest number of desirable characteristics.

GICs for income (or consumption) have now been documented for several countries. An early example was provided by Ravallion and Chen (2001) for China. More recently, income GICs have been documented for 14 countries as part of the recent multi-donor Operationalising Pro-Poor Growth (OPPG) study. GICs for non-income

indicators are much less common. In part this reflects methodological and data issues, discussed further below, which can make their calculation more difficult than income GICs. Nevertheless, the case for looking at the incidence of growth in non-income indicators is strong (OECD-DAC, 2004). The fundamental reason is the view – by now, generally accepted – that well-being and poverty are multi-dimensional concepts, and cannot be measured adequately by a single indicator. The acceptance of this view is reflected in policy-statements of major donor organisations (see, for example World Bank (2000) and OECD-DAC (2001)). It is also reflected in the Millennium Development Goals, which set targets for several different welfare indicators rather than just one.[1]

Some non-income measures also have more specific advantages over income as welfare indicators. Measures of educational-attainment or health status, for example, typically allow one to say more about differences in well-being or poverty within the household than measures of income or consumption. The latter are typically measured at the household level only, and even if some components of income (e.g. wage income) are measured separately by individual it is difficult to know to what extent any one member's income translates into their own well-being. This reinforces the argument for looking at non-income as well as income GICs.

This paper adds to the debate by calculating GICs for various non-income indicators in Uganda and Ghana. In each case the analysis relates to the period 1992-2000, and the calculations are based on the analysis of unit-record household survey data relating to the start and end-year. The paper first describes the methods used in the paper (Section 2), then the non-income welfare indicators available in the Ghanaian and Ugandan household surveys (Section 3), followed by the presentation of results (Section 4) and discussion of conclusions and implications (Section 5).

[1] The shift towards a multi-dimensional view of well-being and poverty owes much to the writings of Amartya Sen (see, for example, Sen 1992, 1998).

2 Methods

There are two main steps to estimating a GIC. The first involves calculating in each year a set of *n* 'quantiles' for the welfare indicator. A quantile is a value of the welfare indicator corresponding to a certain proportion of the sampled households which have values of the welfare indicator below that value. If, for instance, *n* is set equal to 100 (in which case the quantiles are typically referred to as percentiles), 1% of households have values of the welfare indicator below the first quantile/percentile, 10% of households have values of the indicator below the 10th quantile/percentile, and so on.

The second step involves calculating the growth in the indicator between the two years for each of the *n* quantiles. This can be expressed either in absolute terms, by simply subtracting the level of the indicator in the initial year from its level in the subsequent year, or in relative terms, by dividing the absolute difference by the level of the indicator in the initial year. The GIC is then obtained by simply plotting the growth between the two years at each quantile. GICs constructed in this way show two main pieces of information:

1. The growth in the indicator at each quantile of the indicator's distribution. This is represented by the distance of the GIC above zero at each point along the x-axis. The growth in the median value of the indicator is given by the distance of the GIC above zero at the central quantile/point along the x-axis (e.g. the 50th percentile, or the 5th decile).

2. Whether the distribution of the indicator across households is becoming more or less equal. This is represented by the slope of the GIC. If the GIC is everywhere upward sloping, the distribution is becoming more unequal, while if it is everywhere downward sloping the distribution is becoming more equal. If the GIC is everywhere flat, the amount of inequality in the distribution is not changing. The GIC may of course have some downward-sloping and some upward-sloping segments, indicating that some parts of the distribution of the indicator are becoming more unequal while others are becoming more equal.[2]

Two things GICs do not show are:

3. The growth in the mean value of the indicator. One can calculate the mean rate of growth at each of the *n* quantiles, but this will not in general correspond to the growth rate in the mean value. To give an example, a GIC for income will not show the growth rate in per capita income (although it will show the growth rate in median income).

[2] In this case, whether the 'overall' amount of inequality in the distribution rises or falls will depend on the way in which 'overall' inequality is measured. The Gini coefficient is the most common such way but it is in fact only one of many.

4. The growth in the indicator for a specific group of households, e.g. the 10 or 20 per cent of households with the lowest value of the indicator *in the initial year*. One can calculate the growth of the indicator for the households with the lowest value of the indicator *in each year*, but in general these will be different households.[3]

In theory, GICs can be calculated for income and non-income welfare indicators alike. Their calculation for the latter is complicated however, by the fact that non-income welfare indicators are typically measured on a discrete rather a continuous basis (discussed further in Section 3). For instance, many household surveys document the type of drinking water source a household uses: piped water, a public standpipe, a river or stream, and so on. Many (although not all) of these can be aggregated into discrete categories ranked by quality, such as 'good', 'adequate', and 'poor'. However, few household surveys document the exact quantity or quality of the drinking water consumed by the household, because both are difficult if not impossible to observe.

For discrete welfare indicators, each quantile can take only a limited number of values (the maximum being the number of categories underlying the discrete variable). This in turn limits the number of values that the GIC can take. In the extreme (although common) case, in which the welfare indicator can take one of only two values (e.g. enrolled or not enrolled in primary school), the GIC can only take one of two values. It is fair to say that in such cases, the advantages and/or insights gained from the use of a GIC discussed in the introduction are substantially reduced.

The best way of addressing this problem is of course to monitor, improve and expand the coverage of non-income welfare indicators in household surveys. However, an additional procedure has been proposed for calculating GICs for non-income welfare indicators which can take only a limited number of values (OECD-DAC, 2004). This involves three steps.

- The first is to divide households into *n* equal-sized groups, based on their level of income.
- The second step is to calculate the mean value of the non-income welfare indicator for each of the *n* groups.
- The final step is to calculate the growth of the indicator between the two years for each of the *n* groups.

The curve obtained by plotting the growth for each of the *n* income groups has been referred to by OECD-DAC (2004) as a 'conditional' GIC. These are distinguished

[3] This is the case even when using panel data, i.e. when the same households are included in the survey in both the initial and subsequent year. The reason is 'churning': households' positions in the distribution of a given welfare indicator tend to change over time. The amount of churning varies across countries and over time however.

from ‘unconditional’ GICs, which are calculated using the standard method described above.

It is important to recognise that conditional and unconditional GICs for non-income welfare indicators show similar but not identical information. As outlined above, ‘unconditional’ GICs show the growth in the indicator at each quantile of the indicator’s distribution, and whether the distribution of the indicator is becoming more or less equal (and if so where). By contrast, conditional GICs simply show the growth in a non-income welfare indicator at each quantile of the income distribution. Both sorts of information are of interest, although for different reasons. Unconditional GICs are of interest because of the multi-dimensionality of welfare and poverty referred to above. Conditional GICs are of interest because, even if one accepts that income is a sufficiently accurate indicator of well-being and poverty, one might well regard increases in non-income welfare indicators for lower income groups as being more important, from the point of view of social welfare, than increases for higher income groups.

3 Data

This section describes the non-income welfare indicators which are available in the Ghanaian and Ugandan national household surveys and which are used to construct conditional and unconditional GICs shown in the next section. These indicators fall under four main headings: education, health, household amenities (including water, sanitation, electricity, housing conditions), and household assets.

3.1 Education indicators

Education is a well-known and widely used non-income welfare indicator. Two sorts of information are available in the survey on education. The first is educational attainments. In each country the surveys provide information on the highest level of schooling acquired by each household member. On this basis we construct two indicators:

- a dummy variable equal to one if an individual has completed a primary education, and zero otherwise;
- the number of completed years of schooling achieved by each individual.

The first of these indicators is calculated for both countries, but the second is calculated for Uganda only, owing to a lack of information in the 4th (although not the 3rd) Ghanaian household survey on years of completed schooling. In each case we restrict attention to children aged 13-18 (inclusive).

The second type of information on education relates to enrolment in education. Both surveys also provide information on whether children are currently attending school and, if not, the reasons why. With this information we construct a third indicator:

- a dummy variable equal to one if an individual is attending primary school, and zero otherwise.

This indicator is calculated for both countries. In this case we restrict attention to children of primary-school age, which we define as being between 5 and 12 (inclusive).

3.2 Health

Health is another well-known and widely used non-income welfare indicator. Unfortunately however, only a small number of health indicators can be calculated from the Ghanaian and Ugandan household surveys. Data on child mortality are unavailable in each survey; although each questionnaire asks how many children born to the households are still alive today, the age of any children who have died is

not recorded. Information on so-called 'anthropometric' measures of child health (e.g. weight-for-age and height-for-age ratios) is also unavailable, being typically contained in specific Demographic and Health Surveys only.

However, both surveys in each country do provide information on child vaccinations. Information on the type of vaccinations – DPT, polio, measles, and/or BCG – is available in both surveys in Uganda, and in the first but not the second survey in Ghana, which documents only whether any vaccination has been received.[4] We use this information to construct a fourth welfare indicator, namely:

- a dummy variable equal to one if a child has been vaccinated, and zero otherwise.

In this case we restrict attention to children below 5 years of age, which is the age up to which vaccination information is recorded in the Ugandan surveys.

3.3 Household amenities

Each survey in each country contains information on the various types of household amenities. The first is source of drinking water (see Table 1). The Ghanaian survey asks which of the 12 types of water sources is used mainly by the household, and the same categories are used in each survey. The Ugandan survey asks which of 10 categories are used, but unfortunately the categories in each survey are not entirely compatible: in IHS92 'spring' is included with river and lakes, while in UNHS it is included with wells. Neither the Ghanaian or the Ugandan surveys allow us to say households are using 'improved' and 'unimproved' water sources, as defined by the WHO and included as target indicators in the MDGs.[5] Instead, we provide our own definition of 'good quality' and 'poor quality' water sources, which are as shown in Table 1. This allows us to construct the following welfare indicator:

- a dummy variable equal to one if the household is using a good drinking water source, and zero otherwise.

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[4] In the 4th round of the GLSS asks the question: "were any of these vaccinations [DPT, polio, measles and/or BCG] given to NAME during the past 12 months?", but not "does NAME have the following vaccinations". The 3rd round of the GLSS asks both questions.

[5] 'Improved' water supply technologies are: household connection, public standpipe, borehole, protected dug well, protected spring, and rainwater collection; 'unimproved' are: unprotected well, unprotected spring, vendor-provided water, bottled water (based on concerns about the quantity of supplied water, not concerns over the water quality), and tanker truck-provided water. It is assumed that if the user has access to an 'improved source' then such source would be likely to provide 20 litres per capita per day at a distance no longer than 1000 metres. This hypothesis is being tested through National Health Surveys which are being conducted by WHO in 70 countries. (Communication of 25 March 2003 from the WHO Water, Sanitation and Health Programme). (Downloaded from: http://millenniumindicators.un.org/unsd/mi/mi_dict_xrxx.asp?def_code=248).

For Ghana, information is also provided on the distance of the household from its main water source.[6] This allows us to construct another indicator, namely:

- the distance of a household from its main source of drinking water, in kilometres.

The UNHS also asks how far the drinking source is from the dwelling, both currently and in 1992, but the latter information is only provided for a small number of households and we do not therefore analyse this information here.

The second type of amenity for which is information is available is sanitation source. The categories listed in each survey are shown in Table 2. Again neither the Ghanaian nor the Ugandan surveys allows us to say whether households are using 'improved' or 'unimproved' sanitation sources as defined by the WHO and used as target indicator for the MDGs.[7] Once again therefore we use our own definition, which is to define good sanitation source in each country as either a flush toilet or a KVIP. This allows us to construct the following welfare indicator:

- a dummy variable equal to one if the household is using a good sanitation source, and zero otherwise.

The third type of amenity for which information is available is lighting source. The categories contained in the GLSS surveys are: mains electricity, generator, kerosene/gas lamp, and candles/torches. The categories listed in the Ugandan surveys are mains electricity, generator, paraffin/kerosene lamp, candles, tadooba (kerosene candle lamp), and others. Based on this information we construct our eighth non-income welfare indicator as:

- a dummy variable equal to one if the household uses mains electricity, and zero otherwise.

Each survey also contains information about the type of dwelling inhabited by each household: the type of construction materials, tenancy status, number of rooms, and so on. There are various ways in which one might construct welfare indicators from this information, but the one we choose is:

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[6] This is recorded for the following types of water source: well with pump, well without pump, river/lake/spring/pond, and other. The proportion of all households using one of these sources was 63% in 1992 and 58% in 2000. For other households we used an imputed value of zero. This is justifiable, with the exception of households using a public standpipe, which could be located far from the household but no information on distance is recorded in the GLSS.

[7] 'Improved' sanitation technologies are: connection to a public sewer, connection to septic system, pour-flush latrine, simple pit latrine, ventilated improved pit latrine. The excreta disposal system is considered adequate if it is private or shared (but not public) and if hygienically separates human excreta from human contact. 'Unimproved' are: service or bucket latrines (where excreta are manually removed), public latrines, latrines with an open pit.

- the number of rooms in the household dwelling, not including bathroom and kitchen, per adult household member.

This is not a particularly widely-used welfare indicator but can nevertheless be justified by on the basis that individuals' welfare is plausibly adversely affected by crowded living conditions. It can be calculated for Ghana in both years, but for only 1992 in Uganda.

3.4 Household assets

The amount of assets a household owns is likely to affect its welfare for two reasons. First, the more assets it owns, the higher will be its income-earning potential, which raises welfare. Second, the more assets it owns, the higher will be its ability to smooth its consumption level in response to income shocks. To the extent that households are risk-averse, this also increases household welfare. Both surveys in each country provide information on the types of assets and durable consumer goods owned by the household, and their value when purchased and at the time of the survey. We use this information to calculate our final non-income indicator, namely:

- the current value of all assets owned by the household, measured in units of local currency and deflated by the country-level consumer price index.

3.5 Summary

In total therefore we define a total of ten non-income welfare indicators, nine of which can be calculated in both years in Ghana (the exception being years of schooling) and eight of which can be calculated in both years in Uganda (the exceptions being distance from drinking water source and rooms per adult). Of the ten, six are discrete dummy variables which can take on one of only two values; for these, we only calculate conditional GICs. The other four are continuous variables for which we can calculate unconditional GICs.

4 Results

In this section we present the results of the growth incidence analysis for Ghana and Uganda. We begin by showing trends in each indicator at the aggregate (i.e. country average) level (Section 4.1). We then present and discuss the unconditional GICs (Section 4.2) and conditional GICs (Section 4.3) for each country.

4.1 Aggregate level results

The average values and growth rates of each of our non-income welfare indicators at the national level are shown in Tables 3 and 4. In Ghana, all non-income indicators show growth on average over the period, the one exception being rooms per capita. The proportion of all households using good sources of drinking water, for example, rose from 50.6% to 62.2%, while the proportion of all households using mains electricity for lighting rose from 28.5% to 39.2%. In Uganda, by contrast, the picture is more mixed, with increases in some indicators, such as the use of a good sanitation source, primary school enrolment, and the value of household assets, but decreases in others, such as use of a good drinking water source, the use of mains electricity, and child vaccination. This is despite the fact that the rate of growth in average household expenditure per capita was in fact slightly higher in Uganda (3.3% per year) than it was in Ghana (2.4% per year).

4.2 Unconditional GICs

We first show, in Figures 1 and 2, the standard unconditional GICs for income in each country. It is clear that they show very different patterns. Although rates of income growth are positive at all percentiles in each country, they are generally much higher at the lower percentiles of the income distribution in Uganda, but much higher at the upper percentiles of the distribution in Ghana. If we are using a social welfare function which places greater weight on income gains lower down the distribution, these GICs suggest that the difference in 'performance' between Uganda and Ghana is much greater than the small difference in the average rates of growth highlighted by Tables 3 and 4.

Figures 3 and 4 show the unconditional GICs for household assets in each country. In Ghana, the curve is undefined up to percentile 16, indicating that 16% of sampled households reported zero assets in the initial year. In Uganda it is undefined only up to percentile 3, indicating that only 3% of households reported zero assets in the initial year. In this case, both GICs again lie above zero (indicating increases in asset values in real terms) and are on the most part downward sloping, indicating much higher rates of growth among those with less initial amounts of assets. The one exception is in Ghana between percentiles 30-35 and 70-75, where the GIC has

a slight positive slope, indicating slightly lower rates of growth among those with less initial amounts of assets.

Unconditional GICs for other non-income welfare indicators (distance to drinking water and rooms per adult in Ghana, and years of schooling in Uganda) are shown in the Appendix. Those for distance to drinking water and years of schooling show a broadly 'pro-poor' pattern, with much larger increases among those with initial lower amounts of each indicator. The one exception is when measuring the reduction in distance from drinking water in proportional rather than absolute terms, in which case the reduction is highest among those with lower initial distances to their drinking water source. The GIC for rooms per adult shows that reductions in the indicator were witnessed right across the distribution: among those with lowest initial number of rooms per adult, among those with slightly below the median initial number of rooms per adult, and among those with the highest 20% initial number of rooms per adult.

4.3 Conditional GICs

When the number of groups is set to 100, the conditional GICs show a lot of 'short-term' volatility: i.e. the growth of each non-income welfare indicator varies a lot from one income group to the next). To avoid this problem, we set the number of groups equal to ten, and present the results in the form of a bar chart rather than a single line.

The full set of conditional GICs are contained in the Appendix; here we present the results in each country for primary enrolment, child vaccination, and use of good drinking water sources. For primary enrolment (Figures 4 and 5), the results for each country show a clear pro-poor pattern, with both absolute and proportional rates of increase being higher among lower income groups. This reflects the fact that the higher income groups are already close to 100% enrolment, which generates a strong tendency for convergence in this particular indicator. For child vaccination (Figures 6 and 7), the picture is very different between the two countries. In Ghana, vaccination rates increased for all income groups except the highest, which was close to 100% vaccination in any case. In Uganda vaccination rates (against polio) decreased, although with the exception of the two lowest income groups, which saw slight increases over the period. For use of good drinking water (Figures 8 and 9), the pattern also varies markedly between the two countries. In Ghana, the use of good drinking water increased for all income groups, and did so in a broadly pro-poor direction (at least when considering proportional increases). In Uganda, by contrast, the use of good drinking water sources decreased, the amount of decline was followed a broadly anti-poor pattern, with larger reductions among lower income percentiles.

5 Conclusions

This paper discusses the motivation for and methods of using growth incidence analysis for non-income welfare measures. Although there are certain practical difficulties in constructing GICs for non-income indicators, the theoretical case for doing such analysis is strong. The practical difficulties can be addressed by monitoring, improving and extending the coverage of non-income welfare indicators in household surveys. Such an exercise is also important from the point of view of monitoring progress toward the MDGs.

The results contained in this paper for Ghana and Uganda show some significant and important differences income and non-income welfare indicators, both in terms of aggregate trends and distributional patterns. In Ghana, despite relatively low rates of income growth at the lower end of the income distribution, there have been significant improvements and catching up in other non-income indicators, such as primary school enrolment, use of good drinking water, and the value of assets owned (in proportional if not always in absolute terms). In Uganda, despite reasonably high rates of income growth, particularly at the lower end of the income distribution, there has been a deterioration of other non-income indicators. This analysis does not in itself generate simple implications for policy, but it does caution against over-reliance on purely income-based measures of poverty and welfare.

The analysis contained in this paper can be extended in a number of ways. First, there is the possibility of considering more non-income welfare indicators, and extending the analysis to other countries. Second, there is a need to look at the extent to which each non-income welfare indicator is correlated with the income indicator in each country, which is clearly an important consideration when considering the potential usefulness of non-income GICs. Finally, if one accepts the multi-dimensionality of poverty and welfare, there is need to consider ways in which potential trade-offs between income and non-income welfare indicators can be incorporated into policy analysis.

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Table 1: Categories of drinking water sources contained in the GLSS and UIHS

GLSS, 1992 and 2000	UIHS, 1992	UIHS, 2000
Good	*Good*	*Good*
Indoor plumbing	Indoor tap	Piped in dwelling
Inside standpipe	Shared tap within building	Piped outside dwelling
Water vendor	Tap outside building	Public tap
Water truck/tanker service	Well for personal use	Bore-hole
Neighbouring household	Shared well/tube-well	Protected well/spring
Private outside standpipe	Water vendor	Unprotected well/spring
Public standpipe	Water truck/tanker service	Vendor/tanker truck
Well with pump		
Poor	*Poor*	*Poor*
Well without pump	River/lake/spring	River/lake/stream
River/lake/spring/pond	Rain water	Rain water
Rainwater	Other	Other
Other		

Table 2: Categories of sanitation sources contained in the GLSS and UIHS

GLSS, 1992 and 2000	UIHS, 1992 and 2002
Good	*Good*
Flush toilet	Flush toilet
KVIP	Pit latrine
Pit latrine	Pan/bucket
Pan/bucket	Other
Other	
Poor	*Poor*
None	None

Table 3: Aggregate welfare indicators in Ghana, 1992-1999

	Levels		Growth	
	1992	1999	Absolute	Proportional
Household expenditure per equivalent adult*	1,441,095	1,699,468	-	2.4
Good drinking water source (%)	50.6	62.2	11.6	22.9
Good lighting source (%)	28.5	39.2	10.7	37.5
Good sanitation (%)	13.9	34.4	20.5	147.5
Primary school enrolment rate (5-12 yrs) (%)	71.8	83.5	11.7	16.3
Primary school completion rate (13-18 yrs) (%)	58.0	89.7	31.7	54.7
Child vaccination rate (%)	82.4	93.3	10.9	13.2
Distance from drinking water source (km)	3.07	0.47	-2.6	-84.7
Current value of household assets (lcu)*	565,708	3,874,471	-	5.1
Rooms per adult	0.98	0.86	-0.1	-12.2

*Rate of growth shown is average annual rate of increase in real terms, i.e. after subtracting the average annual rate of consumer price inflation between each year.

Source: Ghana Living Standards Survey, 1992 and 1999.

Table 4: Aggregate welfare indicators in Uganda, 1992-1999

	Levels		Growth rate	
	1992	2000	Absolute	Proportional
Household expenditure per equivalent adult*	8,557	11,175	-	3.3
Good drinking water source (%)	68.2	60.3	-7.9	-11.6
Good sanitation source (%)	80.3	88.1	7.8	9.7
Good lighting source (%)	12.0	7.6	-4.4	-36.7
Primary school completion rate (13-18yrs)	22.3	26.7	4.5	20.1
Primary school enrolment rate (5-12yrs)	62.8	82.3	19.5	31.1
Years of schooling (13-18 yrs)	4.35	4.84	0.49	11.3
Vaccination (% of children <60 months)				
- bcg	87.4	78.7	-8.7	-9.9
- measles	72.5	63.5	-9.0	-12.4
- polio	83.3	80.6	-2.7	-3.2
- dpt	83.4	79.4	-4.0	-4.8
Household assets (lcu)*	701,985	3,666,789	-	14.9

Notes: *Rate of growth shown is average annual rate of increase in real terms, i.e. after subtracting the average annual rate of consumer price inflation.

Figure 1: Income GIC, Ghana

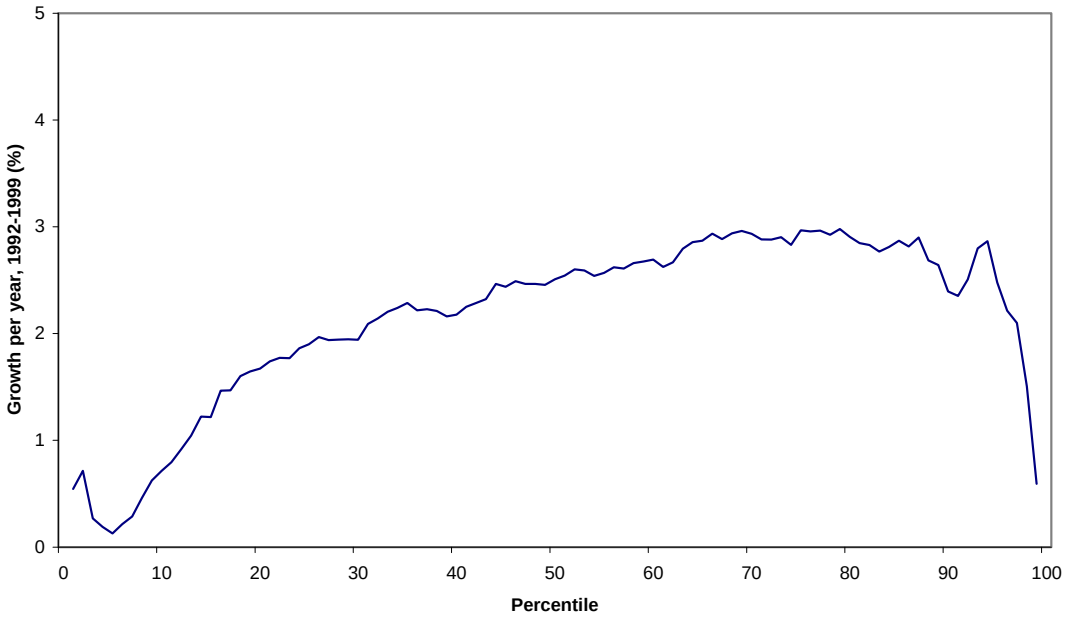

Figure 2: Income GIC, Uganda

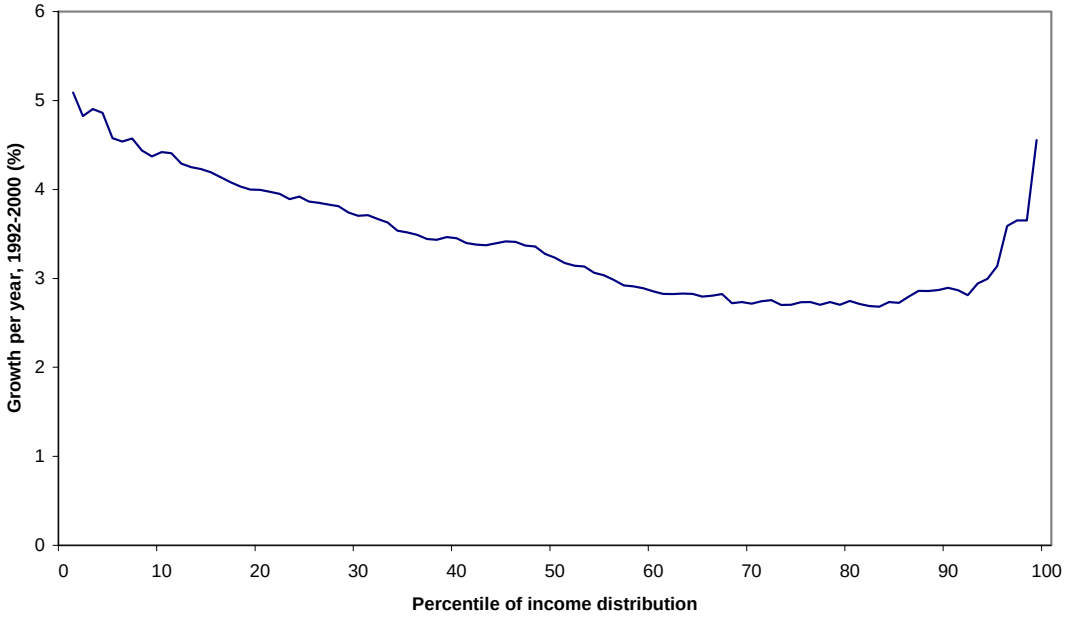

Figure 3: Assets GIC, Ghana

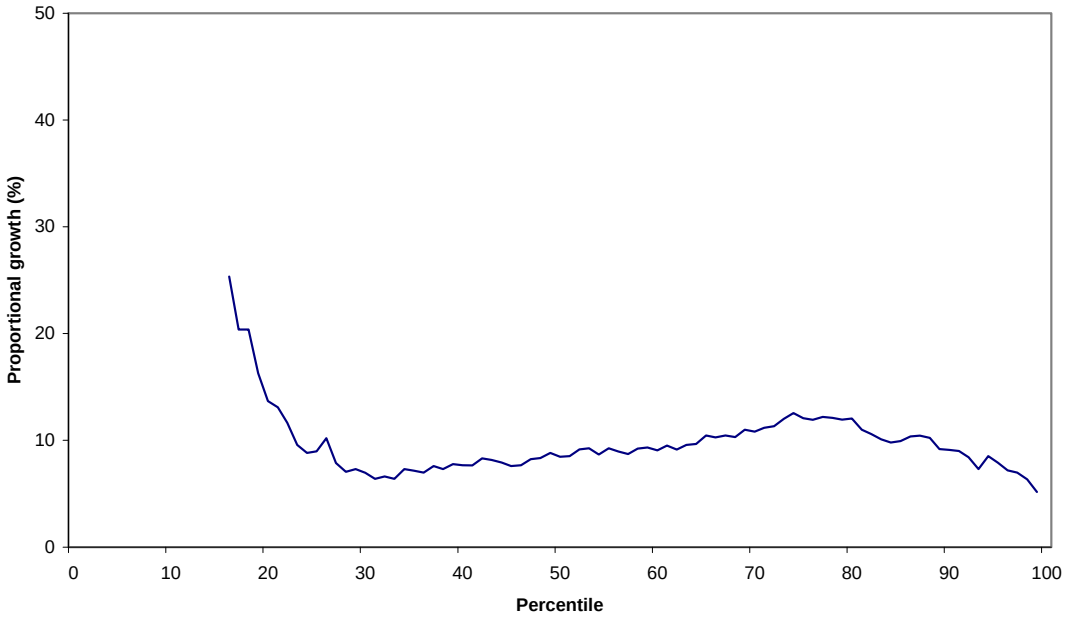

Figure 4: Assets GIC, Uganda

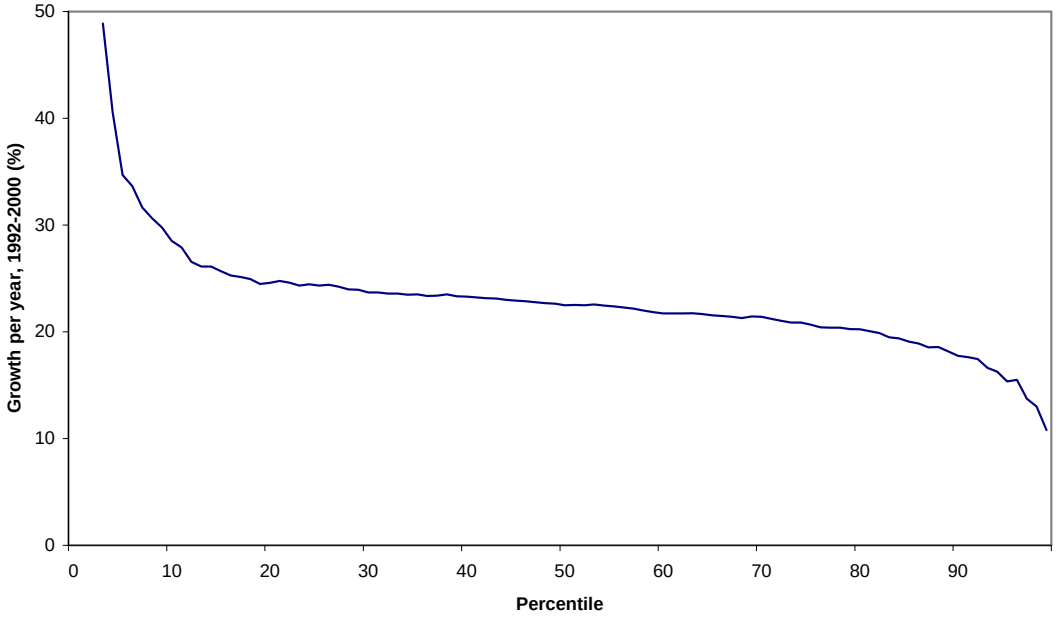

Figure 5: Primary enrolment conditional GIC, Ghana

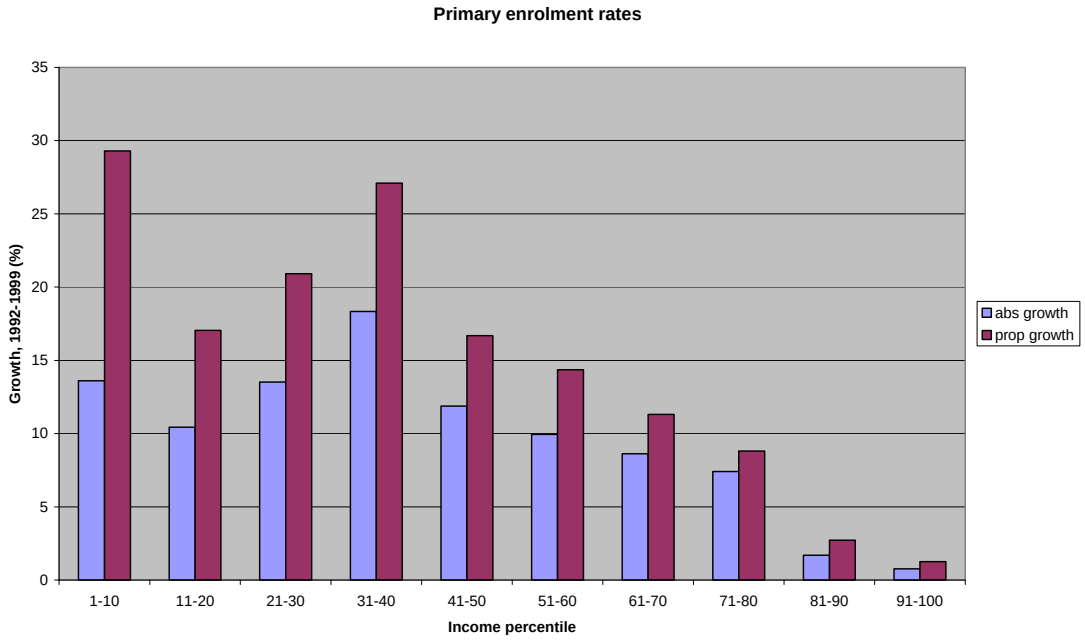

Figure 6: Primary enrolment conditional GIC, Uganda

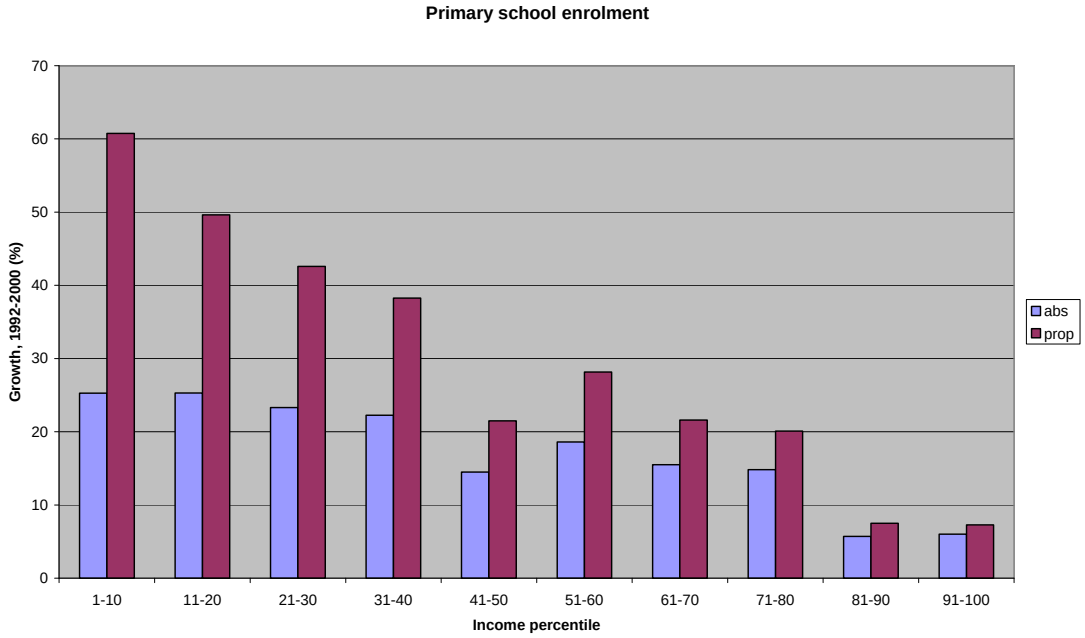

Figure 7: Child vaccination conditional GIC, Ghana

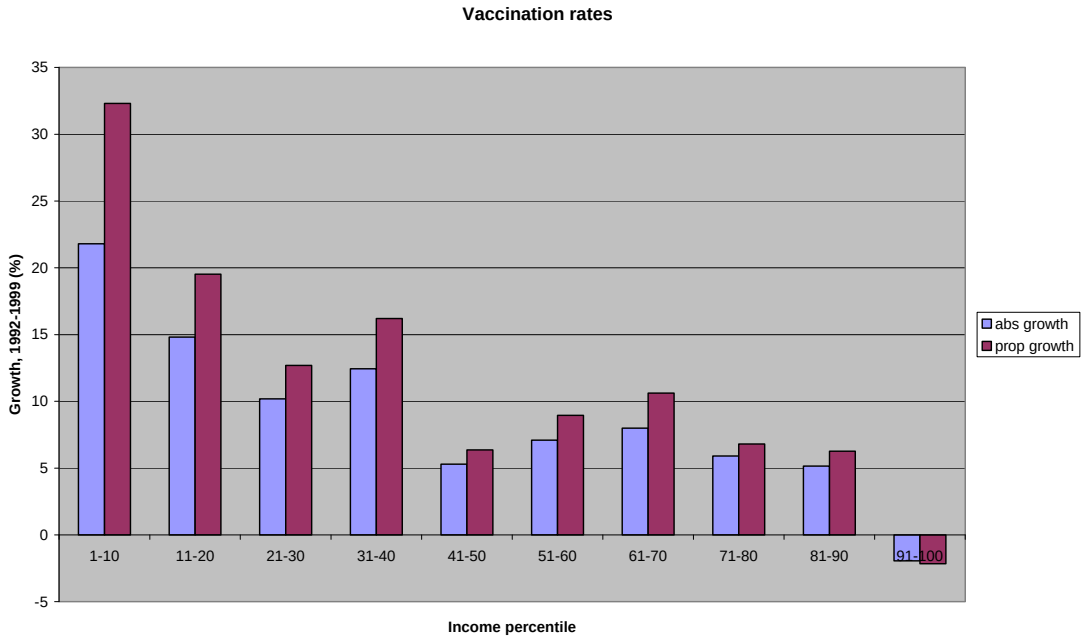

Figure 8: Child vaccination conditional GIC, Uganda

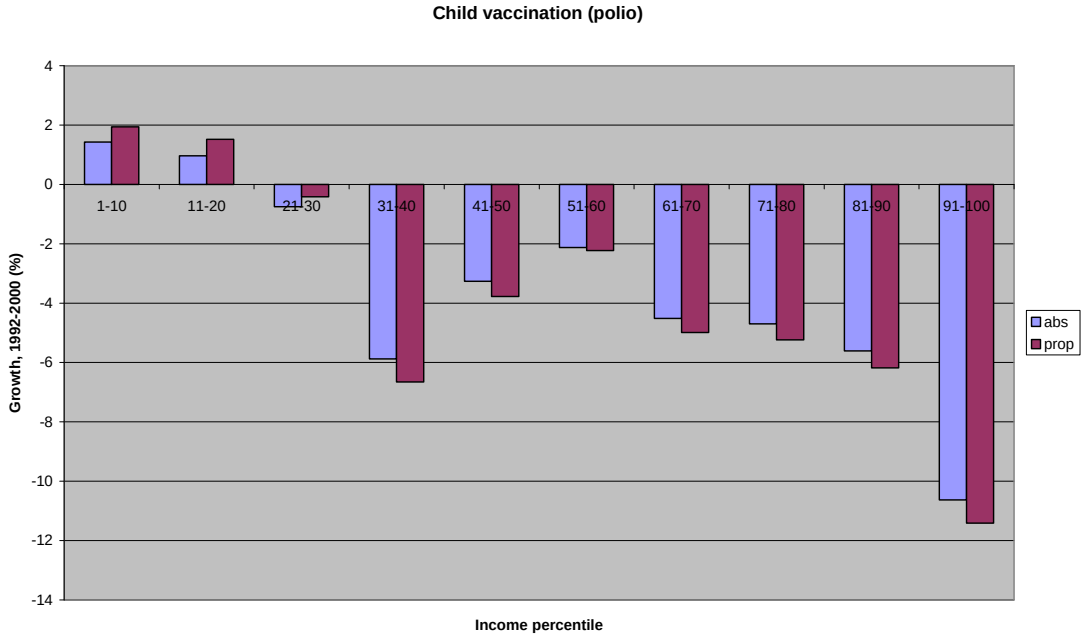

Figure 9: Use of good drinking water conditional GIC, Ghana

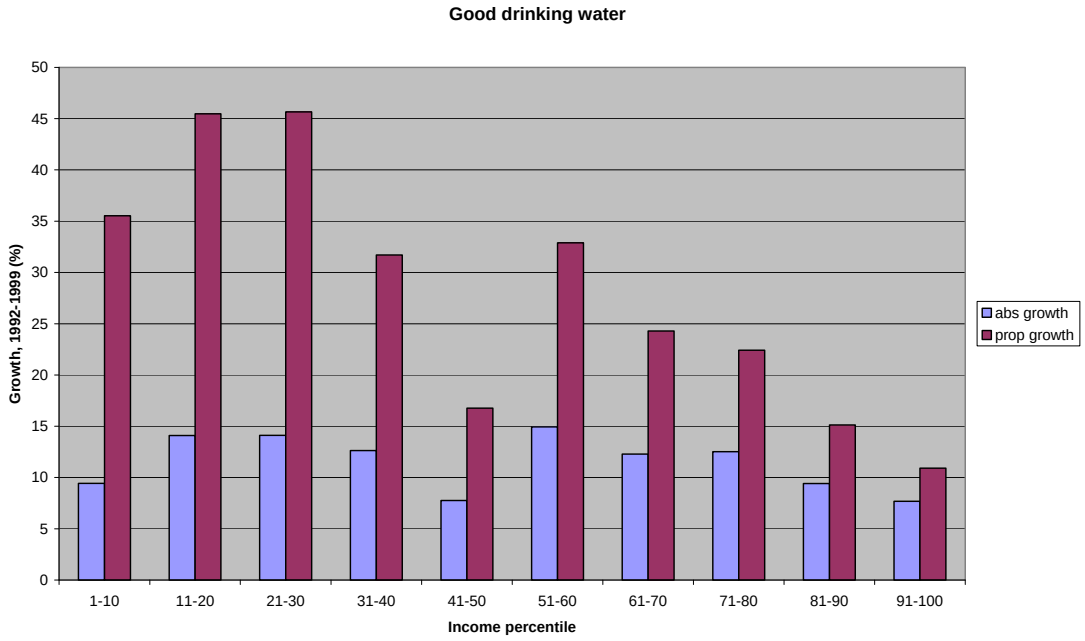

Figure 10: Use of good drinking water conditional GIC, Uganda