Expenditure Incidence in Africa: Microeconomic Evidence

DAVID E. SAHN and STEPHEN D. YOUNGER*

Abstract
In this paper, we examine the progressivity of social sector expenditures in eight sub-Saharan African countries. We employ dominance tests, complemented by extended Gini/concentration coefficients, to determine whether health and education expenditures redistribute resources to the poor. We find that social services are poorly targeted. Among the services examined, primary education tends to be most progressive and university education is least progressive. The benefits associated with hospital care are also less progressive than other health facilities. Our results also show that, while concentration curves are a useful way to summarise information on the distributional benefits of government expenditures, statistical testing of differences in curves is important.

JEL classification: O1, H4, I3.

I. INTRODUCTION
One of the functions that people routinely expect governments to perform is to reduce inequality and poverty. This goal sits somewhat uncomfortably beside the more traditional concerns among economists for economic efficiency, including the provision of public goods. But it is important politically and socially, perhaps more so than issues of economic efficiency. Even the most neo-classical policymaker must heed a policy’s consequences for the poor.

In Africa, a generation of new, nationally representative household surveys has shown that the distribution of consumption is surprisingly unequal. While the Kuznets hypothesis would suggest that Africa’s relatively poor economies

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would have less inequality than middle-income ones, many African economies are in fact among the most unequal in the world (Sahn and Younger, 1999). At a first glance, then, the need for equalising policies appears important on the continent. Yet such policies are fairly limited. Thus this paper will examine the extent to which social sector expenditures succeed in redistributing resources to the poor in eight African countries. The transfer payments schemes that account for much of the government’s redistributive policies in richer economies are almost non-existent in Africa. Instead, most ostensibly pro-poor expenditure is limited to social services, especially health and education. Fortunately, these are also the expenditures that people most commonly expect to have a redistributive impact in Africa, and they are generally covered in household surveys.

Our data come from Côte d’Ivoire, Ghana, Guinea, Madagascar, Mauritania, South Africa, Tanzania and Uganda. In each country, we have access to nationally representative household surveys that integrate information on incomes, expenditure and use of public social services. We use dominance tests to compare the concentration of benefits for various categories of services relative to each other and to two bench-marks: the Lorenz curve for expenditure inequality and the 45-degree line. We also complement these tests with less general (but more decisive) comparisons of extended Gini/concentration coefficients. In all cases, our comparisons are statistical, using a quite general covariance estimator due to Davidson and Duclos (1997).

In addition to tests between individual social services, we also test for welfare dominance between the distribution of expenditures with and without the value to households of all government spending in the social sector. Finally, we conduct cross-country comparisons of specific categories of health and education services in an attempt to determine whether health and education benefits are better targeted and more progressive in one country than the other.

II. METHODS

Our methods are a type of incidence analysis (Demery, 1997). Measuring and comparing the incidence of the benefits of public services requires three steps. First, we must value the benefit to an individual of going to a public school or receiving healthcare in a public facility. Second, we must rank households, from poorest to richest. Third, we need a decision rule that determines when one distribution is better than, the same as or worse than another.

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The simplest approach to valuation, which we rely on heavily in this paper, uses a simple binary indicator of whether or not one uses a service. Implicit in this method is that all who use a service or participate in a programme receive the same benefits. This is obviously not correct, and most likely introduces a systematic bias in the results. Viewed from the supply side, the poor probably attend lower-quality schools and receive lower-quality healthcare. On the demand side, the poor probably have lower willingness to pay for these services. In addition, we cannot sum these binary indicators across services to get, for example, the total benefit of all health and education services to an individual. Nevertheless, the method is easy to implement, and going beyond it is not easy. In those countries for which data are available, we compare these ‘binary’ indicators with the more standard approach in the recent literature, which values the service at the government’s average cost of provision.2

In keeping with generally accepted convention, we use household consumption expenditures per capita to rank households from poorest to richest. While previous research has shown that results are quite sensitive to judgements made about how household size and composition affect the money metric of their welfare,3 the general findings of our work here are not sensitive to the choice of different equivalence scales.4

Our main method for comparing distributions of beneficiaries uses tests for welfare dominance (Yitzhaki and Slemrod, 1991). We do this by comparing concentration curves for different public services or subsidies. A concentration curve is similar to a Lorenz curve in that it graphs the cumulative share of the sample, from poorest to richest, on the horizontal axis, against the cumulative share of benefits from a given service or subsidy on the vertical axis. Public services whose benefits are more concentrated among the poor will have higher (more convex) concentration curves, and vice versa. In addition to comparing the concentration curves for different types of social services, we also compare each concentration curve with two benchmarks: the Lorenz curve for per capita expenditures and the 45-degree line. We can say that a social sector expenditure is progressive if it benefits poorer households more than wealthy ones relative to their expenditures per capita, and regressive if it does not. At the same time,

2See, for example, Meerman (1979), Selowsky (1979), Castro-Leal et al. (1997) and Demery (1997).
3See, for example, Buhmann et al. (1988) and Sahn, Younger and Simler (1999).
4Obviously, some dominance tests do differ when we experiment with different equivalence scales. For example, when we use a household size elasticity of 0.5, which is quite low, 12 per cent of our results change from dominance to non-dominance or vice versa. In no instance do we find that there is a reversal of dominance results as a result of choosing an alternative scale. Further, all of the changes occur because of a difference in one or two ordinates at the extremes of the expenditure distribution, and none changes the general sense of the paper’s conclusions. For example, we find that non-hospital care is more progressive than hospitals and post-secondary education in Côte d’Ivoire, and that the 45-degree line is more progressive than secondary education in Ghana, all of which are findings that are consistent with what we report in general in the paper. The results for other scales, such as that recommended by the National Research Council (1995), differ even less from the per capita results than those for the 0.5 size elasticity.
public expenditures, especially in the social sectors, are often held to a higher standard than taxes in their being considered well targeted to the poor only if the benefits go disproportionately to the poor in absolute terms, not relative to income. We will call such transfers ‘absolutely progressive’ and note that they have a concentration curve that is above the 45-degree line (concave rather than convex). We will call social services whose concentration curve is above the Lorenz curve but below the 45-degree line simply ‘progressive’ and those below the Lorenz curve ‘regressive’, analogous to the standard tax literature.

Because the concentration curves are constructed from sample data, comparisons between them are, or should be, statistical. In a recent paper, Davidson and Duclos (1997) derive distribution-free standard errors for the difference between two concentration curves that may be dependent. We use the Davidson and Duclos estimator to establish a confidence interval around the estimated concentration curves and then test for significant differences between them. The null hypothesis that we test is that the ordinates of two concentration curves are equal at each of 19 evenly spaced abscissae. We reject the null of equality only if all 19 ordinate pairs are significantly different (Howes, 1996).

The dominance tests are quite general and so fail to reject the null fairly often, leaving us with inconclusive results in terms of providing information on the relative progressivity of different types of public expenditures. In these cases, we resort to a second approach to draw conclusions about welfare evaluation and incidence analysis, the use of specific cardinal measures of welfare. The most common is the Gini coefficient, though any of the several options for inequality indices is also plausible. Here, we compare extended Gini coefficients (Yitzhaki, 1983):

\[
G(v) = -v \times \text{cov}\left\{y, [1 - F(y)]^{-v}\right\}
\]

where \(y\) measures households’ welfare (consumption per capita), \(F(y)\) is the cumulative density function of the welfare ordering, \(\bar{y}\) is mean welfare and \(v\) is a parameter that affects the weighting of each point on the Lorenz curve. \(G(2)\) yields the traditional Gini coefficient, while values of \(v\) greater than 2 yield measures that give an even greater weight to poorer households. If we replace the welfare measure, \(y\), but not its distribution, \(F(y)\), in this expression with the value of benefits of a social service, we get an analogous measure of that service’s concentration, an ‘extended concentration ratio’. By calculating the extended coefficients for increasing values of \(v\), we can gain a sense of how a

\[\text{cov}\] It is not unusual that findings regarding dominance are not based on statistical tests of differences in concentration curves. See, for example, Jenkins and Lambert (1993).

\[\text{cov}\] Our research testing for the progressivity of social insurance and assistance in Romania shows that using cardinal measures allows us to draw more inferences about the progressivity of public expenditures. See Sahn, Younger and Simler (1999).
more progressive (yet still cardinal) social welfare function ranks the value of a given public service. To draw conclusions similar to the dominance tests, we calculate Gini/concentration coefficients for $v$ values from 1.01 to 10 in steps of 0.5 for household expenditures and for all the transfers. If all 19 pairs of indices (from $v = 1.01$ to 10) are significantly less for one of the social services, we conclude that it ‘dominates’ the other. Our use of this term clearly does not have the same rigorous foundation in welfare analysis as the ordinal measure. We choose it only because the implied policy conclusion is similar, even if it is based on cardinal measures.

III. RESULTS

In this section, we initially present the expenditure incidence results by country based on the binary categorisation of users and non-users. We report on eight African countries: Côte d’Ivoire, Ghana, Guinea, Madagascar, Mauritania, South Africa, Tanzania and Uganda. These are all the surveys available to us in Africa that are nationally representative, that have a reasonably comprehensive expenditure measure and that allow us to determine who benefits from the provision of health and education services. All the surveys followed roughly the same design, helping ensure comparability across countries.

In general, we could present our results as graphs of concentration curves and as tables of dominance test results. In order to conserve space, we will present only a few graphs, and only tables that show the results of comparisons between the various services and the expenditure distribution or the 45-degree line. Nevertheless, we will present one graph here to show how to interpret it and the tables that follow. Figure 1 shows the concentration curves for public education and health services in Côte d’Ivoire. In general, curves that are more convex indicate greater concentration among the poor, and vice versa. Thus primary education and non-hospital healthcare appear to be the most pro-poor services, and post-secondary education the least. Nevertheless, many of the curves are close together at several points, and they sometimes cross. The statistical tests can sort this out. The statistical tests also highlight cases, such as the concentration curve for post-secondary education in Côte d’Ivoire, where the curve is based on very few observations and thus has standard errors that are too large to yield significant test statistics even though it looks to be quite different from the other curves. While the graphs are a useful representation, only through statistical testing can we reach definitive conclusions on the progressivity of services.

The full set of graphs and tables is available in the Working Paper version of this study, at http://mango.human.cornell.edu/cfnpp/images/wp91.pdf.
I. Within-Country Comparisons

We now summarise the country-specific dominance test results following the methods outlined in the previous section. Table 1 summarises the welfare dominance tests and Table 2 the tests based on extended concentration indices. We are interested in determining whether social services (a) are absolutely progressive (i.e. the concentration curve is above the 45-degree line, implying that the poor receive more benefits than the rich in absolute terms), (b) are progressive (i.e. the concentration curve is above the expenditure distribution, implying that the poor benefit more in relative terms) and (c) can be ranked or ordered by their degree of progressivity. Based on t-tests for the difference between ordinates of two concentration curves at 19 abscissae, we find that, with the exception of primary education in South Africa, no services are absolutely progressive, i.e. we cannot reject the null that their concentration curves are equal to or above the 45-degree line (Table 1). Conversely, there are many examples of the 45-degree line statistically dominating services — that is, where
the poor receive less benefit from the service in per capita terms than individuals at the upper end of the expenditure distribution. These include: post-secondary education in Ghana, Guinea, Madagascar, South Africa and Uganda; secondary education in Guinea, Tanzania and Uganda; primary education in Guinea; hospital care in Ghana, Guinea and Tanzania; and non-hospital care in Madagascar. In addition, there are a number of cases where we find statistically significant crossings with the 45-degree line: primary education in Côte d’Ivoire, Madagascar, Mauritania, Tanzania and Uganda; secondary education in South Africa; hospital care in South Africa; and non-hospital care in South Africa.

Comparisons between the Lorenz curve for household expenditures and various categories of social services reveal a number of cases where the latter dominate, i.e. where the services are progressive. Foremost, we can reject the null of non-dominance between public primary schools and the Lorenz curve in all countries. The same is true for non-hospital healthcare. That is, the benefits of primary school and healthcare outside hospitals are more progressive than the

Notes:
(1) compares the column’s concentration curve with the Lorenz curve for per capita household expenditures.
(2) compares the column’s concentration curve with the 45-degree line.
**+** indicates that the benefits from the column’s service are more concentrated among the poor than per capita expenditures (for (1)) or an equal per capita distribution (for (2)).
**–** indicates that the service is less concentrated among the poor.
**x** indicates that the concentration curves cross.
If the curves are statistically insignificant from one another, the corresponding cell is blank.

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When observed, crossing assures us that a failure to reject the null of non-dominance is not due to large standard errors but due to genuine ambiguity in welfare terms.
distribution of expenditures. This general pattern, however, does not apply to the benefits of hospital care, secondary education and post-secondary education. Specifically, public secondary schools are only progressive relative to the expenditure distribution in the cases of Ghana and South Africa. The only other case of expenditure progressivity is hospitals in South Africa.9

Pair-wise comparisons of social services also reveal some common patterns. Primary education dominates secondary education in all cases except Guinea and South Africa, although only in the case of South Africa can we statistically reject that secondary schooling is no more progressive than post-secondary education.10 We can only show that hospital care is less progressive than other facilities (for example, clinics) in the case of Guinea even though comparison with the Lorenz curves suggests that the latter are more progressive. When we compare primary education with non-hospital-based health services, we cannot reject the null of non-dominance, except in Madagascar, indicating no general ordering in terms of the progressivity of the two types of benefits.

### TABLE 2
Extended Gini Comparisons for Public Services, Relative to the Lorenz Curve and the 45-Degree Line

<table>
<thead>
<tr>
<th></th>
<th>Primary education</th>
<th>Secondary education</th>
<th>Post-secondary education</th>
<th>Non-hospital healthcare</th>
<th>Hospital healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(1)</td>
<td>(2)</td>
<td>(1)</td>
</tr>
<tr>
<td>Côte d’Ivoire</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ghana</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Guinea</td>
<td>+</td>
<td>–</td>
<td>x</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Madagascar</td>
<td>+</td>
<td>–</td>
<td>x</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Mauritania</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>South Africa</td>
<td>+</td>
<td>+</td>
<td>x</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Tanzania</td>
<td>+</td>
<td>x</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>Uganda</td>
<td>+</td>
<td>x</td>
<td>x</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Notes:
(1) compares the column’s extended Gini coefficients with those for the Lorenz curve for per capita household expenditures.
(2) compares the column’s extended Gini coefficients with 0 (for the 45-degree line).
‘+’ indicates that the benefits from the column’s service are more concentrated among the poor than per capita expenditures (for (1)) or an equal per capita distribution (for (2)).
‘-’ indicates that the service is less concentrated among the poor.
‘x’ indicates that the concentration curves cross.
If any of the coefficients are statistically insignificant from one another, the corresponding cell is blank.

9There are also few cases of confirmed crossing of the concentration curves with the Lorenz curve: hospital care and secondary school in Guinea, secondary school in Madagascar and Uganda, and post-secondary education in Mauritania and Tanzania.
10The high standard errors on post-secondary education, because of small number of observations, provide an explanation for this.
In light of the low power of the dominance test in general and the limited number of conclusions we are able to reach based on these tests, especially when it comes to the ordering of services, we next turn to the results of the cardinal measures, where we reach more conclusions (see Table 2). We now find that secondary education is more progressive than the expenditure distribution in the case of Côte d’Ivoire (in addition to Ghana and South Africa), and hospital care is more progressive than the expenditure distribution in the cases of Côte d’Ivoire, Ghana, Mauritania, Tanzania and Uganda (in addition to South Africa). Most important, we get a stronger sense of the orderings within health and education services. Hospital services are less progressive than other health services in all countries except Madagascar, Mauritania and South Africa, and public secondary schools are more progressive than post-secondary education in all countries except Ghana, Guinea and Mauritania.

2. Regional Disaggregation

While the results above are based on national data, it is also possible to disaggregate the data regionally and by gender. To illustrate, Figure 2 shows the primary education concentration curves, distinguishing between rural and urban, and male and female, for Mauritania. These examples are consistent with a general pattern across countries in which the curves in the rural areas appear much more progressive than those in urban areas. Statistical dominance test results support this picture. In the case of primary education, we reject the null of dominance between rural and urban areas in all countries except Côte d’Ivoire. And in the case of non-hospital health services, we do the same for the Côte d’Ivoire, Guinea, Madagascar and Uganda. This implies that services provided in rural areas are more progressive than those in urban areas. One can infer that, on the margin, directing more services to rural areas will be likely to contribute to a more progressive distribution of welfare.

In contrast, a comparison of the male and female concentration curves in all countries reveals few differences. This applies to both education and health. In fact, a review of the dominance test results indicates only one case where we reject the null that the concentration curves for males and females are the same — for primary education in Uganda, where the equality of the benefits of men’s education exceeds that of women’s education. Thus, unlike geographical

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11There are 22 cases where we find that, according to the extended Ginis, the 45-degree line was more progressive than the service, as opposed to only 13 cases when we are able to reject the null in favour of the 45-degree line dominating the services. And whereas using the dominance tests we find 19 cases of services being expenditure progressive, there are 27 such cases when using the extended Ginis.
targeting, there is no evidence here that social sector spending on men is more or less equitable than that on women.\footnote{There may be reasons to target services to women other than immediate reductions in income inequality, including greater returns on human capital investments in girls or lower attendance across the entire expenditure distribution.}

3. Comparing Methods for Service Valuation: Binary Indicators versus Disaggregated Unit Costs

In this section, we compare the results of analysing benefit incidence based on a simple dichotomous variable of whether or not an individual uses a service (for example, goes to a clinic or attends school) with the unit subsidy valuation derived from dividing government budget data by government estimates of the

FIGURE 2
Concentration Curves for Primary Education in Mauritania, Disaggregated by Area or Gender

<table>
<thead>
<tr>
<th>Cumulative share of sample, poorest to richest</th>
<th>Cumulative share of benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>0.2</td>
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<td>0.3</td>
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<td>0.6</td>
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<td>0.7</td>
<td>0.7</td>
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<td>0.8</td>
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<td>0.9</td>
<td>0.9</td>
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<tr>
<td>1.0</td>
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</tr>
</tbody>
</table>

45-degree line
Rural
Male
Female
Urban
number of individuals who use a service.\textsuperscript{13} Our interest in making this comparison is to explore the extent to which the two methods differ and to understand why.

We are able to compare unit subsidies with the binary approach for health and education services in Guinea, Madagascar and, to a lesser extent, South Africa. In Guinea, our unit subsidies are disaggregated on the basis of the five regions of the country. The concentration curve for non-hospital care shifts down when using unit values. These movements are due to a large difference in the per-unit subsidies in Conakry versus other regions. For non-hospital health services, the Conakry value is much higher than the value in other regions, which increases the concentration of benefits because households in Conakry are generally better off than those in other regions of the country. Exactly the converse is true of the education values, where at least one rural area has substantially higher unit values than Conakry, resulting in slightly less convex curves for the unit value approach. In terms of dominance testing, there is only one change in dominance orderings from the results that rely on the binary variable: the 45-degree line no longer dominates primary education. In the case of comparisons based on the extended Gini's and concentration ratios, the only differences are that secondary school is more progressive than hospitals when relying on unit values, and non-hospital services no longer dominate primary school as they do when using the binary method.

For Madagascar, we find the cost data to be somewhat implausible. The unit subsidy for basic healthcare facilities in Antananarivo is far less than that in four of the other five regions. Conversely, the unit value of hospital visits is substantially more in Antananarivo than in other regions, as we would expect, being more than four times greater in two instances. The reason for our scepticism is that we can think of no a priori reason that non-hospital care is so much less expensive in the capital city, while hospital care is much more so. With this qualification, we first examine the concentration curves for the unit value versus the binary approach. The only perceptible change is a downward shift in the hospital curve. In terms of more formal dominance tests, there are no changes either relative to the Lorenz curve or relative to the 45-degree line, or in the ordering of the progressivity of the public services. The same holds true for the statistical comparison of the extended Gini/concentration coefficients.

In the case of South Africa, we have unit subsidy information, by region, only for health services. More specifically, we can distinguish between nine regions of the country, in terms of the unit costs of a visit to hospitals and health centres or clinics. There are extremely large regional differences, with unit subsidies highest in the Northern Cape and lowest in Eastern Transvaal. For health clinics, the difference is more than seven times, and for hospital benefits, the difference is almost fivefold. Despite these dramatic regional differences in unit subsidies,

\footnote{\textsuperscript{13}The unit subsidy data come from Castro-Leal (1996a and 1996b) and World Bank (1996a and 1996b).}
and the fact that an examination of the concentration curves indicates that over most of the range of values the binary approach makes services appear more progressive, we find no statistical differences from the binary approach in the ordering of healthcare or in the comparisons relative to the 45-degree line or Lorenz curve.

In addition to regional disaggregation, we also have disaggregated unit subsidies by race for education. Spending per student is dramatically higher for whites than for Africans, with that for coloureds falling in between. Spending on Africans is far lower in the Homelands than in the non-Homelands. When examining the concentration curves and dominance results for the binary approach versus unit subsidies that take into account these dramatic racial differences, we find that the 45-degree line now dominates primary education, while just the opposite was true based on the binary approach. This same phenomenon occurs with the extended concentration coefficients. Likewise, the 45-degree line now dominates secondary education in the comparison of the concentration coefficients, while we observed crossing when using the binary approach. However, as with all the other cases, employing unit subsidies does not alter the finding that primary and secondary education are expenditure progressive and university education is not. Another difference is that when the binary approach is used, we find that secondary school is more progressive than university education. This is not the case when unit subsidies are employed. Thus when there is a high correlation between income and the benefits of a service received by different segments of the population, employing unit values can have an important impact on the findings.

4. Aggregation Within Countries

We next aggregate the value of all the services to address the question of whether the concentration curve for expenditures inclusive of the value of services dominates expenditures without the services. In addition, we examine the overall impact on the Gini coefficients with and without the total value of health and education services received. This discussion is limited to three cases — Ghana, Guinea and Madagascar — since they are the only ones with the requisite and reliable unit value information for making such a comparison.

Our dominance results indicate that, in the case of Ghana and Madagascar, the expenditure distribution inclusive of the transfers is more progressive than without them. This reflects the fact that the sum of the values of health and education benefits, in both countries, is more progressive than the expenditure distribution. An examination of the standard Gini coefficient (i.e. $v = 2$) reveals, however, that the overall effect on inequality of the healthcare and education transfers is quite small: in the case of Ghana, the Gini without transfers is 0.3512 and the Gini with is 0.3403; in Guinea, it changes from 0.4567 to 0.4536; and in Madagascar, from 0.4524 to 0.4377.
5. Cross-Country Comparisons

In this section, we make inter-country comparisons of the concentration curves of certain categories of social sector expenditure. Prior to doing so, however, we admonish caution in drawing inferences from these results. While all surveys in this study are quite similar in terms of the questionnaire design, the surveys undoubtedly differ in terms of sampling and non-sampling errors. These types of errors are not expected to affect significantly the intra-country comparisons of the progressivity of expenditure, as presented above. However, they will detract from the quality of inter-country comparisons, as this study is not immune to the limitations of all similar exercises that examine inequality across different countries. In addition, we emphasise that in this section we are examining whether a given service is more concentrated among poor people in country X than in country Y.

As our point of departure, we present the per capita expenditure Lorenz curves (Figure 3). Inequality is lowest in Ghana and highest in South Africa.
TABLE 3
Cross-Country Dominance Results for Household Expenditures and Public Schooling

<table>
<thead>
<tr>
<th>Household expenditures</th>
<th>(1) Ghana</th>
<th>(2) Mauritania</th>
<th>(3) Tanzania</th>
<th>(4) Uganda</th>
<th>(5) Guinea</th>
<th>(6) Madagascar</th>
<th>(7) Côte d’Ivoire</th>
<th>(8) South Africa</th>
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<tbody>
<tr>
<td>(A)</td>
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Notes: (A) gives the welfare dominance tests in capital letters. (B) gives the extended Gini/concentration ratio comparisons in lower-case letters. ‘D’ or ‘d’ indicates that the row is more concentrated among the poor than the column. ‘X’ indicates that the concentration curves cross. Blank cells indicate that we are unable to reject the null of non-dominance and non-crossing. All measures are scaled by household size (per capita).
Expenditure Incidence in Africa

Statistical tests of dominance of the country Lorenz curves reveal that South Africa’s expenditure inequality is significantly worse than other countries’ (Table 3). Likewise, Ghana’s inequality is less than all but Mauritania’s. Both Mauritania’s and Tanzania’s expenditure distribution is less concentrated than Guinea’s, Madagascar’s and Côte d’Ivoire’s. Expenditure inequality, based on a statistical comparison of the 19 pairs of ordinates, is also found to be less in Uganda than in Madagascar and Côte d’Ivoire. These findings from dominance testing are broadly consistent with our use of cardinal measures, with the exceptions of the additional finding from the Gini/concentration comparisons that equality is greater in Ghana than in Mauritania, and in Uganda than in Guinea.

Comparisons of the concentration of primary education reveal that the concentration curve for South Africa (which, unlike the other countries, includes private as well as public schools) dominates those in Guinea, Tanzania and Uganda (Table 3). When the extended Gini/concentration criterion is employed, benefits in South Africa are more concentrated among poor people than in all other countries. This finding is particularly interesting in light of the extremely unequal expenditure distribution in South Africa. Also in regard to education, the distribution of benefits associated with primary schools in all countries, except Mauritania, is more concentrated among the poor than in Guinea. Based on the extended Gini/concentration coefficients, Ghana’s primary schooling is more concentrated among the poor than all countries but South Africa and Madagascar.

Dominance testing further indicates that secondary schooling is more concentrated among the poor in South Africa than in Côte d’Ivoire, Guinea, Madagascar and Uganda; and in Ghana than in Guinea and Uganda (Table 3). Employing the extended Gini/concentration coefficients, secondary school benefits in South Africa are also more concentrated among the poor than in all the other countries; and the secondary school concentration curve for Ghana also lies everywhere above all others, except South Africa.

For the remaining public services, there are very few dominance results by either method. We report the few significant results here, without tables. Post-secondary education in South Africa dominates Guinea and Madagascar, and that in Ghana dominates Madagascar. Employing the Gini/concentration criterion, we find that the benefits of post-secondary schooling are also more concentrated among the poor in Ghana than in South Africa, Mauritania, Madagascar, Guinea and Côte d’Ivoire.

The only dominance found in cross-country comparisons of non-hospital-based healthcare is that in Madagascar the concentration curve falls below that of Guinea and Uganda, a finding that applies to all countries when employing the extended Gini/concentration coefficients. When it comes to the distribution of benefits associated with hospital care, dominance results and extended Gini/concentration comparisons indicate that benefits are more concentrated.
among the poor in South Africa than in Côte d’Ivoire, Ghana, Guinea, Madagascar and Tanzania. An additional finding is noted when we use the extended Gini/concentration coefficient comparisons: hospital benefits are more concentrated among the poor in Guinea than in all countries, with the exception of Madagascar.

In the cases of Guinea and Madagascar, where we have unit value information on healthcare and education, we sum up the benefits across types of social services and across all social services. Of the four services we compare (hospitals, other healthcare, primary education and secondary education), only one is significantly different: primary education subsidies in Madagascar are more concentrated among the poor than those in Guinea. Further, because primary education is a large share of all subsidies, the sum of all subsidies for these four services is more concentrated among the poor in Madagascar than in Guinea.

IV. SUMMARY AND CONCLUSIONS

To conclude, we will both summarise our results and comment on methodological issues that we feel are particularly important for future research. First, in terms of summarising our results, an important initial observation is that expenditure inequality is high in most of the eight African countries that we study. Thus inequality is a problem that merits African policymakers’ attention. Among the expenditures that we review, many are progressive and thus will mitigate the existing inequality somewhat, but the effect is often small. African governments would do well to consider how to better target their expenditures.

For the benefits of public services in the social sector, most are progressive relative to the skewed income distribution, but only in one case (primary school in South Africa) does a publicly subsidised service meet our definition of absolute progressivity where the benefits disproportionately fall on the poor in absolute terms. This implies that even the most progressive social services go disproportionately to wealthy people, rather than to the poor, a cause for serious concern. While we recognise that active means testing is administratively and politically difficult (probably impossible) in the African context, our results suggest that general provision of social services as carried out today in these countries is a poor substitute for well-targeted transfer payments to the poor. Of course, there are other arguments in favour of social spending. None the less, expectations that social sector spending has a substantial redistributive impact are misplaced.

Individually, primary education services tend to be the most progressive of the five we consider, and university education is the least progressive, to the point of being regressive in some countries. Secondary education and both types of healthcare usually fall in between, with no clear ordering. Within health
services, however, hospital care is less progressive than care at other health facilities.

From the cross-country comparisons, we learn that inequality is significantly greater in South Africa than in any other country, which is not surprising. At the same time, it is interesting that social services are more concentrated among the poor in South Africa than in other countries. Beyond these findings, no consistent patterns emerge from the cross-country analysis.

In terms of methodological lessons, one clear implication of our work is that statistical testing is important. While the concentration curves are a very useful way to summarise a lot of information, our experience shows that the standard errors differ substantially among curves. Often, curves that appear to be ‘far apart’ are not statistically distinguishable, while others that are ‘close’ are. Thus, even though statistical testing remains relatively rare in the literature, it makes an appreciable difference.

That said, we recognise that there is considerable controversy surrounding the ‘correct’ way to perform tests, a controversy that we make no attempt to resolve or even weigh in this paper. Instead, we have selected procedures that are consistent with regular econometric practice, even though those procedures make it difficult to reject the null of non-dominance in many cases. Our inability to reject the null of equal concentration curves is particularly striking in light of our comparisons of extended Gini/concentration coefficients, which yield more definitive results in terms of the ordering of the curves. This is true even though we use parameter values for the extended indices that implicitly test for dominance at a wide range of social welfare functions — in fact, a range well beyond what many people would consider a reasonable social welfare function. In any case, a useful extension to this research would be to explore the consequences of other decision rules and testing procedures.

Our comparison of simple use/no-use indicators of social services versus valuations based on unit costs at a regional level show few significant differences. This is not so much due to a lack of correlation between welfare and the disaggregation variable (region). We know that residents of rural regions are poorer than urban households. Rather, the estimated cost of service does not vary systematically with region. It is as common to find higher (budgeted) expenditures per student or patient in poorer regions as lower ones. Our prior intuition is that this reflects data and/or valuation problems, not the true value of services to the recipients, which we would expect to be lower in rural (and thus poorer) areas. The one case where the unit value approach clearly gives a different answer is education disaggregated by race in South Africa. Here, both the disaggregating variable and the amount spent per pupil are clearly correlated with welfare, yielding concentration curves that are significantly more convex than the simple binary approach.

If the disaggregated expenditure data that are necessary for the unit value approach were readily available, it would be simple and advisable to make the
comparison in any analysis. Unfortunately, the data are often not available in Africa, and collecting them is an expensive and time-consuming task. Our results suggest that it is usually not worth the effort, except in cases where one expects a clear correlation between welfare and both the disaggregating variable and the estimated unit cost.

This paper is certainly not the last word on expenditure progressivity in Africa. By choosing to examine as many surveys and countries as possible, we are forced to make fairly arbitrary choices about methods and to use rather simple ones. Future work that concentrates on only one country at a time should allow greater attention to important country-specific details and broader explorations of variations in the methods, both of which would provide useful guidance to researchers wanting to know where to look for lack of robustness in broad results such as these.

REFERENCES


South Africa Labour Development Research Unit (1993), South Africa Integrated Household Survey, data tapes, SALDRU, School of Economics, University of Cape Town, Cape Town, South Africa.


