Inter-temporal Changes in Welfare: Preliminary Results from Nine African Countries*

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A new generation of nationally representative household income and expenditure surveys has helped to provide a better understanding of living standards in Africa.[1] While these surveys have been very useful in our analysis of the level and characteristics of poverty on the continent, almost all are both recent, done within the past 10 years, and one-time cross-sections. Thus, while we have learned a great deal about poverty at a particular point in time in many countries, the view remains a snapshot. In the vast majority of African countries, we remain unable to make intertemporal comparisons of poverty. Given the scarcity of comparable expenditure surveys at more than one point time, this study explores an alternative source of household survey data, the Demographic and Health Surveys (DHS), to inform the question of how living standards are evolving in Africa.

The DHS have been collected in a large number of African countries, and in many cases, at more than one point in time.[2] The surveys were not designed for econometric (or even economic) analysis. Instead, the purpose of the surveys was to assist governments and private agencies in developing countries to better understand population and maternal and child health. Consequently, there is no data on income or expenditures, the standard money metric measures of well-being. Despite this important drawback, the DHS do contain information on many variables that one might commonly use as alternatives to a money metric utility approach, including children's nutritional status, infant and child mortality, women's education, and some household assets. And the DHS have two distinct advantages: they are available at two or more points in time for a large number of countries in Africa, nine to be precise, and key survey instruments are standardized for all countries. Therefore, we can confidently compare living standards, across time periods, within a given country, and also across countries for many of our poverty measures.[3]

In the absence of income or expenditure measures, we work with 7 variables that may be treated as welfare, or poverty indicators: children's height-for-age, weight-for-height and weight-for-age z-scores (HAZ, WHZ, and WAZ respectively); infant and childhood mortality rates for children born to mothers aged 15-35; the education level of mothers aged 15 to 49; and a welfare index constructed from the households' asset information. The latter is the outcome of a factor analysis of various assets that the survey asks about household characteristics (water source, toilet facilities, and construction materials) and durables (ownership of radio, television, refrigerator, bicycle, motorcycle and/or car) as well as education of the household head. We assume that there is a common factor, "welfare," behind the ownership of these assets, and allow the factor

[1] Prominent among these surveys is the so-called Living Standards Measurement Surveys (LSMS), which have been implemented and/or funded by the World Bank. However, there are other household budget surveys conducted by governments and research institutions that share many of the characteristics and offer many of the same possibilities for analysis as the living standards surveys.
[2] The DHS is a 13-year project funded primarily by USAID, and is administered by Macro International Inc.
[3] There is growing evidence that even small changes in household survey design (e.g., recall period for consumption, measurement technique for measuring children) will have important affects on results. See Scott and Amenuvegbe 1990.

analysis to define that factor as a weighted sum of the individual assets.[4] One of the advantages of these measures is that in each of the above inter-temporal and intra-regional comparisons, including our wealth index, we need not rely on what are often tenuous and suspect price deflators that are used to compare money metric measures of welfare.

There are many directions that one could go with this analysis. In this paper, we explore some quite completely, and give examples of others that we hope to pursue in the future. Our first step is to compare "poverty" as measured by each indicator over time.[5] We do this by initially comparing percentages of malnourished children, school attainment of women, and the number of families whose welfare falls below a certain level in the asset index distribution. We also compare the distributions of our nutritional status indicators and asset welfare measure at the two (or more) points in time when the DHS data were collected, using standard tests for welfare dominance (Ravallion, 1991; Ravallion, 1994; Davidson and Duclos, 1998). That is, we try to identify distributions that will show less poverty regardless of the poverty line or poverty measure used. In the case of mortality, we construct a 12 to 15 year time series on mortality rates for infants and children 1 to 3 years of age, and examine these trends.

Our next approach is to decompose poverty measures both regionally (as in Ravallion and Huppi, 1991). This allows us to see whether overall changes in poverty are due to changes in one or more particular regions, or movements between regions with different poverty levels.

The preceding analyses are purely descriptive. In order to understand the determinants of our nutrition and mortality measures, we estimate reduced form models using characteristics of the person and household as exogenous regressors. We examine the parameters from comparable models across countries and time to see if there are any generalizable results about the determinants of the nutritional status of children, and their probability of survival.

The following section provides a detailed discussion of the methods we employ, after which we present our findings. We caution that this is the first, in a series of research papers that we are preparing that exploit the DHS to inform the question of how living standards have changed in Africa over the past decade. Therefore, the last section of the paper both summarizes what we have learned so far and sets out the directions we are pursuing as our research continues.

[4] This is similar to the principle components analysis of Filmer and Pritchett (1998)

[5] In general, when we say "poverty" in this paper, we mean poverty as measured by one of the indicators that we have mentioned. For those uncomfortable with the notion that poverty is measured in terms other than money metrics of utility, please substitute the terminology that you are most comfortable with.

METHODS

In this section we describe the nutrition, mortality and asset welfare indicators and discuss the methods used to compare them over time.

Nutrition Indicators

The indicators of nutritional status available in the DHS are anthropometric measures of weight and height for all children present in the household from the individual survey instrument[6] under the age of three. From these measures, along with reported ages of children (the quality of which is generally good in the DHS), normalized measures of weight-for-height, height-for-age, and weight-for-age can be constructed as follows

$$z\text{-}score = \frac{x_i - x_{median}}{s_x},$$

where x_i is a given measurement such as height or weight for child *i*, x_{median} is the median of that measurement for a healthy and well-nourished child from a reference population of the same age or height and of the same gender, and s_x is the standard deviation from the mean of the reference population. Note that the z-score for the reference population has a standard normal distribution in the limit. Thus, a child is typically said to be malnourished (in a given space) if his or her z-score is two standard deviations below the mean of the reference population (zero).

As recommended by the World Health Organization (WHO, 1993), the standard reference population used here is that of the United States National Center for Health Statistics. Studies such as Martorell and Habicht (1986) which found that less than 10 percent of worldwide variance in height is due to differences in genetics or race among children of the same sex under the age of ten, help to establish the appropriateness of using such a reference population.

The height-for-age z-score (HAZ) is an indicator of a child's long-term nutritional status. Children who are "stunted" are those whose past chronic nutritional deprivations leave them shorter than expected for their age and gender cohorts in the reference population. The weight-for-height z-score (WHZ), on the other hand, reflects short-term nutritional status. Current nutritional stress manifests itself in acute "wasting" of children independent of chronic malnutrition. The third measure, the weight-for-age z-score (WAZ), captures a combination of "stunting" and "wasting." While we report levels and changes observed in this indicator, its usefulness is limited relative to the first two measures.

[6] The individual survey instrument consists of interviews of women of childbearing age (15-49) in which a series of questions is asked related to childbirth, breastfeeding, child health, marriage and fertility preferences, and includes anthropometric measurements of children.

Infant and Under-Age-Three Mortality

Infant and under-age-three mortality rates are constructed from the section of the individual survey instrument that includes birth histories of each of the women interviewed. This provides information on all live births, the ages of living children, and the dates of deaths of children who did not survive to the date of interview. Infant mortality (${}_1q_0$) for a given cohort of children is defined as the simple probability of a child dying before his/her first birthday. Under-age-three mortality rate (${}_3q_0$) is the probability of dying before the child's third birthday. We use this instead of the traditionally defined childhood mortality rate (${}_5q_0$) to allow for comparisons with nutrition indicators that are based on samples of children under the age of three. The retrospective nature of the birth histories gives rise to a censoring problem in the estimation of mortality rates. Since the birth histories are recorded for women of child-bearing age (15-49) at the time of the interview, observations on births 10 years prior to the interview do not account for children born to the cohort of women age 40-49 at that time. The infant and childhood mortality regressions presented later show statistically significant parameters across-the-board on the age and age squared of the mother. Thus, uncorrected estimates of infant or under-age-three mortality become more biased as one goes back in time from the date of the survey, and are not comparable across surveys for a given time period. To avoid the censoring problem, we truncated the sample of children to only those born to mothers of age 15-35, or roughly 90 percent of all children reported to have been born in each of the samples, and we extend our mortality estimates back only 10 years from the date of the survey.

Asset Index

To construct an index of the household assets recorded in the DHS survey requires selecting a set of weights for each asset. That is, we want an index of the form

$$A_i = \hat{g}_1 a_{i1} + \ldots + \hat{g}_K a_{iK}$$

where A_i is the asset index, the a_{ik}'s are the individual assets recorded in the survey, and the γ's are the weights, which we must estimate. Because neither the quantity nor the quality of all assets is collected, nor are prices available in the data, the natural welfarist choice of prices as weights is not possible. Rather than imposing arbitrary weights, we let the data determine them directly. Hammer (1998) and Filmer and Pritchett (1998) use a similar method that employs principal component analysis to construct an asset index. The weights for their indices are simply the standardized first principal component of the variance-covariance matrix of the observed household assets. We use factor analysis instead of principal component analysis because the latter forces all of the components to accurately and completely explain the correlation structure between the assets. Factor analysis, on the other hand, accounts for the covariance of the assets in terms of a much smaller number of hypothetical common variates, or factors (Lawley and Maxwell, 1971). In addition, it allows for asset-specific influences to explain the variances. In other words, all of the common factors are not forced to explain the entire covariance matrix. In our case, we assume that the *one* common factor that explains the variance in the ownership of the set of assets is a measure of purchasing power, or "welfare."

Finally, the assumptions necessary to identify the model using factor analysis are stated explicitly.[7]

Unlike with principal component analysis, we must impose structure from the outset. The structural model includes only one factor:

$$a_{ik} = \beta_k c_i + u_{ik} \qquad \text{for} \quad i=1,...,N \quad \text{(households)} \qquad (1)$$

$$k = 1,...,K \text{ (household assets).}$$

The ownership of each observed asset (k) for each household (i), represented by the variable a_{ik}, is a linear function of an unobserved common factor for each household, c_i, which we label "household welfare."[8] Note that the relationship between the asset and the unobserved common factor, β_k, as well as the noise component ("unique element"), u_{ik}, are also unobserved and must be estimated.[9]

To identify the model, we make the following assumptions:

(A1): Households are distributed *iid*

(A2): $E(u_i|c_i) = \underset{Kx1}{0}$

(A3): $V(u_i) = Diag\{\sigma_1^2,...,\sigma_K^2\}$,

Structure can now be imposed on the variance-covariance of the observed assets. To see what these restrictions are, first rewrite the set of k equations (1) in vector form,

$$a_i = \beta c_i + u_i, \qquad (1a)$$

where $\beta = (\beta_1,...,\beta_K)$. Assumption (A3) implies that once the common factor accounts for a portion of the variance in the ownership of assets, the remainder of the variance, the disturbance terms ("unique elements"), should be uncorrelated across assets. Note that these errors are not constrained to be identically distributed. This gives us the variance-covariance matrix of the unique disturbances

$$E(u_i u_i') = Diag\{\sigma_1^2,...,\sigma_K^2\} = \Psi.$$

[7] Nonetheless, the two methods create indexes that rank households similarly. The Spearman rank correlation between the principal components and factor analysis asset indexes is about 0.98 for each of our samples.
[8] Lawley and Maxwell (1971) argue that, given the theoretical and practical difficulties, it is not clear that a non-linear model is necessary or useful.
[9] The disturbances are unique in that for the true model once the common factor is accounted for, the remainder of the variance in the ownership of each asset is determined independently of the other assets.

Without loss of generality, we assume that the mean of the common factor (wealth) is zero, thus the variance of the common factor is

$$E(c_i c_i') = \boldsymbol{s}_c^2 .$$

Orthogonality of the common factor and the disturbance (A2) permits us to write the variance of the assets as

$$E(a_i a_i') = E[(\boldsymbol{b}c_i + u_i)(\boldsymbol{b}c_i + u_i)'] ,$$

which gives us

$$\Omega = \boldsymbol{bb}'\boldsymbol{s}_c^2 + \Psi . \qquad (2)$$

Note that identification requires the normalization of one of the parameters, and typically it is the variance of the unobserved factor ($\boldsymbol{s}_c^2 \equiv 1$). Although this normalization makes it difficult to interpret the coefficients on the common factor $(\boldsymbol{b})$, we shall do so anyway since all statistical packages that provide factor analysis procedures do not have options for other normalizations and since interpretation of these parameters is not crucial to the analysis.[10]

If we assume multivariate normality of c_i and u_i, we can estimate $\boldsymbol{b}$ and Ψ using maximum likelihood techniques (Lawley and Maxwell, 1971). Once these parameters have been estimated, the common factor (asset index) can be estimated for each household, by defining the asset index as the projection of unobserved household wealth (c_i) on the observed household assets:

$$E^*(c_i|a_i) = \boldsymbol{g}_1 a_{i1} + \ldots + \boldsymbol{g}_K a_{iK} \ , \text{ where} \qquad (3)$$

$$\boldsymbol{g} = v(a_i)^{-1} \operatorname{cov}(a_i, c_i)$$

Given the normalization, $\boldsymbol{s}_c^2 \equiv 1$, it is reasonably straightforward to show that $\operatorname{cov}(a_i, c_i) = \boldsymbol{b}$, and thus $\boldsymbol{g} = \Omega^{-1}\boldsymbol{b}$. Finally, the estimate of the asset index for household *i* is defined as:

$$A_i = \hat{\boldsymbol{g}}_1 a_{i1} + \ldots + \hat{\boldsymbol{g}}_K a_{iK} \ , \text{ where} \qquad (3a)$$

$$\hat{\boldsymbol{g}} = \hat{\Omega}^{-1}\hat{\boldsymbol{b}}\hat{\boldsymbol{s}}_c^2 .$$

The assets included in the index can be placed into two categories: household durables and household characteristics. The household durables consist of ownership of

[10] A more reasonable normalization would be $\boldsymbol{b}_1 \equiv 1$, which allows us to interpret the importance of all other assets as being relative to the first asset.

a radio, TV, refrigerator, bicycle, and motorized transportation (a motorcycle or a car). The household characteristics include source of drinking water (piped or surface water relative to well water), toilet facilities (flush or no facilities relative to pit or latrine facilities), and floor material (low quality relative to higher quality). We also include the years of education of the household head to account for household's stock of human capital.[11] Since we want to compare the assets over the two surveys, the data sets are pooled and the factor analysis scoring coefficients (asset weights) are estimated for the pooled sample. They are then applied to the separate samples to estimate the wealth indexes for each of the households.

Stochastic Tests of Welfare Dominance

We employ standard tests of welfare dominance to compare distributions of our nutritional status indicators and asset index over time. The idea is to make ordinal judgments on how poverty changes for a wide class of poverty measures over a range of poverty lines. We start by discussing the concept of welfare dominance, and then explain how to estimate the orderings and to perform statistical inference on them. The discussion follows Ravallion (1994) and Davidson and Duclos (1998) closely.

Consider two distributions of welfare indicators with cumulative distribution functions, F_A and F_B, with support in the nonnegative real numbers.[12] Let

$$D_A^1(x) = F_A(x) = \int_0^x dF_A(y).$$

If $D_A^1(x) \leq (<) D_B^1(x)$ for all $x \in \Re_+$ (i.e. F_A is everywhere to the right of F_B), then distribution *A* is said to (strictly) first order dominate distribution *B*. In terms of welfare economics, the interpretation is that up to the poverty line *x*, *A* is a better distribution than *B* for any welfare function that is both increasing in the welfare variable (e.g. expenditures or height-for-age) and anonymous, in the sense that we do not care that one particular person's welfare falls, as long as another's rises by more than enough to compensate. If we can say this for a broad range of poverty lines, then we have a quite general conclusion that *A* is preferable to *B*.

Since $D_A^1(x)$ is also the poverty *headcount* ratio (P_0) where the *x* is the poverty line, it follows that first order dominance implies that poverty as measured by P_0 is lower for distribution *A* than for distribution *B* regardless of the poverty line chosen. Dominance results can also be considered up to a maximum allowable poverty line if we aren't concerned with relative changes in the upper ends of the distribution.

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[11] Since the 1986 Senegal survey includes only categories of education for the household head, not years, an indicator variable for some education of the household head was substituted for years of education. The same indicator variable is used for Madagascar because of inconsistencies in the years of education variable for the 1992 survey.

[12] Both the anthropometric z-scores and the asset index have negative values. But this does not cause a problem because the distributions of these welfare indicators can be shifted upward so that the support is entirely positive without affecting the outcome of the tests.

If the two distributions cross within the range of poverty lines that we consider relevant, then first order dominance does not hold, and we know that different poverty lines and measures will rank the distributions differently. In other words, depending on the poverty line or measure chosen, we might simultaneously conclude that poverty increased or decreased. In this case, we can still make a fairly general welfare statement if second order dominance holds. In particular, if *A* second-order dominates *B*, then *A* is a better distribution than *B* for all welfare functions that are increasing, anonymous, and that favor equality. To define second-order dominance, let $D_A^2(x)$ be the area under F_A up to x,

$$D_A^2(x) = \int_0^x D_A^1(y)dy .$$

If $D_A^2(x) \le (<) D_B^2(x)$ for all x (i.e. the area under F_A up to x is less the area under F_B up to x), then distribution *A* is said to (strictly) second order dominate distribution *B*.

If, to use Ravallion's (1994) terminology, the "poverty deficit" curves (D^2) cross, then higher orders of dominance can be checked. To generalize, let

$$D_A^s(x) = \int_0^x D_A^{s-1}(y)dy ,$$

for any integer, $s \ge 2$. Now distribution *A* is said to (strictly) dominate distribution *B* at order *s* if $D_A^s(x) \le (<) D_B^s(x)$.

Davidson and Duclos (1998) show that $D^s(x)$ can be equivalently expressed as

$$D^s(x) = \tfrac{1}{(s-1)!}\int_0^x (x-y)^{s-1} dF(y) .$$

This formulation makes it easy to see that second order dominance implies that the *poverty gap* (P_1) is less for distribution *A* than for distribution *B* for all possible poverty lines. Further, third order dominance implies an unambiguous change in the *squared poverty gap* (P_2). To generalize even further, welfare dominance of order *s* implies that the Foster-Greer-Thorbecke poverty measure P_{s-1} is less for distribution *A* than for distribution *B* for all possible poverty lines. Foster and Shorrocks (1988) show that while first-order dominance is a sufficient condition for higher-order dominance, it is not a necessary condition. Thus if we find that a distribution first-order dominates another, then we know how poverty as measured by any of the FGT P_a measures has changed over the relevant range of poverty lines.

Davidson and Duclos (1998) also show that if we have a random sample of N independent observations on the welfare variable, y_i, from a population, then a natural estimator of $D^s(x)$ is

$$\hat{D}^s(x) = \tfrac{1}{N(s-1)!}\int_0^x (x-y)^{s-1} d\hat{F}(y)$$

$$= \tfrac{1}{N(s-1)!}\sum_{i=1}^{N}(x-y_i)^{s-1} I(y_i \le x)$$

where $\hat{F}$ is the empirical cumulative distribution function of the sample, and $I(\cdot)$ is an indicator function, which is equal to one when it's argument is true, and equal to zero when false.

We apply this estimator to two independent samples for each of our indicators. Thus,

$$\text{var}(\hat{D}_A^s(x) - \hat{D}_B^s(x)) = \text{var}(\hat{D}_A^s(x)) + \text{var}(\hat{D}_B^s(x)),$$

which is easy to estimate since $\hat{D}^s(x)$ is a sum of *iid* variables. Simple t statistics are constructed to test the null hypothesis,

$$H_0 : \hat{D}_A^s(x) - \hat{D}_B^s(x) = 0,$$

for a series of test points up to an arbitrarily defined highest reasonable poverty line. In cases where the null hypothesis is rejected and the signs are the same on all of the t statistics, then dominance of order s is declared. The tests were conducted up to $s = 5$, after which "no dominance" is declared.[13]

For the three sets of nutrition indicators (HAZ, WAZ, and WHZ), stochastic dominance tests were applied to the distributions of z-scores up to values of –2 and –1 (two and one standard deviations below the mean of the reference population, respectively). This is appropriate because we are primarily interested in changes in malnutrition, and because a rightward shift in the entire distribution of z-score cannot be interpreted in the same manner as a similar shift in the distribution of expenditures or income.

Since the cumulative distribution functions are defined over supports in the nonnegative real numbers, and because shifting all of the distributions of nutrition indicators by the same constant does not change any of the information, we added values of 10 to each z-score to conduct the tests. Note that since $D^s(x)$ is not normalized by the "poverty line" (x) (i.e. the magnitude of the "poverty gap" (x-y) is all that matters in the

[13] Foster and Shorrocks, 1988, show that eventually one distribution will dominate the other at a higher order. But it is difficult to interpret orders of dominance greater than two, much less five.

estimate of $D^s(x)$, and $\text{var}(D^s(x))$), shifts in both the indicator and the maximum "poverty line" do not affect the outcome of the tests.

We also apply stochastic dominance tests to the shifted distributions of household asset indexes up to two relative poverty lines determined separately for each country. For a given country, the lower (upper) poverty line is simply the 25th (40th) percentile of the distribution in the first survey. Since the weights are consistent across surveys for a country, applying this poverty line to the second survey is also consistent.

Regional Decompositions

The DHS surveys are relatively short on regressors that might help explain changes in the different welfare variables, but we can begin to scratch the surface with simple regional decompositions. Here we concern ourselves with how aggregate changes in poverty, as measured by our indicators, follow from the relative gains or losses of the poor within specific sectors as opposed to population shifts between sectors.

We shall illustrate this decomposition, proposed by Ravallion and Huppi (1991), for two sectors (*u* for urban, and *r* for rural). First we note that it follows directly from the additively separable nature of the FGT class of poverty measures. To illustrate, note that the FGT poverty measure can be written as

$$P_a = \tfrac{1}{N}\sum_{i=1}^{N}\left(\frac{z-y_i}{z}\right)^a I(y_i \le z),$$

where y_i is an independent observation of our welfare indicator from a sample of size *N*, *z* is the poverty line, and $I(\cdot)$ is an indicator function as described above. Since the P_a poverty measure is a sum of *iid* random variables, it follows that for *M* distinct subgroups of the population

$$P_a = \sum_{j=1}^{M}\tfrac{N_j}{N}P_{aj} \qquad \text{for} \qquad N = \sum_{j=1}^{M}N_j,$$

where P_{aj}, the poverty measured for subgroup *j* is

$$P_{aj} = \tfrac{1}{N_j}\sum_{i=1}^{N_j}\left(\frac{z-y_{ij}}{z}\right)^a I(y_{ij} \le z).$$

If we have P_a poverty measures for two distributions (*A* and *B*) of indicators, simple mathematical manipulations can be used to break the difference in these measures into four components:

$$P_a^B - P_a^A = (P_{au}^B - P_{au}^A)n_u^A + (P_{ar}^B - P_{ar}^A)n_r^A$$

Intrasectoral effects:
Change in urban poverty at survey A population share; Change in rural poverty at survey A population share

$$+ \sum_{j=u}^{r}(n_j^B - n_j^A)P_{aj}^A + \sum_{j=u}^{r}(P_{aj}^B - P_{aj}^A)(n_j^B - n_j^A)$$

Change in poverty arising from population shifts (migration); Interaction between sectoral changes and population shifts

where P_{aj}^t is the poverty measured in sector *j* for distribution (or time) *t*, and n_j^t is the population share of sector *j* at time *t*. The first two components, the urban and rural intrasectoral effects, show how changes in poverty in each of the sectors contribute to the aggregate change in poverty. The third component is the contribution of changes in the distribution of the population across the two sectors. Ravallion and Huppi (1991) note that the final component can be interpreted as a measure of the correlation between population shifts and changes in poverty within the sectors. This method of decomposing the changes in poverty is applied at the urban-rural levels for each of the nine countries using the asset index.

As with the dominance tests, in order to calculate poverty rates, the distributions of assets and nutrition outcomes and the poverty lines must be shifted rightward to eliminate all negative values. Although the size of the shift can be arbitrarily large, the magnitude of the FGT measures for $a \geq 1$ depends on the size of the shift. These measures will change by a factor of $\left(\frac{1}{z + shift}\right)^a$. But since the poverty lines applied to the asset index and nutritional outcomes are constant over the course of time for a given country (i.e. $z_A = z_B = z$), the $\left(\frac{1}{z + shift}\right)^a$ term drops out of the decomposition, leaving the relative results unchanged.

Growth and Redistribution Decompositions

Another way to decompose change in poverty over time is into change in the mean and change in the distribution, as in Datt and Ravallion (1992). Because poverty measures are a function of the observations below the poverty line, any movement in the lower end of the of the distribution to the right (i.e. higher welfare levels) will show a reduction in poverty. This movement could occur because the mean of the distribution increased, with the distribution constant; or because the distribution became less disperse, with the mean constant; or from some combination.

To see how these components of the total change in poverty can be captured, we follow Datt and Ravallion (1992) in considering a class of poverty measures that are fully characterized by the poverty line (z), the mean of the distribution (m), and the Lorenz curve (L). For date t the poverty measure can be written as

$$P_t = P\left(z, m_t, L_t\right).$$

A change in poverty between period t and $t+n$ can then be decomposed as follows:

$$P_{t+n} - P_t = G(t, t+n; r) + D(t, t+n; r) + R(t, t+n; r)$$

growth component   redistribution component   residual

where the growth component is defined as the change in poverty due to a change in the mean of the distribution, while holding the Lorenz curve constant at that of the reference year r,

$$G(t, t+n; r) \equiv P(z, m_{t+n}, L_r) - P(z, m_t, L_r).$$

Similarly, the redistribution component is defined as the change in the Lorenz curve while keeping the mean of the distribution constant at that of the reference year r,

$$D(t, t+n; r) \equiv P(z, m_r, L_{t+n}) - P(z, m_r, L_t).$$

As Datt and Ravallion (1992) point out, the residual $R(\,)$ is present whenever a change in the poverty measure due to changes in the mean (distribution) also depends on the precise distribution (mean) (i.e. when the poverty measure is not additively separable in m and L). Although the residual can be forced to disappear by averaging the components using the initial and final years as reference year, we do not do so to avoid arbitrarily apportioning this effect to either the growth or redistribution components.

A variant of this decomposition is applied for each country to the asset indices and nutritional outcomes as measured by height-for-age and weight-for-height z-scores using FGT poverty measures. A direct application of this procedure could be misleading however since the shifts of the distributions needed to calculate poverty, change the Lorenz curve. To illustrate the problem, consider the decomposition of a change in the headcount ratio for distributions of asset indices for a given country that are shifted to the right by adding 10^{100} to each observation. Since the asset indices for both years are constructed from the same set of weights, no information is gained or lost because of this shift. The change in the poverty measure is no different than if the shift was half the size, since the poverty line changes accordingly (25^{th} or 40^{th} percentiles of the year t asset indices). However, the Lorenz curves for the shifted distributions approach 45 degree lines for both periods. In other words, the redistribution component approaches zero. If on the other hand, the shift was just large enough so that each asset index is positive (e.g. add one to each observation), the Lorenz curves are more likely to be different, and the redistribution component is more likely to be nonzero. The size of the redistribution component is sensitive to the initial shift in the distributions of these poverty indicators.[14]

The variant applied here uses dispersion around the mean rather than the Lorenz curve as control for the distribution. Dispersion is defined here as the distance of individual outcomes from the mean of the distribution. In other words, when holding the mean constant and mapping the dispersion of one distribution to another, we allow relative inequality (Lorenz curve) to change. For example, $P(z, m_t, L_{t+n})$ is approximated by applying the poverty measure to the year *t+n* distribution of assets shifted again by $m_t - m_{t+n}$. These decompositions capture the nature of the Datt and Ravallion (1992) decompositions, while remaining insensitive to the magnitude of the initial shifts of the distributions of asset indices and nutritional outcomes.

DATA

The Demographic and Health Survey (DHS) program has conducted over 70 nationally representative household surveys in more than 50 countries since 1984. With funding from USAID, the program is implemented by Macro International Inc.. For our purposes, nine Sub-Saharan African countries have cross-sectional surveys available for two or more periods.[15] The DHS surveys are conducted in single rounds with two main survey instruments: a household schedule and an individual questionnaire for women of reproductive age (15-49). The household schedule collects a list of household members and basic household demographic information and is used primarily to select respondents eligible for the individual survey. The individual survey, *inter alia*, provides information on household assets, reproductive histories, and the health and nutrition status of the women's young children. The quality of the data is generally good with improvements made over successive rounds. For example, analysis of earlier surveys (DHS I) found heaping of reported ages at death at 12 month intervals, with the largest peak at 12 months of age. In succeeding surveys (DHS II and III), interviewers were instructed to probe to ascertain more accurate ages, with the result being less observed heaping. Nonetheless, our preliminary results suggest that comparisons based on the two surveys can be reliable.

In the first wave of DHS surveys (DHS I), co-resident husbands of women successfully interviewed in the individual survey were generally also interviewed in half of the clusters. This practice was changed in the later waves (DHS II and III) to have a nationally representative sample of men, by interviewing all men age 15-49 living in every third or fourth household.

Although the designs of the surveys are not entirely uniform temporally and across countries, efforts were made to standardize them so that in most cases they are

[14] Sensitivity analysis confirmed this result.
[15] These countries are Ghana, Kenya, Madagascar, Mali, Senegal, Tanzania, Uganda, Zambia and Zimbabwe.

reasonably comparable.[16] The DHS program is designed for typical self-weighted national samples of 5,000 to 6,000 women between the age of 15 and 49. In some cases the sample sizes are considerably larger, and some areas are over/under sampled.[17] For all of the countries in this study, except Uganda, the same regions were sampled in each of the surveys. In the analyses that follow for Uganda, those regions included in the 1995 survey that were not in the 1988 survey have been dropped.

RESULTS

Changes in welfare indicators over time

In this section we present the findings on the changes over time of our asset index, three measures of the nutritional status of children, mother's education, and mortality rates of infants and children.

Asset index

The weights for the asset index from the factor analysis procedure appear in Table 1. The signs are all as expected, with positive weights on all but the assets that are defined relative to left out variables that indicate greater wealth (i.e. surface drinking water, no toilet facilities and low floor quality). The magnitudes across the nine countries are surprisingly stable. Figure 1 illustrates that large positive weights are placed on ownership of a television and a radio, as well as piped drinking water and flush toilet. Relatively large negative weights are also assigned to low quality household floor material. Zimbabwe is the exceptional country with two assets receiving the bulk of the weights: flush toilet facilities and piped drinking water.

Weights are missing for motorized transportation for Kenya and for ownership of a bicycle for Mali, Senegal and Zambia. The former is due to absence of the variable in the data. The latter was dropped because the identifying assumptions were clearly violated. After estimating the parameters and constructing the weights, the variance-covariance matrix of the errors (unique elements) was estimated. Ideally this should be a diagonal matrix because orthogonality of the error terms is required for identification (see assumption A3). Visual inspection indicates where gross violations occur, and elimination of the bicycle variables solves the problem. This led to the dropping of bicycle ownership in the case of Mali, Senegal and Zambia. All of the household asset indexes used in the analysis are calculated on a per household basis. The implicit assumption of doing so is that economies of scale of the assets within the household are infinite. Asset indexes were also calculated for assets per capita (no economies of scale), and for assets divided by the square root of the number of household members, to

[16] In addition to the standard set of survey instruments, country-specific questions are asked.

[17] For example, the Tanzanian DHS data for 1991 and 1996 both have sample of about 8,000 women.

determine if our results are sensitive to this assumption. The findings are robust to the choice of equivalence scales and thus are not reported.[18]

We have summarized our results on the analysis of the asset index in Table 2, both in terms of percentage changes in the headcount ratios and our tests of stochastic dominance. Using our asset index as a proxy for poverty, and employing a relative poverty line set at the 25th percentile of the wealth distribution at the time of the first survey (time t), six countries witnessed a statistically significant reduction in poverty from one survey to the next. Of these, we show first order dominance in all but Uganda, where we find second order dominance. The reduction in the headcount ratio was greatest in Ghana and Madagascar. In Zimbabwe the percent of the population below the poverty line increased, corresponding to the unambiguous increase in poverty as indicated by the 1988 distribution of assets first-order dominating that of 1994. Of note is that the changes in rural poverty incidence were far greater than in urban areas. This reflects the far lower initial level of poverty in the cities. We will return to a discussion of the regional dimensions of these changes when presenting the decompositions in the next section.

While such large changes in percent poor measured with the asset index seem unrealistic, they are consistent with at least two other studies of the change in poverty over time. Using LSMS data, Demery (1995) finds that the headcount ratio for Ghana is estimated using expenditures changed from 36.9 in 1988, to 41.8 in 1989, to 31.4 in 1992. The asset index estimates of 39.9 in 1988 and 26.5 in 1993 do not look that unrealistic in this context. McCulloch and Baulch's (1999) findings for Zambia between 1991 and 1996 are also consistent with those from the DHS data. Plots of cumulative distribution functions of per adult equivalent expenditures estimated from household surveys show large drops in the headcount ratio (from 0.25 to approximately 0.12) when the 25th percentile from the 1991 survey is used as the poverty line. The change is also much smaller at the higher 40th percentile poverty line, with the distributions crossing close to the 50th percentile.

To get a better grasp on what assets are driving the large changes in poverty in Ghana and Madagascar, simulations were run allowing individual assets to change one at a time, leaving the remaining assets unchanged. Since identical weights calculated from pooled data are applied to the assets for each survey within a country, the only source of change for the distribution of asset indexes is the ownership of the assets themselves. The method used to break down the ownership of these assets is described in Bourguignon et al (1998), and requires mapping changes from one cross-section to another by quantiles of the asset being changed.

For Ghana, where the asset index headcount dropped from 24.97 percent in 1988 to 8.54 percent in 1993, the changes in the assets were relatively evenly distributed. The improvements in access to quality drinking water led to the largest drop in the asset index headcount to 21.94 in 1993, followed by increases in the education of household head (22.15) and declines in the number of households with low quality floor material (23.30).

[18] The results of the sensitivity analysis are available from the authors upon request.

The picture for Madagascar is considerably different. Improvements in household floor quality accounts for the bulk of the drop in the headcount, which fell from 25.47 percent in 1992 to 12.50 percent in 1997. By mapping the 1997 distribution of low quality household floor variables to the 1992 distribution of household assets, we find that the asset index headcount drops to 13.91 percent. This in part counteracts the effect of changes in the education of household heads, which actually raises the headcount slightly to 25.50. Changes in the remaining assets contributed similar amounts to the total drop in poverty.

Nutritional Status

Among our three nutritional status indicators, there is little consistency in terms of the findings. The percent of children who fall below age and gender standardized height-for-age (stunting), our measure of chronic nutrition, increased in Mali[19] and Zambia, while declining in Uganda and Zimbabwe (see Table 3). In all four cases, we are able to reject the null of non-dominance in the first order. All the other countries show no significant change. In contrast with these mixed results, the weight-for-height indicator (wasting), a measure of acute malnutrition, shows a deterioration in seven of the eight countries for which data are available. In all but the cases of Senegal and Tanzania, first order dominance is found in making comparisons of the distributions. Our composite indicator, the percentage of children below –2 standards deviations of the weight-for-age median, also indicates a deterioration in the cases of Mali, Senegal, Uganda and Zimbabwe.

To illustrate the seemingly contradictory message from our nutrition indicators, we have produced Figure 2, which plots changes in stunting against changes in wasting for our sample countries. Those countries where the incidence of wasting increased are in the top two quadrants, which include all but Zambia. The changes in the percent stunted among those countries with increased wasting cover a wide range, e.g., see Zimbabwe to Mali.

The apparent contradiction between the nutrition indicators has a number of potential explanations. For those countries represented in the top right hand quadrant, we hypothesize that sick children, who suffer from wasting, or acute malnutrition, also are characterized by more frequent and severe episodes of health stress, leading to chronic, or long-term malnutrition, measured by low height-for-age.

For those cases in the top left-hand quadrant, we need to search harder for a plausible explanation. One possible reason for the seemingly contradictory signals in terms of nutritional status is in the properties of the indicators themselves. Height is the numerator of one measure, and the denominator of the other. So, a plausible scenario involves a change in either nutrient consumption or disease patterns that enables increased linear growth, but also results in children becoming leaner. A related

[19] Our more detailed examination of the Mali data gives us some reason to be suspicious of these findings. There are indications that a sample selection problem may be biasing the results. Specifically, for the Mali 1987 survey the month of birth is missing for 573 out of the total of 1,691 children. Our initial attempts to control for selectivity problems, however, have not reversed any of the findings.

explanation is found in the time periods that the two measures reflect. Weight-for-height is a measure of current nutritional status, while height-for-age is a measure of previous nutritional status. So it is plausible that there was more short-term, or acute malnutrition at the times the second surveys were conducted, relative to the times that the first surveys were conducted. Conversely, it is possible that just the opposite was the case in regard to the two of three years prior to the survey measured by height-for-age. This would be consistent with a situation such as the longer but leaner children, as measured in the second survey, suffering from acute periods of illness, for example diarrhea, concurrent with the timing of the survey. Nevertheless, it seems odd that this should be the case in so many surveys.

Clearly, all this is a matter of conjecture, and we will not be able to sort out the explanation for the inconsistencies in the nutrition indicators. It is, however, noteworthy that in both Uganda and Zimbabwe, our composite nutrition indicator, being underweight (weight-for-age), deteriorated (as it did in Mali and Senegal). These findings suggest that the nutritional status of the children in these populations, on balance, was declining, even though children were growing taller.

Disaggregating by urban and rural areas (see Table 4), we find that the rural population drives the national figures, which is no surprise since their numbers are far greater. It is worth highlighting that in Ghana and Tanzania there is a significant decline in the incidence of stunting and under-weight in urban areas that was not witnessed in rural areas.

Another attempt at disaggregating the nutrition indicators is found in Table 5, where we show how they differ between those households according to our asset index. Specifically we divide the sample of households into quintiles based on the asset index. We find that the percent stunted is highest in the first quintile, and declines steadily across all quintiles. In many cases the largest decline occurs between the 4^{th} and 5^{th} asset quintile. A similar, although less dramatic story applies to the percent of children suffering from acute malnutrition, or wasting. While this table is useful in highlighting the relationship between two poverty indicators, our asset index and nutritional indicators, the fact is that these are simply relationships with no underlying causality. Many other factors correlated with the wealth index may be driving these results, an issue that we will begin to address when we present the multivariate analysis below.

Education

In examining the educational attainment of women 15-49,[20] we distinguish between four levels: no school, primary, secondary, and post secondary. In all the countries, with the exception of Madagascar, the share of women with no education declined over time (see Figures 3-5, Tables 6-7). This decline was largest in Uganda, from 38 percent to 31 percent, and in Kenya, from 25 percent to 18 percent. However, the reduction in the percentage of women with no schooling was not evenly distributed between urban and rural areas. For example, in Ghana, the drop in the share of women

[20] There was undoubtedly some censoring of the final school attainment of the younger women who may still be enrolled in school.

with no school was from 27 to 17 percent in urban areas, with no change occurring in rural areas. In contrast, the drop in the share of women with no schooling in Zambia was concentrated in rural areas. This is explained by the fact that in the initial period, only 7 percent of urban women had not completed primary school, in contrast to 27 percent in rural areas.

The results for secondary and post-secondary education among women also show that these levels consistently increased. In the case of secondary and post-secondary education, this was observed in six and seven, respectively, of the nine countries. The increase in the share of women with secondary education from 30 percent to 40 percent over six years in Zimbabwe was particularly large, and explains the fall of nearly nine percent in the share of women completing primary education. The other substantial jump in the percent of women who completed secondary school occurred in Mali, from 1 to 7 percent. In Zimbabwe, these increases in secondary school were noted in rural and urban areas, while in Mali, they are almost exclusively an urban phenomenon.

Mortality

The figures on changes in infant and under-age-three mortality are particularly instructive because, unlike the two points in time comparisons presented above, the techniques we have used allow us to actually estimate a trend over periods ranging from 12 to 18 years (see Figures 6A-6I and 7A-7I). We show both the actual data points, as well as predicted values from a simple time series regression. Where the pooling of the values across surveys is rejected, the regression lines are discontinuous.

The figures on infant mortality show a sustained, declining trend in the cases of Ghana, Madagascar, Mali, Senegal, Tanzania, and Uganda. Among these countries, the rate of decline was most rapid in Mali, at 3.8 percent. Mali's starting point IMR of 192 was also markedly higher than any other country's. It is also noteworthy that in Senegal, where we have three surveys, we see a fall in the rate of decline in the IMR over the 20 years for which we have data. In the case of Kenya, infant mortality was basically unchanged, at a relatively low rate of 65. While in the case of Zambia, the IMR increased during the 1980s, only to level off in the first half of the 1990s. In Zimbabwe, where the starting point IMR was the lowest of all our countries, we have the only case of a marked reversal in the trend over the period for which we have data. The IMR fell during the late 1970s and first half of the 1980s at a rapid rate of 3.7 percent, but was on the rise from the mid 1980s to mid 1990s. Nonetheless, in 1993, the IMR of 57.9 was still lower than any other country for which we have data.

The evolution of under-age-three mortality rates generally mirrors that of infants. The major differences include that in Zambia, the trend continued upward continuously from 1982 to 1993, and in Mali, we observe a precipitous decline in child mortality rates during the period 1977 to 1984, and thereafter, a much more gradual decline. Once again, a comparison across countries reveals that the under three mortality rate is highest in Mali, by a substantial margin, and lowest in Zimbabwe and Kenya, which are also the countries that made little of no progress in reducing child mortality from the late 1970s to the early 1990s.

We also disaggregated infant and under-age-three mortality rates by asset quintile to give a rough idea of how these welfare measures differ between the asset rich and poor. The was done for cohorts of children born within the five-year uncensored spell closest to the survey. Thus infant mortality rates were estimated for the group of children born one to six years prior to the survey, and under-age-three mortality rates were estimated for those born three to eight years before the interview date.

Infant mortality rates were higher for the first asset index quintile than for the fifth quintile for all nine countries (Table 8). The greatest disparity is found for the 1982 to 1986 cohort of children in Mali, where the IMR for the first quintile was 173.4 compared to 102.0 for the richest 20 percent of the population. However, the mortality rates do not decline monotonically with increases in the quintiles in all cases. In fact, monotonic changes are only observed for the 1997 Madagascar survey. Thus if we compare the second (180.1) with the fifth quintiles for Mali, the gap rises further to 78.1 deaths per thousand live births. The smallest difference between the IMR for the extreme quintiles was for children born in Zimbabwe between 1989 and 1993. This gap of 17.5 also does not tell the whole story because the highest mortality rate for this cohort is for kids born into households in the fourth asset index quintile. This rate of 66.2 is 26.8 points higher than that of the fifth quintile. Nevertheless, the distribution of IMR across quintiles for this group of kids remains the most even for our group of countries.

The patterns are very similar for under-age-three mortality rates, the exception being that monotonically increasing rates are observed for six cohorts of children rather than just one (Ghana 1986-1990, Kenya 1983-1987, Mali 1980-1984, Senegal 1981-1985, and Zambia 1985-1989 and 1990-1994). Again the largest overall disparity between mortality rates is for the 1982-1986 cohort of children in Mali, where the gap between the poorest and richest is 133.7 deaths per thousand livebirths. Likewise, the most even distribution of under-age-three mortality rates across asset index quintiles is for the children born in Zimbabwe between 1987 and 1991, where the gap between the fourth and fifth quintiles is 29.7, and between the first and fifth quintiles is 17.4.

We again caution that ceteris is not paribus in these simple disaggregations. The figures in Table 9 do not illustrate the true effect of wealth on child mortality rates because we do not control for behavioral effects. For example, parents' with higher levels of education may use health inputs more efficiently thus reducing the risk of death among their children. At the same time, their higher levels of education may result in increased wealth. Thus we cannot draw direct causal relationships between the differing levels of wealth and the corresponding different levels of mortality. Nonetheless, these disaggregations are useful in giving a general idea of how mortality rates differ.

Decompositions

The decompositions of the asset index headcount ratio suggest that intra-rural effects accounted for most of the changes (Tables 9A-9I). In those cases where there is a substantial fall in poverty (e.g., Ghana, Madagascar and Mali), migration also contributed to a decline in the headcount, generally on the order of 20 percent. In all these cases, the contribution of declining poverty in urban areas is small, around 5 percent. In the case of

Zimbabwe, where the headcount increased by a significant amount, it was also driven by changes in the rural areas, with only small migration and urban effects. In a few countries where we witnessed small declines in poverty (e.g. Kenya, Senegal between 1992 and 1997, Tanzania, and Zambia), we also see that migration worked in the opposite direction of the intra-regional effects. In these cases, the explanation for migration contributing to worsening poverty is found in the increasing population shares in rural areas (either due to migration, higher fertility, or a combination of both).

The regional decompositions also paint a picture of different contributions to the change in headcount poverty levels (Tables 10A-10I). Particularly noteworthy is the case of Ghana where the Upper West, Upper East and Northern regions, in combination referred to as the Savannah region, played a large role in the overall decline in rural poverty. To a lesser extent this is true for Brong Ahafo, a more prosperous forest zone region. In another example of how the regional decompositions inform the regional aspects of changes in welfare, the West and Manicaland regions made particularly large contributions to the increases in our headcount measure for Zimbabwe.

We also decompose the household asset poverty into growth and redistribution effects (Tables 11A-11I), and find that for Ghana, Kenya, Madagascar (P_1 and P_2), Mali, Senegal (1992-1997), Tanzania and Uganda, increases in the mean asset index compensate at least in part for the rise in inequality, with the result being lower poverty for all three FGT measures. In Zimbabwe, the growth effect also outweighed the redistribution effect, but in the opposite direction. In Senegal between 1986 and 1992, except for the headcount ratio at the high poverty line, asset poverty rose as the growth effect was insufficient to overcome the effect of increasing dispersion. Zambia is an exceptional case where poverty declined despite a fall in the mean of the asset index. The tightening of the distribution of assets in 1996, more than compensated for the leftward shift in the mean.

The residuals are not trivial and in some cases are larger than one of the other components. For the change in the headcount ratio in Madagascar when the first year is the reference year, the residual is larger than both the growth and redistribution components. The size of the residuals suggests that reporting results for the two reference years is more appropriate than taking there average. The growth and redistribution components should thus be viewed as bounds for the actual effects.

We have conducted similar decompositions for our nutrition indicators (Tables 12A-12D). Where the changes are significant, such as the increased wasting in Ghana, or the drop in the percent stunted and increase in percent wasted in Uganda, once again the rural areas are responsible for the predominance of the changes observed. Migration effects are much less important than in the case of our asset index.

The growth-redistribution decomposition of changes in poverty measured by the stunting and wasting indicators reveals that in every case where nutrition poverty worsens, the redistribution component is a contributing factor (Tables 13A-13H). In two of the seven countries where weight-for-height z-scores deteriorate (Ghana and Senegal), these increases in the dispersion outweigh the beneficial effect of improvements in the mean WHZ score. In the remaining five countries, the decreases in the mean and the increases in the dispersion together resulted in the increased levels of wasting. The one exception is the insignificant change in P_2 for Tanzania, where the two effects almost completely offset each other. In the one country where wasting decreased, Zambia, the growth and redistribution components also contributed in the same direction.

The growth and redistribution effects move in opposite directions for five of the eight countries in terms of changes in stunting. Of these countries, only in Zimbabwe does the change in the mean unambiguously outweigh the change in the distribution. All three FGT measures indicate declines in poverty there. In Ghana, both the height-for-age headcount and poverty-gap measures improve, but poverty severity worsens with the increased dispersion. The latter change is not statistically significant, however. Although the headcount ratios for Madagascar and Senegal fall, the worsening inequality of HAZ outcomes affect the more distributionally sensitive poverty-gap and poverty-severity measures more than improvements in the mean, and we see increasing poverty as indicated by P_1 and P_2 for both of these countries.

Regression Analysis

In this section of the paper we present some findings from our efforts to model nutritional status and mortality. We present three sets of models. The first two are reduced form models, differing only in terms of whether household demographic variables are included. There remains a difference in view as to the lesser of two evils – including potentially endogenous covariates represented by household composition variables, or the missing variable bias that results from their exclusion. We therefore leave it to the endogenous preferences of the reader as to which model he/she prefers. In a third set of models we include a set of covariates that are designed to capture the quality and quantity of community health infrastructure. Specifically, since immunization and prenatal care of individuals is clearly endogenous, we calculate non-self cluster means for the share of individuals receiving pre-natal care from doctors and nurses in the sampling cluster, and do the same for child and maternal vaccination prevalence. Means and standard deviations of the parameters included in the models are found in Appendix Table A1.

Since we have data for two or more time periods of each country, we also statistically test the parameters to determine whether the surveys can be pooled. We perform this test separately for each nutrition and mortality model, and only pool when the test statistics indicate that it is legitimate to do so. Otherwise, we present models for the two time periods for which we have data.

Nutritional Status

Height for age

In Tables 14A-14C, we can see that the models have similar characteristics across time periods and countries. First, the gender variables are universally negative and usually significant at standard levels. The finding that boys tend to be more likely to suffer from linear growth failure is consistent with other research from Africa (Svedberg, 1990; Sahn 1990). Second we find a pattern, as shown by the dummy variables for the age of the child, where stunting worsens as children get older. This is attributable to the cumulative effect of periods of nutritional and health stress leading to a continued deterioration in growth relative to age and gender standardized norms. A third common finding is that as birth order increases, children have lower height-for-age z-scores. This may be due to parity effects, however, the birth order variable may also be picking up intra-household effects, whereby there is less investment in younger siblings, as well as possibly some income effects that we are not capturing in our reduced from models. Forth, we find that children living in urban areas tend to have better linear growth. This variable is significant for at least one survey in all cases except for the pooled Zimbabwe model. And fifth, children who are from multiple births, as expected, show reduced linear growth, a finding that is strong and statistically significant in all the surveys.

Next we consider the effect of a number of covariates that capture how the mother's characteristics effect nutritional outcomes. The increasing age of the mother contributes to better nutritional outcomes, although the negative quadratic indicates diminishing positive effects of increased maternal age. Recall, that we have controlled for birth order, so that it is likely that this age effect largely represents experience both in household production activities (e.g., child nurturing), as well as possibly in income earning activities outside the home. We also included in the models a variable for whether or not the mother was born in an urban area. We used the mother's birthplace since it would presumably capture some maternal endowments, but not have the problem of endogeneity associated with present location of residence. In any event, only in Tanzania did it prove significant, being positive as expected.

We also consider the effect of the education of the mother and father on the growth of children. The parameter estimates on the primary and secondary education variables are generally positive, with those for secondary education being of large magnitude in keeping with expectations. However, for primary education, only for the pooled Senegal and Zambia surveys, and the 1991 Tanzania survey, do we find that mother's primary education is significant at standard levels. For secondary education the models do much better, with the coefficients being significant in all cases except for Mali, and the early surveys in Ghana and Madagascar. We similarly find that all the coefficients on father's education that are significant have the expected positive sign, and tend to increase with levels of education. Likewise, there are more significant coefficients for secondary, than primary education.

In terms of the covariates that capture the child's proximate sanitary environment, we find that the availability of a flush toilet has a large and significant positive effect on child growth in many cases, although, this is not true of the availability of piped drinking water. It is possible that the flush toilet is capturing some wealth effects, so some caution is suggested in its interpretation.

The introduction of the demographic variables does not alter the nature of the finding reported above regarding the other parameters in the model. In one case, birth order, the inclusion of the household demographics results in fewer significant coefficients, something that comes as no surprise given the correlation between birth order and some of the number of other children in the household. As for the demographic variables themselves, we find that the presence of other children under the age of five, which implied potential competition for child nurturing resources, has the expect negative effect on child growth in one survey for Ghana and Madagascar, and for the pooled Zimbabwe surveys. There are also numerous cases where the coefficients on boys and girls ages 5 to 15 are negative and significant. This implies that that at least relative to male adults, there presence in the household is nutritional risk, and that their potential contribution to child care and income earning potential is outweighed by their competing for household resources.

Finally, the various cluster-based covariates on health services are rarely significant and even when significant, do not always assume signs that we would have expected. It is therefore quite clear that the use of prenatal care and receipt of vaccination among other people in a village are not good explanatory variables for linear growth outcomes.

Weight for Height

In the weight-for-height regressions, the dummy variable for boys consistently has a negative sign, although, it is only significant at standard levels (for one survey period only) in the cases of Ghana, Madagascar, Senegal, and Zimbabwe (Tables 15A-15C). This suggests that like with the models of linear growth, boys standardized weight-for-height is generally lower than for girls. Once again we find that being from a multiple birth is a risk factor, reducing weight-for-height. Whether the implied competition for resources is primarily in-utero, or after birth, is indeterminate from our results. We also observe that wasting is greatest for the left out age group, children 13 to 24 months, in all the equations. This corresponds to the weaning period when illness, particularly diarrheal disease, results in episodes of weight loss characteristic of acute malnutrition. While the birth order covariate takes on the expected negative sign, it is generally not significant at standard levels of confidence.

The education parameters are generally of the expected positive sign, indicating that more education increases the weight-for-height of children. In the case of mothers, in Mali and Zimbabwe (both surveys), Tanzania (pooled) and Uganda (the later survey), we do get positive and significant parameters for primary schooling. This is only the case for maternal post primary education for the pooled Tanzania survey, for both surveys in Zambia and Zimbabwe, and for one survey in Madagascar and Uganda. We also get a perverse negative result for the first survey for both primary and post primary education in Ghana. For father's education, the significant results are limited for both primary and secondary school, although, all are positive as expected.

As with the linear growth models, the access to a flush toilet appears to be a more important benefit to weight-for-height than piped drinking water. But once again, only a small share of the coefficients across the countries is significant.

Inclusion of the demographic variables of the non-self cluster means once again does not have any major effects on the other coefficients. However, these variables do not tell a compelling or consistent story across countries.

Infant and Under-Age-Three Mortality

Our probit models of mortality include a similar set of regressors as those used in modeling anthropometric outcomes. In Tables 16A-16C and 17A-17C, however, instead of showing the model parameters, we present the estimated changes in the probability of an infant or child dying for a change in each of the covariates, evaluated at the mean of the explanatory variables (i.e. $\frac{\partial P(\bar{x};\hat{b})}{x}$).

The results of the infant and under-age-three mortality models are very similar to the models that examine the determinants of linear growth. Male infants and children have a greater probability of dying, as do infants and children of multiple births. Children and infants with a higher birth order, as shown by the positive and generally statistically significant derivatives in Table 16A and 17A, are also more likely to die. It is noteworthy that the marginal effects of birth order, and to a lesser extent gender of the child, are greater in the infant than child mortality models. The children of younger mothers are less likely to survive, although, the positive quadratic age variable indicates that there are diminishing positive effects of age. The signs on these probabilities are statistically significant for most countries and time periods. The negative urban dummies, albeit often not significant, suggest that infants and children living in the cities have a lower probability of dying.

The education derivatives are usually not significant, both for mothers and fathers. However, with only one exception (primary education of the father in the 1997 Madagascar survey), all the significant parameters have the expected negative sign, indicating that relative to no education, all levels of education have a positive effect on survival of infants and children. In general, we also find that the higher education levels, the greater the negative sign, indicating that there are increasing benefits of education on reducing the probability of death

Turning to the models with the household demographics[21] included, for both infant and under three mortality, first, like with the nutrition models, the inclusion of the household demographics does not change the story that emerges from the models absence of these parameters, with the possible exception of weakening the birth order effect in the under age three models. Unlike the nutrition models, there seem to be some strong stories that emerge in terms of the role of household demographics on mortality probabilities. First, there is nearly a universally negative and significant sign on the number of household members. This implies that controlling for composition, there is a lower probability of death for children in larger households. Second, with a couple of exceptions, it is also the case that the variable that measures the presence of other

[21] The household demographics for the mortality models are defined as the make-up of the household at the date of birth of the child, rather than the date of interview as in the nutrition models.

children under the age of five in the household raises is positive and significant, indicating that the competition for child care resources raises the probability of mortality. It is also of interest that there are many other positive and significant parameter estimates for the other composition variables, particularly the number of women in the household greater than age 15. This implies that controlling for household size, that relative to males greater than age 15, the presence of other members, particularly women, increases the probability of infant and under age-three mortality. It is possible that this reflects the greater income earning potential of adult males, particularly relative to females.[22] It is also interesting, however, that in most of the cases where we have information on reported headship of the household, that controlling for all composition and size effects, children and infants are at greater risk of death when the household is headed by a man.

Finally, our community covariates for prenatal care and vaccinations once again do not perform as well as we had hoped in explaining infant and under three mortality. Among these variables, the non-self cluster share of the children in the community being vaccinated is the strongest contributor to better survival probabilities. It is almost always negative, and is significant in numerous cases.

CONCLUDING REMARKS AND FUTURE RESEARCH DIRECTIONS

Our purpose in this study is to examine how living standards have changed over time in Africa. At the same time, we want to evaluate the usefulness of the DHS surveys as an alternative data source for poverty analysis in Africa. As yet, our results give no clear indication about changes in poverty on the continent. One welfare indicator, wasting worsens in almost every country, while others – women's education, infant and child mortality, and our asset index – mostly improve. Stunting is quite mixed. Moreover, in not one country do the four types of indicators move together, so the mixed results are not simply the results of some countries improving on all scores while others decline.

We do find one clear message: the welfare indicators that we use are not close substitutes. At first glance, this is puzzling, since all of the indicators we use are goods that we would expect to have relatively low income (or wealth) elasticities, and thus move closely with household welfare, and each other. While we do not have clear explanations for these paradoxes, our future work clearly must pursue them. We expect that the answers may lie both in timing and in sample selection problems. For example, it is plausible that the increased "wasting" observed across the countries could follow from declines in mortality. Children with relatively poor nutritional endowments that would have died in earlier periods, and thus would not have been in the sample, are now surviving, but at low weights-for-height. Women's education is an investment that responds to living standards only with a long lag, so that the current improvements may

[22] This interpretation would imply that on balance, children loose more as a result of the drain on family resources implied by additional female adult members, than then they benefit as a result of their contribution to child care and nurturing

reflect higher living standards many years earlier. In our further research we hope to be able to shed light on such relationships.

While we do believe that the DHS data are interesting because they allow descriptions of several different welfare variables at different points in time, the possibilities for more detailed explanatory analysis are limited. The DHS surveys do not contain many candidates for regressors, and they are particularly weak on policy variables. Clearly, these surveys were designed for purposes other than econometric policy analysis. Nevertheless, the mere fact that the DHS data provide descriptions that we rarely have in Africa makes them a useful data source. Furthermore, we believe that there are several ways to tweak them in ways that will provide interesting and useful policy analyses.

Among the major directions we are pursuing in our research is to expand on the types of poverty decompositions that we have presented above. Recently, Bourguignon, et.al. (1998; see also Bouillon, et. al., 1998; Ferreira and Paes de Barros, 1999) have used such regressions on two separate samples to decompose the change in an overall poverty measure into one component that is due to the change in the regressors between the two samples, another that is due to the change in the estimated coefficients, and a third that is due to changes in the errors. The first term is an "endowment" effect, because it reflects changes in households' characteristics that influence poverty (e.g. more human capital, better access to public services). The second is a "returns" effect, because it captures the changing effect of a given endowment on poverty. The first two together are analogous to the change in the mean in the Datt and Ravallion method we have used; the latter to the change in the distribution. To the extent that the endowments are policy variables, these regressions would give a clear sense not only of the returns (in terms of poverty reduction) of those policies, but also the direction that policy has changed over time. In addition, such decompositions may help clarify the apparent contradiction between the changes in different welfare indicators between surveys. If different indicators respond differently to the endowment variables (the regressors), then it is possible that the changes in the endowments from one survey to the next can explain how one indicator improves while another worsens.

A second avenue for further research involves our efforts is to link the DHS data with other household datasets that have better information on more traditional welfare indicators, especially consumption. The most obvious candidates are LSMS surveys. There several instances in which governments did an LSMS survey and a DHS survey at nearly the same time. We plan to estimate a prediction equation for a standard money-metric utility measure (expenditures per capita) on the LSMS data, using for regressors a set of variables that are available on both the LSMS and DHS datasets. We can then use the resulting coefficients to predict the value of expenditures in the DHS data, and use that variable to make welfare comparisons. As in much of the work in the first part of this study, our main interest would be to evaluate the consistency of welfare rankings or poverty measures across different kinds of welfare/poverty indicators, now including the predicted expenditures variable. This would allow a comparison between the welfare measure that is conventional for economists (e.g., expenditures), and the other measures available in the DHS data. We are particularly interested in how well the asset index compares with more traditional money metric measures such as expenditures. For the most part, we have treated all the living standards indicators (nutritional status, education, and mortality) on an equal footing with the asset index in this paper, more or less in line with a capabilities approach to poverty. Yet a welfarist approach would give clear priority to some measure of purchasing power. In theory, at least, wealth (as measured by a households assets) should be highly correlated with expenditures or purchasing power. Thus, an asset index such as the one that we have constructed might be a reasonable welfarist measure of well-being. While the limited number of assets is a problem, the asset index has the clear advantage that it does not require any price deflator for inter-regional and inter-temporal comparisons. Thus, if welfare as measured by the asset index in one period is similar to that measured by expenditures in the same period, it may be a preferable welfarist measure for intertemporal comparisons, particularly in highly inflationary environments.

And finally, one of the clear weaknesses of the regressions that we present here is that they are all cross-sections. None of the DHS data sets contain a panel of households. This implies that we cannot control for household fixed effects in our regressions with a poverty indicator on the right-hand side, nor can we control for endogenous program placement (to the rather limited extent that we can evaluate public policy in any case). One possible solution is to create panels of clusters. As far as we know, none of the DHS surveys resurveyed the same clusters intentionally. However, it seems that in at least some cases, some subset of the clusters does repeat from one survey to another. If we are able to match them, then we could use that panel to estimate poverty regressions that control for fixed effects and/or endogenous program placement.

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Figure 1: Weights for Household Asset Indices by Country

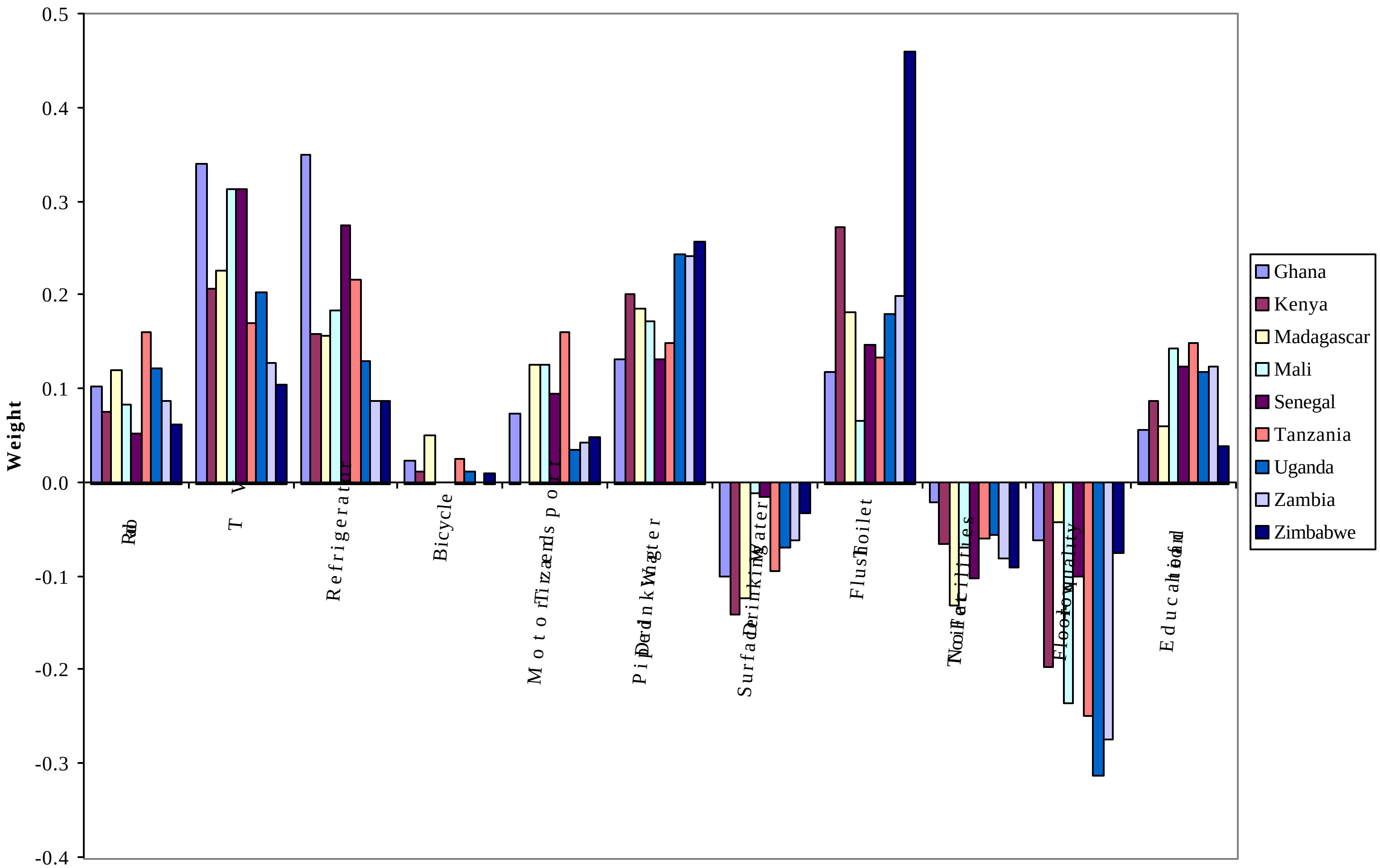

Figure 2: Plots of Changes in Percent Stunted (HAZ) and Wasted (WHZ)

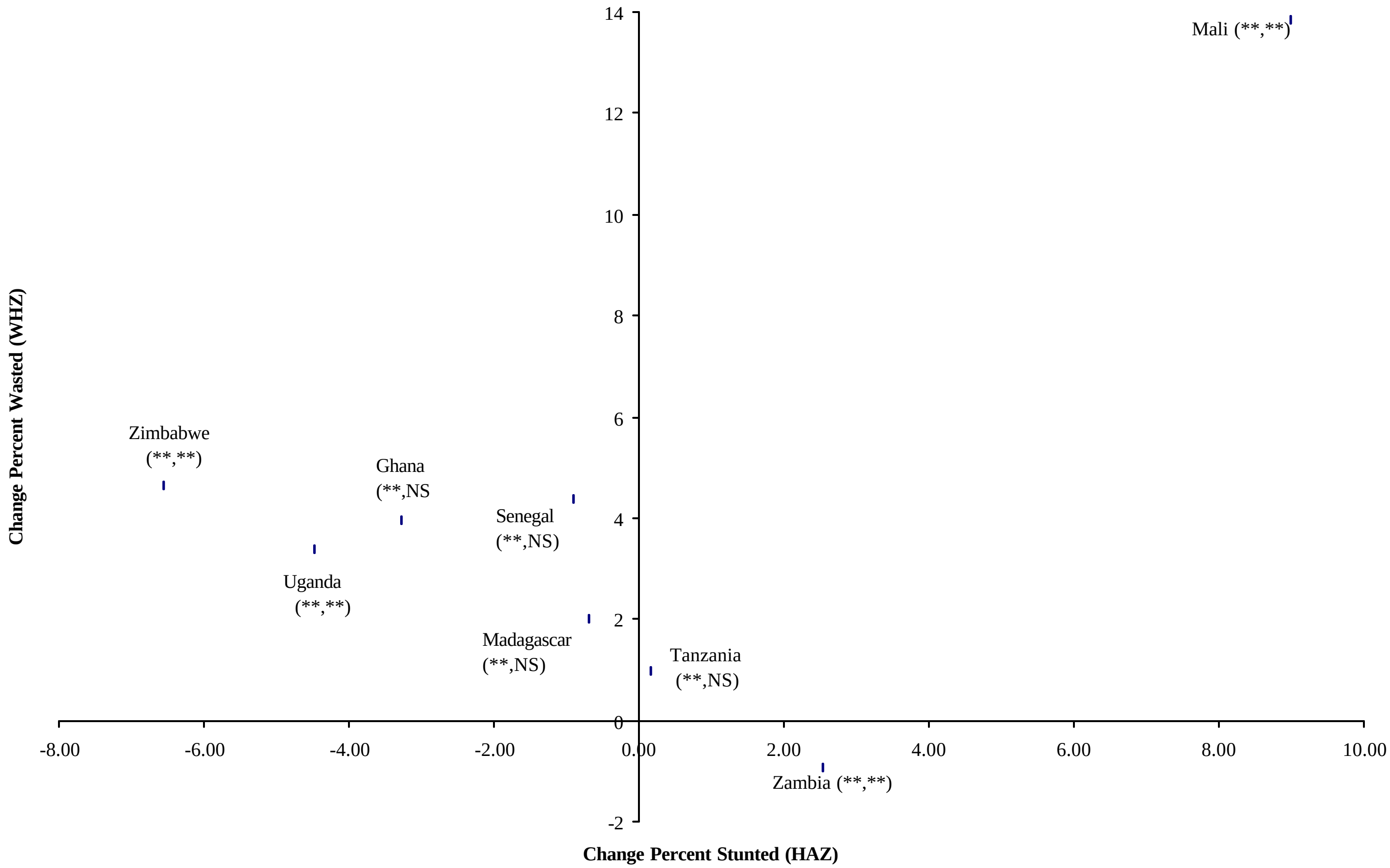

Figure 3

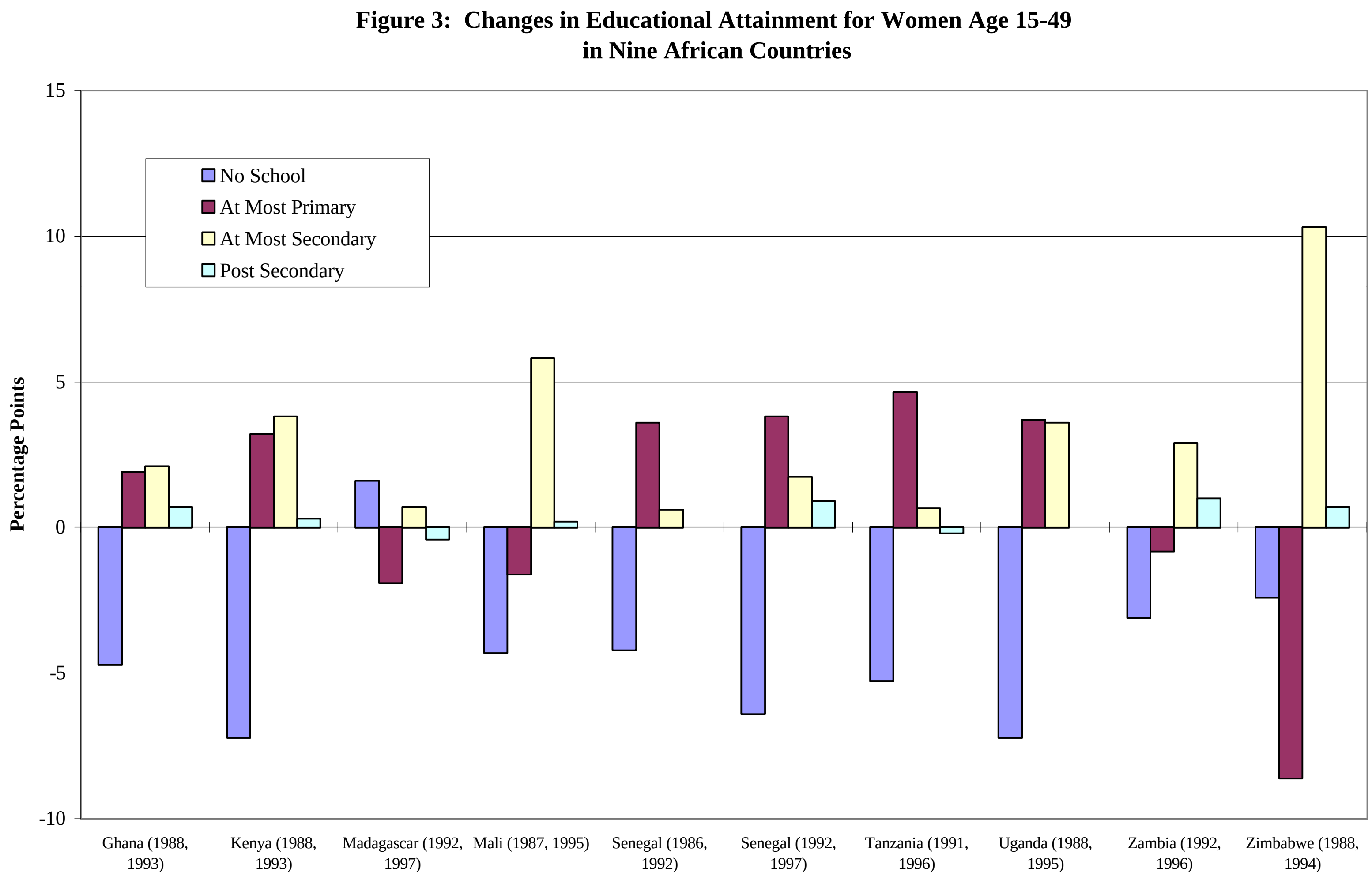
Figure 3: Changes in Educational Attainment for Women Age 15-49
in Nine African Countries
15
10
5
0
-5
-10
Percentage Points
No School
At Most Primary
At Most Secondary
Post Secondary
Ghana (1988, 1993)
Kenya (1988, 1993)
Madagascar (1992, 1997)
Mali (1987, 1995)
Senegal (1986, 1992)
Senegal (1992, 1997)
Tanzania (1991, 1996)
Uganda (1988, 1995)
Zambia (1992, 1996)
Zimbabwe (1988, 1994)

Figure 4

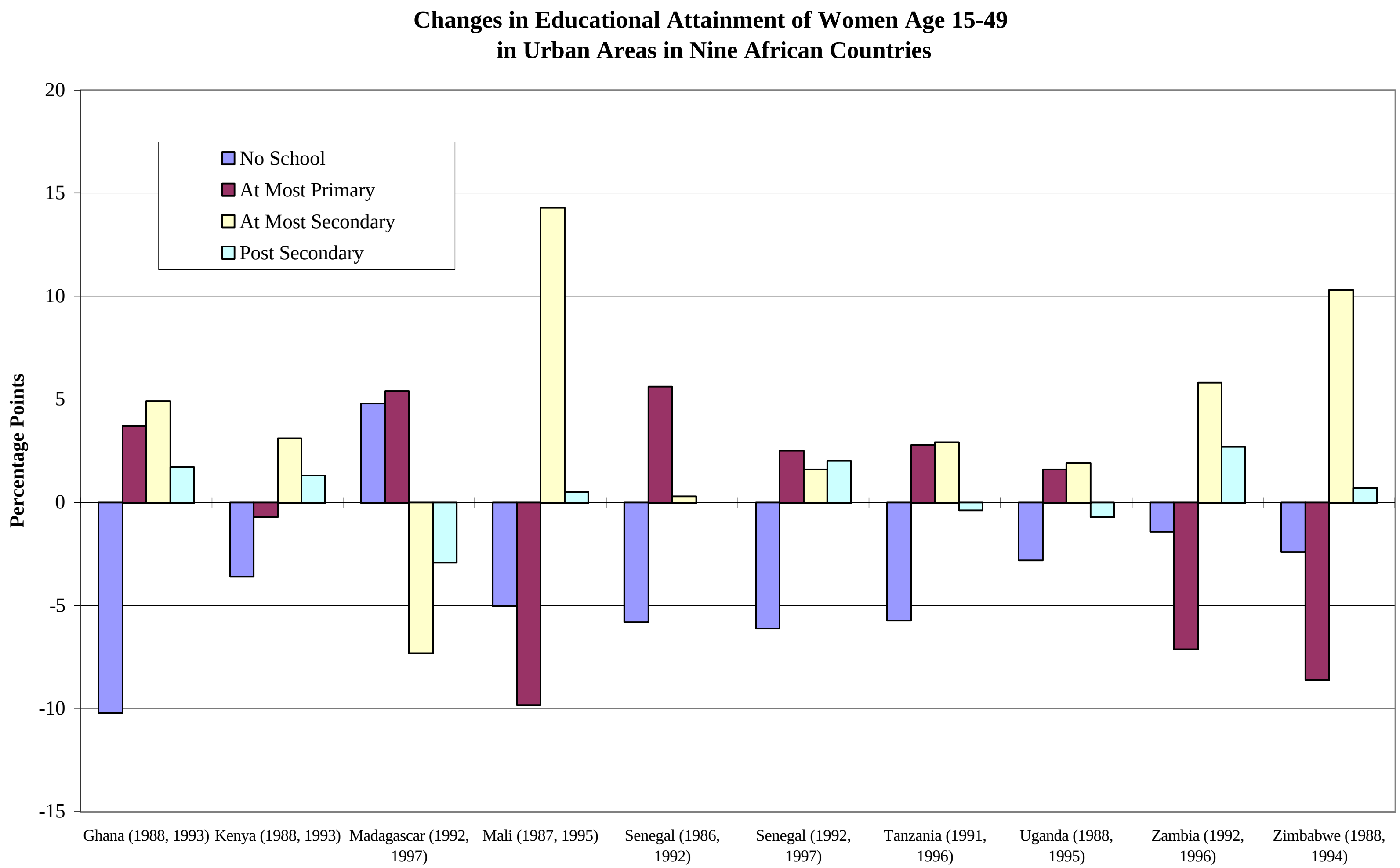
Changes in Educational Attainment of Women Age 15-49
in Urban Areas in Nine African Countries
Percentage Points
20
15
10
5
0
-5
-10
-15
No School
At Most Primary
At Most Secondary
Post Secondary
Ghana (1988, 1993)
Kenya (1988, 1993)
Madagascar (1992, 1997)
Mali (1987, 1995)
Senegal (1986, 1992)
Senegal (1992, 1997)
Tanzania (1991, 1996)
Uganda (1988, 1995)
Zambia (1992, 1996)
Zimbabwe (1988, 1994)

Figure 5

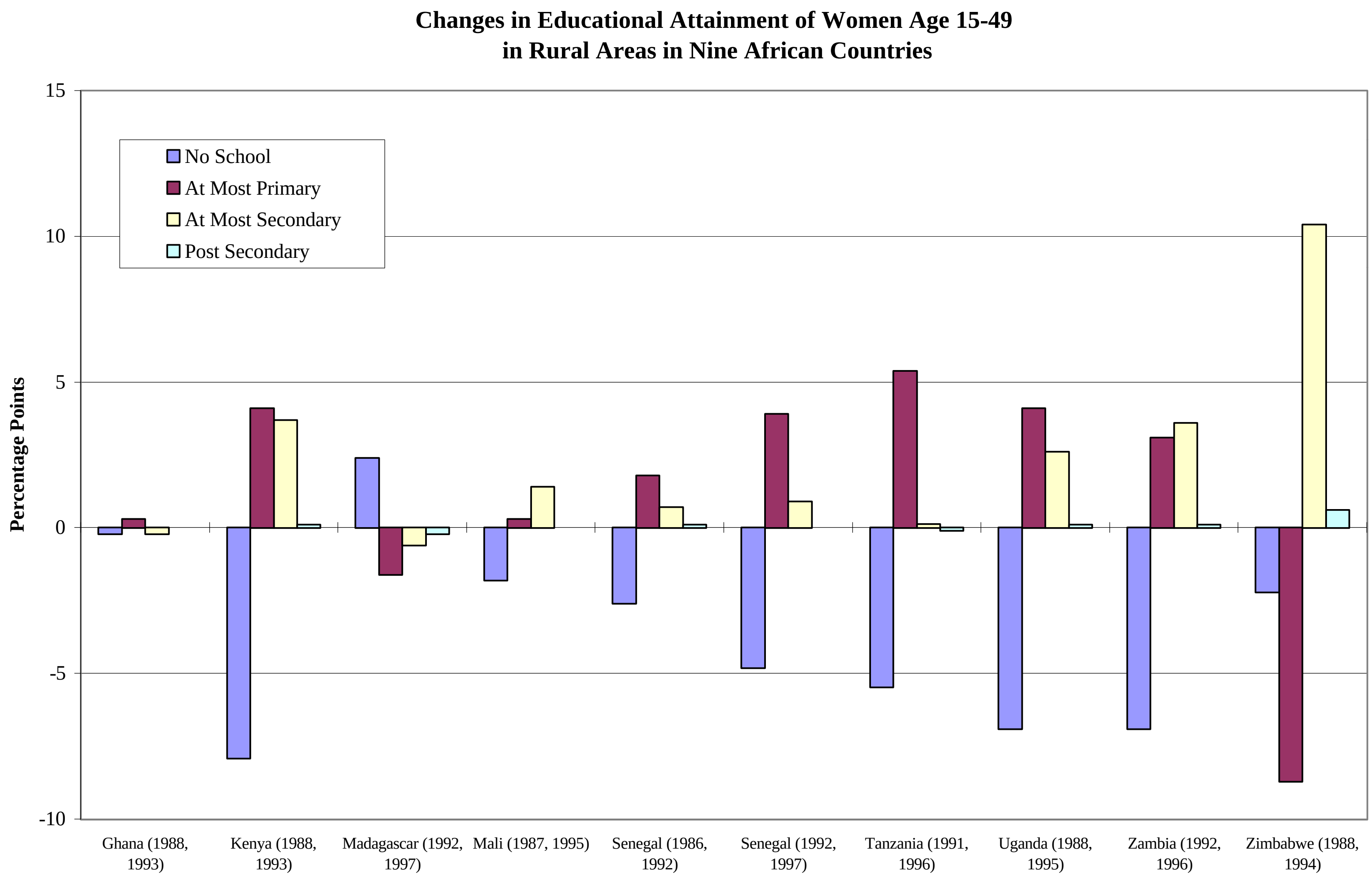
Changes in Educational Attainment of Women Age 15-49
in Rural Areas in Nine African Countries
Percentage Points
15
10
5
0
-5
-10
No School
At Most Primary
At Most Secondary
Post Secondary
Ghana (1988, 1993)
Kenya (1988, 1993)
Madagascar (1992, 1997)
Mali (1987, 1995)
Senegal (1986, 1992)
Senegal (1992, 1997)
Tanzania (1991, 1996)
Uganda (1988, 1995)
Zambia (1992, 1996)
Zimbabwe (1988, 1994)

Figure 6A: Infant Mortality in Ghana:
Retrospectives from DHS I (1988) and DHS III (1993)

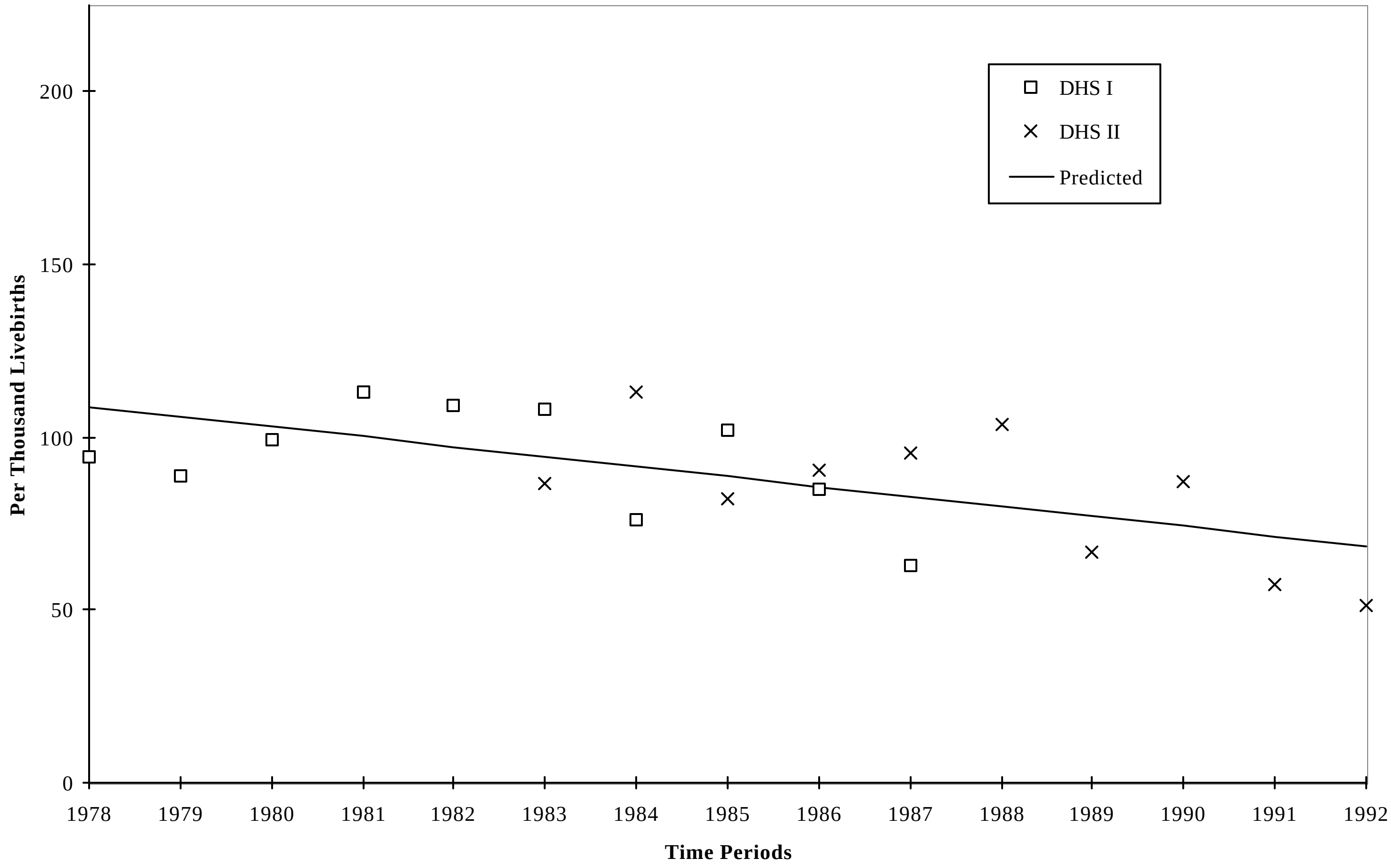

Figure 6B: Infant Mortality in Kenya:
Retrospectives from DHS I (1988) and DHS III (1993)

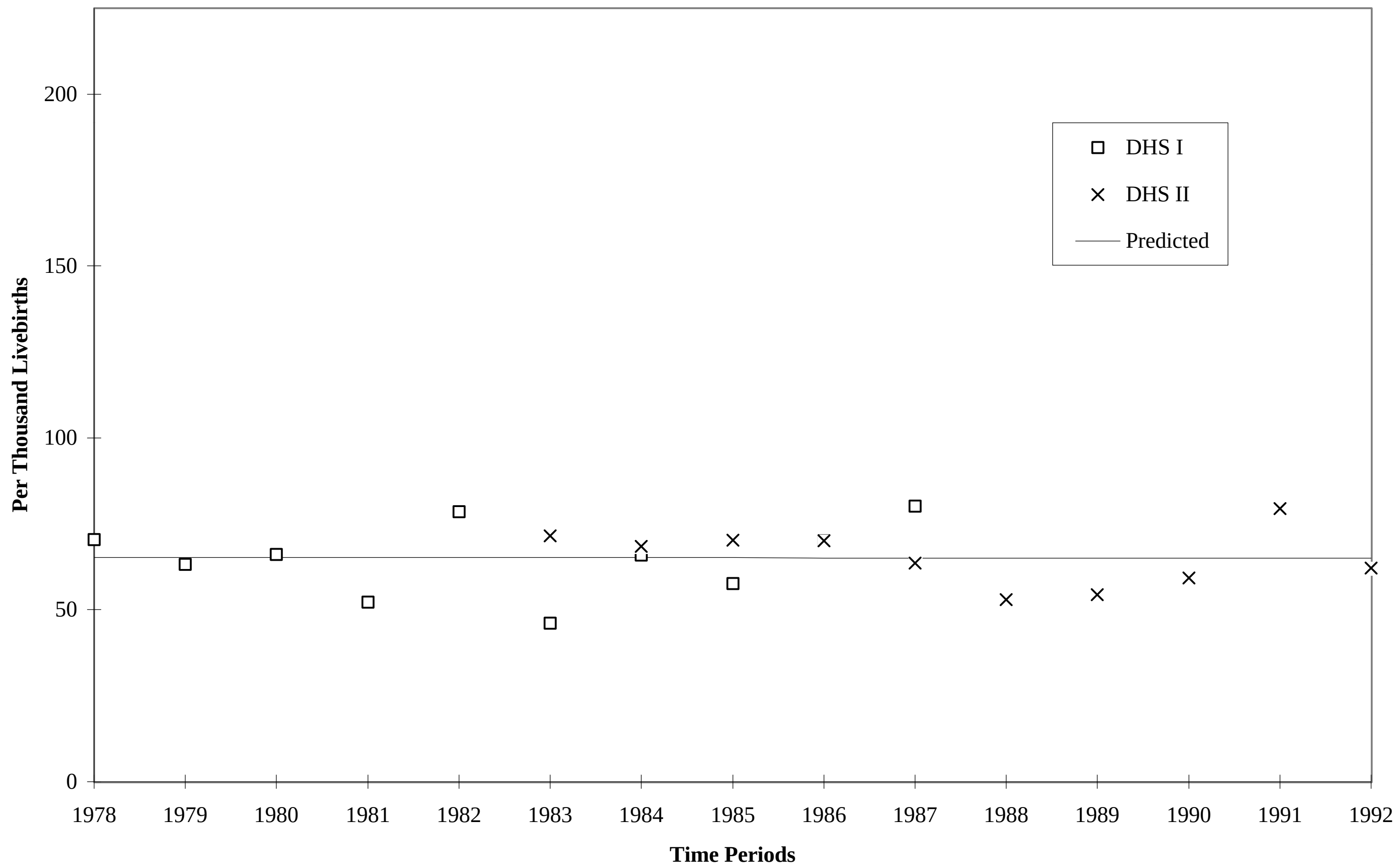

Figure 6C: Infant Mortality in Madagascar:
Retrospectives from DHS II (1992) and DHS III (1997)

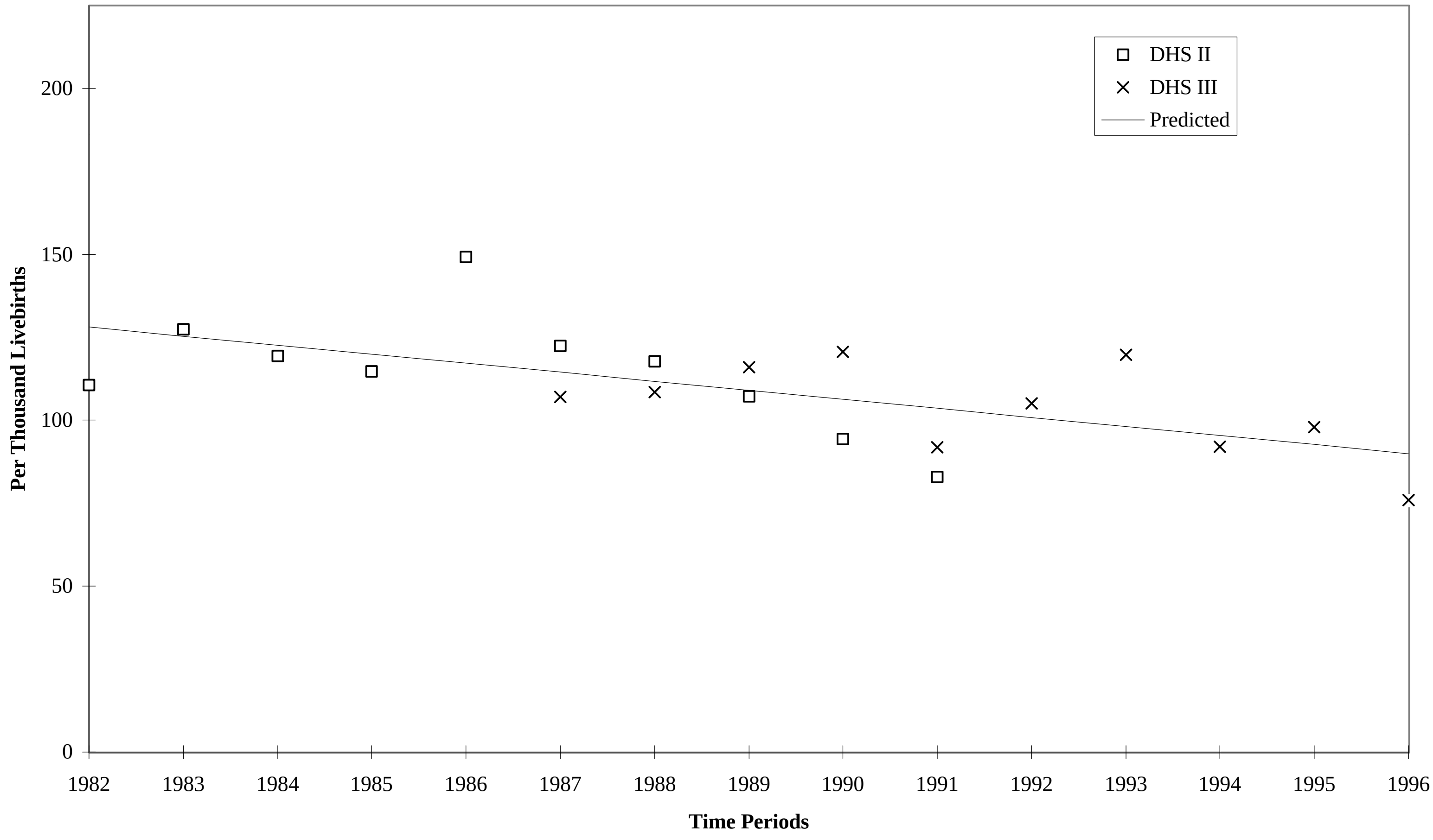

Figure 6D: Infant Mortality in Mali:
Retrospectives from DHS I (1987) and DHS III (1995)

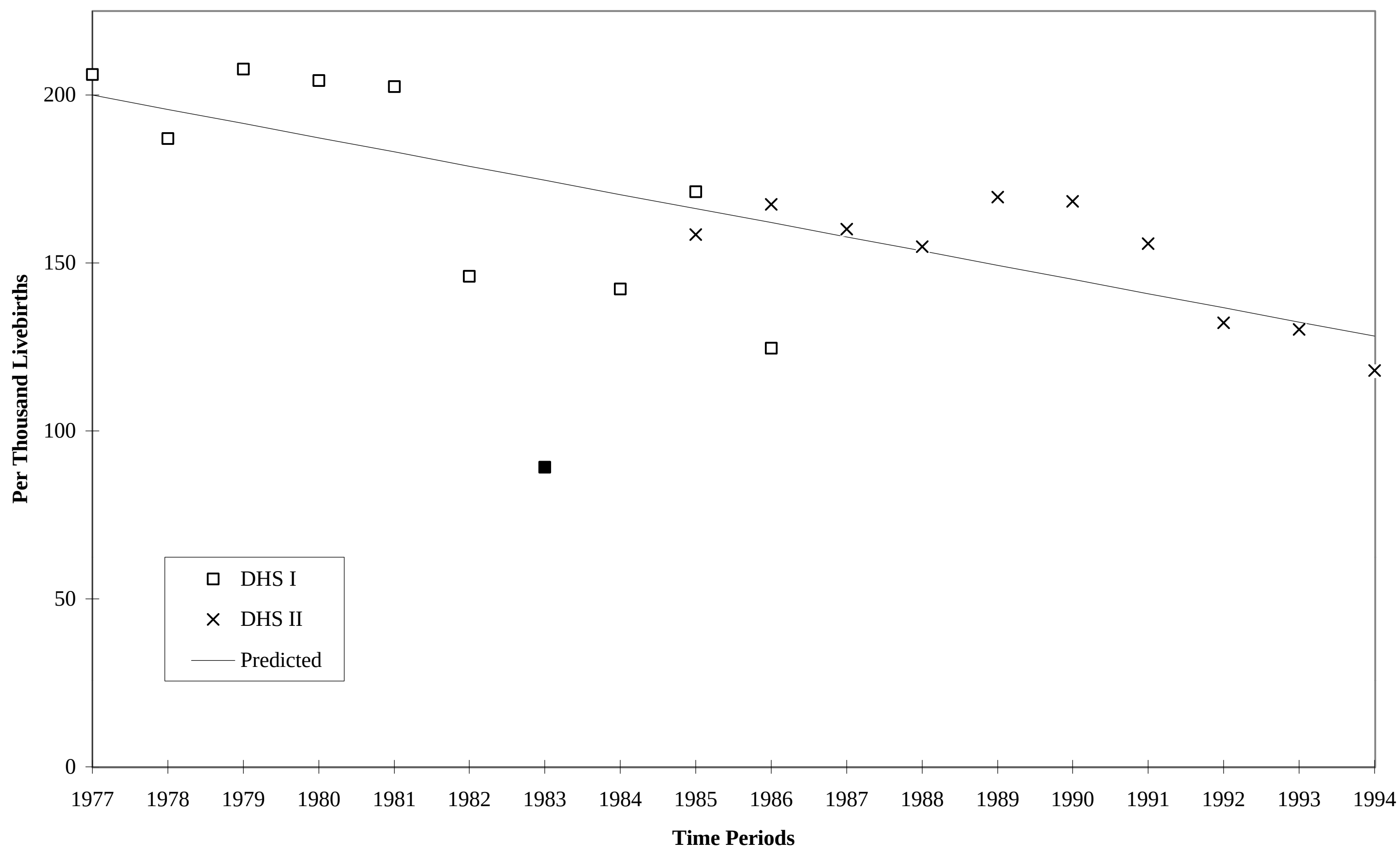

Figure 6E: Infant Mortality in Senegal:
Retrospectives from DHS I (1987), DHS II (1992) and DHS III (1997)

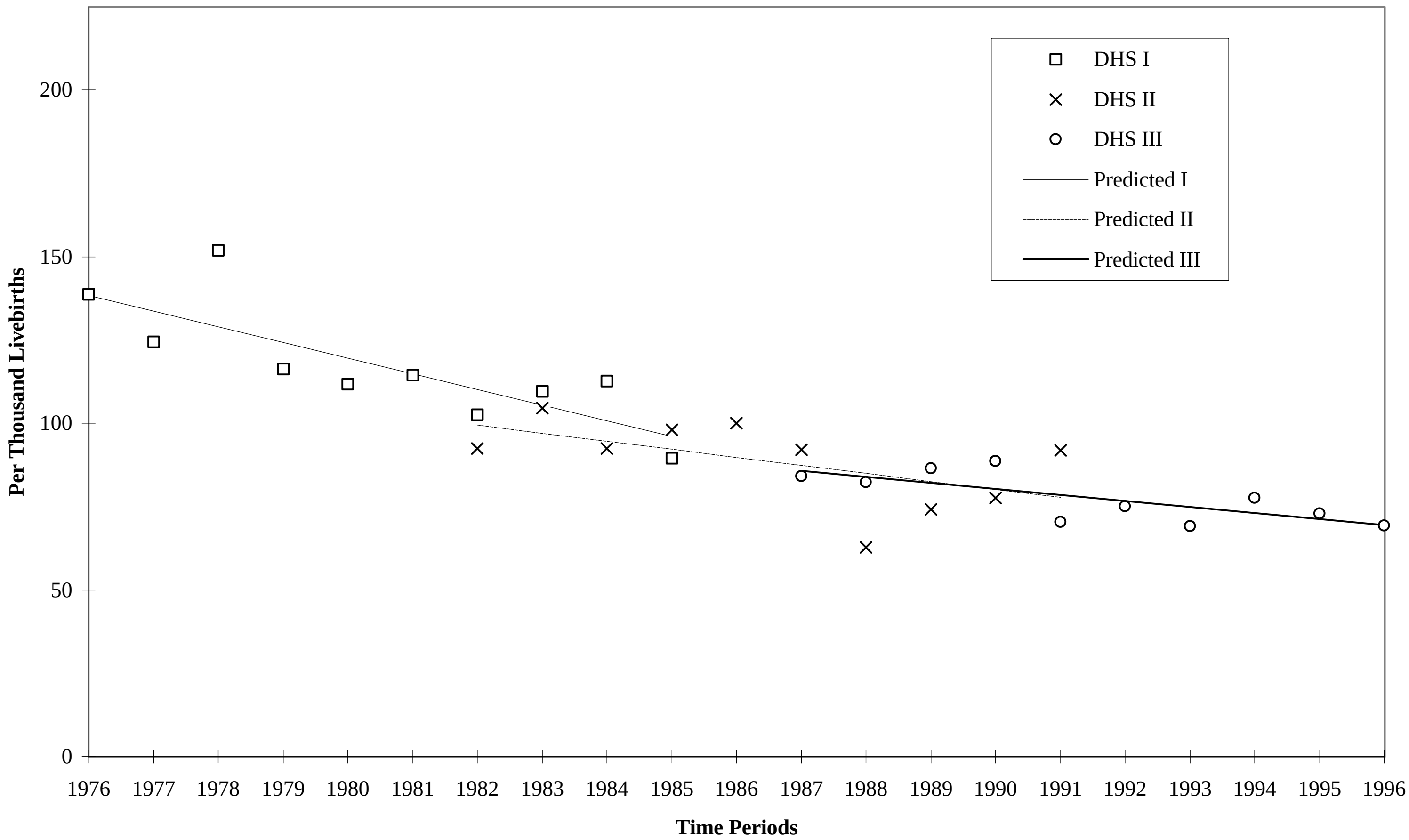

Figure 6F: Infant Mortality in Tanzania:
Retrospectives from DHS II (1991) and DHS III (1996)

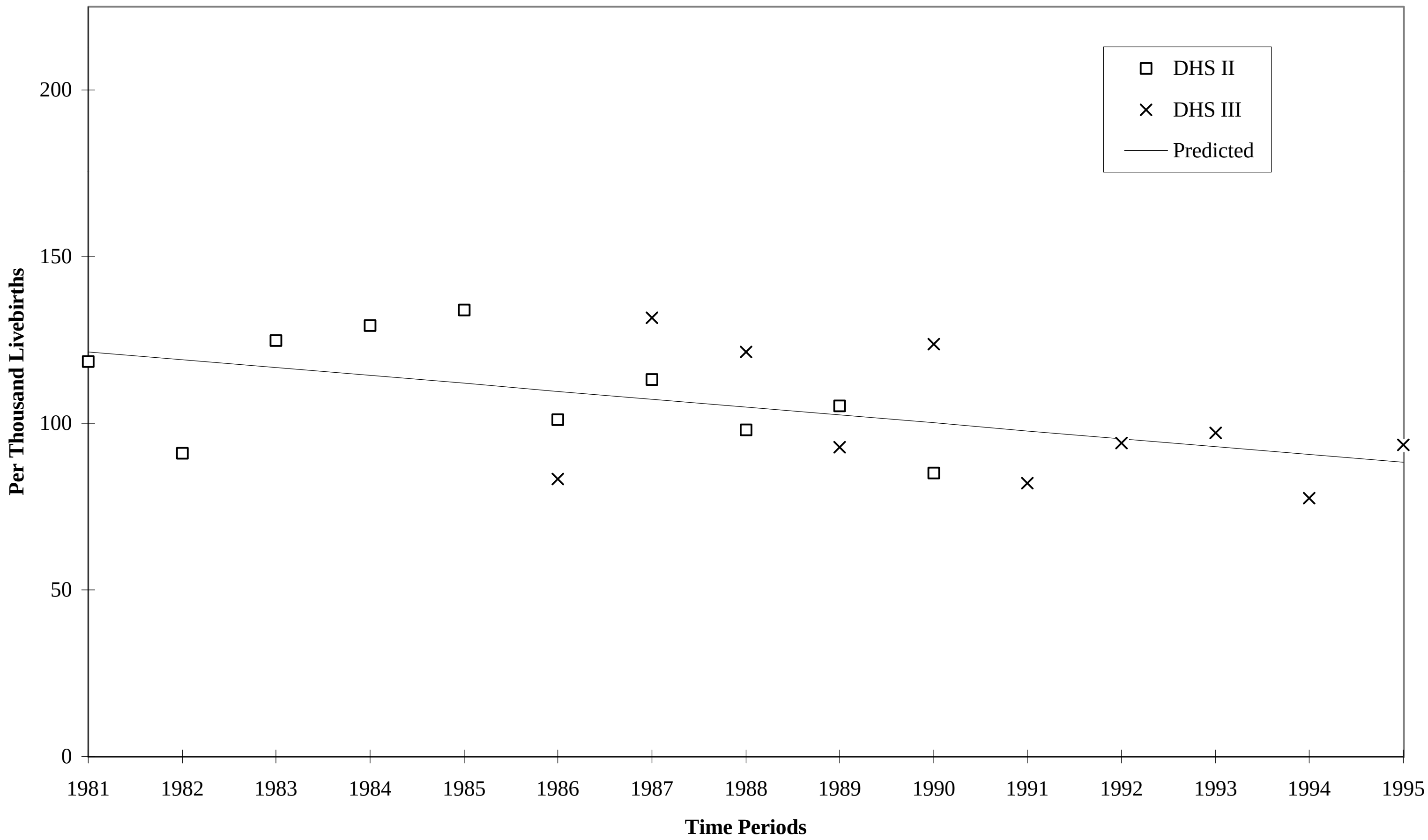

Figure 6G: Infant Mortality in Uganda:
Retrospectives from DHS I (1988) and DHS III (1995)

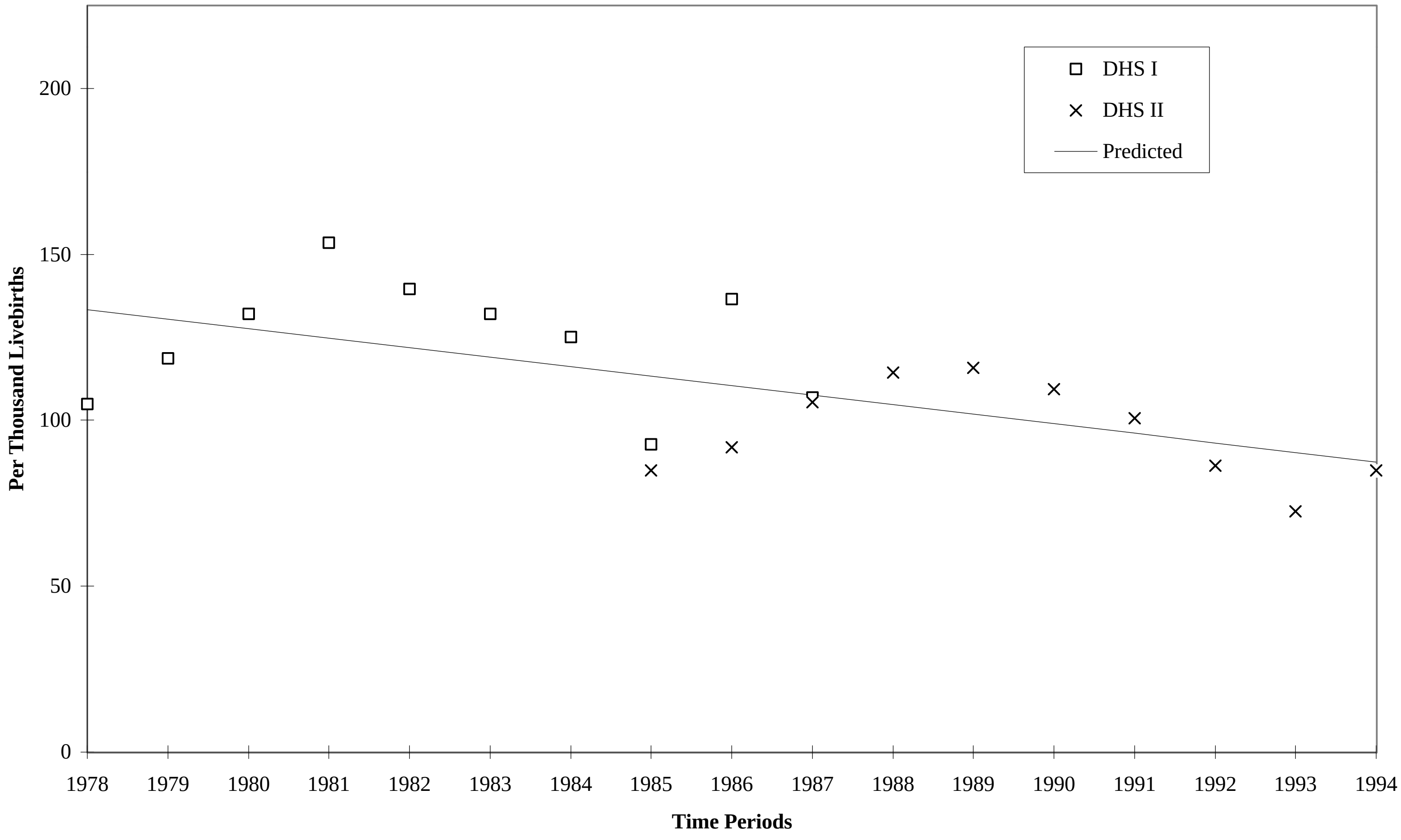

Figure 6H: Infant Mortality in Zambia:
Retrospectives from DHS II (1992) and DHS III (1996)

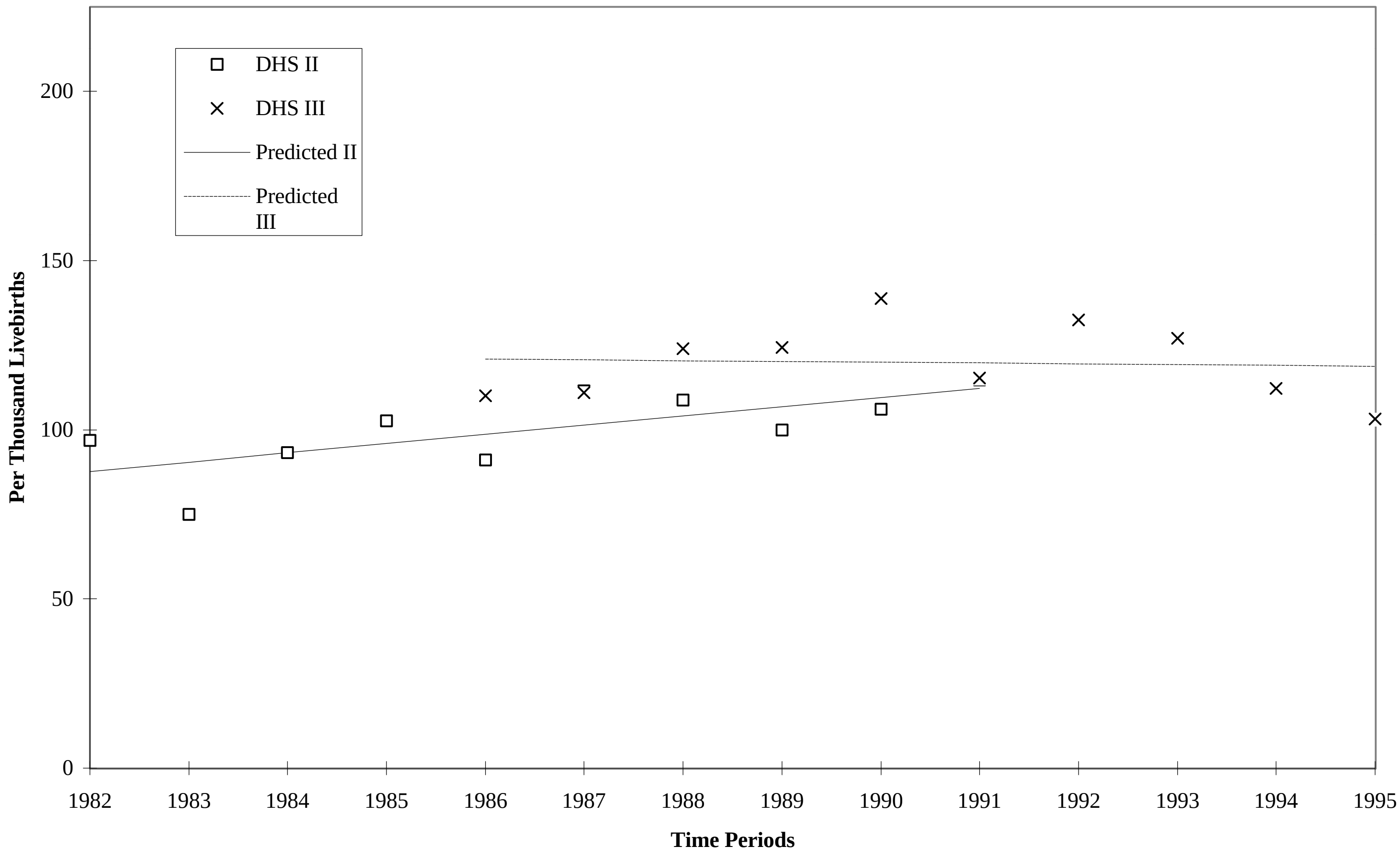

Figure 6I: Infant Mortality in Zimbabwe:
Retrospectives from DHS I (1988) and DHS III (1994)

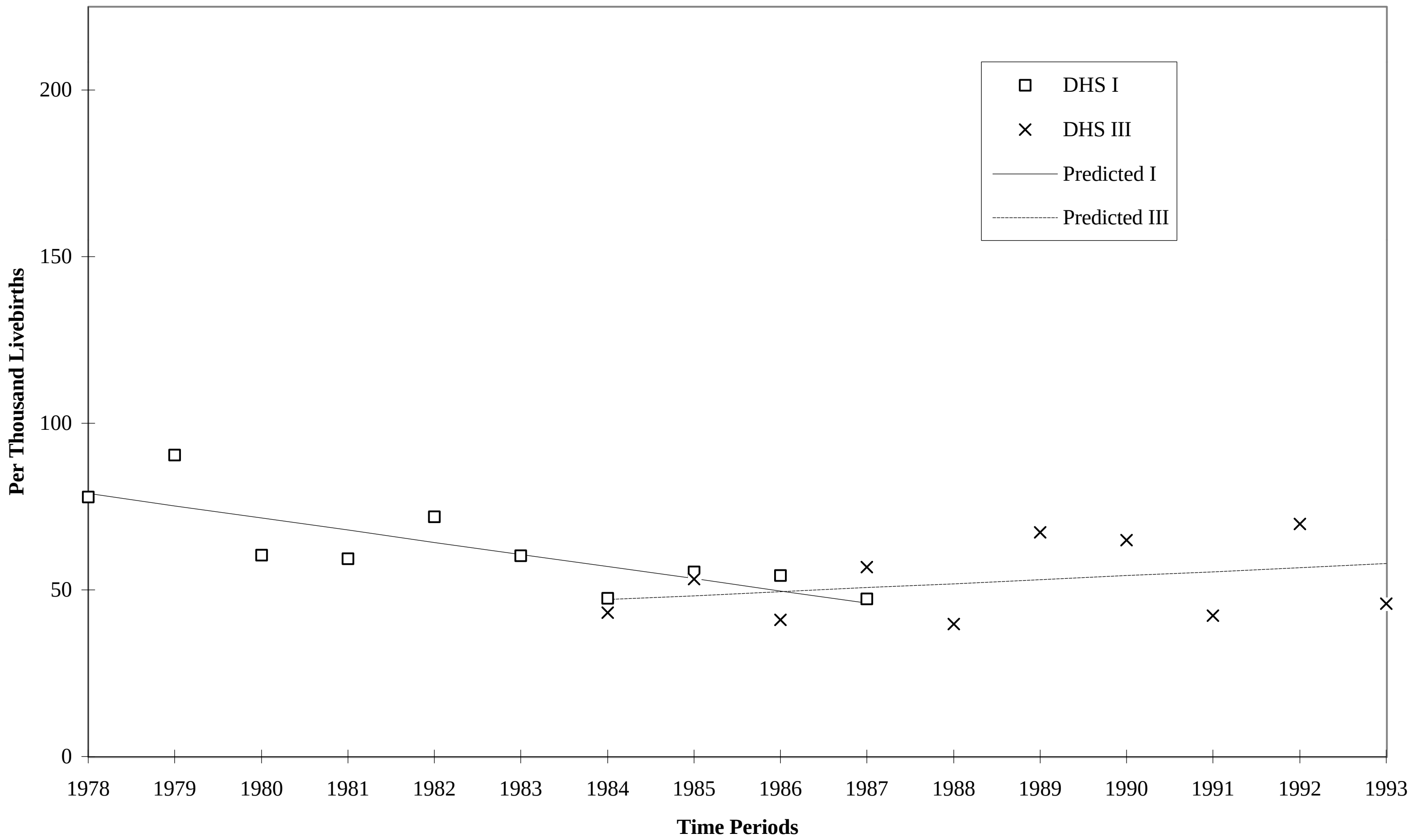

Figure 7A: Under-Age-Three Mortality in Ghana: Retrospectives from DHS I (1988) and DHS III (1993)

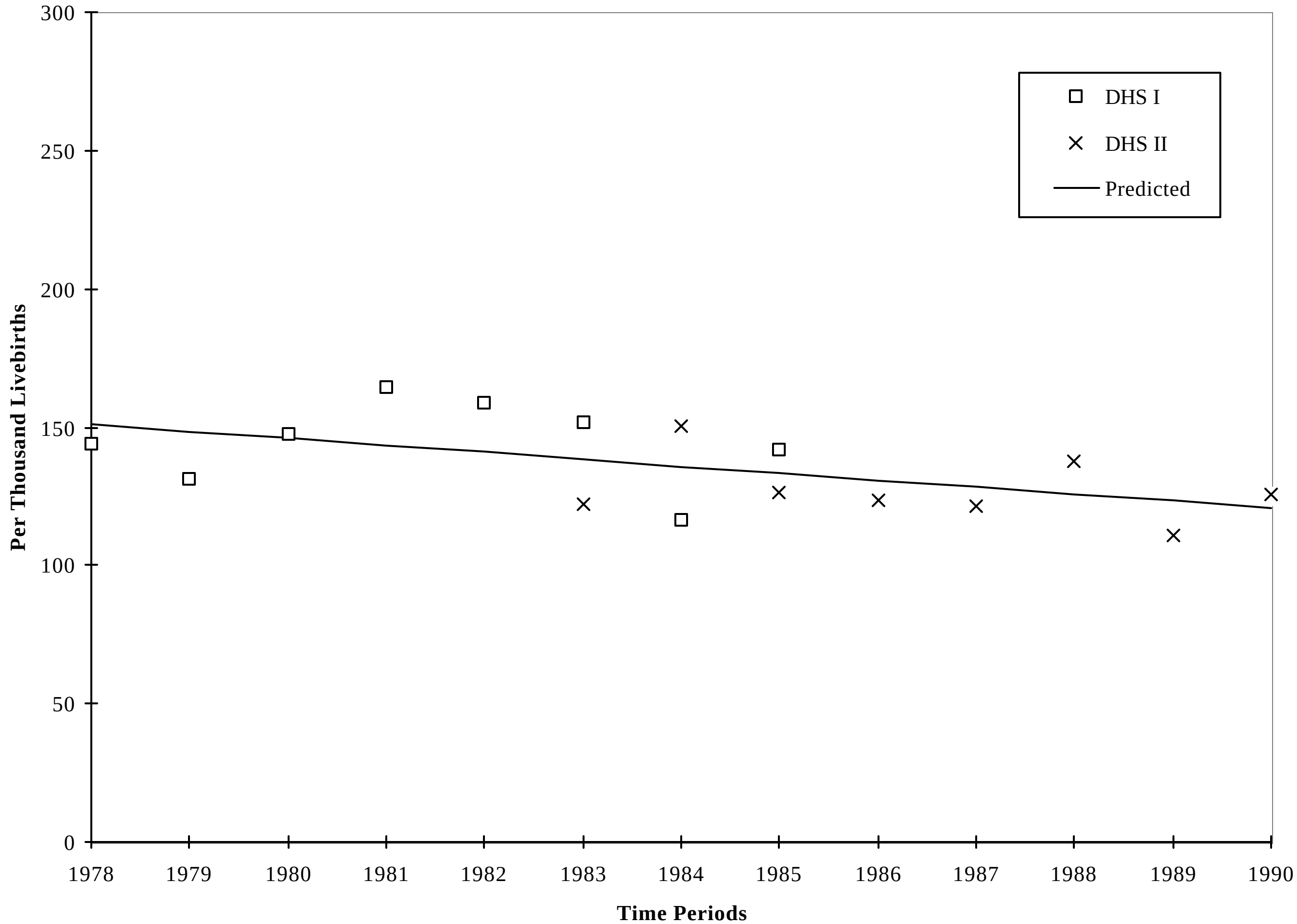

Figure 7B: Under-Age-Three Mortality in Kenya: Retrospectives from DHS I (1988) and DHS III (1993)

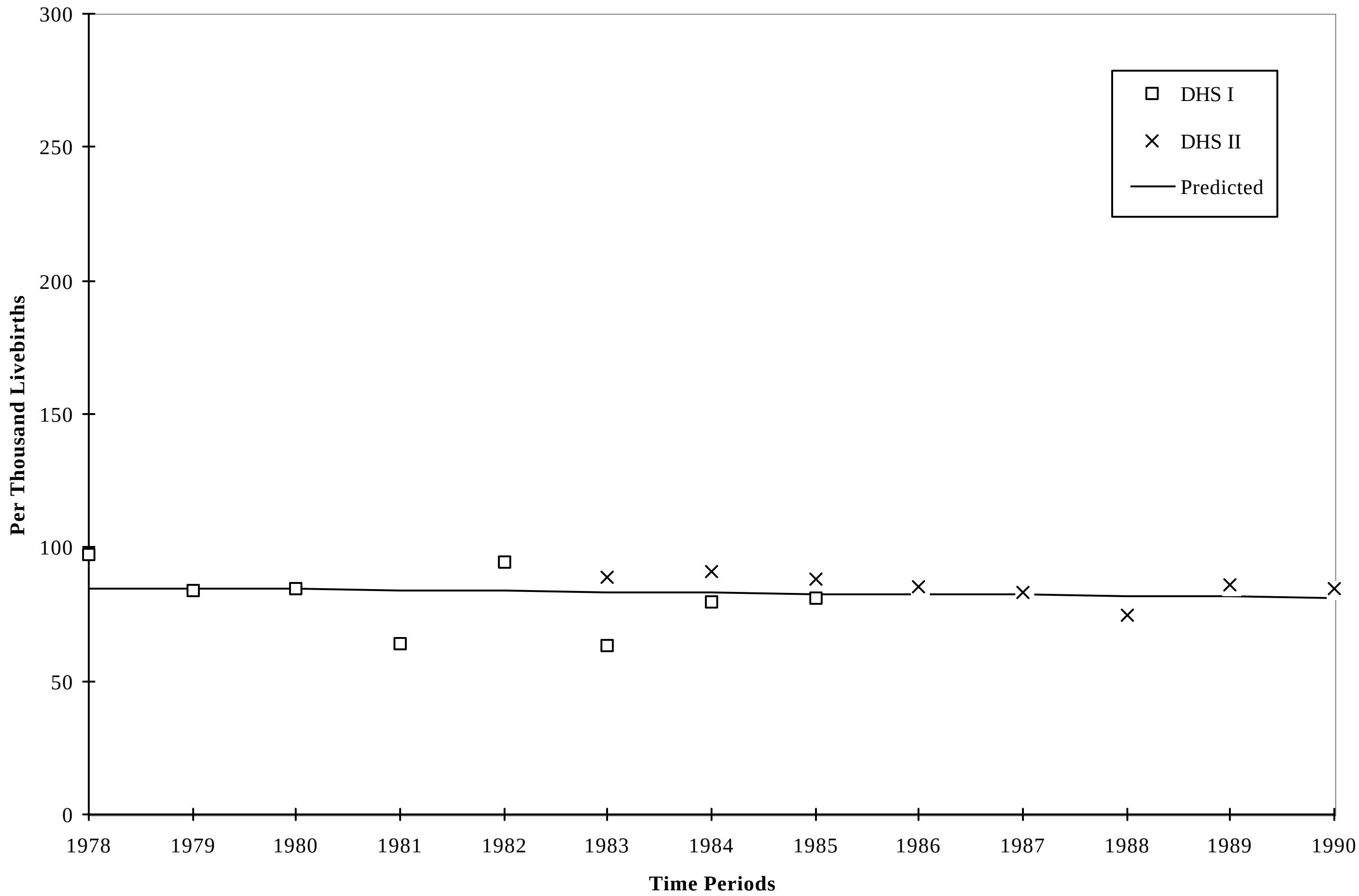

Figure 7C: Under-Age-Three Mortalilty in Madagascar: Retrospectives from DHS II (1992) and DHS III (1997)

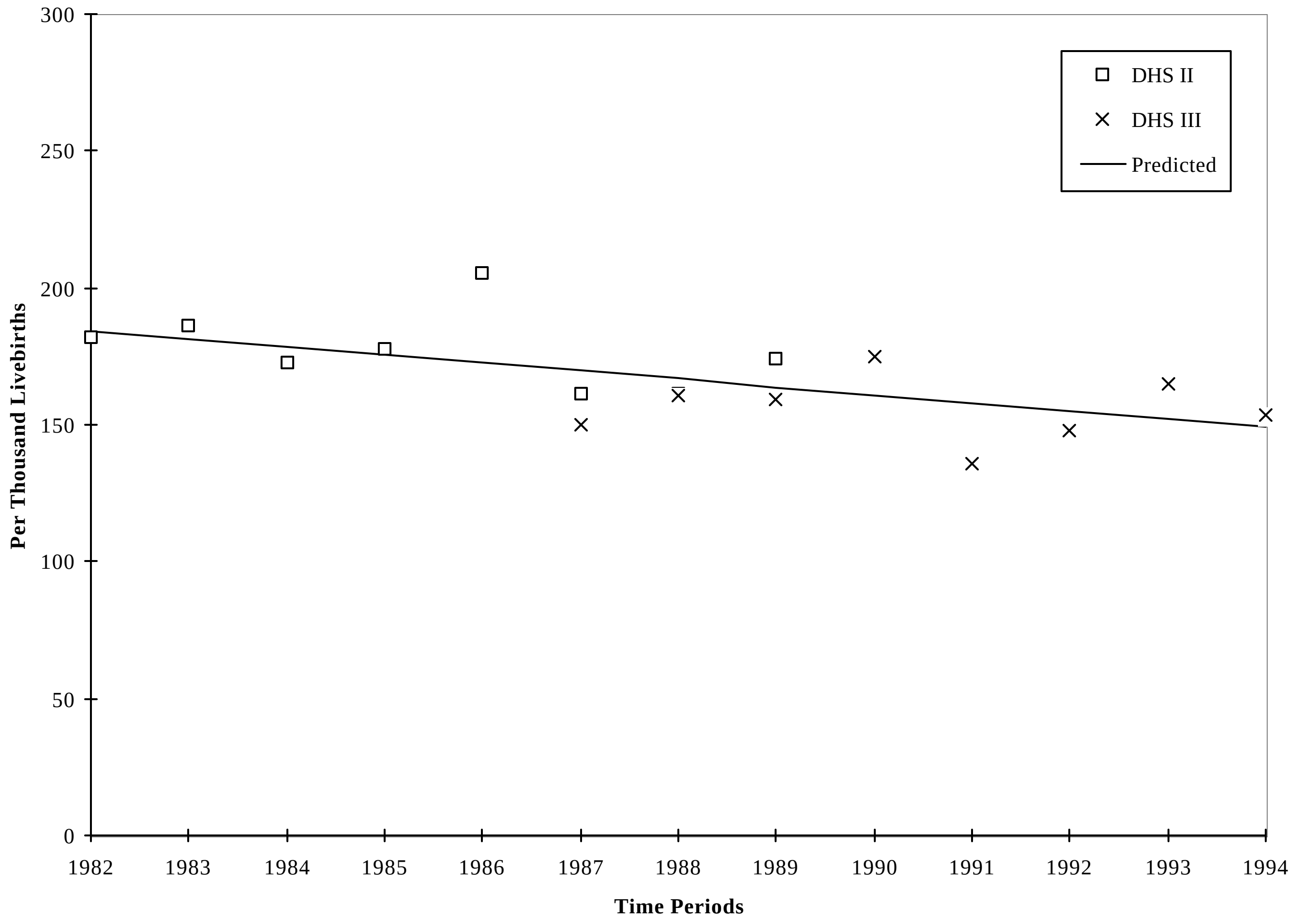

Figure 7D: Under-Age-Three Mortality in Mali:
Retrospectives from DHS I (1987) and DHS III (1995)

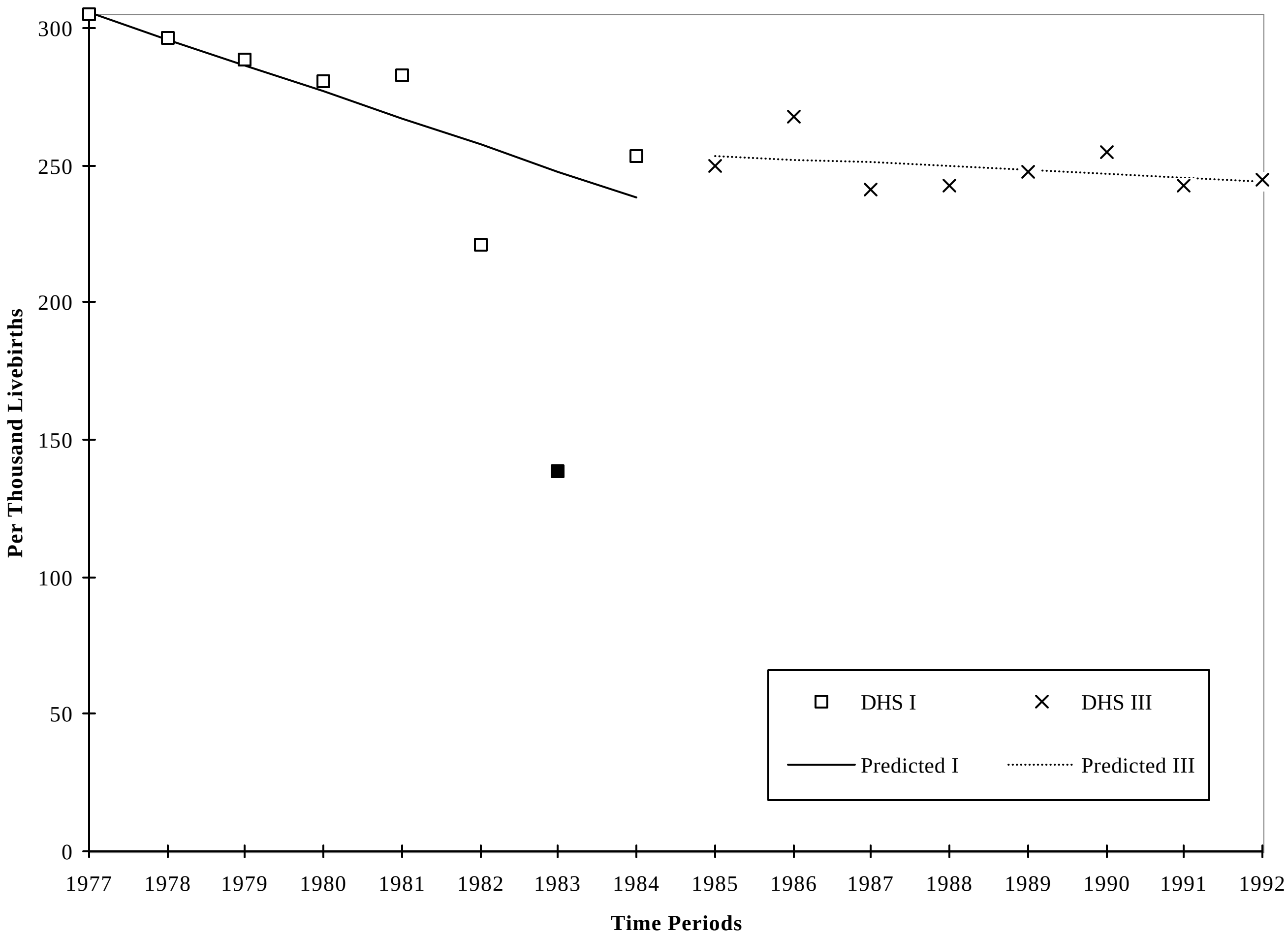

Figure 7E: Under-Age-Three Mortality in Senegal: Retrospectives from DHS I (1986), DHS II (1992) and DHS III (1997)

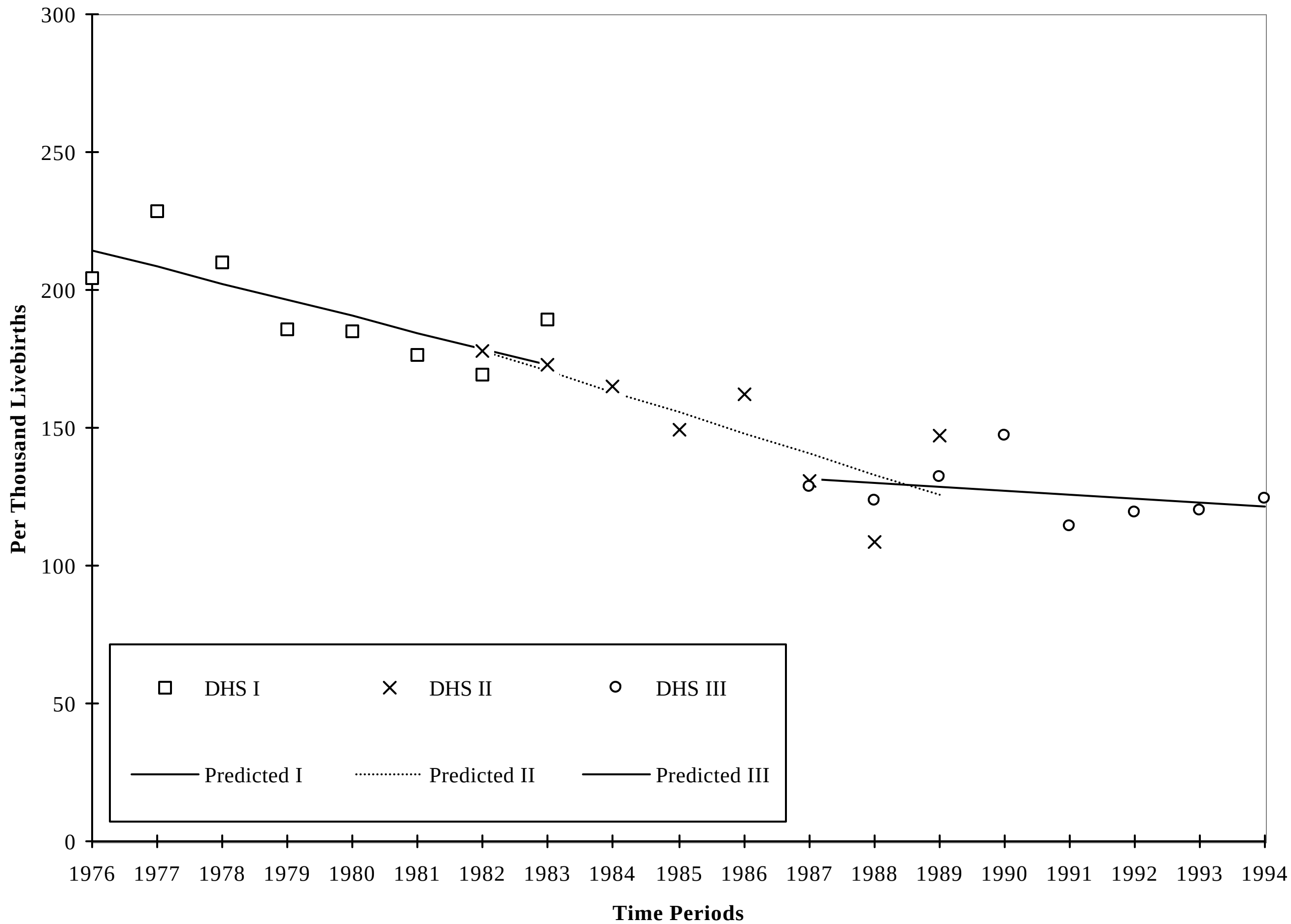

Figure 7F: Under-Age-Three Mortality in Tanzania: Retrospectives from DHS II (1991) and DHS III (1996)

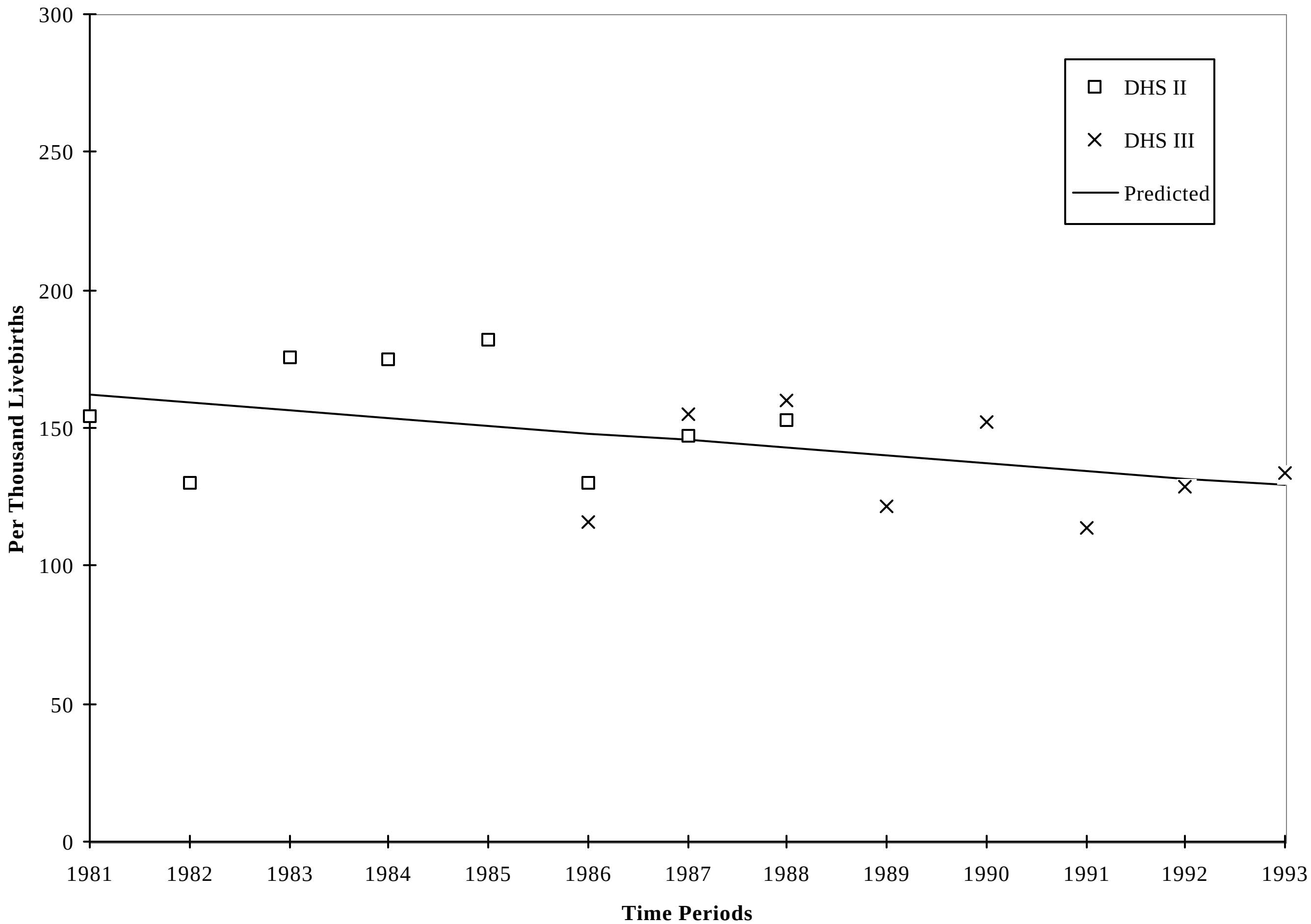

Figure 7G: Under-Age-Three Mortality in Uganda:
Retrospectives from DHS I (1988) and DHS III (1995)

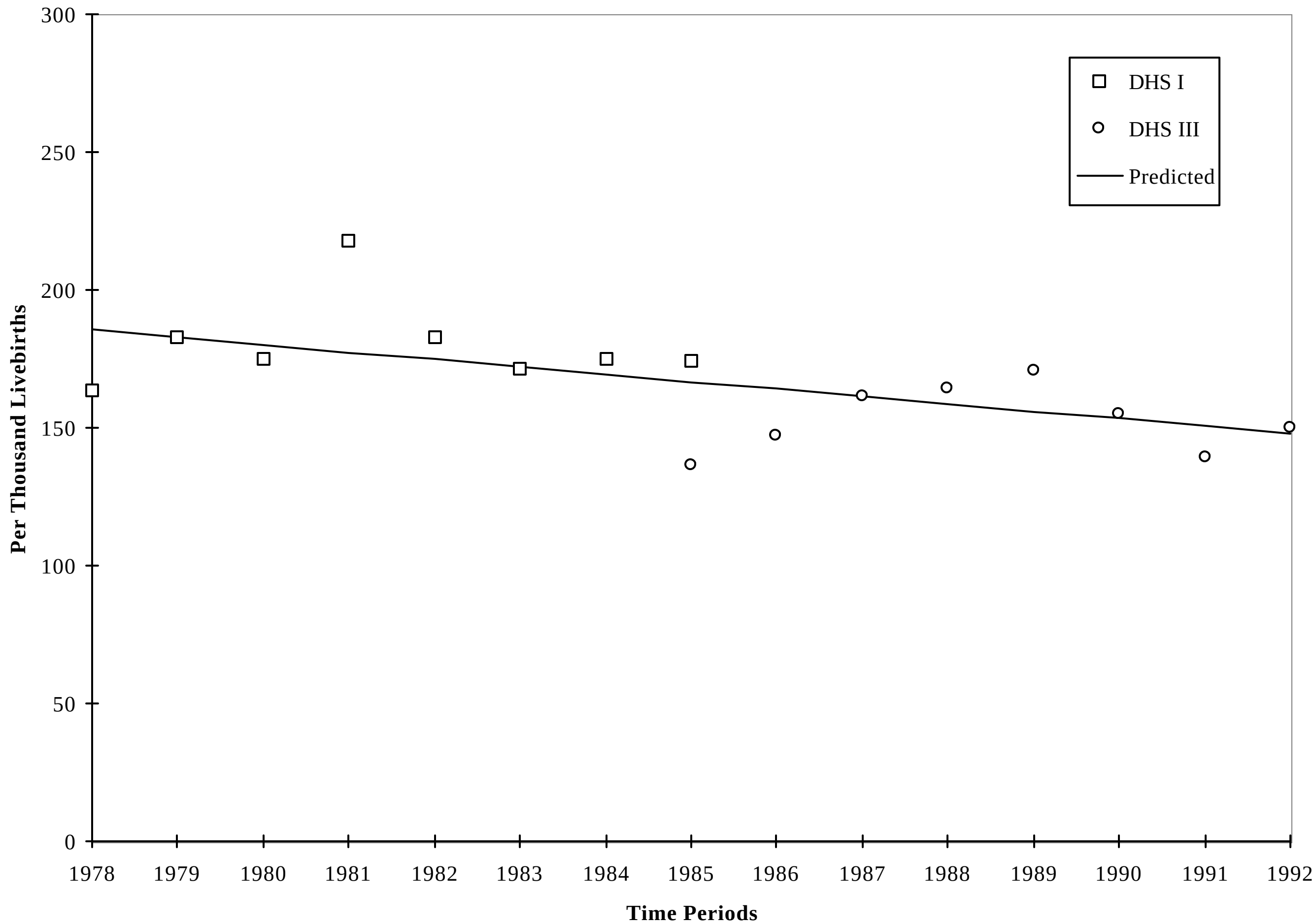

Figure 7H: Under-Age-Three Mortality in Zambia: Retrospectives from DHS II (1992) and DHS III (1996)

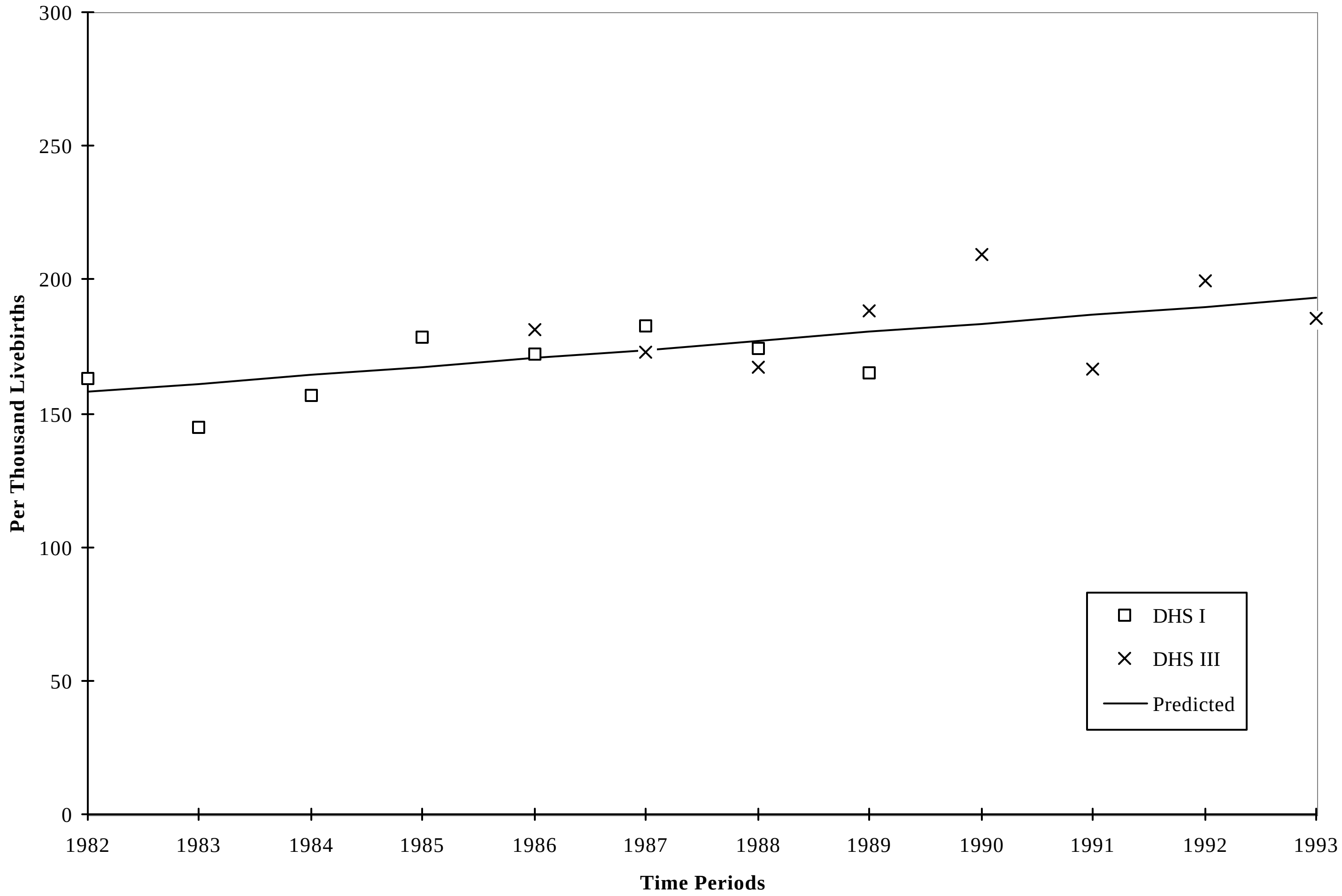

Figure 7I: Under-Age-Three Mortality in Zimbabwe: Retrospectives from DHS I (1988) and DHS III (1994)

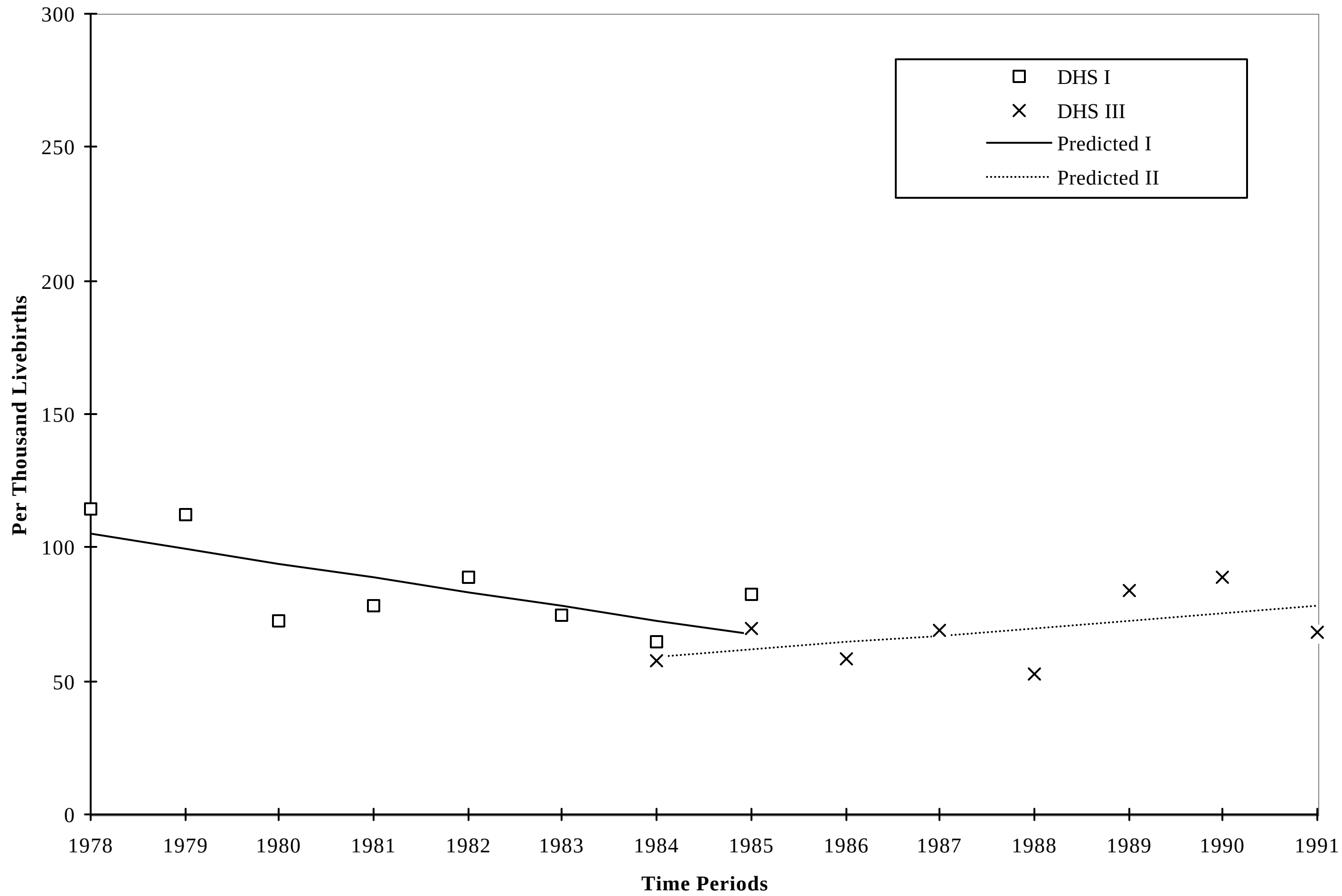

Table 1

Scoring Coefficients (Weights) for Asset Indices by Country

Assets	Ghana	Kenya	Madagascar	Mali	Senegal	Tanzania	Uganda	Zambia	Zimbabwe
Durables									
Radio	0.103	0.076	0.119	0.082	0.052	0.161	0.121	0.086	0.062
TV	0.340	0.207	0.226	0.312	0.312	0.169	0.202	0.127	0.105
Refrigerator	0.350	0.159	0.156	0.183	0.274	0.216	0.129	0.086	0.087
Bicycle	0.023	0.012	0.050			0.024	0.011		0.009
Motorized Transport.	0.073		0.125	0.126	0.095	0.160	0.035	0.042	0.049
Characteristics									
Piped Drinking Water	0.132	0.201	0.186	0.172	0.131	0.149	0.243	0.242	0.256
Surface Drinking Water	-0.098	-0.140	-0.122	-0.010	-0.014	-0.093	-0.067	-0.061	-0.031
Flush Toilet	0.117	0.272	0.182	0.066	0.146	0.134	0.180	0.199	0.459
No Toilet Facilities	-0.020	-0.064	-0.130	-0.068	-0.100	-0.058	-0.055	-0.080	-0.089
Floor -- low quality	-0.060	-0.195	-0.041	-0.234	-0.099	-0.247	-0.311	-0.272	-0.073
Education of head	0.056	0.086	0.060*	0.142	0.124*	0.149	0.118	0.123	0.039

* Dummy variable for household head with some education

Summary of Asset Index for Nine African Countries

Poverty line is 25th percentile of 1st year	*Orders of Dominance in Stochastic Dominanc Tests* "+" ("-") indicates improvement (worsening)			*"Poverty" Headcount P0*								
				First Year			*Second Year*			*Changes (percentage points)*		
Country	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
Ghana (*1988, 1993*)	1 +	1 +	1 +	24.97	3.77	34.72	8.54	0.82	13.91	-16.44 **	-2.96 **	-20.81 **
Kenya (*1988, 1993*)	ND	ND	ND	24.89	1.45	30.17	23.16	0.65	27.92	-1.73 **	-0.81	-2.25 *
Madagascar (*1992, 1997*)	1 +	2 -	1 +	25.47	2.93	29.86	12.50	5.81	14.68	-12.97 **	2.87	-15.18 **
Mali (*1987, 1995*)	1 +	ND	1 +	23.02	3.12	29.46	16.02	2.10	22.03	-7.01 **	-1.02	-7.43 **
Senegal (*1986, 1992*)	1 -	4 +	1 -	24.58	2.80	36.78	28.80	2.66	47.61	4.21 *	-0.13	10.83 **
Senegal (*1992, 1997*)	1 +	1 +	1 +	28.80	2.66	47.61	24.67	1.59	40.29	-4.13 **	-1.07 *	-7.33 **
Senegal (*1986, 1997*)	2 -	1 +	2 -	24.58	2.80	36.78	24.67	1.59	40.29	0.08	-1.21 **	3.50
Tanzania (*1991, 1996*)	ND	1 +	ND	22.60	3.73	28.65	19.13	2.13	24.01	-3.48 **	-1.60 **	-4.64 **
Uganda (*1988, 1995*)	2 +	ND	2 +	26.77	3.12	29.59	24.35	3.30	27.75	-2.42 **	0.18	-1.84 *
Zambia (*1992, 1996*)	1 +	2 +	1 +	24.87	1.18	44.02	18.21	0.73	28.49	-6.66 **	-0.45	-15.53 **
Zimbabwe (*1988, 1994*)	1 -	1 -	1 -	23.33	0.21	34.51	30.11	1.01	43.58	6.78 **	0.80 **	9.07 **

Poverty line is 40th percentile of 1st year	*Orders of Dominance in Stochastic Dominanc Tests* "+" ("-") indicates improvement (worsening)			*"Poverty" Headcount P0*								
				First Year			*Second Year*			*Changes (percentage points)*		
Country	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural
Ghana (*1988, 1993*)	1 +	1 +	1 +	39.90	8.30	54.43	26.54	5.00	41.52	-13.37 **	-3.30 **	-12.91 **
Kenya (*1988, 1993*)	ND	ND	ND	38.82	2.97	46.88	34.83	1.91	41.78	-3.99 **	-1.07	-5.10 **
Madagascar (*1992, 1997*)	1 +	5 -	1 +	36.91	3.85	43.35	31.07	13.52	36.80	-5.83 **	9.66 **	-6.56 **
Mali (*1987, 1995*) #	1 +	ND	1 +	43.28	10.30	53.94	30.71	8.27	40.39	-12.57 *	-2.03	-13.55 **
Senegal (*1986, 1992*)	2 -	5 +	1 -	44.34	8.96	64.16	34.34	4.58	53.78	-10.00 **	-4.38 **	-10.38 **
Senegal (*1992, 1997*)	1 +	1 +	1 +	34.34	4.58	53.78	29.90	2.34	48.56	-4.44 **	-2.24 **	-5.22 **
Senegal (*1986, 1997*)	2 -	1 +	2 -	44.34	8.96	64.16	29.90	2.34	48.56	-14.44 *	-6.62 **	-15.60 *
Tanzania (*1991, 1996*)	ND	1 +	ND	39.58	10.06	49.02	33.07	5.94	40.86	-6.51 **	-4.13 **	-8.16 **
Uganda (*1988, 1995*)	2 +	ND	2 +	38.51	4.31	42.58	35.19	5.34	40.00	-3.32 **	1.03	-2.58 *
Zambia (*1992, 1996*)	2 +	3 +	1 +	39.93	2.84	69.90	39.32	3.05	60.66	-0.61	0.21	-9.25 **
Zimbabwe (*1988, 1994*)	1 -	1 -	1 -	39.74	0.83	58.55	45.53	3.26	65.11	5.79 **	2.43 **	6.56 **

"ND" indicates that there was no stochastic dominance up to order 5
* (**) indicates statistical significance at the 95 (99) percent level of confidence
# 45th percentile

Table 3

Summary of Nutrition Measures for Nine African Countries

Country	*Orders of Dominance in Stochastic Dominanc Tests* "+" ("-") indicates improvement (worsening)			*Percent Malnourished (Below -2 Z)* *First Year*			*Second Year*			*Changes (percentage points)*		
	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ
Ghana (*1988, 1993*)	ND	3 -	1 -	29.47	30.75	8.00	26.18	29.58	11.98	-3.29	-1.17	3.97 **
Kenya (*1993, 1998*)	ND	ND	ND	33.64	22.81	6.19	33.28	22.41	6.19	-0.36	-0.40	0.00
Madagascar (*1992, 1997*)	ND	2 -	1 -	49.27	39.23	5.74	48.57	40.19	7.75	-0.70	0.96	2.01 **
Mali (*1987, 1995*)	1 -	1 -	1 -	23.97	30.92	10.76	32.95	43.67	24.60	8.98 **	12.75 **	13.84 **
Senegal (*1986, 1992*)	2 -	2 -	2 -	22.98	22.04	6.04	22.08	26.90	10.41	-0.90	4.86 **	4.37 **
Tanzania (*1991, 1996*)	ND	2 -	ND	43.55	29.51	6.36	43.72	30.91	7.32	0.17	1.40	0.96 **
Uganda (*1988, 1995*)	1 +	1 -	1 -	43.17	23.25	1.91	38.69	26.10	5.29	-4.48 **	2.85 **	3.38 **
Zambia (*1992, 1996*)	1 -	ND	1 +	40.04	23.35	5.16	42.57	23.75	4.22	2.53 **	0.40	-0.94 **
Zimbabwe (*1988, 1994*)	1 +	1 -	1 -	30.01	12.77	1.20	23.45	17.16	5.83	-6.56 **	4.39 **	4.63 **

"ND" indicates that there was no stochastic dominance up to order 5
* (**) indicates statistical significance at the 95 (99) percent level of confidence

Table 4

Summary of Nutrition Measures for Nine African Countries

Urban

Country	*Orders of Dominance in Stochastic Dominanc Tests* "+" ("-") indicates improvement (worsening)			*Percent Malnourished (Below -2 Z)* *First Year*			*Second Year*			*Changes (percentage points)*		
	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ
Ghana (*1988, 1993*)	ND	ND	ND	24.55	25.15	7.33	16.98	19.46	9.11	-7.57 **	-5.69 *	1.78
Kenya (*1993, 1998*)	ND	ND	ND	22.15	13.03	5.27	24.99	13.81	5.27	2.84 *	0.78	0.00
Madagascar (*1992, 1997*)	ND	3 -	ND	40.53	31.95	3.81	44.83	35.56	5.33	4.30	3.61	1.52
Mali (*1987, 1995*)	2 -	1 -	1 -	19.62	25.65	9.93	23.94	35.35	24.89	4.32	9.70 **	14.96 **
Senegal (*1986, 1992*)	ND	ND	2 -	17.47	15.28	3.49	15.16	16.45	8.81	-2.31	1.17	5.32 *
Tanzania (*1991, 1996*)	ND	ND	ND	38.01	25.98	5.11	32.56	20.12	8.09	-5.45 **	-5.86 **	2.98 **
Uganda (*1988, 1995*)	ND	ND	1 -	24.76	13.35	0.63	22.67	15.34	1.36	-2.09	1.99	0.73 **
Zambia (*1992, 1996*)	ND	2 +	1 +	32.79	20.92	5.35	32.89	16.73	3.29	0.10	-4.19 **	-2.06 **
Zimbabwe (*1988, 1994*)	ND	1 -	1 -	16.00	6.86	1.43	19.02	13.48	6.46	3.02	6.62 **	5.03 **

Rural

Country	*Orders of Dominance in Stochastic Dominanc Tests* "+" ("-") indicates improvement (worsening)			*Percent Malnourished (Below -2 Z)* *First Year*			*Second Year*			*Changes (percentage points)*		
	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ	HAZ	WAZ	WHZ
Ghana (*1988, 1993*)	ND	2 -	1 -	31.40	32.95	8.53	32.31	33.64	13.12	0.91	0.69	4.59 **
Kenya (*1993, 1998*)	ND	ND	ND	35.10	24.05	6.31	34.98	24.17	6.38		0.12	
Madagascar (*1992, 1997*)	5 -	2 -	1 -	50.59	40.33	6.03	49.47	41.31	8.33	-1.12	0.98	2.30 **
Mali (*1987, 1995*)	1 -	1 -	1 -	26.18	33.61	12.25	36.15	46.61	24.41	9.97 **	13.00 **	12.16 **
Senegal (*1986, 1992*)	2 -	2 -	1 -	26.45	25.94	7.05	32.70	33.01	13.40	6.25 *	7.07 *	6.35 **
Tanzania (*1991, 1996*)	ND	ND	ND	44.96	30.41	6.37	46.13	33.24	7.28	1.17	2.83 **	0.91
Uganda (*1988, 1995*)	1 +	1 -	1 -	45.19	24.23	1.96	40.72	27.46	3.23	-4.47 **	3.23 **	1.27 **
Zambia (*1992, 1996*)	2 -	ND	ND	46.50	29.30	4.99	48.93	28.37	4.85	2.43	-0.93	-0.14
Zimbabwe (*1988, 1994*)	1 +	1 -	1 -	34.29	14.57	1.13	25.01	18.46	5.61	-9.28 **	3.89 **	4.48 **

"ND" indicates that there was no stochastic dominance up to order 5
* (**) indicates statistical significance at the 95 (99) percent level of confidence

Table 5

Percent of Children Malnourished by Asset Index Quintile for Eight African Countries

Children between 3 and 36 months of age with anthropometric z-score less than -2

HAZ

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
Survey year:	1988	1993	1992	1997	1987	1995	1986	1992	1991	1996	1988	1995	1992	1997	1988	1994
First quintile	33.62	37.72	52.68	50.36	28.06	38.48	26.67	35.29	43.14	46.02	48.33	42.78	48.69	45.86	41.34	22.79
Second quintile	33.33	29.97	45.09	39.56	29.47	39.09	22.86	30.06	43.52	43.98	45.34	40.23	44.78	48.66	36.50	24.24
Third quintile	29.64	28.53	50.77	50.61	24.71	33.65	24.36	29.74	42.97	41.79	44.32	40.22	38.69	42.71	27.46	24.73
Fourth quintile	26.95	23.34	49.62	48.69	25.70	31.56	25.00	19.61	40.12	39.00	41.55	32.85	30.14	33.49	25.20	22.49
Fifth quintile	20.77	16.73	44.26	45.83	16.94	20.93	13.21	13.91	26.06	28.42	26.91	25.09	26.59	26.82	11.52	12.41

WHZ

Survey year:	1988	1993	1992	1997	1987	1995	1986	1992	1991	1996	1988	1995	1992	1997	1988	1994
First quintile	7.32	15.82	6.30	10.32	12.20	27.95	7.30	14.74	9.12	8.18	1.80	6.17	6.67	5.28	1.22	5.47
Second quintile	9.23	9.89	7.59	6.71	10.78	21.71	4.20	14.41	6.73	9.82	3.53	6.76	6.58	6.99	1.53	4.43
Third quintile	7.67	14.90	7.32	7.33	12.74	23.89	7.41	11.82	5.27	9.02	4.00	7.03	4.68	6.45	1.01	5.47
Fourth quintile	8.24	10.00	3.89	4.93	9.88	23.39	7.69	11.50	6.22	8.89	0.44	4.37	6.41	4.86	0.79	5.63
Fifth quintile	6.74	8.79	3.85	5.02	9.37	22.58	3.77	7.60	6.83	6.24	0.36	3.75	6.29	4.28	0.92	4.73

Educational Attainment of Women, Age 15-49, in Nine African Countries

Percent of women in each category

	First Year				*Second Year*				*Changes (percentage points)*			
Country	No School	Primary	Secondary	Post Secondary	No School	Primary	Secondary	Post Secondary	No School	At Most Primary	At Most Secondary	Post Secondary
Ghana (*1988, 1993*)	39.7	52.8	6.6	0.9	35.0	54.7	8.7	1.6	-4.7 **	1.9 **	2.1 **	0.7 **
Kenya (*1988, 1993*)	25.1	54.4	20.1	0.3	17.9	57.6	23.9	0.6	-7.2 **	3.2 **	3.8 **	0.3 **
Madagascar (*1992, 1997*)	19.6	53.8	24.7	1.9	21.2	51.9	25.4	1.5	1.6 *	-1.9 **	0.7	-0.4
Mali (*1987, 1995*)	85.4	13.5	1.0	0.1	81.1	11.9	6.8	0.3	-4.3 **	-1.6 *	5.8 **	0.2 *
Senegal (*1986, 1992*)	77.2	13.5	8.7	0.6	73.0	17.1	9.3	0.6	-4.2 **	3.6 **	0.6	0.0
Senegal (*1992, 1997*)	73.0	17.1	9.3	0.6	66.6	20.9	11.0	1.5	-6.4 **	3.8 **	1.7 **	0.9 **
Tanzania (*1991, 1996*)	33.8	61.4	4.6	0.2	28.5	66.0	5.3	0.0	-5.3 **	4.6 **	0.7 *	-0.2 **
Uganda (*1988, 1995*)	37.8	52.3	9.7	0.2	30.6	56.0	13.3	0.2	-7.2 **	3.7 **	3.6 **	0.0
Zambia (*1992, 1996*)	16.4	59.7	22.1	1.8	13.3	58.9	25.0	2.8	-3.1 **	-0.8	2.9 **	1.0 **
Zimbabwe (*1988, 1994*)	13.5	55.9	29.7	0.9	11.1	47.3	40.0	1.6	-2.4 **	-8.6 **	10.3 **	0.7 **

* (**) indicates statistical significance at the 95 (99) percent level of confidence

Table 7

Educational Attainment of Women, Age 15-49, in Nine African Countries

Percent of women in each category

Urban

Country	First Year: No School	First Year: Primary	First Year: Secondary	First Year: Post Secondary	Second Year: No School	Second Year: Primary	Second Year: Secondary	Second Year: Post Secondary	Changes (percentage points): No School	Changes: At Most Primary	Changes: At Most Secondary	Changes: Post Secondary
Ghana (*1988, 1993*)	26.7	58.6	12.8	1.8	16.5	62.3	17.7	3.5	-10.2 **	3.7 *	4.9 **	1.7 **
Kenya (*1988, 1993*)	12.3	46.3	40.4	1.0	8.7	45.6	43.5	2.3	-3.6 **	-0.7	3.1	1.3 **
Madagascar (*1992, 1997*)	6.1	31.1	54.8	8.0	10.9	36.5	47.5	5.1	4.8 **	5.4 **	-7.3 **	-2.9 **
Mali (*1987, 1995*)	64.9	30.8	3.9	0.4	59.9	21.0	18.2	0.9	-5.0 **	-9.8 **	14.3 **	0.5 **
Senegal (*1986, 1992*)	53.8	24.8	20.0	1.3	48.0	30.4	20.3	1.3	-5.8 **	5.6 **	0.3	0.0
Senegal (*1992, 1997*)	48.0	30.4	20.3	1.3	41.9	32.9	21.9	3.3	-6.1 **	2.5 *	1.6	2.0 **
Tanzania (*1991, 1996*)	19.5	68.5	11.4	0.6	13.8	71.3	14.3	0.2	-5.7 **	2.8 +	2.9 **	-0.4 +
Uganda (*1988, 1995*)	13.4	48.2	36.8	1.6	10.6	49.8	38.7	0.9	-2.8 **	1.6	1.9	-0.7 *
Zambia (*1992, 1996*)	7.0	55.2	34.9	2.9	5.6	48.1	40.7	5.6	-1.4 *	-7.1 **	5.8 **	2.7 **
Zimbabwe (*1988, 1994*)	13.5	55.9	29.7	0.9	11.1	47.3	40.0	1.6	-2.4 **	-8.6 **	10.3 **	0.7 **

Rural

Country	First Year: No School	First Year: Primary	First Year: Secondary	First Year: Post Secondary	Second Year: No School	Second Year: Primary	Second Year: Secondary	Second Year: Post Secondary	Changes (percentage points): No School	Changes: At Most Primary	Changes: At Most Secondary	Changes: Post Secondary
Ghana (*1988, 1993*)	46.4	49.8	3.4	0.4	46.2	50.1	3.2	0.4	-0.2	0.3	-0.2	0.0
Kenya (*1988, 1993*)	27.8	56.1	15.9	0.1	19.9	60.2	19.6	0.2	-7.9 **	4.1 **	3.7 **	0.1
Madagascar (*1992, 1997*)	22.9	59.5	17.2	0.3	25.3	57.9	16.6	0.1	2.4 *	-1.6 *	-0.6	-0.2
Mali (*1987, 1995*)	92.7	7.3	0.0	0.0	90.9	7.6	1.4	0.0	-1.8 *	0.3	1.4 **	0.0
Senegal (*1986, 1992*)	93.5	5.7	0.8	0.0	90.9	7.5	1.5	0.1	-2.6 **	1.8 **	0.7 **	0.1
Senegal (*1992, 1997*)	90.9	7.5	1.5	0.1	86.1	11.4	2.4	0.1	-4.8 **	3.9 **	0.9 **	0.0
Tanzania (*1991, 1996*)	38.5	59.0	2.3	0.1	33.1	64.4	2.5	0.0	-5.5 **	5.4 **	0.1	-0.1 **
Uganda (*1988, 1995*)	41.0	52.9	6.2	0.0	34.1	57.0	8.8	0.1	-6.9 **	4.1 **	2.6 **	0.1
Zambia (*1992, 1996*)	26.5	64.5	8.6	0.5	19.6	67.6	12.2	0.6	-6.9 **	3.1 **	3.6 **	0.1
Zimbabwe (*1988, 1994*)	17.0	62.6	20.1	0.3	14.8	53.9	30.5	0.9	-2.2 **	-8.7 **	10.4 **	0.6 **

* (**) indicates statistical significance at the 95 (99) percent level of confidence

Table 8

Infant and Under-Age-Three Mortality by Asset Index Quintile for Nine African Countries

For five-year cohorts of children born one and three years prior to the survey, respectively

Infant Mortality

	Ghana		Kenya		Madagascar		Mali		Senegal			Tanzania		Uganda		Zambia		Zimbabwe	
Survey year:	1988	1993	1988	1993	1992	1997	1987	1995	1986	1992	1997	1991	1996	1988	1995	1992	1997	1988	1994
Cohort at risk:	*'83-'87*	*'88-'92*	*'83-'87*	*'88-'92*	*'87-'91*	*'92-'96*	*'82-'86*	*'90-'94*	*'81-'85*	*'87-'91*	*'92-'96*	*'86-'90*	*'91-'95*	*'83-'87*	*'90-'94*	*'87-'91*	*'92-'96*	*'83-'87*	*'89-'93*
First quintile	120.0	89.7	78.4	89.7	121.0	127.9	173.4	156.8	113.6	95.5	100.6	113.7	116.2	141.1	106.7	133.7	142.6	66.4	56.9
Second quintile	101.5	82.3	65.5	56.0	106.7	114.4	180.1	140.2	132.0	107.0	94.0	112.0	103.2	111.5	98.9	113.1	126.1	54.8	54.2
Third quintile	92.2	84.9	75.7	55.5	109.2	102.6	167.9	155.5	95.8	76.0	69.8	97.4	88.5	115.1	100.4	128.8	101.3	69.5	53.8
Fourth quintile	102.6	66.5	43.8	60.0	115.4	80.9	133.1	130.7	97.2	60.3	71.3	87.7	99.9	117.8	87.0	95.5	120.5	39.2	66.2
Fifth quintile	74.4	47.7	54.9	45.4	87.7	73.2	102.0	97.7	80.6	37.5	47.2	75.9	66.1	103.1	73.1	74.2	102.7	37.5	39.4

Under-Age-Three Mortality

Cohort at risk:	*'81-'85*	*'86-'90*	*'81-'85*	*'86-'90*	*'85-'89*	*'90-'94*	*'80-'84*	*'88-'92*	*'79-'83*	*'85-'89*	*'90-'94*	*'84-'88*	*'89-'93*	*'81-'85*	*'88-'92*	*'85-'89*	*'90-'94*	*'81-'85*	*'87-'91*
First quintile	159.9	151.9	92.8	128.3	199.9	190.7	318.1	266.3	223.6	168.8	156.5	155.6	144.1	188.5	182.5	216.8	224.2	83.6	70.6
Second quintile	153.6	151.6	84.9	81.6	175.2	164.3	264.6	247.0	219.5	178.5	170.6	168.3	144.1	163.9	154.5	198.8	219.4	97.9	75.3
Third quintile	136.7	107.7	83.2	66.9	176.4	166.5	237.1	255.6	174.6	135.6	119.5	152.4	138.0	184.5	168.1	187.4	183.9	91.6	69.8
Fourth quintile	165.7	103.1	69.9	76.9	162.1	126.2	232.8	234.1	118.1	85.1	105.6	141.3	153.3	180.6	134.3	174.9	182.6	52.6	82.9
Fifth quintile	113.3	79.9	60.3	54.4	135.1	85.3	184.4	148.5	114.4	59.7	65.6	126.6	91.2	157.6	99.7	103.4	147.3	36.0	53.2

Per thousand livebirths

Table 9A

Ghana: Decomposition of Changes in "Poverty" between 1988 & 1993

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1988	1993	Change		Urban	Rural	Migration	Interaction
P0	24.97	8.54	-16.44	**	-0.93	-14.26	-2.95	1.70
P1	0.31	0.08	-0.23	**	-0.01	-0.21	-0.04	0.03
P2	0.005	0.001	-0.004	**	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.06	0.87	0.18	-0.10
P1			1.00		0.03	0.92	0.17	-0.12
P2			1.00		0.02	0.95	0.16	-0.13
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1991	1996	Change		Urban	Rural	Migration	Interaction
P0	39.90	26.54	-13.37	**	-1.04	-8.85	-4.40	0.92
P1	0.62	0.22	-0.40	**	-0.02	-0.35	-0.07	0.04
P2	0.014	0.004	-0.010	**	0.00	-0.01	0.00	0.00
Share of Total Change								
P0			1.00		0.08	0.66	0.33	-0.07
P1			1.00		0.05	0.87	0.19	-0.11
P2			1.00		0.03	0.92	0.17	-0.12

** Indicates significance at the 99 percent level of confidence

Table 9B

Kenya: Decomposition of Changes in "Poverty" between 1988 & 1993

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total	Intrasectoral Effects			
Percentile in 1988	1988	1993	Change	Urban	Rural	Migration	Interaction
P0	24.89	23.16	-1.73 **	-0.15	-1.84	0.27	-0.01
P1	0.37	0.37	-0.01	0.00	-0.01	0.00	0.00
P2	0.009	0.009	0.000	0.00	0.00	0.00	0.00
Share of Total Change							
P0			1.00	0.09	1.06	-0.16	0.01
P1			1.00	0.16	1.36	-0.53	0.01
P2			1.00	-0.19	0.39	0.79	0.01
Poverty Line is 40th	Poverty		Total	Intrasectoral Effects			
Percentile in 1988	1988	1993	Change	Urban	Rural	Migration	Interaction
P0	38.82	34.83	-3.99 **	-0.20	-4.17	0.41	-0.04
P1	0.86	0.81	-0.06	0.00	-0.06	0.01	0.00
P2	0.028	0.027	-0.001	0.00	0.00	0.00	0.00
Share of Total Change							
P0			1.00	0.05	1.04	-0.10	0.01
P1			1.00	0.07	1.09	-0.17	0.01
P2			1.00	0.13	1.26	-0.39	0.01

** Indicates significance at the 99 percent level of confidence

Table 9C

Madagascar: Decomposition of Changes in "Poverty" between 1992 & 1997

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1992	1992	1997	Change		Urban	Rural	Migration	Interaction
P0	25.47	12.50	-12.97	**	0.47	-12.70	-2.23	1.49
P1	0.39	0.18	-0.21	**	0.01	-0.20	-0.03	0.02
P2	0.007	0.003	-0.004	*	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		-0.04	0.98	0.17	-0.12
P1			1.00		-0.03	0.98	0.17	-0.11
P2			1.00		-0.02	0.98	0.15	-0.11
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1992	1992	1997	Change		Urban	Rural	Migration	Interaction
P0	36.91	31.07	-5.83	**	1.58	-5.49	-3.26	1.34
P1	0.47	0.26	-0.22	**	0.01	-0.21	-0.04	0.03
P2	0.009	0.004	-0.005	*	0.00	-0.01	0.00	0.00
Share of Total Change								
P0			1.00		-0.27	0.94	0.56	-0.23
P1			1.00		-0.05	0.98	0.19	-0.12
P2			1.00		-0.03	0.98	0.15	-0.11

** Indicates significance at the 99 percent level of confidence

Table 9D

Mali: Decomposition of Changes in "Poverty" between 1987 & 1995

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

*** NOTE: Poverty line is 45th Percentile instead of 40th (otherwise P0 is same for both 25th & 40th percentiles)

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1987	1987	1995	Change		Urban	Rural	Migration	Interaction
P0	23.02	16.02	-7.01	**	-0.25	-5.62	-1.51	0.37
P1	0.29	0.24	-0.05	**	0.00	-0.03	-0.02	0.00
P2	0.004	0.004	-0.001	*	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.04	0.80	0.22	-0.05
P1			1.00		0.02	0.64	0.38	-0.04
P2			1.00		0.02	0.48	0.53	-0.03
Poverty Line is 45th	Poverty		Total		Intrasectoral Effects			
Percentile in 1987	1987	1995	Change		Urban	Rural	Migration	Interaction
P0	43.28	30.71	-12.57	**	-0.50	-10.24	-2.50	0.66
P1	0.36	0.29	-0.07	**	0.00	-0.05	-0.02	0.00
P2	0.006	0.005	-0.001	*	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.04	0.81	0.20	-0.05
P1			1.00		0.03	0.69	0.33	-0.05
P2			1.00		0.02	0.53	0.48	-0.04

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 9E

Senegal: Decomposition of Changes in "Poverty" between 1986 & 1992, and 1992 & 1997

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

1986-1992

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1986	1986	1992	Change		Urban	Rural	Migration	Interaction
P0	24.58	28.80	4.21	**	-0.05	6.94	-2.03	-0.65
P1	0.36	0.56	0.20	**	0.00	0.25	-0.03	-0.02
P2	0.007	0.013	0.006	**	0.00	0.01	0.00	0.00
Share of Total Change								
P0			1.00		-0.01	1.65	-0.48	-0.16
P1			1.00		0.01	1.26	-0.15	-0.12
P2			1.00		0.02	1.18	-0.10	-0.11

Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1986	1986	1992	Change		Urban	Rural	Migration	Interaction
P0	44.34	34.34	-10.00	**	-1.57	-5.37	-3.29	0.24
P1	0.53	0.74	0.21	**	-0.01	0.29	-0.04	-0.03
P2	0.012	0.021	0.008	**	0.00	0.01	0.00	0.00
Share of Total Change								
P0			1.00		0.16	0.54	0.33	-0.02
P1			1.00		-0.04	1.37	-0.20	-0.13
P2			1.00		0.01	1.22	-0.12	-0.11

1992-1997

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1986	1992	1997	Change		Urban	Rural	Migration	Interaction
P0	28.80	24.67	-4.13	**	-0.45	-4.26	0.67	-0.09
P1	0.56	0.45	-0.11	**	-0.01	-0.11	0.01	0.00
P2	0.013	0.010	-0.003	*	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.11	1.03	-0.16	0.02
P1			1.00		0.07	1.03	-0.12	0.02
P2			1.00		0.06	1.03	-0.11	0.02

Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1986	1992	1997	Change		Urban	Rural	Migration	Interaction
P0	34.34	29.90	-4.44	**	-0.94	-4.20	0.77	-0.07
P1	0.74	0.61	-0.13	**	-0.01	-0.13	0.02	0.00
P2	0.021	0.016	-0.004	*	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.21	0.94	-0.17	0.02
P1			1.00		0.09	1.02	-0.13	0.02
P2			1.00		0.07	1.02	-0.12	0.02

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 9F

Tanzania: Decomposition of Changes in "Poverty" between 1991 & 1996

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1991	1991	1996	Change		Urban	Rural	Migration	Interaction
P0	22.60	19.13	-3.48	**	-0.39	-3.51	0.48	-0.06
P1	0.42	0.36	-0.06		-0.01	-0.06	0.01	0.00
P2	0.010	0.009	0.00		0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.11	1.01	-0.14	0.02
P1			1.00		0.17	0.97	-0.15	0.01
P2			1.00		0.30	0.94	-0.23	0.00
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1991	1991	1996	Change		Urban	Rural	Migration	Interaction
P0	39.58	33.07	-6.51	**	-1.00	-6.18	0.76	-0.08
P1	0.91	0.76	-0.15		-0.02	-0.15	0.02	0.00
P2	0.029	0.025	0.00		0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.15	0.95	-0.12	0.01
P1			1.00		0.14	0.97	-0.12	0.01
P2			1.00		0.18	0.96	-0.15	0.01

** Indicates significance at the 99 percent level of confidence

Table 9G

Uganda: Decomposition of Changes in "Poverty" between 1988 & 1996

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1988	1996	Change		Urban	Rural	Migration	Interaction
P0	26.77	24.35	-2.42	**	0.02	-1.64	-0.86	0.07
P1	0.32	0.30	-0.02	**	0.00	-0.01	-0.01	0.00
P2	0.006	0.005	0.000		0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		-0.01	0.68	0.36	-0.03
P1			1.00		-0.03	0.47	0.59	-0.03
P2			1.00		-0.04	0.66	0.42	-0.04
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1988	1996	Change		Urban	Rural	Migration	Interaction
P0	38.51	35.19	-3.32	**	0.11	-2.30	-1.25	0.12
P1	0.54	0.51	-0.04	**	0.00	-0.02	-0.02	0.00
P2	0.012	0.011	-0.001		0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		-0.03	0.69	0.37	-0.04
P1			1.00		-0.02	0.57	0.47	-0.03
P2			1.00		-0.03	0.60	0.46	-0.03

** Indicates significance at the 99 percent level of confidence

Table 9H

Zambia: Decomposition of Changes in "Poverty" between 1992 & 1996

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1992	1992	1996	Change		Urban	Rural	Migration	Interaction
P0	24.87	18.21	-6.66	**	-0.20	-8.59	3.28	-1.15
P1	0.41	0.25	-0.16	**	0.00	-0.18	0.05	-0.02
P2	0.009	0.004	-0.004	**	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.03	1.29	-0.49	0.17
P1			1.00		0.03	1.15	-0.34	0.15
P2			1.00		0.03	1.09	-0.27	0.15
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1992	1992	1996	Change		Urban	Rural	Migration	Interaction
P0	39.93	39.32	-0.61		0.10	-5.11	5.13	-0.72
P1	1.12	0.90	-0.23	**	-0.01	-0.32	0.15	-0.04
P2	0.039	0.027	-0.013	**	0.00	-0.02	0.01	0.00
Share of Total Change								
P0			1.00		-0.16	8.40	-8.44	1.19
P1			1.00		0.03	1.43	-0.65	0.19
P2			1.00		0.03	1.22	-0.41	0.16

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 9I

Zimbabwe: Decomposition of Changes in "Poverty" between 1988 & 1994

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1988	1994	Change		Urban	Rural	Migration	Interaction
P0	23.33	30.11	6.78	**	0.26	6.12	0.32	0.08
P1	0.33	0.48	0.15	**	0.00	0.14	0.00	0.00
P2	0.007	0.010	0.003	**	0.00	0.00	0.00	0.00
Share of Total Change								
P0			1.00		0.04	0.90	0.05	0.01
P1			1.00		0.01	0.94	0.03	0.01
P2			1.00		0.00	0.95	0.03	0.01
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects			
Percentile in 1988	1988	1994	Change		Urban	Rural	Migration	Interaction
P0	39.74	45.53	5.79	**	0.79	4.42	0.54	0.04
P1	0.93	1.19	0.26	**	0.01	0.24	0.01	0.00
P2	0.029	0.040	0.011	**	0.00	0.01	0.00	0.00
Share of Total Change								
P0			1.00		0.14	0.76	0.09	0.01
P1			1.00		0.05	0.90	0.05	0.01
P2			1.00		0.02	0.93	0.04	0.01

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 10A

Ghana: Decomposition of Changes in Asset Index Poverty between 1988 & 1993

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th Percentile in 1988	Poverty 1988	Poverty 1993	Total Change	Intrasectoral Effects: Western	Central	Greater Accra	Eastern	Volta	Ashanti	Brong Ahafo	Upper W, E & N	Migration	Interaction
P0	24.97	8.54	-16.44 **	0.14	-1.03	-0.48	-1.65	-2.08	-2.93	-3.01	-5.38	-2.34	2.33
P1	0.31	0.08	-0.23 **	0.00	-0.02	0.00	-0.02	-0.02	-0.04	-0.05	-0.08	-0.04	0.04
P2	0.005	0.001	-0.004 **	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change													
P0			1.00	-0.01	0.06	0.03	0.10	0.13	0.18	0.18	0.33	0.14	-0.14
P1			1.00	-0.01	0.07	0.02	0.10	0.10	0.16	0.23	0.33	0.16	-0.16
P2			1.00	0.00	0.08	0.01	0.09	0.09	0.14	0.25	0.35	0.18	-0.18

Poverty Line is 40th Percentile in 1988	Poverty 1988	Poverty 1993	Total Change	Intrasectoral Effects: Western	Central	Greater Accra	Eastern	Volta	Ashanti	Brong Ahafo	Upper W, E & N	Migration	Interaction
P0	39.90	26.54	-13.37 **	0.66	-1.13	-0.55	-1.43	-1.31	-1.26	-2.42	-5.84	-2.87	2.79
P1	0.62	0.22	-0.40 **	0.00	-0.03	-0.01	-0.04	-0.04	-0.06	-0.08	-0.13	-0.06	0.06
P2	0.014	0.004	-0.010 **	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change													
P0			1.00	-0.05	0.08	0.04	0.11	0.10	0.09	0.18	0.44	0.21	-0.21
P1			1.00	-0.01	0.08	0.03	0.10	0.10	0.16	0.21	0.33	0.16	-0.15
P2			1.00	-0.01	0.08	0.02	0.10	0.10	0.15	0.23	0.33	0.16	-0.16

** Indicates significance at the 99 percent level of confidence

Table 10B

Kenya: Decomposition of Changes in "Poverty" between 1988 & 1993

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects								
Percentile in 1988	1988	1993	Change		Nairobi	Central	Coast	Eastern	Nyanza	Rift Valley	Western	Migration	Interaction
P0	24.89	23.16	-1.73	**	0.05	-0.05	-0.25	0.78	0.92	-1.07	-2.13	0.23	-0.22
P1	0.37	0.37	-0.01		0.00	0.00	-0.01	0.01	0.01	0.00	-0.02	0.01	0.00
P2	0.009	0.009	0.000		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change													
P0			1.00		-0.03	0.03	0.14	-0.45	-0.53	0.62	1.23	-0.14	0.13
P1			1.00		-0.04	-0.09	1.32	-1.27	-1.67	-0.16	3.11	-0.70	0.50
P2			1.00		0.01	0.40	-2.95	1.72	2.05	3.21	-3.80	1.22	-0.86
Poverty Line is 40th	Poverty		Total										
Percentile in 1988	1988	1993	Change		Nairobi	Central	Coast	Eastern	Nyanza	Rift Valley	Western	Migration	Interaction
P0	38.82	34.83	-3.99	**	0.04	-0.90	0.01	0.59	1.68	-2.38	-3.09	0.32	-0.27
P1	0.86	0.81	-0.06		0.00	-0.01	-0.01	0.02	0.03	-0.02	-0.07	0.01	-0.01
P2	0.028	0.027	-0.001		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change													
P0			1.00		-0.01	0.22	0.00	-0.15	-0.42	0.60	0.78	-0.08	0.07
P1			1.00		-0.02	0.10	0.23	-0.35	-0.57	0.43	1.21	-0.18	0.15
P2			1.00		-0.03	-0.02	0.96	-0.89	-1.21	-0.11	2.43	-0.51	0.38

** Indicates significance at the 99 percent level of confidence

Table 10C

Madagascar: Decomposition of Changes in "Poverty" between 1992 & 1997

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects							
Percentile in 1992	1992	1997	Change		Antananarivo	Fianarantsoa	Toamasina	Mahajanga	Toliary	Antsirana	Migration	Interaction
P0	25.47	12.50	-12.97	**	-3.17	-3.81	-0.28	-3.64	-2.04	-0.04	-0.24	0.24
P1	0.39	0.18	-0.21	**	-0.05	-0.06	0.00	-0.06	-0.03	0.00	0.00	0.00
P2	0.007	0.003	-0.004	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change												
P0			1.00		0.24	0.29	0.02	0.28	0.16	0.00	0.02	-0.02
P1			1.00		0.25	0.29	0.02	0.28	0.16	0.00	0.02	-0.02
P2			1.00		0.25	0.29	0.02	0.28	0.15	0.00	0.02	-0.02
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects							
Percentile in 1992	1992	1997	Change		Antananarivo	Fianarantsoa	Toamasina	Mahajanga	Toliary	Antsirana	Migration	Interaction
P0	36.91	31.07	-5.83	**	-0.92	-1.66	-1.19	-1.03	0.09	-0.85	-0.49	0.23
P1	0.47	0.26	-0.22	**	-0.05	-0.07	-0.02	-0.05	-0.02	-0.01	-0.01	0.01
P2	0.009	0.004	-0.005	*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change												
P0			1.00		0.16	0.29	0.20	0.18	-0.02	0.15	0.08	-0.04
P1			1.00		0.21	0.31	0.10	0.22	0.09	0.06	0.04	-0.03
P2			1.00		0.23	0.30	0.06	0.25	0.12	0.03	0.03	-0.02

** Indicates significance at the 99 percent level of confidence

Table 10D

Mali: Decomposition of Changes in "Poverty" between 1987 & 1995

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

*** NOTE: Poverty line is 45th Percentile instead of 40th (otherwise P0 is same for both 25th & 40th percentiles)

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects				
Percentile in 1987	1987	1995	Change	Kayes, Koulikoro	Sikasso, Segou	Mopti,Gao,Timbuctou	Bamako	Migration	Interaction
P0	23.02	16.02	-7.01 **	0.05	-3.73	-2.28	-0.05	-1.55	0.54
P1	0.29	0.24	-0.05 **	0.01	-0.04	0.00	0.00	-0.02	0.00
P2	0.004	0.004	-0.001 *	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	-0.01	0.53	0.32	0.01	0.22	-0.08
P1			1.00	-0.18	0.82	0.05	0.00	0.39	-0.08
P2			1.00	-0.31	1.10	-0.26	0.00	0.54	-0.08

Poverty Line is 45th	Poverty		Total		Intrasectoral Effects				
Percentile in 1987	1987	1995	Change	Kayes, Koulikoro	Sikasso, Segou	Mopti,Gao,Timbuctou	Bamako	Migration	Interaction
P0	43.28	30.71	-12.57 **	-2.21	-5.39	-3.28	-0.08	-2.27	0.65
P1	0.36	0.29	-0.07 **	0.01	-0.05	-0.01	0.00	-0.02	0.01
P2	0.006	0.005	-0.001 *	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	0.18	0.43	0.26	0.01	0.18	-0.05
P1			1.00	-0.08	0.71	0.11	0.00	0.33	-0.07
P2			1.00	-0.26	1.01	-0.16	0.00	0.49	-0.08

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 10E

Senegal: Decomposition of Changes in "Poverty" between 1986 & 1992, and 1992 & 1997

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration

The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

1986-1992

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects				
Percentile in 1986	1986	1992	Change	West	Central	South	North East	Migration	Interaction
P0	24.58	28.80	4.21 **	0.84	-1.50	1.54	2.72	0.11	0.50
P1	0.36	0.56	0.20 **	0.03	0.02	0.05	0.09	0.00	0.01
P2	0.007	0.013	0.006 **	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	0.20	-0.36	0.36	0.65	0.03	0.12
P1			1.00	0.15	0.10	0.23	0.45	0.00	0.07
P2			1.00	0.14	0.16	0.21	0.42	0.00	0.07

Poverty Line is 40th	Poverty		Total		Intrasectoral Effects				
Percentile in 1986	1986	1992	Change	West	Central	South	North East	Migration	Interaction
P0	44.34	34.34	-10.00 **	3.09	5.10	-7.50	-8.02	-1.13	-1.55
P1	0.53	0.74	0.21 **	0.02	0.01	0.06	0.10	0.00	0.02
P2	0.012	0.021	0.008 **	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	-0.31	-0.51	0.75	0.80	0.11	0.15
P1			1.00	0.12	0.05	0.27	0.47	0.01	0.08
P2			1.00	0.14	0.14	0.22	0.43	0.00	0.07

1992-1997

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects				
Percentile in 1986	1992	1997	Change	West	Central	South	North East	Migration	Interaction
P0	28.80	24.67	-4.13 **	-1.42	-1.30	0.88	-2.60	-0.33	0.65
P1	0.56	0.45	-0.11 **	-0.03	-0.04	0.03	-0.08	-0.01	0.02
P2	0.013	0.010	-0.003 *	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	0.34	0.32	-0.21	0.63	0.08	-0.16
P1			1.00	0.27	0.36	-0.32	0.78	0.10	-0.20
P2			1.00	0.23	0.37	-0.36	0.88	0.12	-0.23

Poverty Line is 40th	Poverty		Total		Intrasectoral Effects				
Percentile in 1986	1992	1997	Change	West	Central	South	North East	Migration	Interaction
P0	34.34	29.90	-4.44 **	-1.87	-1.18	1.43	-3.30	-0.42	0.90
P1	0.74	0.61	-0.13 **	-0.04	-0.05	0.04	-0.10	-0.01	0.03
P2	0.021	0.016	-0.004 **	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change									
P0			1.00	0.42	0.27	-0.32	0.74	0.10	-0.20
P1			1.00	0.30	0.35	-0.32	0.78	0.10	-0.20
P2			1.00	0.25	0.36	-0.35	0.84	0.11	-0.22

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 10G

Uganda: Decomposition of Changes in "Poverty" between 1988 & 1996

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects							
Percentile in 1988	1988	1996	Change		West Nile	East	Central	West	South West	Kampala	Migration	Interaction
P0	26.77	24.35	-2.42	**	0.74	-2.64	0.40	-0.92	0.11	-0.03	0.02	-0.10
P1	0.32	0.30	-0.02	**	0.00	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00
P2	0.006	0.005	0.000		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change												
P0			1.00		-0.30	1.09	-0.17	0.38	-0.05	0.01	-0.01	0.04
P1			1.00		-0.24	0.54	0.10	0.28	0.43	0.00	-0.04	-0.06
P2			1.00		-0.23	0.40	0.10	0.31	0.52	0.00	-0.08	-0.02
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects							
Percentile in 1988	1988	1996	Change		West Nile	East	Central	West	South West	Kampala	Migration	Interaction
P0	38.51	35.19	-3.32	**	0.15	-1.52	-0.86	-0.21	-0.83	0.02	-0.46	0.39
P1	0.54	0.51	-0.04	**	0.01	-0.02	-0.01	-0.01	-0.01	0.00	0.00	0.00
P2	0.012	0.011	-0.001		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change												
P0			1.00		-0.05	0.46	0.26	0.06	0.25	-0.01	0.14	-0.12
P1			1.00		-0.14	0.50	0.13	0.19	0.37	0.00	0.03	-0.07
P2			1.00		-0.21	0.46	0.10	0.27	0.46	0.00	-0.04	-0.05

** Indicates significance at the 99 percent level of confidence
Note: 787 observations out of the total 5506 were dropped from the 1996 data
because they represented regions not covered in the 1988 data

Zambia: Decomposition of Changes in "Poverty" between 1992 & 1996

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

Poverty Line is 25th	Poverty		Total		Intrasectoral Effects										
Percentile in 1992	1992	1996	Change		Central	Copperbelt	Eastern	Luapula	Lusaka	Northern	N-Western	Southern	Western	Migration	Interaction
P0	24.87	18.21	-6.66	**	-0.53	0.11	-1.48	-1.66	0.15	-3.02	-0.52	-0.29	-0.73	2.97	-1.67
P1	0.41	0.25	-0.16	**	-0.01	0.00	-0.04	-0.03	0.00	-0.06	-0.01	-0.01	-0.01	0.05	-0.03
P2	0.009	0.004	-0.004	**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Share of Total Change															
P0			1.00		0.08	-0.02	0.22	0.25	-0.02	0.45	0.08	0.04	0.11	-0.45	0.25
P1			1.00		0.07	-0.01	0.28	0.16	0.00	0.41	0.05	0.06	0.07	-0.32	0.22
P2			1.00		0.07	0.00	0.31	0.12	0.01	0.38	0.04	0.07	0.06	-0.25	0.20
Poverty Line is 40th	Poverty		Total		Intrasectoral Effects										
Percentile in 1992	1992	1996	Change		Central	Copperbelt	Eastern	Luapula	Lusaka	Northern	N-Western	Southern	Western	Migration	Interaction
P0	39.93	39.32	-0.61		-0.75	0.56	-0.76	-1.21	0.32	-2.01	-0.44	1.00	-0.44	4.62	-1.50
P1	1.12	0.90	-0.23	**	-0.02	0.01	-0.07	-0.06	0.01	-0.12	-0.02	0.00	-0.02	0.13	-0.07
P2	0.039	0.027	-0.013	**	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Share of Total Change															
P0			1.00		1.24	-0.92	1.25	1.99	-0.53	3.30	0.72	-1.65	0.72	-7.58	2.46
P1			1.00		0.11	-0.04	0.29	0.25	-0.03	0.52	0.09	-0.01	0.11	-0.59	0.31
P2			1.00		0.08	-0.01	0.29	0.18	-0.01	0.43	0.06	0.05	0.08	-0.38	0.24

** (*) Indicates significance at the 99 (95) percent level of confidence

Zimbabwe: Decomposition of Changes in "Poverty" between 1988 & 1994

Intrasectoral Effects, Migration Effexts (population shifts) and Interaction Between Intrasectoral & Migration
The measure of poverty is the distribution of asset indexes evaluated with FGT poverty measures

				Intrasectoral Effects											
Poverty Line is 25th	Poverty		Total		Mashonaland	Mashonaland	Mashonaland	Matabeleland	Matabeleland			Harrare/			
Percentile in 1988	1988	1994	Change	Manicaland	Central	East	West	North	South	Midlands	Masvingo	Chitungwiza	Bulawayo	Migration	Interaction
P0	23.33	30.11	6.78 **	1.95	0.91	1.61	2.94	-0.36	0.05	1.18	0.35	0.08	-0.05	-1.08	-0.81
P1	0.33	0.48	0.15 **	0.003	0.002	0.003	0.005	-0.001	-0.001	0.004	0.001	0.000	0.000	-0.001	-0.002
P2	0.007	0.010	0.003 **	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Share of Total Change															
P0			1.00	0.29	0.13	0.24	0.43	-0.05	0.01	0.17	0.05	0.01	-0.01	-0.16	-0.12
P1			1.00	0.24	0.18	0.19	0.39	-0.06	-0.05	0.26	0.05	0.00	0.00	-0.08	-0.12
P2			1.00	0.24	0.21	0.17	0.41	-0.08	-0.10	0.28	0.04	0.00	-0.01	-0.07	-0.11

				Intrasectoral Effects											
Poverty Line is 40th	Poverty		Total		Mashonaland	Mashonaland	Mashonaland	Matabeleland	Matabeleland			Harrare/			
Percentile in 1988	1988	1994	Change	Manicaland	Central	East	West	North	South	Midlands	Masvingo	Chitungwiza	Bulawayo	Migration	Interaction
P0	39.74	45.53	5.79 **	2.94	0.42	1.10	2.73	-0.22	0.30	0.84	0.34	0.26	0.04	-2.53	-0.43
P1	0.93	1.19	0.26 **	0.003	0.002	0.003	0.005	-0.001	-0.001	0.004	0.001	0.000	0.000	-0.001	-0.002
P2	0.029	0.040	0.011 **	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Share of Total Change															
P0			1.00	0.51	0.07	0.19	0.47	-0.04	0.05	0.14	0.06	0.04	0.01	-0.44	-0.07
P1			1.00	0.32	0.14	0.19	0.42	-0.05	-0.02	0.20	0.06	0.01	0.00	-0.18	-0.10
P2			1.00	0.27	0.17	0.19	0.41	-0.06	-0.05	0.24	0.06	0.01	0.00	-0.12	-0.11

** (*) Indicates significance at the 99 (95) percent level of confidence

Table 11A

Ghana: 1988-1993

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	24.97	8.54	-16.44	**	-24.97	22.28	-13.74
P1	0.31	0.08	-0.23	**	-0.31	0.74	-0.66
P2	0.005	0.001	-0.004	**	-0.01	0.03	-0.03
Share of Total Change							
Po			100.00		151.96	-135.58	83.63
P1			100.00		133.11	-319.39	286.28
P2			100.00		121.74	-621.19	599.45

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	24.97	8.54	-16.44	**	-38.72	8.54	13.74
P1	0.31	0.08	-0.23	**	-0.97	0.08	0.66
P2	0.005	0.001	-0.004	**	-0.03	0.00	0.03
Share of Total Change							
Po			100.00		235.58	-51.96	-83.63
P1			100.00		419.39	-33.11	-286.28
P2			100.00		721.19	-21.74	-599.45

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	39.90	26.54	-13.37	**	-39.90	10.70	15.84
P1	0.62	0.22	-0.40	**	-0.62	0.90	-0.68
P2	0.014	0.004	-0.010	**	-0.01	0.04	-0.04
Share of Total Change							
Po			100.00		298.54	-80.06	-118.48
P1			100.00		156.76	-227.71	170.95
P2			100.00		133.99	-404.44	370.45

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	39.90	26.54	-13.37	**	-24.07	26.54	-15.84
P1	0.62	0.22	-0.40	**	-1.30	0.22	0.68
P2	0.014	0.004	-0.010	**	-0.05	0.00	0.04
Share of Total Change							
Po			100.00		180.06	-198.54	118.48
P1			100.00		327.71	-56.76	-170.95
P2			100.00		504.44	-33.99	-370.45

Table 11B

Kenya, 1988-1993

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	24.89	23.16	-1.73	**	-7.18	1.02	4.43
P1	0.37	0.37	-0.01		-0.10	0.11	-0.02
P2	0.009	0.009	0.000		0.00	0.00	0.00
Share of Total Change							
Po			100.00		415.12	-59.19	-255.93
P1			100.00		1311.20	-1436.08	224.87
P2			99.99		-2354.57	3236.18	-781.62

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	24.89	23.16	-1.73	**	-2.75	5.45	-4.43
P1	0.37	0.37	-0.01		-0.12	0.10	0.02
P2	0.009	0.009	0.000		0.00	0.00	0.00
Share of Total Change							
Po			100.00		159.19	-315.12	255.93
P1			100.00		1536.08	-1211.20	-224.87
P2			99.99		-3136.19	2454.56	781.62

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	38.82	34.83	-3.99	**	-5.43	0.79	0.66
P1	0.86	0.81	-0.06		-0.18	0.13	-0.01
P2	0.028	0.027	-0.001		-0.01	0.01	0.00
Share of Total Change							
Po			100.00		136.25	-19.81	-16.44
P1			100.00		318.69	-229.22	10.53
P2			100.00		956.21	-1008.73	152.52

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1993	Change		Growth	Redistr.	Residual
Po	38.82	34.83	-3.99	**	-4.78	1.45	-0.66
P1	0.86	0.81	-0.06		-0.18	0.12	0.01
P2	0.028	0.027	-0.001		-0.01	0.01	0.00
Share of Total Change							
Po			100.00		119.81	-36.25	16.44
P1			100.00		329.22	-218.70	-10.53
P2			100.00		1108.73	-856.21	-152.52

Table 11C

Madagascar, 1992-1997
Variant of Datt-Ravallion Decomposition of Asset Index
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th	Poverty						
Percentile in 1st Survey	1992	1997	Change		Growth	Redistr.	Residual
Po	25.47	12.50	-12.97	**	0.00	5.44	-18.40
P1	0.39	0.18	-0.21	**	-0.03	-0.17	-0.01
P2	0.007	0.003	-0.004	*	0.00	0.00	0.00
Share of Total Change							
Po			100.00		0.00	-41.92	141.92
P1			100.00		12.52	84.67	2.80
P2			100.00		18.34	90.35	-8.70

Reference is 2nd Survey

Poverty Line is 25th	Poverty						
Percentile in 1st Survey	1992	1997	Change		Growth	Redistr.	Residual
Po	25.47	12.50	-12.97	**	-18.40	-12.97	18.40
P1	0.39	0.18	-0.21	**	-0.03	-0.18	0.01
P2	0.007	0.003	-0.004	*	0.00	0.00	0.00
Share of Total Change							
Po			100.00		141.92	100.00	-141.92
P1			100.00		15.33	87.48	-2.80
P2			100.00		9.65	81.66	8.70

Reference is 1st Survey

Poverty Line is 40th	Poverty						
Percentile in 1st Survey	1992	1997	Change		Growth	Redistr.	Residual
Po	36.91	31.07	-5.83	**	-2.17	-5.34	1.68
P1	0.47	0.26	-0.22	**	-0.04	-0.18	0.00
P2	0.009	0.004	-0.005	*	0.00	0.00	0.00
Share of Total Change							
Po			100.00		37.25	91.54	-28.80
P1			100.00		16.85	85.11	-1.95
P2			100.00		17.84	89.25	-7.09

Reference is 2nd Survey

Poverty Line is 40th	Poverty						
Percentile in 1st Survey	1992	1997	Change		Growth	Redistr.	Residual
Po	36.91	31.07	-5.83	**	-0.49	-3.66	-1.68
P1	0.47	0.26	-0.22	**	-0.03	-0.18	0.00
P2	0.009	0.004	-0.005	*	0.00	0.00	0.00
Share of Total Change							
Po			100.00		8.46	62.75	28.80
P1			100.00		14.89	83.15	1.95
P2			100.00		10.75	82.16	7.09

Mali, 1987-1995

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1987	1995	Change		Growth	Redistr.	Residual
Po	23.02	16.02	-7.01	**	-23.02	36.01	-19.99
P1	0.29	0.24	-0.05	**	-0.29	1.05	-0.81
P2	0.004	0.004	-0.001	*	0.00	0.04	-0.03
Share of Total Change							
Po			100.00		328.64	-514.03	285.39
P1			100.00		577.79	-2067.85	1590.07
P2			100.00		806.45	-6418.86	5712.41

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1987	1995	Change		Growth	Redistr.	Residual
Po	23.02	16.02	-7.01	**	-43.02	16.02	19.99
P1	0.29	0.24	-0.05	**	-1.10	0.24	0.81
P2	0.004	0.004	-0.001	*	-0.04	0.00	0.03
Share of Total Change							
Po			100.00		614.03	-228.64	-285.39
P1			100.00		2167.85	-477.79	-1590.07
P2			100.00		6518.86	-706.45	-5712.41

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1987	1995	Change		Growth	Redistr.	Residual
Po	43.28	30.71	-12.57	**	-43.28	16.24	14.46
P1	0.36	0.29	-0.07	**	-0.36	1.07	-0.78
P2	0.006	0.005	-0.001	*	-0.01	0.04	-0.03
Share of Total Change							
Po			100.00		344.21	-129.19	-115.02
P1			100.00		510.05	-1501.95	1091.90
P2			100.00		733.98	-5153.31	4519.33

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1987	1995	Change		Growth	Redistr.	Residual
Po	43.28	30.71	-12.57	**	-28.82	30.71	-14.46
P1	0.36	0.29	-0.07	**	-1.15	0.29	0.78
P2	0.006	0.005	-0.001	*	-0.04	0.00	0.03
Share of Total Change							
Po			100.00		229.19	-244.21	115.02
P1			100.00		1601.95	-410.05	-1091.90
P2			100.00		5253.31	-633.98	-4519.33

Table 11E

Senegal, 1986-1992 and 1992-1997
Variant of Datt-Ravallion Decomposition of Asset Index
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th	Poverty					
Percentile in 1st Survey	1986	1992	Change	Growth	Redistr.	Residual
Po	24.58	28.80	4.21 **	0.00	6.07	-1.86
P1	0.36	0.56	0.20 **	-0.02	0.22	0.00
P2	0.007	0.013	0.006 **	0.00	0.01	0.00
Share of Total Change						
Po			100.00	0.00	144.10	-44.10
P1			100.00	-9.02	110.94	-1.93
P2			100.00	-8.47	113.62	-5.16

Reference is 2nd Survey

Poverty Line is 25th	Poverty					
Percentile in 1st Survey	1986	1992	Change	Growth	Redistr.	Residual
Po	24.58	28.80	4.21 **	-1.86	4.21	1.86
P1	0.36	0.56	0.20 **	-0.02	0.21	0.00
P2	0.007	0.013	0.006 **	0.00	0.01	0.00
Share of Total Change						
Po			100.00	-44.10	100.00	44.10
P1			100.00	-10.94	109.02	1.93
P2			100.00	-13.62	108.47	5.16

Reference is 1st Survey

Poverty Line is 40th	Poverty					
Percentile in 1st Survey	1986	1992	Change	Growth	Redistr.	Residual
Po	44.34	34.34	-10.00 **	-15.74	-4.16	9.91
P1	0.53	0.74	0.21 **	-0.02	0.24	-0.01
P2	0.012	0.021	0.008 **	0.00	0.01	0.00
Share of Total Change						
Po			100.00	157.46	41.64	-99.10
P1			100.00	-10.41	113.88	-3.47
P2			100.00	-8.95	112.89	-3.94

Reference is 2nd Survey

Poverty Line is 40th	Poverty					
Percentile in 1st Survey	1986	1992	Change	Growth	Redistr.	Residual
Po	44.34	34.34	-10.00 **	-5.83	5.74	-9.91
P1	0.53	0.74	0.21 **	-0.03	0.23	0.01
P2	0.012	0.021	0.008 **	0.00	0.01	0.00
Share of Total Change						
Po			100.00	58.36	-57.46	99.10
P1			100.00	-13.88	110.41	3.47
P2			100.00	-12.89	108.95	3.94

Reference is 1st Survey

Poverty Line is 25th	Poverty					
Percentile in 1st Survey	1992	1997	Change	Growth	Redistr.	Residual
Po	28.80	24.67	-4.13 **	-5.09	9.08	-8.12
P1	0.56	0.45	-0.11 **	-0.34	0.30	-0.07
P2	0.013	0.010	-0.003 *	-0.01	0.01	-0.01
Share of Total Change						
Po			-98.00	-120.77	215.40	-192.63
P1			-54.66	-171.30	152.40	-35.76
P2			-46.15	-163.71	225.87	-108.30

Reference is 2nd Survey

Poverty Line is 25th	Poverty					
Percentile in 1st Survey	1992	1997	Change	Growth	Redistr.	Residual
Po	28.80	24.67	-4.13 **	-13.21	0.96	8.12
P1	0.56	0.45	-0.11 **	-0.41	0.23	0.07
P2	0.013	0.010	-0.003 *	-0.02	0.01	0.01
Share of Total Change						
Po			-98.00	-313.40	22.76	192.63
P1			-54.66	-207.06	116.64	35.76
P2			-46.15	-272.02	117.56	108.30

Reference is 1st Survey

Poverty Line is 40th	Poverty					
Percentile in 1st Survey	1992	1997	Change	Growth	Redistr.	Residual
Po	34.34	29.90	-4.44 **	-10.29	6.49	-0.63
P1	0.74	0.61	-0.13 **	-0.38	0.35	-0.11
P2	0.021	0.016	-0.004 **	-0.01	0.02	-0.01
Share of Total Change						
Po			44.42	102.98	-64.91	6.35
P1			-62.45	-181.08	169.48	-50.86
P2			-49.89	-167.39	206.59	-89.09

Reference is 2nd Survey

Poverty Line is 40th	Poverty					
Percentile in 1st Survey	1992	1997	Change	Growth	Redistr.	Residual
Po	34.34	29.90	-4.44 **	-10.93	5.85	0.63
P1	0.74	0.61	-0.13 **	-0.48	0.25	0.11
P2	0.021	0.016	-0.004 **	-0.02	0.01	0.01
Share of Total Change						
Po			44.42	109.33	-58.56	-6.35
P1			-62.45	-231.93	118.62	50.86
P2			-49.89	-256.47	117.50	89.09

Table 11F

Tanzania, 1991-1996

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th	Poverty						
Percentile in 1st Survey	1991	1996	Change		Growth	Redistr.	Residual
Po	22.60	19.13	-3.48	**	-4.59	8.37	-7.26
P1	0.42	0.36	-0.06		-0.22	0.23	-0.07
P2	0.010	0.009	-0.001		-0.01	0.01	0.00
Share of Total Change							
Po			100.00		132.03	-240.94	208.91
P1			100.00		369.72	-386.38	116.66
P2			100.00		733.65	-1078.31	444.65

Reference is 2nd Survey

Poverty Line is 25th	Poverty						
Percentile in 1st Survey	1991	1996	Change		Growth	Redistr.	Residual
Po	22.60	19.13	-3.48	**	-11.85	1.11	7.26
P1	0.42	0.36	-0.06		-0.28	0.16	0.07
P2	0.010	0.009	-0.001		-0.01	0.01	0.00
Share of Total Change							
Po			100.00		340.94	-32.03	-208.91
P1			100.00		486.38	-269.72	-116.66
P2			100.00		1178.31	-633.65	-444.65

Reference is 1st Survey

Poverty Line is 40th	Poverty						
Percentile in 1st Survey	1991	1996	Change		Growth	Redistr.	Residual
Po	39.58	33.07	-6.51	**	-8.58	-0.13	2.20
P1	0.91	0.76	-0.15		-0.38	0.25	-0.02
P2	0.029	0.025	-0.004		-0.02	0.02	-0.01
Share of Total Change							
Po			100.00		131.90	1.94	-33.84
P1			100.00		251.32	-167.30	15.98
P2			100.00		391.52	-421.40	129.89

Reference is 2nd Survey

Poverty Line is 40th	Poverty						
Percentile in 1st Survey	1991	1996	Change		Growth	Redistr.	Residual
Po	39.58	33.07	-6.51	**	-6.38	2.08	-2.20
P1	0.91	0.76	-0.15		-0.40	0.23	0.02
P2	0.029	0.025	-0.004		-0.02	0.01	0.01
Share of Total Change							
Po			100.00		98.06	-31.90	33.84
P1			100.00		267.30	-151.32	-15.98
P2			100.00		521.40	-291.52	-129.89

Uganda, 1988-1995

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1995	Change		Growth	Redistr.	Residual
Po	26.77	24.35	-2.42	**	-9.27	7.48	-0.62
P1	0.32	0.30	-0.02	**	-0.12	0.15	-0.04
P2	0.006	0.005	0.000		0.00	0.00	0.00
Share of Total Change							
Po			100.00		383.70	-309.47	25.78
P1			100.00		672.50	-815.60	243.10
P2			100.00		562.11	-745.51	283.40

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1995	Change		Growth	Redistr.	Residual
Po	26.77	24.35	-2.42	**	-9.90	6.86	0.62
P1	0.32	0.30	-0.02	**	-0.17	0.10	0.04
P2	0.006	0.005	0.000		0.00	0.00	0.00
Share of Total Change							
Po			100.00		409.47	-283.70	-25.78
P1			100.00		915.60	-572.50	-243.10
P2			100.00		845.51	-462.11	-283.40

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1995	Change		Growth	Redistr.	Residual
Po	38.51	35.19	-3.32	**	-8.09	6.05	-1.28
P1	0.54	0.51	-0.04	**	-0.19	0.19	-0.04
P2	0.012	0.011	-0.001		0.00	0.01	0.00
Share of Total Change							
Po			100.00		243.53	-182.07	38.54
P1			100.00		504.78	-499.86	95.08
P2			100.00		567.11	-686.35	219.24

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1995	Change		Growth	Redistr.	Residual
Po	38.51	35.19	-3.32	**	-9.37	4.77	1.28
P1	0.54	0.51	-0.04	**	-0.23	0.15	0.04
P2	0.012	0.011	-0.001		-0.01	0.00	0.00
Share of Total Change							
Po			100.00		282.07	-143.53	-38.54
P1			100.00		599.86	-404.78	-95.08
P2			100.00		786.35	-467.11	-219.24

Zambia, 1992-1996

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1992	1996	Change		Growth	Redistr.	Residual
Po	24.87	18.21	-6.66	**	5.01	-8.65	-3.02
P1	0.41	0.25	-0.16	**	0.15	-0.25	-0.06
P2	0.009	0.004	-0.004	**	0.01	-0.01	0.00
Share of Total Change							
Po			100.00		-75.16	129.86	45.29
P1			100.00		-93.69	159.16	34.53
P2			100.00		-121.20	151.09	70.11

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1992	1996	Change		Growth	Redistr.	Residual
Po	24.87	18.21	-6.66	**	1.99	-11.67	3.02
P1	0.41	0.25	-0.16	**	0.09	-0.31	0.06
P2	0.009	0.004	-0.004	**	0.00	-0.01	0.00
Share of Total Change							
Po			100.00		-29.86	175.16	-45.29
P1			100.00		-59.16	193.69	-34.53
P2			100.00		-51.09	221.20	-70.11

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1992	1996	Change		Growth	Redistr.	Residual
Po	39.93	39.32	-0.61		2.98	-3.95	0.37
P1	1.12	0.90	-0.23	**	0.22	-0.43	-0.02
P2	0.039	0.027	-0.013	**	0.01	-0.02	0.00
Share of Total Change							
Po			100.00		-489.21	649.24	-60.03
P1			100.00		-98.71	191.97	6.74
P2			100.00		-104.49	167.79	36.69

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1992	1996	Change		Growth	Redistr.	Residual
Po	39.93	39.32	-0.61		3.34	-3.59	-0.37
P1	1.12	0.90	-0.23	**	0.21	-0.45	0.02
P2	0.039	0.027	-0.013	**	0.01	-0.03	0.00
Share of Total Change							
Po			100.00		-549.24	589.21	60.03
P1			100.00		-91.97	198.71	-6.74
P2			100.00		-67.79	204.49	-36.69

Zimbabwe 1988-1994

Variant of Datt-Ravallion Decomposition of Asset Index

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1994	Change		Growth	Redistr.	Residual
Po	23.33	30.11	6.78	**	8.82	-1.34	-0.70
P1	0.33	0.48	0.15	**	0.29	-0.10	-0.04
P2	0.007	0.010	0.003	**	0.01	0.00	0.00
Share of Total Change							
Po			100.00		130.10	-19.74	-10.36
P1			100.00		197.38	-70.55	-26.82
P2			100.00		285.58	-110.45	-75.14

Reference is 2nd Survey

Poverty Line is 25th Percentile in 1st Survey	Poverty 1988	1994	Change		Growth	Redistr.	Residual
Po	23.33	30.11	6.78	**	8.11	-2.04	0.70
P1	0.33	0.48	0.15	**	0.25	-0.14	0.04
P2	0.007	0.010	0.003	**	0.01	-0.01	0.00
Share of Total Change							
Po			100.00		119.74	-30.10	10.36
P1			100.00		170.55	-97.38	26.82
P2			100.00		210.45	-185.58	75.14

Reference is 1st Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1994	Change		Growth	Redistr.	Residual
Po	39.74	45.53	5.79	**	8.92	-1.17	-1.96
P1	0.93	1.19	0.26	**	0.45	-0.14	-0.04
P2	0.029	0.040	0.011	**	0.02	-0.01	0.00
Share of Total Change							
Po			100.00		154.01	-20.19	-33.83
P1			100.00		171.43	-54.76	-16.68
P2			100.00		208.10	-78.64	-29.46

Reference is 2nd Survey

Poverty Line is 40th Percentile in 1st Survey	Poverty 1988	1994	Change		Growth	Redistr.	Residual
Po	39.74	45.53	5.79	**	6.96	-3.13	1.96
P1	0.93	1.19	0.26	**	0.41	-0.19	0.04
P2	0.029	0.040	0.011	**	0.02	-0.01	0.00
Share of Total Change							
Po			100.00		120.19	-54.01	33.83
P1			100.00		154.76	-71.43	16.68
P2			100.00		178.64	-108.10	29.46

Ghana: Regional Decomposition of Changes in Child (Age 3-36 months)

Measure of malnutrition is normalized anthropometric measures evaluated with FGT poverty measures (z=-2)

HAZ	Total Change 1988	1993	Change		Intrasectoral Effets Urban	Rural	Migration	Interaction
Po	29.47	26.18	-3.29	+	-4.49	1.38	-0.07	-0.10
P1	1.43	1.35	-0.08		0.65	-0.76	0.01	0.02
P2	0.121	0.125	0.004		0.00	0.01	0.00	0.00
Share of Total Change								
Po			1.00		1.37	-0.42	0.02	0.03
P1			1.00		-8.07	9.35	-0.08	-0.21
P2			1.00		-0.83	1.87	-0.01	-0.03

WHZ	Total Change 1988	1993	Change		Intrasectoral Effets Urban	Rural	Migration	Interaction
Po	8.00	11.98	3.97	+	0.52	3.46	0.00	0.00
P1	0.18	0.41	0.24		0.05	0.19	0.00	0.00
P2	0.007	0.023	0.016		0.00	0.01	0.00	0.00
Share of Total Change								
Po			1.00		0.13	0.87	0.00	0.00
P1			1.00		0.20	0.80	0.00	0.00
P2			1.00		0.21	0.79	0.00	0.00

Madagascar: Regional Decomposition of Changes in Child (Age 3-36 months)

Measure of malnutrition is normalized anthropometric measures evaluated with FGT poverty measures (z=-2)

	Total Change				Intrasectoral Effets			
HAZ	1992	1997	Change		Urban	Rural	Migration	Interaction
Po	49.27	48.57	-0.70	+	0.57	-0.98	-0.64	0.34
P1	2.73	2.83	0.11		0.04	0.09	-0.04	0.01
P2	0.240	0.260	0.020		0.00	0.02	0.00	0.00
Share of Total Change								
Po			1.00		-0.81	1.39	0.91	-0.49
P1			1.00		0.37	0.88	-0.36	0.11
P2			1.00		0.19	0.98	-0.19	0.02

	Total Change				Intrasectoral Effets			
WHZ	1992	1997	Change		Urban	Rural	Migration	Interaction
Po	5.74	7.75	2.01	**	0.20	2.01	-0.14	-0.06
P1	0.13	0.21	0.08	**	0.01	0.08	0.00	0.00
P2	0.005	0.010	0.004	**	0.00	0.00	0.00	0.00
Share of Total Change								
Po			1.00		0.10	1.00	-0.07	-0.03
P1			1.00		0.09	0.96	-0.03	-0.02
P2			1.00		0.11	0.92	-0.02	-0.01

Mali: Regional Decomposition of Changes in Child (Age 3-36 months)

Measure of malnutrition is normalized anthropometric measures evaluated with FGT poverty measures (z=-2)

	Total Change				Intrasectoral Effets			
HAZ	1987	1995	Change		Urban	Rural	Migration	Interaction
Po	23.97	32.95	8.98	**	0.90	8.18	0.00	-0.09
P1	1.18	2.11	0.93	**	0.12	0.82	0.00	-0.01
P2	0.106	0.218	0.112	**	0.02	0.10	0.00	0.00
Share of Total Change								
Po			1.00		0.10	0.91	0.00	-0.01
P1			1.00		0.13	0.88	0.00	-0.01
P2			1.00		0.14	0.87	0.00	-0.01

	Total Change				Intrasectoral Effets			
WHZ	1987	1993	Change		Urban	Rural	Migration	Interaction
Po	10.76	24.60	13.84	**	3.60	10.24	0.00	0.00
P1	0.28	0.97	0.69	**	0.16	0.53	0.00	0.00
P2	0.012	0.058	0.046	**	0.01	0.04	0.00	0.00
Share of Total Change								
Po			1.00		0.26	0.74	0.00	0.00
P1			1.00		0.23	0.77	0.00	0.00
P2			1.00		0.21	0.79	0.00	0.00

Uganda: Regional Decomposition of Changes in Child (Age 3-36 months)

Measure of malnutrition is normalized anthropometric measures evaluated with FGT poverty measures (z=-2)

	Total Change				Intrasectoral Effets			
HAZ	1988	1995	Change		Urban	Rural	Migration	Interaction
Po	43.17	38.69	-4.48	**	-0.18	-4.03	-0.31	0.04
P1	2.48	2.09	-0.39	**	-0.02	-0.35	-0.02	0.00
P2	0.234	0.200	-0.034	**	0.00	-0.03	0.00	0.00
Share of Total Change								
Po			1.00		0.04	0.90	0.07	-0.01
P1			1.00		0.05	0.91	0.05	-0.01
P2			1.00		0.07	0.89	0.05	-0.01

	Total Change				Intrasectoral Effets			
WHZ	1988	1995	Change		Urban	Rural	Migration	Interaction
Po	1.91	5.29	3.38	**	0.34	3.05	-0.02	0.00
P1	0.04	0.16	0.12	**	0.01	0.11	0.00	0.00
P2	0.002	0.009	0.007	**	0.00	0.01	0.00	0.00
Share of Total Change								
Po			1.00		0.10	0.90	-0.01	0.00
P1			1.00		0.09	0.91	0.00	0.00
P2			1.00		0.08	0.92	0.00	0.00

Ghana: 1988-1993
Variant of Datt-Ravallion Decomposition of Nutritional Outcomes
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1996	Change		Growth	Redistr.	Residual
Po	8.00	11.98	3.97	**	-1.25	5.03	0.19
P1	0.18	0.41	0.24	**	-0.02	0.28	-0.02
P2	0.007	0.023	0.016	**	-0.001	0.019	-0.002
Share of Total Change							
Po			100.00		-31.38	126.55	4.83
P1			100.00		-8.92	115.33	-6.41
P2			100.00		-5.83	115.33	-9.50

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1996	Change		Growth	Redistr.	Residual
Po	8.00	11.98	3.97	**	-1.06	5.22	-0.19
P1	0.18	0.41	0.24	**	-0.04	0.26	0.02
P2	0.007	0.023	0.016	**	-0.003	0.017	0.002
Share of Total Change							
Po			100.00		-26.55	131.38	-4.83
P1			100.00		-15.33	108.92	6.41
P2			100.00		-15.33	105.83	9.50

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1996	Change		Growth	Redistr.	Residual
Po	29.47	26.18	-3.29	+	-4.12	1.28	-0.44
P1	1.43	1.35	-0.08		-0.27	0.20	-0.01
P2	0.121	0.125	0.004		-0.025	0.033	-0.004
Share of Total Change							
Po			100.00		125.38	-38.85	13.47
P1			100.00		329.05	-243.34	14.29
P2			100.00		-560.96	743.40	-82.44

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1996	Change		Growth	Redistr.	Residual
Po	29.47	26.18	-3.29	+	-4.57	0.83	0.44
P1	1.43	1.35	-0.08		-0.28	0.19	0.01
P2	0.121	0.125	0.004		-0.029	0.030	0.004
Share of Total Change							
Po			100.00		138.85	-25.38	-13.47
P1			100.00		343.34	-229.05	-14.29
P2			100.00		-643.40	660.96	82.44

Madagascar, 1992-1997

Variant of Datt-Ravallion Decomposition of Nutritional Outcomes

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1992	1997	Change		Growth	Redistr.	Residual
Po	5.74	7.75	2.01	**	0.65	1.53	-0.17
P1	0.13	0.21	0.08	**	0.01	0.06	0.00
P2	0.005	0.010	0.004	**	0.001	0.003	0.000
Share of Total Change							
Po			100.00		32.40	76.29	-8.69
P1			100.00		16.75	79.30	3.95
P2			100.00		14.07	79.15	6.78

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1992	1997	Change		Growth	Redistr.	Residual
Po	5.74	7.75	2.01	**	0.48	1.36	0.17
P1	0.13	0.21	0.08	**	0.02	0.07	0.00
P2	0.005	0.010	0.004	**	0.001	0.004	0.000
Share of Total Change							
Po			100.00		23.71	67.60	8.69
P1			100.00		20.70	83.25	-3.95
P2			100.00		20.85	85.93	-6.78

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1992	1997	Change		Growth	Redistr.	Residual
Po	49.27	48.57	-0.70		-1.87	0.99	0.18
P1	2.73	2.83	0.11		-0.14	0.25	0.00
P2	0.240	0.260	0.020		-0.015	0.037	-0.001
Share of Total Change							
Po			100.00		266.23	-140.70	-25.53
P1			100.00		-132.31	235.32	-3.02
P2			100.00		-75.38	182.43	-7.05

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1992	1997	Change		Growth	Redistr.	Residual
Po	49.27	48.57	-0.70		-1.69	1.17	-0.18
P1	2.73	2.83	0.11		-0.14	0.25	0.00
P2	0.240	0.260	0.020		-0.017	0.036	0.001
Share of Total Change							
Po			100.00		240.70	-166.23	25.53
P1			100.00		-135.32	232.31	3.02
P2			100.00		-82.43	175.38	7.05

Mali, 1987-1995

Variant of Datt-Ravallion Decomposition of Nutritional Outcomes

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ				
Poverty Line is -2 Z-score	1987	1995	Change	Growth	Redistr.	Residual
Po	10.76	24.60	13.84 **	8.51	7.37	-2.04
P1	0.28	0.97	0.69 **	0.24	0.33	0.11
P2	0.012	0.058	0.046 **	0.013	0.020	0.013
Share of Total Change						
Po			100.00	61.50	53.23	-14.74
P1			100.00	35.07	48.26	16.67
P2			100.00	28.64	42.70	28.66

Reference is 2nd Survey

		WHZ				
Poverty Line is -2 Z-score	1987	1995	Change	Growth	Redistr.	Residual
Po	10.76	24.60	13.84 **	6.47	5.33	2.04
P1	0.28	0.97	0.69 **	0.36	0.45	-0.11
P2	0.012	0.058	0.046 **	0.026	0.033	-0.013
Share of Total Change						
Po			100.00	46.77	38.50	14.74
P1			100.00	51.74	64.93	-16.67
P2			100.00	57.30	71.36	-28.66

Reference is 1st Survey

		HAZ				
Poverty Line is -2 Z-score	1987	1995	Change	Growth	Redistr.	Residual
Po	23.97	32.95	8.98 **	5.37	3.55	0.06
P1	1.18	2.11	0.93 **	0.39	0.49	0.05
P2	0.106	0.218	0.112 **	0.040	0.058	0.015
Share of Total Change						
Po			100.00	59.81	39.56	0.63
P1			100.00	41.72	53.30	4.98
P2			100.00	35.24	51.49	13.27

Reference is 2nd Survey

		HAZ				
Poverty Line is -2 Z-score	1987	1995	Change	Growth	Redistr.	Residual
Po	23.97	32.95	8.98 **	5.43	3.61	-0.06
P1	1.18	2.11	0.93 **	0.43	0.54	-0.05
P2	0.11	0.22	0.11 **	0.05	0.07	-0.01
Share of Total Change						
Po			100.00	60.44	40.19	-0.63
P1			100.00	46.70	58.28	-4.98
P2			100.00	48.51	64.76	-13.27

Senegal, 1986-1992
Variant of Datt-Ravallion Decomposition of Nutritional Outcomes
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1986	1992	Change		Growth	Redistr.	Residual
Po	6.04	10.41	4.37	**	0.00	4.44	-0.07
P1	0.17	0.36	0.19	**	0.00	0.19	0.00
P2	0.007	0.021	0.014	**	0.000	0.015	0.000
Share of Total Change							
Po			100.00		0.00	101.66	-1.66
P1			100.00		-1.86	103.21	-1.35
P2			100.00		-1.38	102.93	-1.55

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1986	1992	Change		Growth	Redistr.	Residual
Po	6.04	10.41	4.37	**	-0.07	4.37	0.07
P1	0.17	0.36	0.19	**	-0.01	0.19	0.00
P2	0.007	0.021	0.014	**	0.000	0.014	0.000
Share of Total Change							
Po			100.00		-1.66	100.00	1.66
P1			100.00		-3.21	101.86	1.35
P2			100.00		-2.93	101.38	1.55

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1986	1992	Change		Growth	Redistr.	Residual
Po	22.98	22.08	-0.90		-4.21	3.94	-0.63
P1	1.04	1.08	0.04	*	-0.24	0.32	-0.04
P2	0.077	0.092	0.015	**	-0.021	0.043	-0.007
Share of Total Change							
Po			100.00		467.76	-438.19	70.43
P1			100.00		-590.71	801.28	-110.57
P2			100.00		-139.33	284.50	-45.17

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1986	1992	Change		Growth	Redistr.	Residual
Po	22.98	22.08	-0.90		-4.84	3.31	0.63
P1	1.04	1.08	0.04	*	-0.28	0.28	0.04
P2	0.077	0.092	0.015	**	-0.028	0.036	0.007
Share of Total Change							
Po			100.00		538.19	-367.76	-70.43
P1			100.00		-701.28	690.71	110.57
P2			100.00		-184.50	239.33	45.17

Tanzania, 1991-1996
Variant of Datt-Ravallion Decomposition of Nutritional Outcomes
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ				
Poverty Line is -2 Z-score	1991	1996	Change	Growth	Redistr.	Residual
Po	6.36	7.32	0.96 **	0.69	0.05	0.23
P1	0.20	0.23	0.03	0.03	0.00	0.00
P2	0.012	0.012	0.001	0.002	-0.002	0.000
Share of Total Change						
Po			100.00	71.54	4.76	23.71
P1			100.00	111.93	-14.36	2.44
P2			100.00	386.48	-279.78	-6.70

Reference is 2nd Survey

		WHZ				
Poverty Line is -2 Z-score	1991	1996	Change	Growth	Redistr.	Residual
Po	6.36	7.32	0.96 **	0.91	0.27	-0.23
P1	0.20	0.23	0.03	0.03	0.00	0.00
P2	0.012	0.012	0.001	0.002	-0.002	0.000
Share of Total Change						
Po			100.00	95.24	28.46	-23.71
P1			100.00	114.36	-11.93	-2.44
P2			100.00	379.78	-286.48	6.70

Reference is 1st Survey

		HAZ				
Poverty Line is -2 Z-score	1991	1996	Change	Growth	Redistr.	Residual
Po	43.55	43.72	0.17	-0.33	0.17	0.33
P1	2.37	2.45	0.08	-0.02	0.10	0.00
P2	0.215	0.227	0.012	-0.002	0.015	0.000
Share of Total Change						
Po			100.00	-192.89	100.00	192.89
P1			100.00	-29.09	129.43	-0.34
P2			100.00	-19.51	120.32	-0.80

Reference is 2nd Survey

		HAZ				
Poverty Line is -2 Z-score	1991	1996	Change	Growth	Redistr.	Residual
Po	43.55	43.72	0.17	0.00	0.50	-0.33
P1	2.37	2.45	0.08	-0.02	0.10	0.00
P2	0.215	0.227	0.012	-0.002	0.015	0.000
Share of Total Change						
Po			100.00	0.00	292.89	-192.89
P1			100.00	-29.43	129.09	0.34
P2			100.00	-20.32	119.51	0.80

Uganda, 1988-1995

Variant of Datt-Ravallion Decomposition of Nutritional Outcomes

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1995	Change		Growth	Redistr.	Residual
Po	1.91	5.29	3.38	**	1.30	1.54	0.54
P1	0.04	0.16	0.12	**	0.03	0.06	0.02
P2	0.002	0.009	0.007	**	0.001	0.003	0.002
Share of Total Change							
Po			100.00		38.58	45.50	15.92
P1			100.00		27.25	52.75	20.00
P2			100.00		21.81	48.24	29.94

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1995	Change		Growth	Redistr.	Residual
Po	1.91	5.29	3.38	**	1.84	2.07	-0.54
P1	0.04	0.16	0.12	**	0.06	0.09	-0.02
P2	0.002	0.009	0.007	**	0.003	0.005	-0.002
Share of Total Change							
Po			100.00		54.50	61.42	-15.92
P1			100.00		47.25	72.75	-20.00
P2			100.00		51.76	78.19	-29.94

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1995	Change		Growth	Redistr.	Residual
Po	43.17	38.69	-4.48	**	-4.12	-0.13	-0.23
P1	2.48	2.09	-0.39	**	-0.34	-0.04	0.00
P2	0.234	0.200	-0.034	**	-0.039	0.004	0.001
Share of Total Change							
Po			100.00		92.06	2.90	5.04
P1			100.00		89.05	11.41	-0.46
P2			100.00		113.81	-11.67	-2.14

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1995	Change		Growth	Redistr.	Residual
Po	43.17	38.69	-4.48	**	-4.35	-0.36	0.23
P1	2.48	2.09	-0.39	**	-0.34	-0.04	0.00
P2	0.234	0.200	-0.034	**	-0.038	0.005	-0.001
Share of Total Change							
Po			100.00		97.10	7.94	-5.04
P1			100.00		88.59	10.95	0.46
P2			100.00		111.67	-13.81	2.14

Zambia, 1992-1996

Variant of Datt-Ravallion Decomposition of Nutritional Outcomes

Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1992	1996	Change		Growth	Redistr.	Residual
Po	5.16	4.22	-0.94	**	-0.65	-0.23	-0.05
P1	0.18	0.12	-0.06	**	-0.02	-0.04	0.00
P2	0.010	0.006	-0.004	**	-0.002	-0.003	0.000
Share of Total Change							
Po			100.00		69.83	24.56	5.61
P1			100.00		39.73	62.81	-2.54
P2			100.00		36.56	71.37	-7.93

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1992	1996	Change		Growth	Redistr.	Residual
Po	5.16	4.22	-0.94	**	-0.71	-0.28	0.05
P1	0.18	0.12	-0.06	**	-0.02	-0.04	0.00
P2	0.010	0.006	-0.004	**	-0.001	-0.003	0.000
Share of Total Change							
Po			100.00		75.44	30.17	-5.61
P1			100.00		37.19	60.27	2.54
P2			100.00		28.63	63.44	7.93

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1992	1996	Change		Growth	Redistr.	Residual
Po	40.04	42.57	2.53	**	1.51	0.90	0.12
P1	2.11	2.41	0.30	**	0.12	0.17	0.00
P2	0.189	0.224	0.034	**	0.013	0.020	0.001
Share of Total Change							
Po			100.00		59.70	35.65	4.65
P1			100.00		41.58	57.37	1.05
P2			100.00		39.12	57.75	3.13

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1992	1996	Change		Growth	Redistr.	Residual
Po	40.04	42.57	2.53	**	1.63	1.02	-0.12
P1	2.11	2.41	0.30	**	0.13	0.18	0.00
P2	0.189	0.224	0.034	**	0.014	0.021	-0.001
Share of Total Change							
Po			100.00		64.35	40.30	-4.65
P1			100.00		42.63	58.42	-1.05
P2			100.00		42.25	60.88	-3.13

Zimbabwe, 1988-1994
Variant of Datt-Ravallion Decomposition of Nutritional Outcomes
Total change in poverty is decomposed into growth and redistribution components and and interaction term

Reference is 1st Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1994	Change		Growth	Redistr.	Residual
Po	1.20	5.83	4.63	**	2.54	1.66	0.43
P1	0.04	0.18	0.14	**	0.06	0.03	0.05
P2	0.002	0.009	0.007	**	0.003	0.001	0.003
Share of Total Change							
Po			100.00		54.85	35.92	9.23
P1			100.00		41.07	23.37	35.56
P2			100.00		47.44	8.47	44.08

Reference is 2nd Survey

		WHZ					
Poverty Line is -2 Z-score	1988	1994	Change		Growth	Redistr.	Residual
Po	1.20	5.83	4.63	**	2.97	2.09	-0.43
P1	0.04	0.18	0.14	**	0.11	0.08	-0.05
P2	0.002	0.009	0.007	**	0.006	0.003	-0.003
Share of Total Change							
Po			100.00		64.08	45.15	-9.23
P1			100.00		76.63	58.93	-35.56
P2			100.00		91.53	52.56	-44.08

Reference is 1st Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1994	Change		Growth	Redistr.	Residual
Po	30.01	23.45	-6.56	**	-7.69	1.98	-0.86
P1	1.27	0.96	-0.31	**	-0.43	0.16	-0.03
P2	0.093	0.072	-0.021	**	-0.035	0.018	-0.005
Share of Total Change							
Po			100.00		117.17	-30.23	13.06
P1			100.00		141.19	-50.58	9.39
P2			100.00		161.66	-83.16	21.50

Reference is 2nd Survey

		HAZ					
Poverty Line is -2 Z-score	1988	1994	Change		Growth	Redistr.	Residual
Po	30.01	23.45	-6.56	**	-8.54	1.13	0.86
P1	1.27	0.96	-0.31	**	-0.46	0.13	0.03
P2	0.093	0.072	-0.021	**	-0.039	0.013	0.005
Share of Total Change							
Po			100.00		130.23	-17.17	-13.06
P1			100.00		150.58	-41.19	-9.39
P2			100.00		183.16	-61.66	-21.50

Estimated Parameters for Malnutrition (height-for-age Z-scores) Models for Eight African Countries

Model I

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986 & 1993 Pooled		1991	1996	1988 & 1995 Pooled		1992 & 1996 Pooled		1988 & 1994 Pooled	
Common Parameters																
Prenatal care w/ doctor ++																
Prenatal care w/ nurse ++																
Child vaccinated ++																
Mother received tetanus injection ++																
Child gender dummy (male=1)	-0.052	-0.129 *	-0.108 *	-0.265 **	-0.130	-0.104 *	-0.085 +		-0.153 **	-0.074	-0.170 **		-0.163 **		-0.107 **	
Multiple births	-0.624 **	-0.907 **	-1.192 **	-1.174 **	-0.260	-0.752 **	-1.091 **		-0.799 **	-1.096 **	-0.811 **		-0.796 **		-0.677 **	
Birth Order	-0.013	-0.064 *	0.013	-0.050 **	-0.043	-0.060 **	-0.019		-0.056 **	-0.011	-0.043 **		-0.012		-0.055 **	
Child dummy for age 3-6	1.336 **	1.238 **	1.275 **	1.615 **	0.938 **	1.752 **	0.881 **		1.238 **	1.390 **	1.329 **		1.389 **		1.070 **	
Child dummy for age 7-12	0.696 **	0.917 **	0.575 **	0.750 **	0.294 *	1.102 **	0.699 **		0.588 **	0.714 **	0.567 **		0.765 **		0.671 **	
Child dummy for age 25-35	-0.240 **	-0.189 *	-0.067	0.060	-0.239 +	-0.124 *	-0.126 *		0.020	-0.001	0.028		-0.041		0.000	
No. of HH members age < 5																
No. of HH girls age 5-15																
No. of HH boys age 5-15																
No. of HH women > age 15																
No. of HH members																
Household head gender (male=1)																
Age of mother	0.073	0.133 **	0.037	0.066 +	0.055	0.061 +	0.063 +		0.057 +	0.072 +	0.014		0.061 **		0.088 **	
Squared age of mother	-0.001	-0.002 *	-0.001	-0.001	-0.001	-0.001	-0.001 +		-0.001 +	-0.001 +	0.000		-0.001 +		-0.001 +	
Educ. of mother -- primary	0.045	0.002	-0.034	0.096	-0.009	0.084	0.282 **		0.103 *	0.033	-0.003		0.087 +		0.079	
Educ. of mother -- post primary	0.189	0.351 *	0.038	0.350 **	-0.390	0.034	0.478 **		0.228 +	0.290 +	0.126 +		0.247 **		0.221 **	
Educ. of father -- primary	-0.072	-0.089	-0.034	-0.162 *	-0.174	0.043	0.227 *		-0.025 +	0.140 *	-0.052		0.018		0.131	
Educ. of father -- post primary	0.178	-0.087	-0.015	-0.054	0.354	0.422 **	0.188 +		0.309 **	0.356 **	0.082		0.129 +		0.308 **	
Dummy for no info on father's educ.	-0.196	-0.085	-0.109	-0.194 +	0.047	0.202 +	0.031		-0.032	-0.057	-0.077		0.099		0.226 *	
Mother's birthplace (urban=1)	-0.048	0.025	0.047	(dropped)	-0.034	0.087	0.097		0.078 +	0.241 **	0.021		-0.021		0.064	
Flush toilet	0.329 +	0.273	0.409 *	0.269	0.767	-0.389	0.124		0.626 **	0.656 **	0.224		0.162 **		0.406 **	
Piped drinking water	0.075	0.157	0.018	0.188	0.216	-0.091	0.046		0.126 *	0.050	0.130		-0.036		-0.180 *	
Urban dummy	0.086	0.224 *	0.192 +	0.100	0.346 *	0.234 **	0.334 **		0.050 +	0.207 **	0.286 **		0.106 +		0.111	
Constant	-2.359 **	-3.630 **	-2.826 **	-3.614 **	-2.165 *	-2.849 **	-3.021 **	-2.247 **	-2.726 **	-3.478 **	-2.070 **	-2.117 **	-3.155 **	-3.188 **	-3.439 **	-3.172 **
Number of observations	1702	1605	2532	2777	911	4087	2488		3910	3256	5867		6659		3421	
R-squared	0.201	0.215	0.241	0.252	0.110	0.225	0.150		0.168	0.200	0.159		0.218		0.182	

** and + indicate significance at the 95% and 90% levels of confidence, respectively*

Table 14B

Estimated Parameters for Malnutrition (height-for-age Z-scores) Models for Eight African Countries

Model II -- Household demographics included

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986 & 1993 Pooled		1991	1996	1988 & 1995 Pooled		1992 & 1996 Pooled		1988 & 1994 Pooled	
Common Parameters																
Prenatal care w/ doctor ++																
Prenatal care w/ nurse ++																
Child vaccinated ++																
Mother received tetanus injection ++																
Child gender dummy (male=1)	-0.046	-0.126 +	-0.105 *	-0.265 **	-0.123	-0.103 *	-0.083		-0.151 **	-0.077	-0.169 **		-0.164 **		-0.108 **	
Multiple births	-0.618 **	-0.848 **	-1.084 **	-1.153 **	-0.308	-0.762 **	-1.105 **		-0.850 **	-1.110 **	-0.820 **		-0.829 **		-0.642 **	
Birth Order	-0.009	-0.005	0.033 +	-0.028	-0.035	-0.052 **	-0.010		-0.060 **	0.010	-0.037 *		-0.003		-0.029	
Child dummy for age 3-6	1.336 **	1.234 **	1.305 **	1.614 **	0.926 **	1.745 **	0.882 **		1.231 **	1.382 **	1.326 **		1.384 **		1.077 **	
Child dummy for age 7-12	0.694 **	0.928 **	0.583 **	0.748 **	0.284 *	1.100 **	0.695 **		0.584 **	0.709 **	0.566 **		0.765 **		0.675 **	
Child dummy for age 25-35	-0.233 **	-0.178 *	-0.042	0.066	-0.233 +	-0.122 *	-0.121 *		0.017	0.001	0.034		-0.037		0.010	
No. of HH members age < 5	-0.021	-0.122 *	-0.098 **	-0.032	0.012	0.028	0.001		0.008	-0.021	0.003		-0.006		-0.052 *	
No. of HH girls age 5-15	-0.082 *	-0.039	0.007	-0.035	-0.060	-0.006	-0.033 *		0.005 +	-0.075 **	0.009		-0.027		-0.058 **	
No. of HH boys age 5-15	0.072 *	-0.124 **	-0.013	-0.043	-0.003	-0.015	-0.007		-0.054 **	-0.036	-0.045 *		-0.040 *		-0.022	
No. of HH women > age 15	-0.036	-0.004	0.071	0.029	-0.040	0.054	0.012		-0.077 *	-0.003	0.057		-0.019		0.095 **	
No. of HH members	0.000	0.019	-0.012	0.000	0.012	-0.018 +	-0.003		0.034 **	0.026 *	0.004		0.020 **		0.006	
Household head gender (male=1)			0.031	0.147 +					-0.114	0.017			0.036			
Age of mother	0.068	0.156 **	0.058	0.084 *	0.056	0.065 *	0.073 +		0.058 +	0.092 *	0.025		0.070 **		0.118 **	
Squared age of mother	-0.001	-0.002 *	-0.001 +	-0.001 *	-0.001	-0.001	-0.001 +		-0.001 +	-0.001 *	0.000		-0.001 *		-0.002 **	
Educ. of mother -- primary	0.033	-0.006	-0.023	0.101	-0.013	0.081	0.282 **		0.106 *	0.032	-0.008		0.082 +		0.077	
Educ. of mother -- post primary	0.161	0.342 *	0.043	0.351 **	-0.412	0.041	0.466 **		0.214 +	0.269 +	0.111		0.236 **		0.194 *	
Educ. of father -- primary	-0.077	-0.123	-0.026	-0.167 *	-0.176	0.042	0.206 *		-0.020 +	0.137 *	-0.057		0.017		0.129	
Educ. of father -- post primary	0.179	-0.121	-0.013	-0.061	0.345	0.423 **	0.165		0.318 **	0.341 **	0.071		0.126 +		0.295 **	
Dummy for no info on father's educ.	-0.212 +	-0.089	-0.103	-0.184 +	0.042	0.221 *	0.028		-0.043	-0.074	-0.097		0.096		0.211 +	
Mother's birthplace (urban=1)	-0.049	0.037	0.053		-0.026	0.085	0.100		0.081 +	0.229 **	0.011		-0.023		0.065	
Flush toilet	0.368 *	0.247	0.388 +	0.265	0.806	-0.390	0.127		0.653 **	0.657 **	0.218		0.155 **		0.398 **	
Piped drinking water	0.060	0.144	0.015	0.184	0.200	-0.079	0.051		0.136 *	0.053	0.139		-0.034		-0.190 **	
Urban dummy	0.116	0.224 *	0.183 +	0.098	0.336 *	0.241 **	0.313 **		0.054 +	0.212 **	0.278 **		0.107 +		0.125	
Constant	-2.185 **	-3.789 **	-2.960 **	-3.847 **	-2.213 *	-2.939 **	-3.059 **	-2.317 **	-2.799 **	-3.817 **	-2.284 **	-2.348 **	-3.323 **	-3.359 **	-3.903 **	-3.657 **
Number of observations	1702	1605	2532	2777	911	4087	2488		3910	3256	5867		6659		3421	
R-squared	0.209	0.224	0.245	0.253	0.112	0.226	0.154		0.172	0.202	0.161		0.219		0.186	

** and + indicate significance at the 95% and 90% levels of confidence, respectively*

Table 14C

Estimated Parameters for Malnutrition (height-for-age Z-scores) Models for Eight African Countries

Model III -- Household demographics & non-self cluster means as proxies for endogenous inputs

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986 & 1993 Pooled		1991	1996	1988 & 1995 Pooled		1992 & 1996 Pooled		1988 & 1994 Pooled	
Common Parameters																
Prenatal care w/ doctor ++	0.153	-0.134	0.056	-0.069	2.268	-0.228	1.102 **		0.051	0.005	0.110		0.284		-0.007	
Prenatal care w/ nurse ++	0.178	0.174	-0.107	0.218	0.410	0.218	0.003		0.007 +	0.445 **	0.198		0.004		-0.075	
Child vaccinated ++	1.869	-0.102	0.022	-1.267 **		0.790 **	0.154		0.167	0.307	-0.128		0.054		0.259	
Mother received tetanus injection ++	-0.090	0.234	-0.211 +	-0.053	0.007	-0.345 *	0.146		0.096	-0.066	-0.056		0.158		-0.180	
Child gender dummy (male=1)	-0.049	-0.130 *	-0.107 *	-0.271 **	-0.116	-0.103 *	-0.081		-0.148 **	-0.076	-0.169 **		-0.164 **		-0.105 *	
Multiple births	-0.608 **	-0.842 **	-1.066 **	-1.120 **	-0.294	-0.765 **	-1.109 **		-0.852 **	-1.082 **	-0.820 **		-0.830 **		-0.640 **	
Birth Order	-0.015	-0.005	0.033 +	-0.026	-0.036	-0.054 **	-0.011		-0.060 **	0.004	-0.038 *		-0.003		-0.029	
Child dummy for age 3-6	1.344 **	1.241 **	1.300 **	1.610 **	0.931 **	1.742 **	0.888 **		1.226 **	1.385 **	1.326 **		1.383 **		1.083 **	
Child dummy for age 7-12	0.694 **	0.929 **	0.582 **	0.751 **	0.294 *	1.094 **	0.709 **		0.583 **	0.715 **	0.565 **		0.765 **		0.674 **	
Child dummy for age 25-35	-0.241 **	-0.192 *	-0.037	0.071	-0.246 +	-0.023	-0.107 +		0.024	-0.004	0.031		-0.043		0.004	
No. of HH members age < 5	-0.026	-0.119 *	-0.098 **	-0.045	0.014	0.022	0.000		0.009	-0.013	0.003		-0.006		-0.050 +	
No. of HH girls age 5-15	-0.075 *	-0.039	0.009	-0.037	-0.060	-0.006	-0.032 *		0.005 +	-0.070 *	0.010		-0.027		-0.059 **	
No. of HH boys age 5-15	0.078 *	-0.121 **	-0.011	-0.045	-0.006	-0.016	-0.006		-0.055 **	-0.031	-0.044 *		-0.039 *		-0.023	
No. of HH women > age 15	-0.034	-0.001	0.073	0.039	-0.043	0.051	0.010		-0.081 *	-0.013	0.057		-0.019		0.095 **	
No. of HH members	-0.003	0.017	-0.013	0.002	0.011	-0.017 +	-0.003		0.034 **	0.026 *	0.004		0.020 *		0.005	
Household head gender (male=1)			0.031	0.130 +					-0.113	0.019			0.035			
Age of mother	0.067	0.154 **	0.058	0.091 *	0.058	0.069 *	0.070 +		0.054 +	0.090 *	0.025		0.070 **		0.114 **	
Squared age of mother	-0.001	-0.002 *	-0.001 +	-0.001 *	-0.001	-0.001	-0.001 +		0.000 +	-0.001 *	0.000		-0.001 *		-0.002 **	
Educ. of mother -- primary	0.040	-0.011	-0.018	0.134 *	-0.029	0.065	0.264 **		0.107 *	0.013	-0.008		0.077		0.073	
Educ. of mother -- post primary	0.180	0.326 *	0.048	0.413 **	-0.427	0.034	0.451 **		0.214 +	0.283 +	0.110		0.226 **		0.187 *	
Educ. of father -- primary	-0.072	-0.128	-0.014	-0.149 *	-0.169	0.036	0.210 *		-0.033	0.111	-0.057		0.015		0.135	
Educ. of father -- post primary	0.181	-0.120	-0.004	-0.032	0.340	0.417 **	0.161		0.304 **	0.293 *	0.073		0.123 +		0.296 **	
Dummy for no info on father's educ.	-0.200	-0.095	-0.094	-0.171 +	0.038	0.223 *	0.024		-0.058	-0.107	-0.099		0.090		0.214 +	
Mother's birthplace (urban=1)	-0.059	0.040	0.050		-0.033	0.074	0.087		0.076 +	0.209 **	0.011		-0.023		0.069	
Flush toilet	0.351 +	0.243	0.374 +	0.311	0.886	-0.432	0.105		0.654 **	0.606 **	0.227		0.146 **		0.400 **	
Piped drinking water	0.037	0.162 +	0.016	0.181	0.180	-0.093	0.029		0.127 *	0.047	0.143		-0.042		-0.187 *	
Urban dummy	0.118	0.207 *	0.196 +	0.155 *	0.195	0.200 *	0.294 **		0.040	0.095	0.279 **		0.096 +		0.121	
Constant	-4.038 **	-3.875 **	-2.837 **	-2.822 **	-2.280 *	-3.493 **	-3.274 **	-2.587 **	-2.976 **	-4.203 **	-2.251 **	-2.374 **	-3.521 **	-3.520 **	-3.917 **	-3.663 **
Number of observations	1699	1605	2530	2777	911	4084	2486		3901	3247	5867		6658		3420	
R-squared	0.212	0.227	0.247	0.261	0.115	0.229	0.159		0.172	0.207	0.162		0.220		0.188	

** and + indicate significance at the 95% and 90% levels of confidence, respectively*

Estimated Parameters for Malnutrition (weight-for-height Z-scores) Models for Eight African Countries

Model I

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986	1992	Pooled (1991 & 1996)		1988	1995	1992	1996	1988	1994
Common Parameters																
Prenatal care w/ doctor ++																
Prenatal care w/ nurse ++																
Child vaccinated ++																
Mother received tetanus injection ++																
Child gender dummy (male=1)	-0.066	-0.108 +	-0.099 **	-0.051	-0.072	0.012	-0.287 **	-0.083	-0.045		-0.020	-0.017	0.002	-0.055	0.015	-0.131 *
Multiple births	-0.237 *	-0.178	-0.243 +	-0.344 *	-0.509 **	-0.212 +	-0.841 +	-0.313	-0.122		-0.129	-0.648 **	-0.315 **	-0.236 *	-0.240	0.162
Birth Order	-0.001	-0.030	0.001	-0.008	-0.008	-0.028 *	-0.007	-0.022	-0.006		-0.010	-0.023	0.002	0.011	-0.002	-0.023
Child dummy for age 3-6	1.033 **	0.654 **	1.133 **	1.295 **	0.691 **	0.761 **	1.587 **	0.594 **	0.935 **		0.809 **	0.876 **	1.106 **	0.889 **	1.204 **	0.776 **
Child dummy for age 7-12	0.145 *	-0.047	0.238 **	0.293 **	0.064	0.073	0.487 **	0.243 **	0.271 **		0.347 **	0.112 *	0.323 **	0.167 **	0.526 **	0.075
Child dummy for age 25-35	0.419 **	0.212 **	0.304 **	0.170 **	0.306 **	0.470 **	0.094	0.115 +	0.229 **		0.348 **	0.351 **	0.287 **	0.386 **	0.121 +	0.107
No. of HH members age < 5																
No. of HH girls age 5-15																
No. of HH boys age 5-15																
No. of HH women > age 15																
No. of HH members																
Household head gender (male=1)																
Age of mother	0.017	-0.064	-0.008	-0.016	0.019	-0.008	0.015	-0.017	0.001		0.009	-0.017	0.044	0.009	-0.015	0.056
Squared age of mother	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	-0.001	0.000	0.000	-0.001
Educ. of mother -- primary	-0.109 *	-0.003	0.071	-0.047	0.239 **	0.212 **	0.242 +	0.034	0.090 **		-0.040	0.092 +	-0.003	0.035	0.195 *	0.167 +
Educ. of mother -- post primary	-0.230 *	0.232	0.130 +	0.106	0.158	0.148	0.148	0.200	0.209 *		0.053	0.172 *	0.148 +	0.147 +	0.281 **	0.216 +
Educ. of father -- primary	0.068	-0.016	-0.028	0.107 +	-0.052	0.162 *	0.035	0.136	0.005		0.082	0.016	-0.118	-0.019	0.190 +	0.005
Educ. of father -- post primary	0.200 **	0.037	0.089	0.095	0.029	0.208 **	-0.003	0.239 *	0.073		0.106	0.083	-0.107	0.125	0.175	0.101
Dummy for no info on father's educ.	0.023	-0.033	-0.026	-0.008	0.247 *	-0.079	-0.082	0.148	0.037		0.061	-0.003	-0.116	-0.101	0.186	-0.097
Mother's birthplace (urban=1)	-0.028	-0.133 *	0.045	(dropped)	-0.037	-0.019	0.336 **	0.001	0.031		0.010	-0.114	-0.029	-0.065	(dropped)	0.016
Flush toilet	0.053	0.254	0.013	0.307	0.952 +	-0.033	0.429 +	-0.036	-0.031		0.043	-0.175	0.072	0.116 +	0.331 *	0.127
Piped drinking water	0.001	-0.043	0.071	0.099	-0.314 +	0.057	-0.198	0.074	0.005		-0.140	0.019	0.012	0.019	0.065	0.001
Urban dummy	-0.020	0.043	-0.052	0.119 *	-0.033	0.043	0.240	-0.045	0.077		0.247 *	0.086	0.120	-0.060	-0.358 *	0.050
Constant	-1.139 *	0.235	-0.572	-0.510	-1.214 *	-1.290 **	-1.479 +	-0.553	-0.646 *	-0.738 *	-0.589	-0.668	-1.034 *	-0.760	0.006	-1.327 *
Number of observations	1820	1669	2594	2883	1445	4109	600	2094	7283		2379	3002	3165	3520	1422	2000
R-squared	0.144	0.095	0.203	0.204	0.101	0.076	0.203	0.040	0.091		0.122	0.122	0.131	0.095	0.198	0.085

** and + indicate significance at the 95% and 90% levels of confidence, repspectively*

Estimated Parameters for Malnutrition (weight-for-height Z-scores) Models for Eight African Countries

Model II -- Household demographics included

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986	1992	Pooled (1991 & 1996)		1988	1995	1992	1996	1988	1994
Common Parameters																
Prenatal care w/ doctor ++																
Prenatal care w/ nurse ++																
Child vaccinated ++																
Mother received tetanus injection ++																
Child gender dummy (male=1)	-0.071 +	-0.110 +	-0.099 **	-0.052	-0.074	0.011	-0.282 **	-0.083	-0.045		-0.023	-0.017	0.004	-0.055	0.010	-0.138 **
Multiple births	-0.261 *	-0.200	-0.245 +	-0.333 *	-0.486 *	-0.226 +	-0.884 +	-0.306	-0.109		-0.126	-0.664 **	-0.308 *	-0.265 *	-0.282 +	0.246
Birth Order	-0.004	-0.028	0.005	0.016	-0.023	-0.025 +	-0.006	-0.009	0.007		-0.018	-0.014	0.004	0.028	-0.033	0.013
Child dummy for age 3-6	1.030 **	0.650 **	1.132 **	1.289 **	0.698 **	0.757 **	1.593 **	0.590 **	0.934 **		0.810 **	0.872 **	1.107 **	0.886 **	1.196 **	0.796 **
Child dummy for age 7-12	0.141 *	-0.051	0.236 **	0.293 **	0.068	0.072	0.490 **	0.238 **	0.269 **		0.347 **	0.113 *	0.323 **	0.169 **	0.517 **	0.086
Child dummy for age 25-35	0.415 **	0.214 **	0.305 **	0.177 **	0.303 **	0.472 **	0.098	0.112 +	0.231 **		0.345 **	0.353 **	0.288 **	0.388 **	0.101	0.106
No. of HH members age < 5	0.000	0.001	-0.014	-0.027	0.020	0.012	-0.026	-0.038 *	-0.018		0.011	0.009	0.004	-0.021	0.057 +	-0.080 *
No. of HH girls age 5-15	0.001	0.002	-0.002	-0.042 +	0.064 **	0.004	-0.006	-0.015	-0.032 *		0.006	-0.023	0.002	-0.046 *	0.054 +	-0.043
No. of HH boys age 5-15	-0.015	-0.021	-0.019	-0.058 *	0.002	-0.040 **	0.009	-0.043 *	-0.008		0.028	-0.028	0.008	-0.041 +	0.035	0.010
No. of HH women > age 15	-0.076 *	-0.099	-0.011	0.078 +	0.002	0.001	0.008	0.000	0.029		0.012	-0.081 *	0.008	-0.015	-0.093 *	0.142 **
No. of HH members	0.014	0.008	0.008	0.009	-0.006	0.008	-0.002	0.017 *	0.003		-0.007	0.003	-0.012	0.017 +	0.000	-0.037 **
Household head gender (male=1)			-0.072	-0.059					-0.009				0.123 +	0.002		
Age of mother	0.007	-0.079 +	-0.004	0.012	0.007	-0.004	0.019	-0.005	0.012		0.001	-0.017	0.041	0.019	-0.050	0.078 *
Squared age of mother	0.000	0.001 +	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	-0.001	0.000	0.001	-0.001 +
Educ. of mother -- primary	-0.106 *	0.000	0.073	-0.050	0.229 **	0.207 **	0.229	0.024	0.090 **		-0.037	0.092 +	0.004	0.031	0.203 **	0.182 +
Educ. of mother -- post primary	-0.227 *	0.240	0.130 +	0.095	0.171	0.136	0.125	0.170	0.199 *		0.061	0.167 *	0.160 +	0.140 +	0.311 **	0.225 *
Educ. of father -- primary	0.064	-0.020	-0.032	0.113 *	-0.041	0.159 *	0.033	0.122	0.002		0.087	0.023	-0.120	-0.021	0.192 +	-0.008
Educ. of father -- post primary	0.197 *	0.043	0.085	0.095	0.047	0.204 *	-0.016	0.223 +	0.065		0.114	0.091	-0.111	0.121	0.187 +	0.077
Dummy for no info on father's educ.	0.020	-0.012	-0.030	-0.023	0.256 *	-0.089	-0.082	0.144	0.026		0.057	0.026	-0.094	-0.084	0.181	-0.101
Mother's birthplace (urban=1)	-0.031	-0.128 +	0.045		-0.045	-0.024	0.340 **	-0.003	0.026		0.008	-0.107	-0.028	-0.066		-0.002
Flush toilet	0.049	0.240	0.013	0.284	0.921 +	-0.056	0.444 +	-0.025	-0.047		0.049	-0.168	0.082	0.116 +	0.325 *	0.138
Piped drinking water	0.007	-0.044	0.071	0.109	-0.308 +	0.052	-0.220	0.074	0.005		-0.141	0.009	0.004	0.013	0.082	-0.038
Urban dummy	-0.017	0.055	-0.052	0.107 *	-0.027	0.035	0.245	-0.053	0.074		0.251 *	0.094	0.116	-0.056	-0.351 *	0.019
Constant	-0.945 *	0.527	-0.607	-1.000 *	-1.060 *	-1.409 **	-1.469	-0.695	-0.811 **	-0.901 **	-0.506	-0.538	-0.948 *	-0.911 +	0.496	-1.482 **
Number of observations	1820	1669	2594	2883	1445	4109	600	2094	7283		2379	3002	3165	3520	1422	2000
R-squared	0.147	0.097	0.203	0.208	0.107	0.078	0.207	0.047	0.092		0.123	0.126	0.132	0.097	0.203	0.096

** and + indicate significance at the 95% and 90% levels of confidence, repspectively*

Estimated Parameters for Malnutrition (weight-for-height Z-scores) Models for Eight African Countries

Model III -- Household demographics & non-self cluster means as proxies for endogenous inputs

	Ghana		Madagascar		Mali		Senegal		Tanzania		Uganda		Zambia		Zimbabwe	
	1988	1993	1992	1997	1987	1995	1986	1992	Pooled (1991 & 1996)		1988	1995	1992	1996	1988	1994
Common Parameters																
Prenatal care w/ doctor ++	-0.422 *	-0.018	-0.124	0.189 *	-2.838	1.353 **	0.634	0.026	-0.044		-0.136	-0.049	-0.008	0.642 *	-0.040	-0.101
Prenatal care w/ nurse ++	-0.056	-0.042	0.043	0.284	-0.141	-0.100	0.625 *	0.067	0.138 *		-0.105	-0.060	-0.027	0.156	0.232	-0.154
Child vaccinated ++	-0.060	-0.092	-0.111	-0.008		-0.112	4.447 *	0.026	0.319		5.324 +	-0.142	0.253	-0.419	-0.427	1.010
Mother received tetanus injection ++	-0.258 *	-0.151	-0.036	0.272 **	0.367 *	0.460 **	-0.255	-0.021	0.128		0.001	-0.083	0.019	-0.073	-0.273	0.235
Child gender dummy (male=1)	-0.065	-0.110 +	-0.100 **	-0.045	-0.073	0.017	-0.277 **	-0.085	-0.043		-0.022	-0.018	0.003	-0.058	0.011	-0.140 **
Multiple births	-0.245 *	-0.198	-0.248 +	-0.340 *	-0.484 *	-0.210 +	-0.717	-0.307	-0.112		-0.128	-0.667 **	-0.311 *	-0.274 *	-0.274	0.243
Birth Order	-0.003	-0.027	0.005	0.017	-0.020	-0.024 +	-0.009	-0.009	0.007		-0.018	-0.015	0.004	0.028	-0.034	0.013
Child dummy for age 3-6	1.020 **	0.645 **	1.131 **	1.297 **	0.701 **	0.762 **	1.588 **	0.590 **	0.931 **		0.813 **	0.868 **	1.105 **	0.882 **	1.193 **	0.806 **
Child dummy for age 7-12	0.138 *	-0.056	0.234 **	0.305 **	0.067	0.070	0.512 **	0.236 **	0.270 **		0.350 **	0.110 *	0.322 **	0.164 **	0.513 **	0.101
Child dummy for age 25-35	0.419 **	0.217 **	0.306 **	0.133 *	0.304 **	0.369 **	0.094	0.113 +	0.230 **		0.344 **	0.355 **	0.289 **	0.390 **	0.091	0.039
No. of HH members age < 5	-0.004	-0.002	-0.014	-0.025	0.017	0.017	-0.022	-0.038 *	-0.016		0.012	0.009	0.006	-0.022	0.057 +	-0.082 *
No. of HH girls age 5-15	-0.001	0.001	-0.002	-0.041 +	0.063 **	0.003	-0.013	-0.014	-0.032 *		0.006	-0.022	0.002	-0.046 *	0.053 +	-0.040
No. of HH boys age 5-15	-0.018	-0.023	-0.020	-0.056 *	0.001	-0.042 **	0.012	-0.044 *	-0.008		0.029	-0.028	0.008	-0.042 +	0.035	0.009
No. of HH women > age 15	-0.073 *	-0.099	-0.009	0.079 *	0.006	0.003	0.022	-0.001	0.027		0.011	-0.080 *	0.008	-0.014	-0.097 *	0.144 **
No. of HH members	0.014	0.009	0.008	0.007	-0.007	0.006	-0.005	0.017 *	0.003		-0.007	0.003	-0.013	0.017 +	-0.001	-0.038 **
Household head gender (male=1)			-0.076	-0.050					-0.007				0.123 +	0.004		
Age of mother	0.005	-0.078 +	-0.004	0.012	0.007	-0.004	0.022	-0.005	0.011		0.002	-0.017	0.040	0.020	-0.052	0.081 *
Squared age of mother	0.000	0.001 +	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	-0.001	0.000	0.001	-0.001 +
Educ. of mother -- primary	-0.095 +	0.005	0.079	-0.060	0.217 **	0.209 **	0.231	0.022	0.075 *		-0.040	0.097 +	-0.005	0.041	0.200 *	0.187 *
Educ. of mother -- post primary	-0.205 +	0.248 +	0.135 *	0.077	0.176	0.114	0.135	0.172	0.187 *		0.060	0.178 *	0.151 +	0.149 +	0.307 **	0.232 *
Educ. of father -- primary	0.084	-0.008	-0.028	0.101 +	-0.046	0.153 *	0.018	0.122	-0.016		0.087	0.030	-0.124	-0.018	0.187 +	-0.006
Educ. of father -- post primary	0.221 **	0.057	0.088	0.082	0.045	0.174 *	-0.034	0.222 +	0.040		0.120 +	0.101	-0.116	0.128	0.185 +	0.081
Dummy for no info on father's educ.	0.045	-0.007	-0.027	-0.036	0.249 *	-0.102	-0.096	0.144	0.007		0.064	0.034	-0.102	-0.092	0.187	-0.103
Mother's birthplace (urban=1)	-0.026	-0.125 +	0.041		-0.043	-0.030	0.352 **	-0.004	0.022		0.006	-0.107	-0.029	-0.072		-0.012
Flush toilet	0.039	0.246	0.016	0.281	0.891 +	-0.028	0.434 +	-0.025	-0.054		0.053	-0.183	0.079	0.090	0.341 *	0.169
Piped drinking water	0.032	-0.046	0.066	0.113	-0.295 +	0.039	-0.268	0.069	-0.005		-0.138	0.015	-0.002	0.010	0.076	-0.074
Urban dummy	0.032	0.079	-0.030	0.120 *	-0.120	-0.044	0.120	-0.061	0.036		0.254 *	0.109	0.116	-0.055	-0.325 *	0.004
Constant	-0.482	0.704	-0.465	-1.181 *	-1.078 *	-1.532 **	-5.961 **	-0.756	-1.232 **	-1.328 **	-5.720 +	-0.297	-1.144 *	-0.619	1.024	-2.529 **
Number of observations	1817	1669	2592	2883	1444	4106	600	2091	7265		2379	3002	3164	3520	1422	1999
R-squared	0.156	0.098	0.204	0.212	0.111	0.084	0.224	0.047	0.093		0.125	0.126	0.132	0.099	0.206	0.098

** and + indicate significance at the 95% and 90% levels of confidence, repspectively*

Table 16A

Estimated Parameters for Reduced-Form Infant Mortality Probit Models for Nine African Countries

Model I

Probit: Dependent variable = kids who die before age 1 | born 1-5 years before survey to mothers age 15-39

	Ghana	Kenya	Madagascar		Mali		Senegal	Tanzania	Uganda		Zambia	Zimbabwe	
	1988 & 1993 Pooled	1988 & 1993 Pooled	1992	1997	1987	1995	1986, 1992 & 1997 Poole	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988	1994
Common Parameters													
Prenatal care w/ doctor ++													
Prenatal care w/ nurse ++													
Child vaccinated ++													
Mother received tetanus injection ++													
Child gender dummy (male=1)	0.029 **	0.004	-0.006	0.024 **	0.007	0.008	0.009 *	0.010	0.016 +	-0.007	0.021 **	0.002	0.010
Multiple births	0.128 **	0.137 **	0.220 **	0.133 **	0.165 **	0.310 **	0.205 **	0.173 **	0.211 **	0.246 **	0.240 **	0.082 **	0.178 **
Birth Order	0.004	0.002	0.003	0.002	0.006	0.002	0.000	0.002	-0.010 **	0.002	-0.008 **	0.004	-0.002
No. of HH members < age 5													
No. of HH girls age 5-15													
No. of HH boys age 5-15													
No. of HH women > age 15													
No. of HH members													
Household head gender (male=1)													
Age of mother at child's birth	-0.010 *	-0.009 **	-0.022 **	-0.009	-0.036 **	-0.021 **	-0.011 **	-0.014 **	-0.007	-0.016 **	-0.010 *	-0.013 *	0.003
Squared age of mother at child's birth	0.000 +	0.000 *	0.000 **	0.000	0.001 **	0.000 **	0.000 **	0.000 **	0.000	0.000 *	0.000 +	0.000 *	0.000
Educ. of mother -- primary	0.007	-0.007	-0.016	-0.016	-0.051 *	-0.022 +	-0.007	-0.016	-0.001	-0.007	0.004	-0.017	-0.006
Educ. of mother -- post primary	0.011	-0.026 **	-0.043 **	-0.039 **	0.080	-0.059 **	-0.026 *	-0.040 **	0.000	-0.020	-0.010	-0.004	-0.017
Educ. of father -- primary	-0.008	-0.015 *	-0.031 *	0.018	-0.031	-0.027 *	-0.017 +	-0.004	-0.024 +	0.006	-0.017	-0.010	0.007
Educ. of father -- post primary	-0.025 *	-0.012	-0.035 *	0.009	-0.056	-0.036 *	-0.016	-0.012	-0.032 +	-0.017	-0.017	0.002	0.015
Dummy for no info on father's educ.	-0.008	-0.012	-0.009	-0.004	0.020	-0.017	-0.029 **	-0.002	-0.001	-0.002	-0.039 *	0.014	-0.018
Mother's birthplace (urban=1)	-0.002	0.006	-0.008		0.010	-0.033 *	0.010 +	-0.003	-0.025	-0.001	0.001		-0.007
Flush toilet	-0.032	-0.008	-0.028	-0.008	-0.057	0.111 *	-0.025 *	-0.014	-0.039	0.021	-0.012	-0.008	-0.023
Piped drinking water	-0.005	0.009	0.018	0.026	-0.002	-0.001	-0.008	0.013	-0.004	-0.025	0.016	-0.005	0.021 +
Urban dummy	-0.005	0.002	-0.021	-0.008	-0.013	-0.033 **	0.006	-0.012	-0.016	0.000	0.000	-0.017	0.030
Number of observations	6030	10227	4050	4603	2435	7855	13193	8653	3789	5589	10344	2640	3144
Pseudo R-squared	0.052	0.065	0.042	0.034	0.054	0.039	0.043	0.034	0.029	0.041	0.042	0.050	0.063

* and + indicate significance at the 95% and 90% levels of confidence respectively

Estimated Parameters for Reduced-Form Infant Mortality Probit Models for Nine African Countries

Model II -- Includes household demographics at date of birth

Probit: Dependent variable = kids who die before age 1 | born 1-5 years before survey to mothers age 15-39

	Ghana	Kenya	Madagascar		Mali		Senegal	Tanzania	Uganda		Zambia	Zimbabwe	
	1988 & 1993 Pooled	1988 & 1993 Pooled	1992	1997	1987	1995	1986, 1992 & 1997 Pooled	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988	1994
Common Parameters													
Prenatal care w/ doctor ++													
Prenatal care w/ nurse ++													
Child vaccinated ++													
Mother received tetanus injection ++													
Child gender dummy (male=1)	0.026 **	0.004	-0.005	0.025 **	0.008	0.010	0.009 *	0.011	0.017 +	-0.007	0.019 **	0.002	0.009
Multiple births	0.110 **	0.104 **	0.212 **	0.107 **	0.133 *	0.308 **	0.210 **	0.154 **	0.169 **	0.217 **	0.221 **	0.075 *	0.240 **
Birth Order	0.001	0.000	0.000	-0.002	-0.006	0.008 **	0.000	-0.001	-0.014 **	0.001	-0.013 **	0.006 +	-0.004
No. of HH members < age 5	0.018 **	0.018 **	0.024 **	0.031 **	0.029 **	0.004	0.002	0.027 **	0.028	0.012	0.023 **	0.004	-0.018
No. of HH girls age 5-15	0.005	0.003	0.006	0.015 **	0.029 **	0.001	0.004 **	0.010 **	0.010	0.002	0.015 **	-0.002	0.007
No. of HH boys age 5-15	0.002	0.004 +	0.015 **	0.005	0.019 **	0.001	-0.001	0.011 **	0.002	0.006	0.021 **	-0.001	0.000
No. of HH women > age 15	0.024 **	0.014 **	0.055 **	0.045 **	0.006	0.041 **	0.010 **	0.050 **	0.001	-0.006	0.045 **	-0.003	0.004
No. of HH members	-0.014 **	-0.011 **	-0.026 **	-0.024 **	-0.026 **	-0.017 **	-0.003 **	-0.025 **	-0.007	-0.003	-0.025 **	-0.006	0.007
Household head gender (male=1)			0.021 +	0.018				0.020 *			0.017 *		
Age of mother at child's birth	-0.013 **	-0.014 **	-0.025 **	-0.014 *	-0.040 **	-0.018 **	-0.011 **	-0.019 **	-0.011	-0.017 **	-0.012 **	-0.013 *	0.002
Squared age of mother at child's birth	0.000 *	0.000 **	0.000 **	0.000 *	0.001 **	0.000 **	0.000 **	0.000 **	0.000 +	0.000 *	0.000 **	0.000 *	0.000
Educ. of mother -- primary	0.007	-0.005	-0.013	-0.010	-0.039 *	-0.024 +	-0.006	-0.010	0.000	-0.007	0.004	-0.017	-0.005
Educ. of mother -- post primary	0.013	-0.022 **	-0.037 *	-0.030 *	0.139	-0.057 **	-0.025 *	-0.032 **	0.001	-0.020	-0.009	-0.004	-0.015
Educ. of father -- primary	-0.006	-0.015 *	-0.021 +	0.019	-0.031	-0.029 *	-0.014	-0.001	-0.024 +	0.005	-0.012	-0.009	0.008
Educ. of father -- post primary	-0.020 +	-0.012	-0.023	0.010	-0.037	-0.028 +	-0.014	-0.007	-0.032 +	-0.018	-0.009	0.004	0.013
Dummy for no info on father's educ.	-0.006	-0.010	0.002	0.005	0.032	-0.001	-0.030 **	0.008	-0.001	-0.002	-0.030 *	0.016	-0.022
Mother's birthplace (urban=1)	-0.001	0.005	-0.002		0.006	-0.034 **	0.010	0.002	-0.026	-0.001	0.000		-0.006
Flush toilet	-0.027	-0.008	-0.032	-0.004	-0.076	0.131 *	-0.026 *	-0.013	-0.037	0.020	-0.004	-0.007	-0.023
Piped drinking water	-0.006	0.009	0.011	0.032	0.010	0.003	-0.008	0.011	-0.005	-0.024	0.010	-0.006	0.024 +
Urban dummy	-0.006	-0.009	-0.017	-0.006	-0.012	-0.025 *	0.002	-0.010	-0.014	0.000	-0.004	-0.017	0.030
Number of observations	6030	10227	4050	4603	2435	7855	13193	8653	3789	5589	10344	2640	3144
Pseudo R-squared	0.081	0.097	0.089	0.072	0.089	0.061	0.049	0.074	0.032	0.043	0.084	0.052	0.069

* and + indicate significance at the 95% and 90% levels of confidence respectively

Estimated Parameters for Reduced-Form Infant Mortality Probit Models for Nine African Countries

Model III -- Includes household demographics at date of birth & non-self cluster means as proxies for endogenous inputs

Probit: Dependent variable = kids who die before age 1 | born 1-5 years before survey to mothers age 15-39

	Ghana	Kenya	Madagascar		Mali		Senegal	Tanzania	Uganda		Zambia	Zimbabwe	
	1988 & 1993 Pooled	1988 & 1993 Pooled	1992	1997	1987	1995	1986, 1992 & 1997 Poolec	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988	1994
Common Parameters													
Prenatal care w/ doctor ++	-0.007	-0.020 +	0.016	0.008	0.162	0.132	-0.011	0.010	-0.065	0.052	0.021	-0.030	-0.007
Prenatal care w/ nurse ++	-0.007	-0.011	0.020	-0.053	-0.005	-0.040	0.013	0.012	-0.030	-0.071 *	0.038 *	-0.021	0.041
Child vaccinated ++	-0.171	-0.248 **	-0.296 **	0.068	0.037	-0.210	-0.343 **	-0.183 **	-2.744	-0.113	-0.195	0.833	-0.438
Mother received tetanus injection ++	-0.003	0.000	0.013	-0.021		-0.027	-0.008	-0.001	-0.058 **	-0.005	-0.034 +	0.009	-0.003
Child gender dummy (male=1)	0.027 **	0.002	-0.003	0.014	0.005	0.007	0.009 +	0.003	0.020 *	-0.005	0.017 **	0.000	0.025 **
Multiple births	0.110 **	0.100 **	0.194 **	0.151 **	0.140 **	0.309 **	0.212 **	0.181 **	0.157 **	0.232 **	0.220 **	0.066 *	0.040
Birth Order	-0.001	0.000	0.002	-0.004	-0.004	0.003	0.000	0.000	-0.012 *	0.000	-0.013 **	0.006 +	-0.002
No. of HH members < age 5	0.019 **	0.017 **	0.024 **	0.021 **	0.029 **	0.004	0.002	0.022 **	0.028 +	0.000	0.023 **	0.010	0.001
No. of HH girls age 5-15	0.005	0.003	0.005	0.007	0.024 **	0.004	0.004 **	0.005	0.010	0.004	0.015 **	-0.001	-0.001
No. of HH boys age 5-15	0.004	0.005 *	0.015 **	0.008	0.013 *	0.002	-0.001	0.013 **	0.001	0.005	0.020 **	0.001	-0.012 *
No. of HH women > age 15	0.019 **	0.014 **	0.050 **	0.039 **	0.005	0.056 **	0.010 **	0.045 **	0.004	-0.009 +	0.044 **	-0.001	-0.002
No. of HH members	-0.013 **	-0.011 **	-0.024 **	-0.017 **	-0.022 **	-0.023 **	-0.003 **	-0.022 **	-0.008	0.000	-0.025 **	-0.007	0.011
Household head gender (male=1)			0.014	0.008				0.012			0.016 *		
Age of mother at child's birth	-0.008	-0.012 **	-0.025 **	-0.009	-0.038 **	-0.027 **	-0.011 **	-0.018 **	-0.009	-0.010	-0.012 **	-0.012 *	0.014 +
Squared age of mother at child's birth	0.000	0.000 **	0.000 **	0.000	0.001 **	0.000 **	0.000 **	0.000 **	0.000	0.000	0.000 **	0.000 +	0.000
Educ. of mother -- primary	0.011	0.000	0.001	-0.007	-0.037 +	-0.009	-0.003	-0.001	0.002	-0.016	0.005	-0.017 +	-0.014
Educ. of mother -- post primary	0.033	-0.015 *	-0.025 +	-0.036 *	0.139	-0.028	-0.023 +	-0.027 *	0.012	-0.024	-0.009	0.000	-0.025
Educ. of father -- primary	-0.004	-0.020 **	-0.011	0.015	-0.029	-0.020	-0.014	-0.002	-0.025 +	0.019	-0.010	-0.002	-0.020
Educ. of father -- post primary	-0.020	-0.017 *	-0.016	0.004	-0.029	-0.031	-0.014	-0.009	-0.037 *	0.014	-0.004	0.010	-0.012
Dummy for no info on father's educ.	-0.009	-0.013	0.008	0.007	0.024	0.036	-0.029 **	0.009	0.000	0.012	-0.027 +	0.012	-0.030
Mother's birthplace (urban=1)	0.001	0.005	0.000		0.003	-0.023	0.009	0.003	-0.033	-0.004	0.000		-0.010
Flush toilet	-0.033	-0.007	-0.022	-0.026	-0.068	0.220 *	-0.024 *	-0.018	-0.045	-0.017	-0.002	-0.009	-0.005
Piped drinking water	-0.006	0.010	0.014	0.084 *	0.012	0.007	-0.007	0.020	-0.003	-0.022	0.006	0.005	0.027 +
Urban dummy	-0.001	-0.009	-0.012	-0.006	-0.025	-0.011	0.001	-0.009	0.002	0.006	-0.003	-0.018	0.011
Number of observations	6030	10227	4050	4603	2435	7855	13193	8653	3789	5589	10344	2640	3144
Pseudo R-squared	0.086	0.107	0.093	0.082	0.093	0.083	0.052	0.085	0.037	0.048	0.085	0.064	0.098

* and + indicate significance at the 95% and 90% levels of confidence respectively

Estimated Parameters for Reduced-Form Under-Age-Three Mortality Probit Models for Nine African Countries

Model I

Probit: Dependent variable = kids who die before age 3 | born 3-5 years before survey to mothers age 15-39

	Ghana	Kenya		Madagascar		Mali	Senegal	Tanzania	Uganda		Zambia	Zimbabwe
	1988 & 1993 pooled	1988	1993	1992	1997	1987 & 1995 Pooled	1986, 1992 & 1997 Poolec	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988 & 1994 Pooled
Common Parameters												
Prenatal care w/ doctor ++												
Prenatal care w/ nurse ++												
Child vaccinated ++												
Mother received tetanus injection ++												
Child gender dummy (male=1)	0.028 *	0.011	0.018 *	-0.032 *	0.041 **	0.024 *	-0.004	0.009	0.031 +	-0.017	0.036 **	-0.001
Multiple births	0.169 **	0.220 **	0.023	0.230 **	0.102 +	0.323 **	0.201 **	0.163 **	0.244 **	0.342 **	0.272 **	0.138 **
Birth Order	0.004	0.005	0.006 *	0.001	0.014 **	0.010 **	0.004	0.008 *	-0.008	0.012 **	0.003	0.007 *
No. of HH members < age 5												
No. of HH girls age 5-15												
No. of HH boys age 5-15												
No. of HH women > age 15												
No. of HH members												
Household head gender (male=1)												
Age of mother at child's birth	-0.020 *	-0.008	-0.008	-0.015	-0.013	-0.016 *	-0.008	-0.015 *	-0.025 *	-0.037 **	-0.013 +	-0.010 +
Squared age of mother at child's birth	0.000 *	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000 *	0.001 **	0.000	0.000
Educ. of mother -- primary	-0.008	-0.019 +	0.009	-0.024	-0.019	-0.048 **	-0.031 *	-0.024	-0.010	0.009	0.015	0.000
Educ. of mother -- post primary	-0.048	-0.009	-0.015	-0.072 **	-0.056 *	-0.119 **	-0.066 **	-0.066 **	-0.032	0.028	-0.010	-0.007
Educ. of father -- primary	0.005	-0.006	-0.008	-0.041 +	0.031	-0.025	-0.017	-0.002	-0.001	-0.035 +	-0.017	0.015
Educ. of father -- post primary	-0.006	-0.022	-0.017	-0.054 *	0.035	-0.048 +	-0.004	-0.005	-0.036	-0.085 **	-0.007	0.025
Dummy for no info on father's educ.	0.042	-0.045 **	0.007	0.038	0.005	-0.027	-0.011	0.040	-0.049	-0.027	-0.054 +	0.030
Mother's birthplace (urban=1)	-0.001	0.008	0.003	0.005		0.008	0.006	0.002	0.025	-0.012	0.004	0.013
Flush toilet	-0.033	-0.018	-0.022	-0.041	-0.019	0.057	-0.059 **	-0.035	0.012	0.045	-0.048 **	-0.001
Piped drinking water	0.011	-0.006	-0.001	0.007	-0.044	-0.007	-0.007	-0.005	0.042	-0.048	0.019	0.001
Urban dummy	-0.004	0.012	-0.001	0.005	-0.018	-0.009	0.001	-0.012	-0.034	0.011	0.017	-0.005
Number of observations	3054	2689	2445	2007	2340	5371	6814	4347	1821	2732	4899	2961
Pseudo R-squared	0.044	0.104	0.078	0.040	0.032	0.040	0.039	0.027	0.037	0.064	0.037	0.069

* and + indicate significance at the 95% and 90% levels of confidence respectively

Estimated Parameters for Reduced-Form Under-Age-Three Mortality Probit Models for Nine African Countries

Model II -- Includes household demographics at date of birth

Probit: Dependent variable = kids who die before age 3 | born 3-5 years before survey to mothers age 15-39

	Ghana	Kenya		Madagascar		Mali	Senegal	Tanzania	Uganda		Zambia	Zimbabwe
	1988 & 1993 pooled	1988	1993	1992	1997	1987 & 1995 Pooled	1986, 1992 & 1997 Poolec	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988 & 1994 Pooled
Common Parameters												
Prenatal care w/ doctor ++												
Prenatal care w/ nurse ++												
Child vaccinated ++												
Mother received tetanus injection ++												
Child gender dummy (male=1)	0.024 *	0.009	0.014 *	-0.025	0.044 **	0.027 *	-0.003	0.013	0.032 *	-0.015	0.036 **	-0.002
Multiple births	0.153 **	0.188 **	0.005	0.237 **	0.070	0.302 **	0.208 **	0.150 **	0.352 **	0.258 **	0.243 **	0.139 **
Birth Order	-0.002	0.001	0.006 +	-0.006	0.010	0.017 **	0.004	0.003	-0.012	0.009	-0.006	0.006 +
No. of HH members < age 5	0.024 **	0.015 **	0.017 **	0.047 **	0.045 **	0.014 **	0.005 *	0.046 **	-0.057 +	0.040 +	0.037 **	0.007
No. of HH girls age 5-15	0.016 *	0.007	-0.003	0.008	0.033 **	0.001	0.005 *	0.020 **	0.032 **	0.005	0.024 **	0.005
No. of HH boys age 5-15	0.005	0.004	0.004	0.033 **	-0.001	-0.011 *	0.000	0.015 *	-0.009	0.009	0.029 **	0.008 *
No. of HH women > age 15	0.028 **	0.010	0.033 **	0.094 **	0.075 **	0.052 **	0.019 **	0.086 **	-0.009	-0.006	0.060 **	0.021 **
No. of HH members	-0.021 **	-0.011 **	-0.012 **	-0.043 **	-0.042 **	-0.021 **	-0.006 **	-0.043 **	0.025 +	0.002	-0.037 **	-0.011 **
Household head gender (male=1)				0.056 **	0.043 *			0.050 **			0.015	-0.011 +
Age of mother at child's birth	-0.023 **	-0.012 +	-0.009 +	-0.023 *	-0.021 *	-0.015 *	-0.010 +	-0.023 **	-0.035 **	-0.039 **	-0.018 *	0.000
Squared age of mother at child's birth	0.000 **	0.000	0.000	0.000 *	0.000 +	0.000	0.000	0.000 **	0.001 **	0.001 **	0.000 +	
Educ. of mother -- primary	-0.005	-0.017	0.006	-0.017	-0.012	-0.046 **	-0.028 *	-0.015	-0.007	0.009	0.017	0.002
Educ. of mother -- post primary	-0.049 +	-0.005	-0.015	-0.064 *	-0.047 +	-0.117 **	-0.064 **	-0.056 **	-0.031	0.027	-0.003	-0.004
Educ. of father -- primary	0.008	-0.010	0.000	-0.023	0.036 +	-0.029	-0.011	0.005	-0.003	-0.037 +	-0.015	0.015
Educ. of father -- post primary	0.004	-0.024	-0.010	-0.033	0.042	-0.035	0.000	0.004	-0.039	-0.086 **	-0.001	0.020
Dummy for no info on father's educ.	0.041	-0.044 **	0.019	0.062 *	0.021	-0.010	-0.013	0.054 *	-0.056	-0.028	-0.046	0.024
Mother's birthplace (urban=1)	0.002	0.007	0.001	0.012		0.005	0.005	0.010	0.027	-0.014	0.001	0.010
Flush toilet	-0.028	-0.015	-0.030 *	-0.045	-0.004	0.063	-0.060 **	-0.029	0.005	0.035	-0.036 *	0.002
Piped drinking water	0.009	-0.005	0.001	0.002	-0.034	-0.005	-0.008	-0.005	0.034	-0.047	0.010	-0.005
Urban dummy	-0.006	0.003	-0.013	0.009	-0.009	0.001	-0.002	-0.006	-0.024	0.012	0.008	-0.011
Number of observations	3054	2689	2445	2007	2340	5371	6814	4347	1821	2732	4899	2961
Pseudo R-squared	0.071	0.129	0.121	0.103	0.086	0.060	0.051	0.081	0.049	0.067	0.077	0.089

* and + indicate significance at the 95% and 90% levels of confidence respectively

Estimated Parameters for Reduced-Form Under-Age-Three Mortality Probit Models for Nine African Countries

Model III -- Includes household demographics at date of birth & non-self cluster means as proxies for endogenous inputs

Probit: Dependent variable = kids who die before age 3 | born 3-5 years before survey to mothers age 15-39

	Ghana	Kenya		Madagascar	Mali	Senegal	Tanzania	Uganda		Zambia	Zimbabwe
	1988 & 1993 pooled	1988	1993	1992 & 1997 Pooled	1987 & 1995 Pooled	1986, 1992 & 1997 Pooled	1991 & 1996 Pooled	1988	1995	1992 & 1996 Pooled	1988 & 1994 Pooled
Common Parameters											
Prenatal care w/ doctor ++	-0.007	-0.034	-0.032 +	-0.067	0.333	-0.072	-0.067	-0.034	-0.030	0.034	-0.044
Prenatal care w/ nurse ++	-0.004	-0.021	0.011	0.020	0.066	0.023	0.020	-0.055	-0.051	0.059 +	0.000
Child vaccinated ++	-0.143	1.405	-0.186 *	-0.474 **		-0.375 *	-0.474 **	-1.132	-0.090	-0.556 *	-0.143
Mother received tetanus injection ++	-0.003	0.033	-0.013	0.034	-1.348	-0.020	0.034	-0.056	-0.146 *	-0.026	-0.004
Child gender dummy (male=1)	0.021	0.009	0.010	-0.020	-0.069	-0.001	-0.019	0.042 *	-0.042 *	0.034 **	-0.004
Multiple births	0.221 **	0.186 **	0.008	0.200 **	0.028	0.208 **	0.199 **	0.326 **	0.365 **	0.247 **	0.095 **
Birth Order	-0.011 +	0.002	0.007 *	-0.002	0.115	0.003	-0.002	-0.011	0.011	-0.006	0.008 +
No. of HH members < age 5	0.021 **	0.015 **	0.013 **	0.041 **	0.013 +	0.006 **	0.041 **	-0.058 +	0.021	0.036 **	-0.004
No. of HH girls age 5-15	0.020 *	0.005	-0.001	0.006	0.046 **	0.004	0.006	0.032 **	0.003	0.025 **	0.007
No. of HH boys age 5-15	0.008	0.004	0.003	0.028 **	0.007	0.002	0.028 **	-0.010	0.007	0.028 **	0.006
No. of HH women > age 15	0.022 +	0.012 +	0.031 **	0.078 **	0.003	0.018 **	0.078 **	-0.004	-0.020 +	0.059 **	0.014 +
No. of HH members	-0.019 **	-0.009 **	-0.012 **	-0.037 **	0.030	-0.006 **	-0.037 **	0.026 +	-0.011	-0.037 **	-0.009 **
Household head gender (male=1)				0.044 *			0.045 *			0.008	
Age of mother at child's birth	-0.017	-0.013 *	-0.009 *	-0.022 *	-0.030 **	-0.010 +	-0.022 *	-0.037 **	-0.035 **	-0.018 *	-0.010
Squared age of mother at child's birth	0.000 +	0.000	0.000 +	0.000 +	-0.031 *	0.000	0.000	0.001 **	0.001 *	0.000 +	0.000
Educ. of mother -- primary	0.014	-0.013	0.010	0.008	0.001 +	-0.021	0.008	-0.007	0.018	0.019	-0.014
Educ. of mother -- post primary	-0.015	0.005	-0.009	-0.035	-0.047	-0.059 **	-0.034	-0.020	0.043	-0.004	-0.003
Educ. of father -- primary	0.012	-0.017	-0.001	-0.008	-0.036	-0.010	-0.008	-0.002	-0.009	-0.013	0.016
Educ. of father -- post primary	-0.005	-0.036 *	-0.012	-0.020	-0.036	0.002	-0.020	-0.042	-0.022	0.006	0.026
Dummy for no info on father's educ.	0.056	-0.044 **	0.011	0.064 *	-0.060	-0.010	0.064 *	-0.046	-0.017	-0.039	0.028
Mother's birthplace (urban=1)	0.029 +	0.008	0.001		0.055	0.005	0.007	0.020	-0.035	0.002	0.048
Flush toilet	-0.064 +	-0.021	-0.021	-0.019	0.015	-0.054 **	-0.018	-0.012	-0.090	-0.033 +	0.000
Piped drinking water	0.011	-0.007	0.001	0.001	0.173 *	-0.005	0.002	0.027	-0.020	0.004	0.004
Urban dummy	0.012	0.009	-0.015	0.005	-0.004	-0.003	0.007	-0.013	0.042	0.013	-0.021
Number of observations	3054	2689	2445	4347	5371	6814	4347	1821	2732	4899	2961
Pseudo R-squared	0.087	0.141	0.139	0.112	0.122	0.054	0.112	0.049	0.099	0.080	0.139

* and + indicate significance at the 95% and 90% levels of confidence respectively

Summary of Welfare Indicators for Nine African Countries

Country	Nutrition: Orders of Dominance in Stochastic Dominanc Tests ("+" ("-") indicates improvement (worsening)) HAZ	WAZ	WHZ	Nutrition: Changes in Percent Malnourished (Below -2 Z) (percentage points) HAZ	WAZ	WHZ	Infant and Childhood Mortality: Predicted IMR 1st srvy	Predicted IMR 2nd srvy	Predicted CMR 1st srvy	Predicted CMR 2nd srvy	Predicted Rates of change IMR	Predicted Rates of change CMR
Ghana (*1988, 1993*)	ND	3 -	1 -	-3.29	-1.17	3.97 **	108.8	68.5	150.8	120.9	-2.9 **	-2.5 *
Kenya (*1988, 1993*)	..	..	..				65.3	65.0	84.8	81.4	0.0	-0.3
Madagascar (*1992, 1997*)	ND	2 -	1 -	-0.70	0.96	2.01 **	128.1	90.0	184.4	149.1	-2.7 **	-2.9 **
Mali (*1987, 1995*)	1 -	1 -	1 -	8.98 **	12.75 **	13.84 **	191.9	127.7	305.4	244.0	-3.8 **	-9.6/-1.4 **
Senegal (*1986, 1992*)	2 -	2 -	2 -	-0.90	4.86 **	4.73 **	138.4	89.8	214.4	147.9	-4.7/-2.4 **	-6.0/-7.5 *
Senegal (*1992, 1997*)							89.8	69.5	147.9	121.3	-2.4/-1.8 **	-7.5/-1.4 *
Senegal (*1986, 1997*)							138.4	69.5	214.4	121.3		
Tanzania (*1991, 1996*)	ND	2 -	ND	0.17	1.40	0.96 **	121.5	88.2	161.9	129.1	-2.4 **	-2.7 +
Uganda (*1988, 1995*)	1 +	1 -	1 -	-4.48 **	2.85 **	3.38 **	133.4	87.4	185.5	147.9	-2.9 **	-2.7 **
Zambia (*1992, 1996*)	1 -	ND	1 +	2.53 **	0.40	-0.94 **	87.7	118.8	157.8	193.2	2.7/-0.2 *	-3.2 **
Zimbabwe (*1988, 1994*)	1 -	1 -	1 -	-6.56 **	4.39 **	4.63 **	78.9	57.9	104.9	77.9	-3.7/1.2 **	-5.4/2.7 **

"ND" indicates that there was no stochastic dominance up to order 5

Country	Asset Index (40th percentile): Orders of Dominance in Stochastic Dominanc Tests ("+" ("-") indicates improvement (worsening)) National	Urban	Rural	"Poverty" Headcount Po Changes (percentage points) National	Urban	Rural	Educational Attainment of Women: Percent of Women, Age 15-49, Changes (percentage points) No School	Primary	Secondary	Post Sec
Ghana (*1988, 1993*)	1 +	1 +	1 +	-13.4 **	-3.3 **	-12.9 **	-4.7 **	1.9 **	2.1 **	0.7 **
Kenya (*1988, 1993*)	ND	ND	ND	-4.0 **	-1.1	-5.1 **	-7.2 **	3.2 **	3.8 **	0.3 **
Madagascar (*1992, 1997*)	1 +	5 -	1 +	-5.8 **	9.7 **	-6.6 **	1.6 *	-1.9 **	0.7	-0.4
Mali (*1987, 1995*)	1 +	ND	1 +	-12.6 *	-2.0	-13.6 **	-4.3 **	-1.6 *	5.8 **	0.2 *
Senegal (*1986, 1992*)	2 -	5 +	1 -	-10.0 **	-4.4 **	-10.4 **	-4.2 **	3.6 **	0.6	0.0
Senegal (*1992, 1997*)	1 +	1 +	1 +	-4.4 **	-2.2 **	-5.2 **	-6.4 **	3.8 **	1.7 **	0.9 **
Senegal (*1986, 1997*)	2 -	1 +	2 -	-14.4 **	-6.6 **	-15.6 *	-10.6 **	7.4 **	2.3 **	0.9 **
Tanzania (*1991, 1996*)	ND	1 +	ND	-6.5 **	-4.1 **	-8.2 **	-5.3 **	4.6 **	0.7 *	-0.2 **
Uganda (*1988, 1995*)	2 +	ND	2 +	-3.3 **	1.0	-2.6 *	-7.2 **	3.7 **	3.6 **	0.0
Zambia (*1992, 1996*)	2 +	3 +	1 +	-0.6	0.2	-9.3 **	-3.1 **	-0.8	2.9 **	1.0 **
Zimbabwe (*1988, 1994*)	1 -	1 -	1 -	5.8 **	2.4 **	6.6 **	-2.4 **	-8.6 **	10.3 **	0.7 **

* (**) indicates statistical significance at the 95 (99) percent level of confidence

+ indicates statistical significance at the 90 percent level of confidence

Means of Variables in Nutrition Models for Eight African Countries

	Ghana				Madagascar				Mali				Senegal			
	1988		1993		1992		1997		1987		1995		1986		1992	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
HAZ	-1.30	1.37	-1.21	1.44	-1.93	1.34	-1.90	1.44	-1.08	1.43	-1.33	1.65	-1.17	1.23	-1.16	1.40
WHZ	-0.71	0.94	-0.69	1.20	-0.49	1.01	-0.52	1.13	-0.86	0.99	-1.16	1.25	-0.47	1.11	-0.65	1.20
NSCM Prenatal care w/ doctor	0.27	0.22	0.21	0.26	0.10	0.15	0.16	0.22	0.00	0.01	0.01	0.04	0.03	0.07	0.05	0.10
NSCM Prenatal care w/ nurse	0.57	0.24	0.37	0.28	0.12	0.21	0.04	0.10	0.21	0.25	0.21	0.25	0.27	0.23	0.71	0.27
NSCMChild vaccinated	0.99	0.03	0.87	0.14	0.76	0.16	0.88	0.12			0.86	0.12	0.99	0.02	0.80	0.16
NSCMMother received tetanus injection	0.73	0.23	0.81	0.25	0.60	0.24	0.57	0.26	0.22	0.27	0.60	0.26	0.34	0.24	0.73	0.25
Child gender dummy (male=1)	0.50	0.50	0.51	0.50	0.51	0.50	0.50	0.50	0.52	0.50	0.49	0.50	0.50	0.50	0.49	0.50
Multiple births	0.04	0.20	0.04	0.19	0.02	0.14	0.01	0.12	0.02	0.14	0.02	0.15	0.01	0.09	0.02	0.14
Birth Order	3.61	2.24	3.30	2.03	4.17	2.81	3.76	2.61	4.26	2.53	4.36	2.62	4.16	2.64	4.20	2.50
Child dummy for age 3-6	0.12	0.33	0.14	0.35	0.21	0.41	0.21	0.41	0.17	0.38	0.17	0.37	0.05	0.22	0.03	0.18
Child dummy for age 7-12	0.21	0.41	0.19	0.40	0.18	0.38	0.19	0.39	0.24	0.43	0.21	0.40	0.23	0.42	0.22	0.41
Child dummy for age 25-35	0.30	0.46	0.32	0.47	0.26	0.44	0.26	0.44	0.26	0.44	0.31	0.46	0.28	0.45	0.35	0.48
No. of HH members age < 5	2.09	1.12	1.78	0.86	2.10	0.93	1.97	0.82	2.28	1.14	2.67	1.72	4.99	3.34	3.46	2.27
No. of HH girls age 5-15	1.08	1.18	0.85	1.07	1.00	1.11	0.85	1.04	1.37	1.42	1.71	1.78	3.63	3.27	2.23	2.02
No. of HH boys age 5-15	1.15	1.28	0.94	1.17	1.01	1.11	0.92	1.09	1.42	1.47	1.73	1.88	3.70	3.48	2.33	2.21
No. of HH women > age 15	1.58	0.91	1.30	0.68	1.39	0.75	1.32	0.68	1.46	0.73	1.62	0.98	2.95	2.70	2.94	1.94
Household head gender (male=1)					0.86	0.34	0.87	0.33								
Age of mother	27.85	5.96	28.01	5.98	27.40	6.38	26.71	6.27	27.80	6.29	27.76	6.33	27.92	6.34	28.31	6.28
Squared age of mother	811.09	343.18	820.62	344.72	791.51	363.23	752.67	351.66	812.36	358.33	810.51	360.29	819.32	363.73	840.87	362.63
Educ. of mother -- primary	0.54	0.50	0.56	0.50	0.59	0.49	0.57	0.50	0.15	0.35	0.11	0.31	0.14	0.34	0.14	0.35
Educ. of mother -- post primary	0.05	0.22	0.06	0.24	0.23	0.42	0.22	0.41	0.01	0.09	0.05	0.21	0.06	0.23	0.05	0.23
Educ. of father -- primary	0.48	0.50	0.48	0.50	0.45	0.50	0.49	0.50	0.09	0.29	0.09	0.28	0.06	0.23	0.08	0.28
Educ. of father -- post primary	0.15	0.36	0.18	0.39	0.23	0.42	0.23	0.42	0.03	0.18	0.08	0.28	0.08	0.28	0.08	0.28
Dummy for no info on father's educ.	0.09	0.29	0.07	0.26	0.19	0.39	0.10	0.29	0.06	0.24	0.06	0.23	0.16	0.36	0.11	0.31
Mother's birthplace (urban=1)	0.50	0.50	0.43	0.50	0.09	0.29			0.54	0.50	0.21	0.41	0.33	0.47	0.33	0.47
Flush toilet	0.03	0.17	0.04	0.21	0.02	0.12	0.01	0.10	0.00	0.05	0.01	0.08	0.07	0.25	0.09	0.29
Piped drinking water	0.25	0.44	0.30	0.46	0.15	0.36	0.03	0.18	0.03	0.16	0.15	0.36	0.12	0.32	0.43	0.50
Urban dummy	0.27	0.45	0.29	0.45	0.13	0.34	0.19	0.40	0.26	0.44	0.26	0.44	0.33	0.47	0.35	0.48

	Tanzania				Uganda				Zambia				Zimbabwe			
	1991		1996		1986		1995		1992		1996		1988		1994	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
HAZ	-1.63	1.40	-1.61	1.50	-1.67	1.49	-1.50	1.47	-1.55	1.39	-1.59	1.47	-1.39	1.25	-1.00	1.33
WHZ	-0.25	1.25	-0.39	1.22	-0.02	0.98	-0.26	1.16	-0.24	1.20	-0.21	1.18	0.26	1.10	-0.12	1.21
NSCM Prenatal care w/ doctor	0.06	0.13	0.07	0.12	0.11	0.15	0.11	0.15	0.05	0.10	0.03	0.08	0.18	0.20	0.17	0.19
NSCM Prenatal care w/ nurse	0.58	0.27	0.46	0.29	0.76	0.20	0.85	0.16	0.88	0.23	0.91	0.16	0.73	0.22	0.73	0.26
NSCMChild vaccinated	0.89	0.10	0.95	0.09	1.00	0.01	0.86	0.11	0.89	0.11	0.96	0.06	0.99	0.02	0.98	0.04
NSCMMother received tetanus injection	0.91	0.13	0.93	0.12	0.61	0.26	0.78	0.20	0.83	0.21	0.84	0.17	0.81	0.19	0.86	0.18
Child gender dummy (male=1)	0.50	0.50	0.51	0.50	0.48	0.50	0.49	0.50	0.50	0.50	0.49	0.50	0.49	0.50	0.49	0.50
Multiple births	0.03	0.16	0.03	0.16	0.03	0.16	0.03	0.16	0.03	0.17	0.03	0.18	0.03	0.17	0.03	0.17
Birth Order	3.59	2.33	3.57	2.30	4.15	2.59	3.87	2.52	3.76	2.55	3.71	2.43	3.70	2.36	3.33	2.28
Child dummy for age 3-6	0.20	0.40	0.21	0.41	0.20	0.40	0.18	0.39	0.22	0.41	0.19	0.39	0.13	0.33	0.21	0.41
Child dummy for age 7-12	0.18	0.39	0.18	0.39	0.20	0.40	0.21	0.41	0.18	0.39	0.18	0.38	0.17	0.38	0.19	0.39
Child dummy for age 25-35	0.27	0.44	0.27	0.44	0.26	0.44	0.24	0.43	0.29	0.45	0.28	0.45	0.34	0.47	0.29	0.46
No. of HH members age < 5	2.27	1.52	2.04	1.12	2.29	1.09	2.17	1.01	2.23	1.24	2.13	1.07	2.01	0.99	1.81	0.97
No. of HH girls age 5-15	1.10	1.28	1.02	1.17	1.10	1.22	1.01	1.16	1.17	1.35	1.06	1.17	1.09	1.17	0.97	1.19
No. of HH boys age 5-15	1.13	1.40	1.03	1.14	1.05	1.14	0.97	1.17	1.14	1.34	1.01	1.17	1.11	1.20	1.04	1.31
No. of HH women > age 15	1.80	1.39	1.53	0.92	1.45	0.77	1.39	0.77	1.75	1.16	1.62	1.01	1.60	0.92	1.60	0.91
Household head gender (male=1)	0.88	0.32	0.85	0.36					0.90	0.30	0.85	0.36				
Age of mother	27.00	6.06	27.20	6.01	26.72	6.12	26.29	6.02	26.54	6.16	26.57	6.06	27.63	5.90	27.14	6.27
Squared age of mother	765.65	343.99	775.79	342.65	751.28	342.64	727.25	335.79	742.29	344.17	742.51	339.50	798.05	338.20	775.74	358.72
Educ. of mother -- primary	0.66	0.48	0.70	0.46	0.52	0.50	0.59	0.49	0.65	0.48	0.64	0.48	0.62	0.48	0.50	0.50
Educ. of mother -- post primary	0.03	0.17	0.04	0.19	0.08	0.28	0.12	0.32	0.21	0.41	0.22	0.42	0.21	0.41	0.38	0.49
Educ. of father -- primary	0.62	0.49	0.67	0.47	0.58	0.49	0.57	0.49	0.43	0.50	0.43	0.50	0.52	0.50	0.43	0.49
Educ. of father -- post primary	0.07	0.25	0.08	0.27	0.21	0.41	0.23	0.42	0.42	0.49	0.43	0.50	0.30	0.46	0.45	0.50
Dummy for no info on father's educ.	0.10	0.30	0.08	0.27	0.05	0.23	0.08	0.28	0.09	0.28	0.07	0.26	0.09	0.28	0.06	0.24
Mother's birthplace (urban=1)	0.13	0.34	0.14	0.35	0.06	0.23	0.09	0.28	0.44	0.50	0.44	0.50			0.19	0.39
Flush toilet	0.01	0.11	0.02	0.12	0.03	0.17	0.01	0.11	0.26	0.44	0.19	0.39	0.27	0.44	0.26	0.44
Piped drinking water	0.29	0.46	0.33	0.47	0.07	0.26	0.07	0.25	0.50	0.50	0.35	0.48	0.38	0.49	0.34	0.47
Urban dummy	0.21	0.40	0.18	0.38	0.10	0.30	0.12	0.33	0.48	0.50	0.39	0.49	0.24	0.43	0.27	0.44