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AGEING AND POVERTY IN AFRICA AND THE ROLE OF SOCIAL PENSIONS

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Executive Summary

In many low income African countries, three factors are placing an undue burden on the elderly. First, the burden on the elderly has enormously increased with the increase in mortality of prime age adults due to HIV AIDS pandemic and regional conflicts. Second, the traditional safety net of the extended family has become ineffective and unreliable for the elderly. Third, in a few countries, the elderly are called upon to shoulder the responsibility of the family as they became the principal breadwinners and caregivers for young children. While a number of studies have examined the welfare consequences of these developments on children, few studies have systematically analyzed the poverty situation among the elderly (relative to other groups) in low income countries Africa, and the role of social pensions. This study aims to fill this gap.

Drawing on household survey information, the study has delineated the profile of the elderly for 15 African countries which include both East and West African countries, and countries with a high and low prevalence of HIV-AIDS pandemic.

The findings show much heterogeneity across countries with respect to the proportion of the elderly population, the living arrangements and the composition of households, and household headship. The variations in household types and living arrangements presumably reflect the variations in, and changing character of, the traditional family support system and household coping strategies in the wake of covariate shocks and the HIV-AIDS pandemic. However, the proportion of the single elderly is still very small in most countries. A household type "elderly and children" or what is known as "skipped generation household" has emerged as an important structure in some countries. In addition, "households headed by the elderly" has also emerged as a significant household type in several countries.

The analysis shows that the poverty situation, and especially the poverty gap ratio, for the household types the elderly only, the elderly with children and the elderly-headed households is much higher than the average in several countries and the differences are statistically significant. For example, in Malawi, Uganda and Zambia, the poverty gap ratio for various household types in which the elderly are living is 6 to 20 percentage points higher than the average (national) ratio. Likewise the poverty gap ratio among the elderly-headed households in 11 countries is higher than the national average. Such differences are particularly large in rural areas. However, ***it is worth stressing that the elderly are not always over-represented among the poor in every country: on the other hand the study finds, for example***, children in Madagascar, Mozambique and Nigeria are in a much worse situation than the elderly. Careful identification of which particular group is in a dire situation requiring immediate social assistance calls for a critical analysis of the risk and vulnerability situation in each country, and a relative ranking of groups by risk and vulnerability – an analysis beyond the scope of this paper. While the study finds the case for an universal social pension for all of the elderly to be weak, it does point to the need to consider a non-contributory social pension ***targeted to certain groups of the elderly.***

The study then examines the impacts on group-specific and national incidence of head count poverty and poverty gap ratios of providing a social pension for various categories of the elderly and explores its fiscal implications. The analysis shows that the fiscal cost of providing an ***universal*** non-contributory social pension to ***all*** of the elderly will be quite high – 2 to3 percent of GDP, a level comparable to, or even higher, than the levels of total public spending on health care in some countries. The study also notes that the case for such an universal social pension also appears to be weak even on welfare grounds inasmuch as there are other competing groups and claims on scarce safety net resources in some countries (such as families with many children) whose incidence of poverty is much higher than that of the elderly.

Since such an universal social pension program is fiscally unaffordable and also cannot be defended on welfare grounds in some countries, the study explored the options for a ***targeted*** social pension with a fixed budget constraint (0.5 percent of GDP), and with a fixed benefit level (70% and 35% of the poverty threshold) for the elderly defined as persons 60+ and 65+. First, two household types, the elder living with children and the elderly-headed households were considered. A program of social pension targeted to these groups yields considerable reduction in the incidence of poverty and poverty gap ratio, for the particular groups targeted, and also at the national level. The case for covering the elderly only also under the pension program appears strong because the impact of a pension for this group leads to significant reduction in the poverty gap ratio of the group.

While categorical targeting of a pension for the above groups yields the maximum poverty reduction impacts, and is also fiscally sustainable even in low income countries, its ***operational feasibility*** is considered to be weak. Moreover, targeting a social pension for such specific groups among the elderly is most likely to lead to adverse incentive effects and possible induced changes in household types in order to claim a pension. Bearing this mind, two other simulations were done: impacts of a social pension for "all elderly" i.e., universal social pension, and "poor elderly", i.e., a targeted social pension, regardless of whichever household type they live in. The simulation also assumes the realistic scenario that the pension is shared within households.

Taking all things into account – the need to keep the fiscal cost low, minimize adverse incentive effects, and maximize the poverty reduction impacts both at the national level and at the level of the targeted group, and bearing in mind the fact that there are other groups among whom the incidence of poverty is about the same or much worse than that of the elderly – the study concludes that the case for an universal approach is weak. The best option appears to be ***to target the pension only to the poor among the elderly, keeping the benefit level low (say at about one-third of the poverty threshold), and eligible age limit at 65+.*** The study underscores the need for more country-specific work to explore the feasibility of the recommended option in diverse country settings. The availability of credible household survey information should enable one to assess the benefits and costs of various targeting approaches (simple means tests, proxy means tests, community targeting, self-selection, conditional cash transfers,

etc.) in a given country situation, and help policymakers decide on an appropriate approach to targeting to identify the poor among the elderly for purposes of eligibility to a social pension.

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I. Introduction

Demographic structures in Africa are transforming in an unique way, unlike in any other Region of the world. Normal demographic change over time sees a rapid fall in mortality at birth and infancy, and rising life expectancy in later years arising from basic improvements in health care and rising living standards. These tendencies are prevalent in Africa too, though the risk of death among infants and the elderly is declining only slowly. At the same time, conflicts and HIV/AIDS have increased the probability of death among prime age adults, generating apparent perversities in life expectancies at different ages. (R. Disney, 2003). The result has been that some of the elderly have become prime earning members for families and/or caregivers for grandchildren, either because prime age adults have died (or sick and dying) or migrated . The Region has also witnessed an unprecedented increase in the number of orphans who have lost either one or both parents. The welfare consequences of the growing number of orphans and vulnerable children have been analyzed.[1] However, the economic and welfare consequences of the growing burden on the elderly in Sub Saharan countries have not been systematically analyzed from the perspective of the role of appropriate social protection instruments. This study aims to fill this gap.

The study has many objectives, and is organized as follows. The second section (II) provides the context and the motivation for the study. Section III provides a brief outline of the methodology; a detailed methodology is given in Appendix 1. Drawing on the available recent household survey information, the profile of the elderly in 15 low income sub Saharan African countries is delineated in section IV. Three aspects of welfare are discussed: poverty incidence, poverty gap ratio, and sickness and access to healthcare. In section V the implications for poverty reduction of a social pension to the elderly under alternative targeting options are analyzed. In particular, it will examine the short run impacts of providing assistance to the elderly (living in diverse household settings) to a reduction in the poverty among the elderly, *as well as* for *national* poverty reduction. Section VI contains a brief discussion of the education disadvantage, if any, of children living with the elderly. The last section concludes, drawing some inferences for the role of non-contributory social pensions for the elderly.

[1] See Kalanidhi Subbarao and Diane Coury, *Reaching Out to Africa's Orphans: A Framework for Public Action, (2004):* The World Bank: Africa Human Development publication (in press)

II. The Context and the Motivation for the Study

According to the UN estimate, nearly 10 percent of the world's population, or over 600 million persons are over the age of 60, and this number is expected to double by 2050 (Schwarz, 2003). Nearly two-thirds of this elderly group live in the developing world where formal arrangements for old age support are few and far between, and the traditional arrangements, for reasons outlined below, seem to be on the decline particularly in Africa.

Ageing diminishes the capacity to work and earn. In much of Africa, the traditional safety net for the elderly is the extended family, especially their own children. As Schwarz (2003) points out, the extended family is not, and was never, a perfect safety net especially when their own children are too poor to support their parents. Moreover, recent developments have led to older persons emerging as an increasingly visible vulnerable group. While improvements in public health and immunizations have slowed the death rate among infants and adults (in some countries more rapidly than in others), conflicts and the spread of HIV virus have increased the number of deaths among prime age adults. In countries devastated by the AIDS pandemic as well as other shocks (such as repeated droughts and conflicts), the hazard of death continues to be high not only early in life, and but also during the middle age. As a result some countries are beginning to experience "skipped generation" households, where prime age adults are dead, and the responsibility of raising children has fallen on the elderly.

Apart from the pressures imposed by the AIDS pandemic, changing patterns of urbanization and globalization have further exposed older persons to the risk of poverty. In some countries, the elderly have become the prime breadwinners and/or caregivers. The risk of poverty may be particularly high especially if older persons are engaged in the informal economy. Whatever the underlying cause, changes in demographic structures in Africa may be rendering older persons vulnerable to poverty.

The Social Risk Management (SRM) Framework enables one to look at an array of vulnerable groups including the elderly, children, the disabled and the like. Towards this end, Risk and Vulnerable Assessments were carried out in some countries in order to better understand which groups are more vulnerable than others, which particular type of intervention for which specific vulnerable group makes sense in a given country, what is the best delivery mechanism and the country capacity to implement the program, and what are the fiscal implications for financing and sustainability of the intervention. Recent Risk and Vulnerability Assessments have shown much heterogeneity with respect to the nature of risks and high risk groups and variations with respect to vulnerability of each group to poverty. While these assessments have drawn attention to high risk groups like women with many children, the disabled, chronically food insecure households, etc. , the prospects for the elderly deserve a little more attention than was possible in the Risk and Vulnerability Assessments largely because of the changing demographics, HIV-AIDS pandemic, the pace of urbanization and the gradual emergence of nuclear families – all contributing to a gradual erosion of the traditional safety net, viz., the extended

family. Given that most poor happen to be in informal sectors, the contributory pensions really don't play a role in protecting the elderly in informal sectors. As such, there is a need to consider the role of non-contributory pensions for the elderly, even if as a partial solution to the poverty among the elderly.

Thus while there is a case for considering the role of non-contributory pensions for the elderly in Africa adopting the SRM framework, before launching any program it is important to know whether in fact the elderly are poorer than the average. We need to know this because the objective of social assistance or any form of targeted transfer in most countries is not poverty reduction of specific vulnerable groups such as the elderly, but poverty reduction at the ***national*** level. Given that the elderly live in extended families, whether or not the elderly are poorer than the average is not an easy question to answer. We need to examine different household structures, and see whether specific household types where the elderly currently live experience a higher incidence of poverty than the national average in each country. In most low income countries different vulnerable groups do compete for scarce social safety net resources. Therefore, understanding the poverty situation of the elderly relative to average (national) poverty is an essential starting point for a study of the role of non-contributory social pensions.

The next section delineates the methodology adopted to assess the poverty status among the elderly, followed by empirical findings.

III. Data and Methodology

The study will utilize the unit record household data sets from 15 African countries. With the exception of three countries, the data sets belong to 1998-2001.[2] Although the choice of the 15 selected countries is governed by the availability of household survey information, the sample includes both western and eastern African countries, Francophone and Anglophone countries, and countries with a high incidence of the HIV-AIDS and others. Thus, the sample countries are broadly representative of the whole of Sub Saharan Africa.

A. Household classifications/Methodology

The living conditions of the elderly will be assessed in relation to the average and other household types. For purposes of this study, children and the elderly are classified as follows:

1. Children from 0 to 14 years
2. Elderly males and females 60 years and older[3]
3. Elderly males and females 65 years and older

[2] The household survey information for Burkina Faso and Guinea belong to 1994, and that of Cameroon to 1996.

[3] While the welfare profile in section III is done with the elderly defined as 60+, the costing and targeting simulations in section IV are carried out with two elderly groups: 60+ and 65+.

The household type classification will be:

1. Households with no elderly persons
2. Households with only elderly persons
3. Households with only children and elderly persons
4. Mixed households with children, working age persons and elderly
5. Households headed by elderly persons
6. Households headed by working age (15-59) males or females

Households in groups 5 and 6 are sub-groups of household group 4. To analyze the poverty status of elderly, we will need a poverty line for each of the 15 countries. The study uses national poverty lines. These poverty lines have been obtained from various poverty assessments. These poverty lines do not take account of different needs of household members by age and sex. The poverty lines used in this study have been modified to take account of equivalence and household economies of scale.

The study will focus on two poverty measures:[4]

1. Head-count ratio
2. Poverty gap ratio

These two measures are more than adequate to capture different aspects of poverty among the elderly.

B. Policy simulations.

The study analyzes alternative scenarios for targeting assistance to the elderly. We need an objective in order to be able to assess various scenarios. We decided that our objective will be to achieve a maximum reduction in the *national* poverty with a given *fixed* budget. Thus, our focus will be not only on the impact of social pension on poverty incidence among the elderly, but also on the poverty incidence at the *national* level. Further, the study will assess the poverty reduction impacts of targeting social pension to different household types where the elderly are living, using a fixed budget of 0.5 percent of GDP in local currency, and a fixed benefit level equal to 70% and 35% of the national poverty threshold expenditure level.

The study will consider the following targeting alternatives:

1. Perfect targeting (filling the gap) and universal targeting (this is purely to serve as a bench mark, recognizing such perfect targeting is unrealistic in practice.

2. Targeting different household types:

[4] "Head count poverty" is defined as the percentage of population below the national poverty line. "Poverty gap ratio" is defined as the mean income shortfall below the poverty line as a proportion of the national poverty line.

- Targeting all elderly (regardless of household structure in which they live)
- Targeting elderly living alone
- Targeting elderly living with children
- Targeting only the poor among the elderly (regardless of household structure in which they live)

The purpose of these simulations is to measure the impact of targeting on total poverty as well as on poverty among elderly and assess trade offs to alternative targeting options including fiscal (budgetary) implications. For example, a program of social pension (with a given budget) aimed at all poor households regardless whether or not housing the elderly may have a significant poverty reduction impact but may not have a big dent on poverty among the elderly. On the other hand a social pension program aimed at the elderly may substantially reduce the incidence of poverty of that particular group but may not contribute significantly to a reduction in the incidence of poverty at the national level, mainly because the share of the elderly recipients of the pension program (whether aged 60+ or 65+) in total population is small. The study will evaluate these trade offs to alternative targeting scenerios, and will also compute the targeting elasticity (i.e., the elasticity of total poverty reduction and elderly poverty reduction with respect to different targeting criteria).

A detailed methodology is provided in Appendix 1.

IV. A Profile of the Elderly in Africa.

A. The Setting: Characteristics of sample countries.

The study is based on recent household survey information for 15 low income Sub Saharan countries. Details of the household surveys are provided in the Appendix. Table 1 provides some background information on basic characteristics of these countries. The sample countries include very low income countries with per capita incomes of $100 to slightly better off countries with per capita incomes close to $300. Two countries in the sample have per capita incomes higher than $500. The incidence of head count poverty ranges from a low 36.7 per cent to a high 68.9 per cent. The sample includes countries with a low incidence of HIV-AIDS pandemic among young adults in the age group 15-24 (such as Guinea, Gambia and Madagascar) to countries with a high incidence (Malawi and Zambia). There is also a wide range of variation with respect to primary school completion rates. Thus, although all 15 countries are Sub Saharan countries, there is much heterogeneity across these countries with respect to levels of both economic and human capital development.

B. Where are the elderly?

The elderly (defined as those above 60 years of age) range from a low 3.5 percent of population in Zambia to about 7 percent in Guinea (Figure 1). The single elderly (i.e.,

the elderly living alone) constitute a very small percentage of the population in Africa, though there are

Table 1: Characteristics of sample countries

Country	GDP Per capita ($)	Population (millions)	Head count poverty (%)	HIV prevalence rate 15-24 (%)		Life expectancy at birth		Primary school completion rate (%)
				M	F	M	F	
1	2	3	4	5	6	7	8	9
Burundi	100	7	61.2	5	11	41	42	43
Burkina Faso	220	12	52.0	4	9.7	43	44	25
Cote d'Ivoire	630	16	36.7	2.9	8.3	45	46	40
Cameroon	580	15	60.9	5.4	12.7	48	50	43
Ethiopía	100	66	40.9	4.4	7.8	41	43	24
Ghana	290	20	43.6	1.4	3.0	55	57	64
Guinea	410	8	38.1	0.6	1.4	46	47	34
Gambia	320	1	62.2	0.5	1.4	52	55	70
Kenya	350	31	49.7	6.0	15.6	46	47	63
Madagascar	260	16	62.0	0.1	0.2	54	57	26
Mozambique	210	18	68.9	6.1	14.7	41	43	36
Malawi	160	11	63.9	6.3	14.9	38	39	64
Nigeria	290	130	63.4	3	5.8	45	47	67
Uganda	260	23	48.2	2	4.6	43	43	65
Zambia	132	10	66.7	8.1	21	37	38	73

Notes: Data for all columns except column 4 belong to the year 2001. Column 4 provides the latest available estimate of the incidence of poverty, calculated by authors.
Source: World Bank: World Development Indicators, 2003, and Authors' calculations

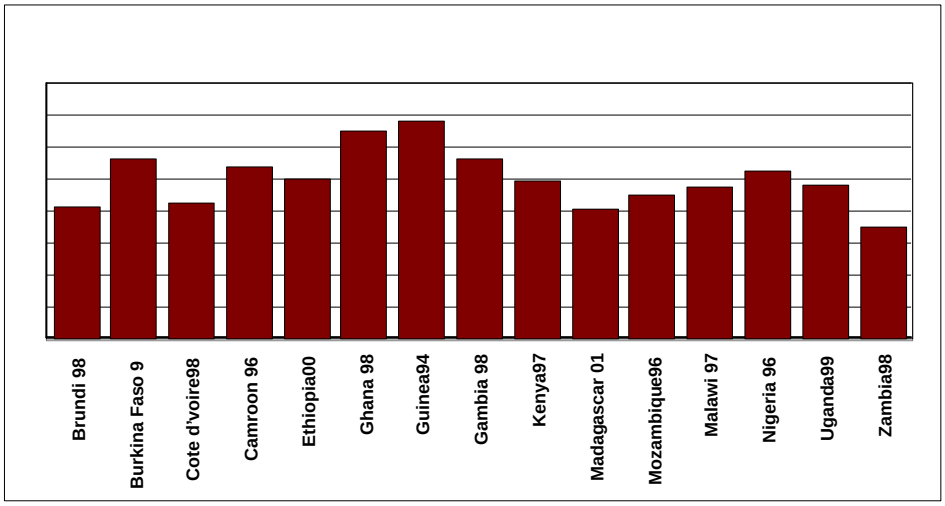


Table 2: Population share by household type

Country	No elderly persons	Elderly persons only	Elderly & children only	Mixed households	Not headed by elderly	Headed by elderly
1	2	3	4	5	6	7
Burundi	85.21	0.57	1.30	12.92	86.46	13.54
Burkina Faso	58.86	0.26	0.43	40.46	74.38	25.62
Cote d'Ivoire	74.93	0.40	0.39	24.49	82.07	17.79
Camroon	69.72	0.41	0.47	29.40	81.13	18.83
Etiopía	79.78	0.50	0.88	19.03	83.99	16.12
Ghana	75.11	1.22	1.23	22.70	81.69	18.04
Guinea	60.44	0.36	0.98	38.22	74.70	25.30
Gambia	53.80	0.11	0.06	46.02	72.87	27.13
Kenya	82.62	1.36	0.98	15.25	84.98	15.23
Madagascar	84.89	0.67	0.64	13.78	88.08	11.61
Mozambique	81.30	0.77	0.84	17.32	86.34	13.90
Malawi	83.46	0.84	1.38	14.33	86.46	13.54
Nigeria	79.41	1.27	0.80	18.61	83.30	16.82
Uganda	78.16	0.89	1.34	19.83	83.16	17.08
Zambia	83.83	0.46	0.39	15.33	87.52	12.48

the elderly *living alone* is very small in these countries. By contrast in many East African countries, the share of the elderly in total population is low (presumably because the life expectancies are low), but the proportion of the elderly living alone is somewhat higher, again presumably due to relatively high AIDS-induced mortality of the middle-aged population. It is worth stressing these statements are based on "eye balling" of the data presented in Table 2, and are not based on statistical tests (which are not possible with just 15 observations.)

One of the consequences of high adult mortality (either due to AIDS or due to conflicts or both) is that the elderly may have become caregivers for children, in which case a household type of "elderly with children" becomes important. Column 4 in Table 2 presents the percentage of population living in such households. The proportion ranges from a low 0.06 percent in Gambia to a high 1.34 percent in Uganda, 1.38 percent in Malawi, and 1.30 percent in Burundi. [5] It is worth noting that the household type "elderly with children" existed even prior to the AIDS pandemic with working age adults migrating to cities leaving children behind with elders in rural areas.

Another household type that is of interest is "households headed by the elderly". These are households in which the elderly are the breadwinners with or without prime age adults living. This is shown in the last column of Table 2. Nearly a quarter of all households are headed by the elderly in Burkina Faso, Guinea and Gambia. This proportion is between 11 to 15 percent in Madagascar, Mozambique, Malawi and Zambia. In the remaining countries the proportion varied between 16 to 20 percent.

The above findings show much heterogeneity across countries with respect to the proportion of elderly population, living arrangements of the elderly, and household headship by age. The variations in household types and living arrangements presumably reflect the variations in, and the changing character of, the traditional extended family system and household coping strategies across countries in the wake of the HIV-AIDS pandemic, regional conflicts and migration patterns.

B. Poverty among the Elderly (Head count ratio).

We have seen in the previous section that the proportion of the elderly living alone is very low in all countries. The elderly are living in extended families, or with grandchildren. Moreover, the proportion of households headed by the elderly is large in some countries. These characteristics of the living arrangements of the elderly have prompted us to consider three questions pertaining to differences in the incidence of poverty. Is the incidence of poverty:

(a) higher in households where the elderly are living, compared with the average,

[5] We are presenting only national level aggregates. It is just possible that there are significant intra-country differences. An analysis of intra-country differences is beyond the scope of this paper.

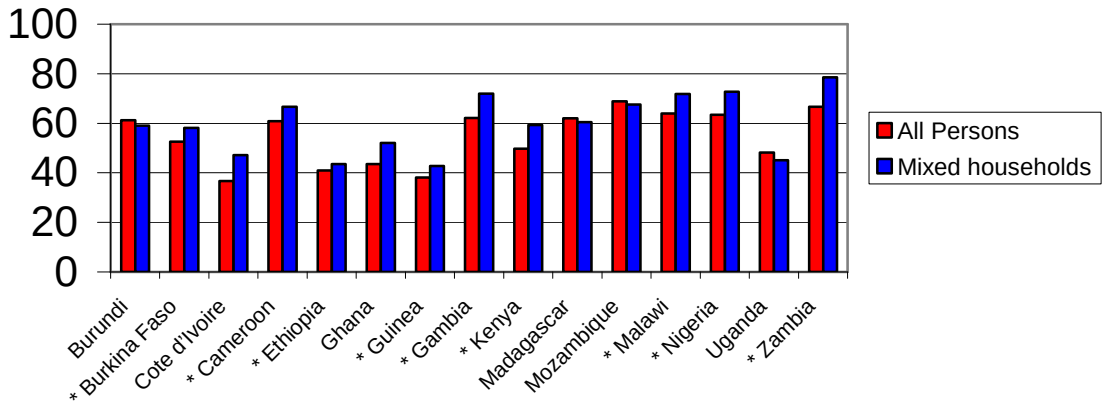
(b) higher in households where the elderly and children are living, compared with the average, and

(c) higher among households headed by the elderly compared with the average. (The head of the household is defined in the surveys as any person, male or female, at least 15 years old, who is regarded by other members of the household as their head, and who is generally the main breadwinner in the household.) [6]

(d) How statistically significant are these difference? Are the patterns similar for the incidence of the poverty gap ratio? These questions are explored below.

The results for question (a) above presented in Figure 2.[7] In eleven out of fifteen countries, the incidence of poverty among households in which the elderly are living (we call them "mixed households") is higher than the average; in nine countries the differences are statistically significant. It is worth stressing that in Malawi and Zambia where the incidence of the HIV-AIDS is very high, the differences are very large and statistically significant.

Figure 2: The incidence of Poverty for all Persons and for mixed households with the elderly



*** Differences statistically significant at 5% or 10% level.**

Figure 3 sheds light on question (b) above. In ten out of fifteen countries, the incidence of poverty in households where the elderly are living with children (usually grandchildren) is higher than the average; the differences are statistically significant in eight countries, which include the three countries where the HIV-AIDS prevalence rates are high. The finding seems to confirm the generally held impression that the incidence of poverty among elderly is exacerbated when they become caregivers for children. In

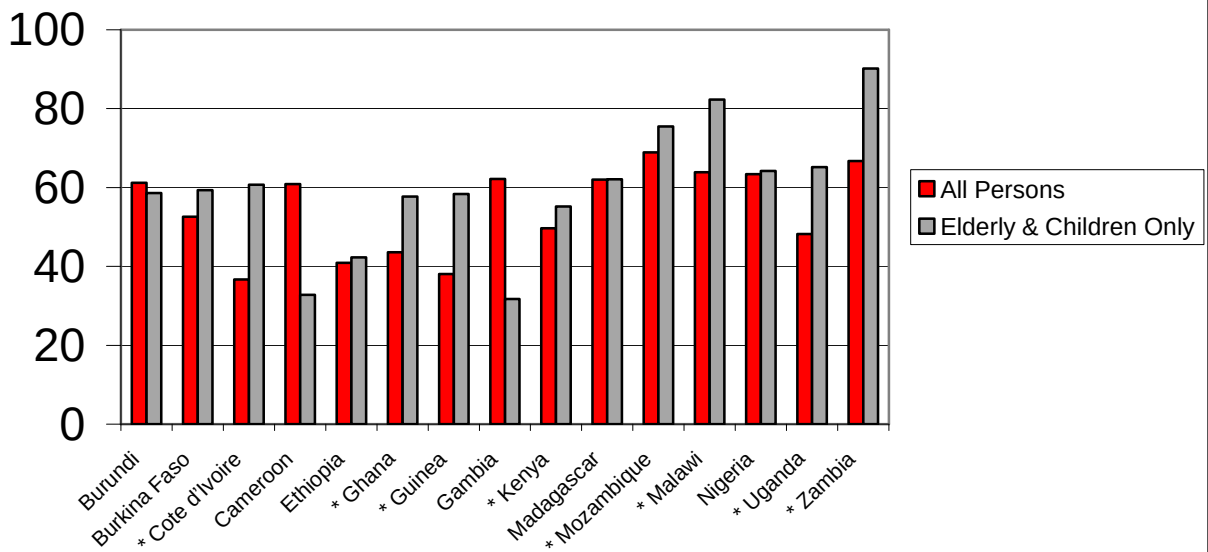
[6] It is difficult to verify whether actually this definition has been followed in all surveys.
[7] For actual numbers behind Figures 2, 3, 4 and 5 are given in Appendix Table A3.

Malawi, Uganda and Zambia, households in which the elderly are living with children is 20 percentage points higher than the average and statistically significant.

Question (c) is addressed in Figure 4. In 12 out of 15 countries the incidence of poverty in households headed by the elderly is higher than the average; the differences are statistically significant in 11 countries.

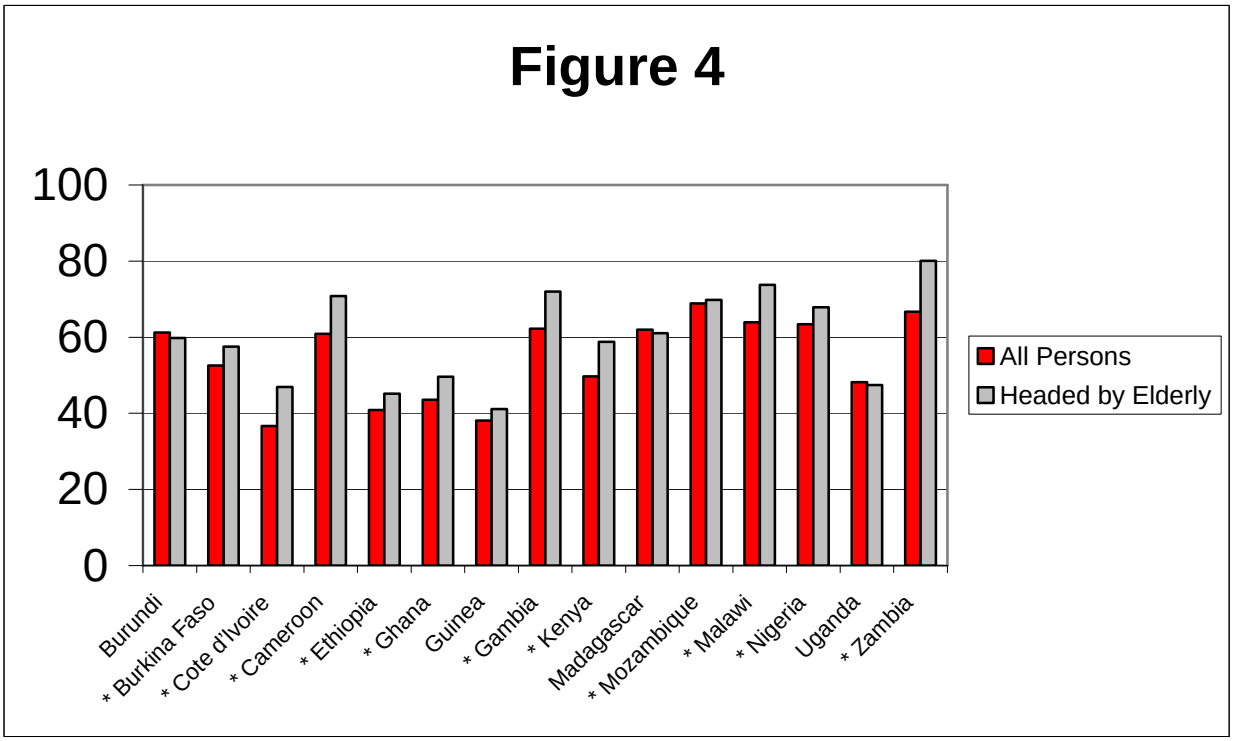
An interesting finding is that the "elderly living alone" are not worse off than the average except in Uganda and Zambia. (Figure 5) In fact, in most countries the incidence of poverty among the single elderly is lower than the average. In Uganda and Zambia, not only the proportion of single elderly is highest in Africa but also this group depicts a higher than average incidence of poverty. It is worth noting, however, that while the incidence of head count poverty among the single elderly is not very different from the average in most countries, the *depth* of poverty among the single elderly is much higher than the average (see the discussion on poverty gap ratio below).

Figure 3: The incidence of poverty: Average for all persons and for Elderly with children

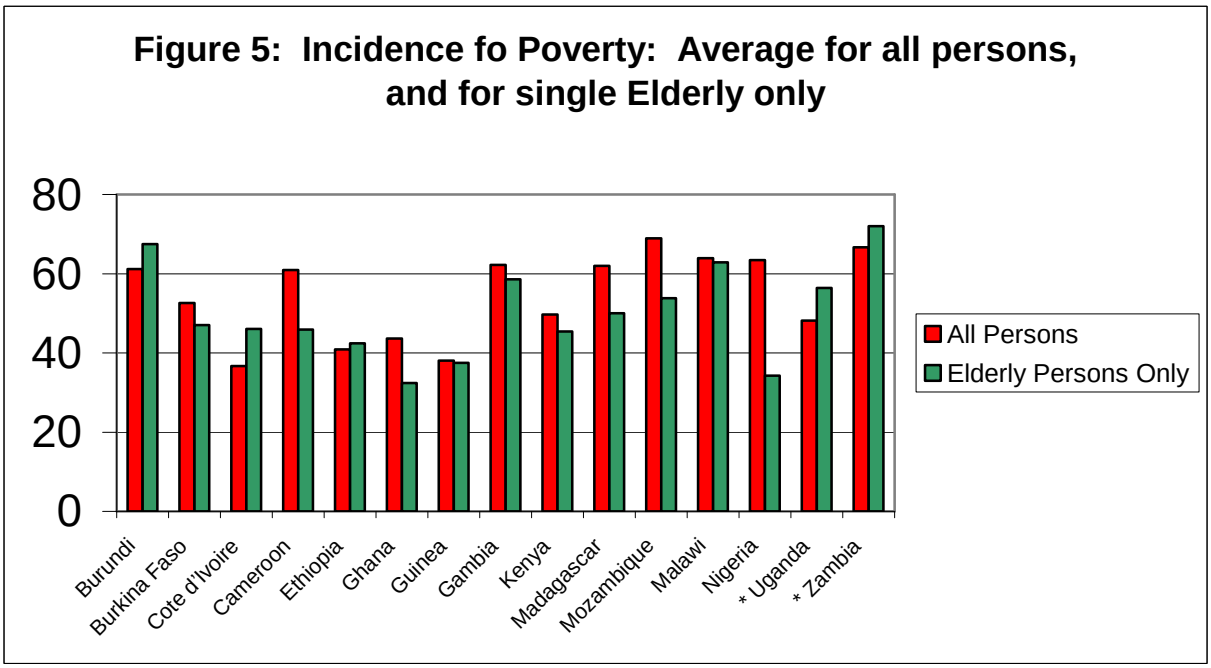


*** Differences statistically significant at 5% or 10% level.**

Figure 4. Incidence of poverty: Average and for households headed by the elderly



*** Differences statistically significant at 5% or 10% level.**



*** Differences statistically significant at 5% or 10% level.**

One question that is of interest: is the incidence of poverty among children higher or lower than for the elderly? Table 2 below gives the proportion of children in poverty,

alongside the average for the whole population, and the proportion of elderly in poverty. The incidence of poverty among the elderly and among the children is about the same in most countries; the incidence of poverty among the elderly is more than 5 percentage points higher than that of children in Cote d'Ivore, Malawi and Zambia. On the other hand, the incidence of poverty among the children is more than 5 percentage points than that of elderly in Madagascar, Mozambique and Nigeria. The pattern remains the same even when disaggregated by rural/urban location (tables not presented).

The above findings strongly confirm the elderly disadvantage especially when the elderly have become either principal breadwinners for the family, or have become caregivers for children. For most countries the differences between the above two groups of the elderly and the average for the whole population are statistically significant. However, ***it is worth stressing that in every country it is possible to find groups whose welfare situation (defined as the incidence of poverty) may be a lot worse than that of the elderly.*** For example, as can be seen from Table 3, children in Madagascar, Mozambique and Nigeria are in a much worse situation than the elderly. Careful identification of which particular group is in a dire situation requiring immediate social assistance calls for a critical analysis of the risk and vulnerability situation in each country, and a relative ranking of groups by risk and vulnerability – an analysis beyond the scope of this paper. Nonetheless, findings from the recently completed Risk and Vulnerability Assessments for three African countries are worth citing here. In Ethiopia,

Table 3: Head count ratio by individual types

Country	Children 0-14 years	All Persons	Elderly Persons
Burundi 98	62.5	61.2	59.2
Burkina Faso 98	54.5	52.0	56.3
Cote d'voire98	39.1	36.7	46.7
Cameroon 96	63.6	60.9	62.4
Ethiopia00	41.6	40.9	43.7
Ghana 98	47.0	43.6	45.5
Guinea94	40.5	38.1	44.0
Gambia 98	65.5	62.2	68.2
Kenya97	53.5	49.7	53.8
Madagascar 01	66.4	62.0	55.3
Mozambique96	71.4	68.9	65.8
Malawi 97	65.4	63.9	71.6
Nigeria 96	66.6	63.4	59.5
Uganda99	50.1	48.2	52.2
Zambia98	67.8	66.7	79.4

all chronically food insecure households located in zones heavily exposed to droughts are highly vulnerable on average than most other households; in Kenya households exposed to periodic bouts of malaria and related health shocks, and those with little access to markets, are more vulnerable than others; in Burkina Faso, all households growing cotton which are subjected to both weather shocks and severe fluctuations in terms of trade, women who are subjected to onerous cultural practices, and girl children dropped out of school, are highly vulnerable.[8]

C. Poverty gap ratio

From the perspective of an individual or household's deprivation, poverty gap ratio is more instructive than head count poverty.[9] In Table 4, we present the average income shortfall from the poverty line (i.e., absolute amount of poverty gap in local currency) as percent of the average poverty gap for the country as a whole, for different household types. For example, in Burundi, the income shortfalls from the poverty line for the household type "elderly persons only" and "elderly and children" are 154 and 143 per cent higher than the national average income shortfall respectively. From this table it is clear that there is much cross-country variation in the size of the gap for different categories of the elderly, relative to the average. Thus, the size of the gap among "elderly persons only", is higher than the average in all countries except in Madagascar, Mozambique, and Nigeria. When one considers "elderly with children" category, the size of the gap is higher than the average in all countries except in Gambia, Madagascar and Nigeria. The size of the gap among households headed by the elderly is much higher than those not headed by the elderly, and the national average, in all countries except Burundi, Burkina Faso and Malawi where the differences are small.

When we consider by household types, cross-country patterns in poverty gap ratio are similar to those observed for the head count ratio. (see Figure 6 – the absolute value of the poverty gap ratio are presented in Table 5). Households with elderly and children show much higher poverty gap ratios than the average in 11 countries, and the differences (from the average) are statistically significant in 8 countries. As with the head count ratio, the elderly disadvantage further worsens when we consider households headed by the elderly. In 13 out of 15 countries, households headed by the elderly exhibit higher than average poverty gap ratios, and the differences are statistically significant in 11 countries.

[8] For details, see see studies by World Bank (2004), L. Christiaensen and K. Subbarao (2005) and K. Subbarao, M. Temourov and E.D. Tesliuc (2004).

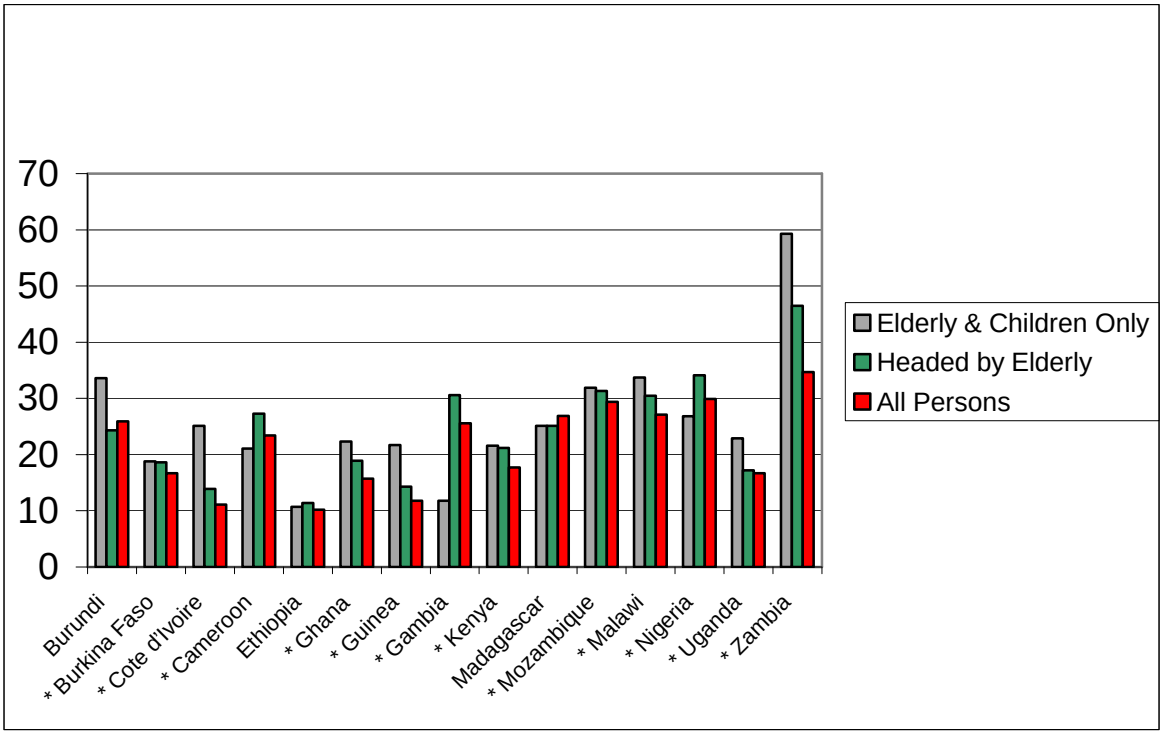
[9] Poverty gap ratio is defined as the mean income shortfall below the poverty line as a proportion of the poverty line with non-poor having zero income shortfalls.

Table 4. Income shortfall from the poverty threshold for different household types, as percent of average income short fall (poverty gap) for the country as a whole.

	No Elderly Persons	Elderly Persons Only	Elderly & Children Only	Not Headed by Elderly	Headed by Elderly	All Persons
Burundi	100	154	143	100	100	100
Burkina Faso	100	113	116	100	99	100
Cote d'Ivoire	93	213	224	95	121	100
Cameroon	99	151	107	97	112	100
Ethiopia	98	168	120	97	117	100
Ghana	92	119	155	95	123	100
Guinea	88	181	208	92	123	100
Gambia	87	163	59	93	118	100
Kenya	96	128	136	96	124	100
Madagascar	101	96	99	101	93	100
Mozambique	101	92	122	99	105	100
Malawi	98	131	131	98	115	100
Nigeria	96	57	97	98	112	100
Uganda	99	185	151	98	109	100
Zambia	95	171	189	95	135	100

(Note: The figures in the above Table are to be interpreted as follows. If, for Burundi, the national poverty gap , i.e., income short fall from the poverty line in absolute quantity is 100, the income short fall for the household type "elderly and children" is 154 percent of the national average.)

Figure 6. Poverty Gap Ratio for different Household Types



*** Differences statistically significant at 5% or 10% level.**

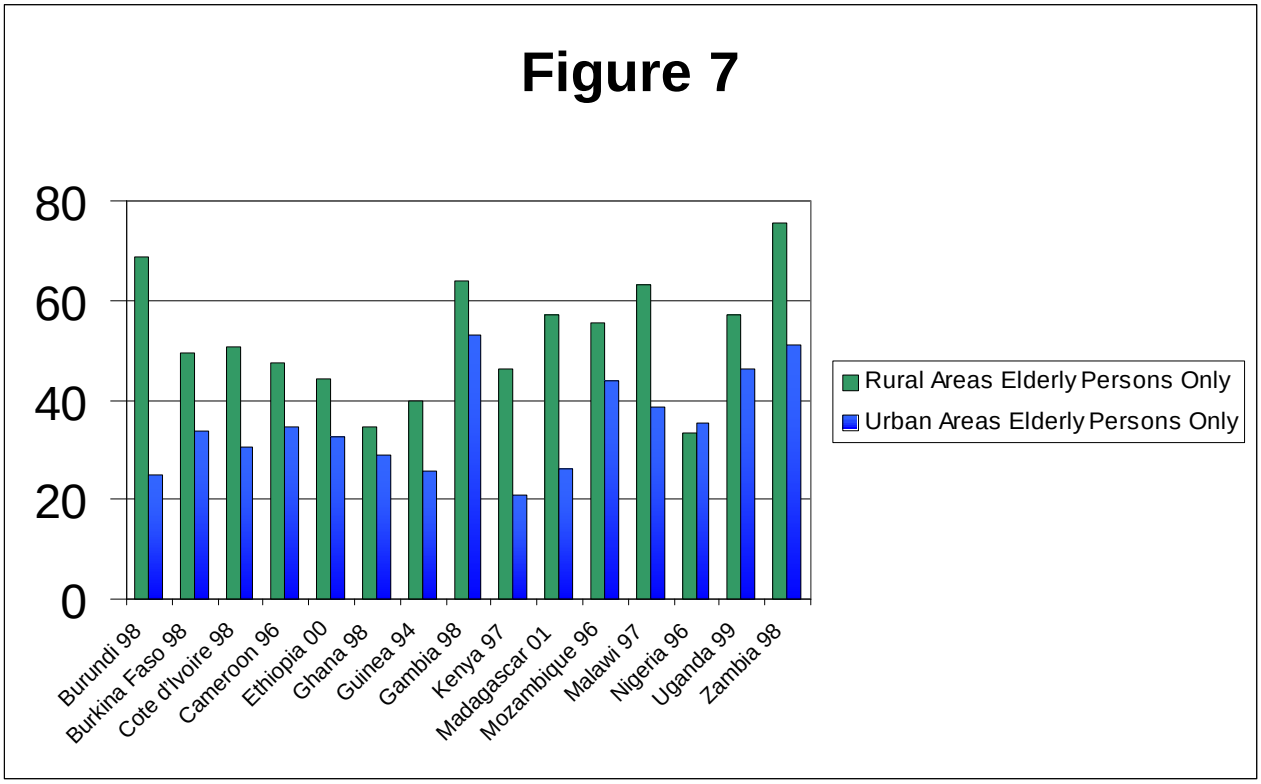
Table 5: Poverty gap by household type

Country	No elderly persons	Elderly persons only	Elderly & children only	Mixed Households	Not headed by elderly	Headed by elderly	All persons
Burundi	26.2	27.0	33.6	23.1	26.2	24.3	25.9
Burkina Faso	14.6	12.2	18.8	18.3	15.4	18.6	16.7
Cote d'Ivoire	10.0	16.0	25.1	14.3	10.5	13.9	11.1
Cameroon	22.6	23.8	21.1	25.3	22.5	27.3	23.4
Ethiopia	9.9	12.1	10.7	11.0	9.9	11.4	10.2
Ghana	14.4	12.0	22.3	19.8	14.9	18.9	15.7
Guinea	10.2	13.0	21.7	14.0	10.9	14.3	11.8
Gambia	20.9	24.7	11.8	31.0	23.7	30.6	25.6
Kenya	17.1	15.9	21.6	21.0	17.1	21.2	17.7
Madagascar	27.1	17.6	25.1	26.1	27.1	25.1	26.9
Mozambique	29.4	19.2	31.9	29.8	29.2	31.3	29.4
Malawi	26.5	25.6	33.7	29.6	26.5	30.5	27.1
Nigeria	28.3	12.1	26.8	38.1	29.0	34.1	29.9
Uganda	16.7	20.1	22.9	15.9	16.6	17.2	16.7
Zambia	32.8	41.6	59.3	44.1	33.0	46.5	34.7

D. Rural/Urban differences

There are clearly significant rural/urban differences. With respect to single elderly persons, a much higher proportion of individuals are poor in rural areas compared with urban areas in every country. (Figure 7) The pattern remains the same for other household types, viz., households with elderly and children, and households headed by the elderly. (The results are not presented.) The relatively higher proportion of poverty in rural areas among all these household types may be a reflection of the fact that rural poverty is *generally* higher than urban poverty in all countries.

Figure 7: Head count poverty ratio – Elderly Rural and Elderly Urban (%)



The pattern with respect to poverty gap ratio is the same as with the head count ratio. In particular, the size of the poverty gap ratio for households headed by the elderly in rural areas in most countries is extremely high compared with urban areas – these results are not presented here.

V. Social Pensions for the Elderly: Impacts and Costs

A. Fiscal Cost of Filling the Poverty Gap among the Elderly

We now examine the pros and cons of assisting the elderly with a social pension program. We proceed with the analysis as follows. First, we look at the fiscal implications of the best of all options from the perspective of the elderly, viz., filling the poverty gap among different household types housing the elderly for typical low income countries of Africa. The analysis in later sections is done with a fixed (hard) budget constraint (assuming a level of spending of 0.5 percent of GDP), and a fixed benefit level (70% of the national average poverty threshold). We then consider four different categories of potential beneficiaries: a social pension to (a) ***all*** elderly individuals regardless of their income/wealth status; (b) elderly ***with*** children but with no prime age adults, (c) to ***poor*** among the elderly, i.e., those elderly who are living in households below the national poverty line, and (d) all households ***headed*** by the elderly. The main purpose is to assess which targeting option makes sense, i.e., yields the maximum possible gains in national poverty reduction, with a given budget and with a given benefit level.

The resources required (as per cent of GDP) to eliminate the poverty gap among all elderly women and men and others is shown in Table 6. Compared with the cost of filling the poverty gap for other categories, the cost of filling the poverty gap for elderly men and women is not very high for most countries: as per cent of GDP it ranged from a low 0.1 percent in Burkina Faso and Cote d'Ivore to a high of 0.6 of GDP in Zambia.

Table 6. Budget as % of GDP required to eliminate poverty gap by age and gender

Country	Children 0-14 years	Men 15-59 years	Women 15-59 years	Elderly Men	Elderly women	All persons
Burundi	13.3	5.8	7.1	0.5	0.7	27.4
Burkina Faso	1.5	0.7	0.8	0.1	0.1	3.2
Cote d'Ivoire	1.7	1.3	1.0	0.1	0.1	4.2
Cameroon	4.0	2.5	2.5	0.3	0.3	9.6
Ethiopia	4.9	2.5	2.7	0.4	0.3	10.9
Ghana	4.8	2.6	2.5	0.4	0.4	10.8
Guinea	3.1	1.2	1.5	0.3	0.3	6.5
Gambia	7.7	4.2	4.2	0.6	0.5	17.2
Kenya	4.7	2.4	2.5	0.3	0.3	10.2
Madagascar	4.8	2.7	2.7	0.2	0.2	10.6
Mozambique	12.3	6.5	6.8	0.8	0.5	26.8
Malawi	10.8	6.4	6.8	0.7	0.7	25.5
Nigeria	4.9	3.6	3.5	0.4	0.2	12.7
Uganda	4.7	1.9	2.0	0.3	0.3	9.2
Zambia	10.0	6.2	6.4	0.6	0.6	23.8

This estimate assumes that the pension is not shared with others in the household and, as such, is not realistic. This estimate assumes that the assistance is not shared in the household and as such, not realistic. Most elderly live in households with others and any assistance is likely to be shared.

Once we recognize the fact that the elderly live in extended families, we have to allow for the possibility that any assistance to the elderly will be shared by all in the family, eliminating the poverty gap of households in which the elderly live would require a lot more resources (Table 7). For example, in Burkina Faso, while individual poverty gap among the elderly can be eliminated only 0.2 percent of GDP, it would require twice as much for filling the poverty among the elderly with children, and thirteen times more resources for filling the poverty gap among elderly headed households. Results are similar for other countries. In ten out of 15 countries 2 to 5 percent of GDP would be required to fill the entire poverty gap among households headed by the elderly – clearly not affordable for most countries. Even to fill the poverty gap among the elderly with children – a small proportion of the population in all countries – the resources required ranged from 0.1 to 0.5 percent of GDP.

Table 7: Money as % of GDP required to eliminate poverty gap by household type

Country	No elderly persons	Elderly persons only	Elderly & children only	Mixed households	Not headed by elderly	Headed by elderly
Burundi	23.44	0.24	0.51	3.24	23.71	3.72
Burkina Faso	1.90	0.01	0.02	1.28	2.40	0.81
Cote d'Ivoire	2.89	0.04	0.04	1.21	3.26	0.90
Cameroon	6.56	0.06	0.05	2.89	7.53	2.02
Etiopía	8.43	0.09	0.11	2.24	8.82	2.05
Ghana	7.44	0.16	0.21	3.01	8.36	2.39
Guinea	3.43	0.04	0.13	2.85	4.44	2.01
Gambia	8.08	0.03	0.01	9.10	11.71	5.51
Kenya	8.05	0.18	0.14	1.83	8.27	1.92
Madagascar	9.04	0.07	0.07	1.39	9.39	1.14
Mozambique	21.91	0.19	0.27	4.49	22.94	3.92
Malawi	20.85	0.28	0.46	3.90	21.53	3.97
Nigeria	9.70	0.09	0.10	2.83	10.34	2.39
Uganda	7.16	0.15	0.19	1.73	7.52	1.71
Zambia	18.91	0.19	0.17	4.49	19.77	3.99

Considering that any program of social pension to fill the poverty gap of households with the elderly is fiscally unaffordable, we examine the implications of a social pension with a fixed budget constraint, and with a fixed benefit level, in the next section.

B. Simulation Results with a Fixed Budget Constraint and Benefit level

The analysis in the following sections is carried out with two assumptions: (a) a hard budget constraint of 0.5% of GDP, and (b) a fixed benefit level equal to 70% of the national average poverty threshold. In deciding on these thresholds, we relied on international experience. Thus in advanced OECD countries, total public spending on social security amounted to 2 to 3 percent of GDP. In India, the total expenditure on various safety net programs including old age pensions amounted to 1.5 to 2 percent of GDP.[10] Brazil, Namibia and South Africa spend 1, 2 and 1.4 percent of GDP respectively on old age pensions.

Considering that (a) most sub Saharan countries have incomes much lower than low income countries of South Asia and Latin America, (b) there may be groups poorer and more vulnerable than the elderly competing for social safety net expenditures, and given the demands on public spending from other priority sectors such as health and education, an expenditure level of 0.5% of GDP for non-contributory social pension may be considered the upper bound. (In our sample fifteen African countries, the total public expenditure on health ranged 1.5 to 2 percent of GDP.) As for the absolute level of the benefit, there is much variation across countries, and international experience is less helpful as a guide. We work with 70% percent of the national average poverty threshold, given the large income gap (from the poverty line) for some critical vulnerable groups such as the elderly with children. These thresholds are meant to be illustrative, to understand the implications of targeting for various categories of the elderly. Simulations can be done with other thresholds as well, depending upon the prevailing country situation with respect to poverty, fiscal affordability, and competing demands from other sectors.

With a hard budget constraint of 0.5% of GDP, we assess the impact of providing a social pension to the elderly aged 60 and above living in various living arrangements. The simulation assumes that though the pension is given to the elderly, it is shared within households. Results are presented in Table 8. Significant (even dramatic) reduction in head count poverty incidence can be realized by targeting social assistance pension to all of the elderly living in various household types. In 11 out of 15 countries, the impact on national poverty reduction of targeting social assistance pension to households with elderly and children (columns 4) is higher than what could be obtained by targeting it to the elderly only group (column 2). The poverty reduction impacts of targeting the household type "households with elderly and children" are particularly large in two countries devastated by AIDS, viz., Uganda and Malawi. It is worth noting, however, targeting this particular household type for social pension cannot solve the wider problem of orphans and vulnerable children because these children live in other household types as well.

We now compare households headed by the elderly with those not headed by the elderly (the last four columns of Table 7). The reduction in head count poverty

[10] It is difficult to estimate the amount spent on the elderly because the Government runs both a pension program and also an in-kind Annapoorna (food distribution) program.

accomplished by targeting the elderly headed households is certainly very impressive for that particular group. As for impacts on national poverty reduction, the impact is greater than targeting all of the elderly in ten out of fifteen countries (comparing column 8 and column 2). We then compare the impacts of targeting by household headship. In five out of 15 countries the reduction in ***national*** head count poverty is greater if the program is targeted to households headed by the elderly than for those not headed by the elderly. The opposite is the case for 8 countries; and for two countries the differences in reduction of national poverty between targeting the two groups are small.

Table 8: % change in Head count ratio of household type and national HC due to targeting .5% of GDP

	Elderly only		Elderly & children only		Households Not headed by the elderly		Household Headed by the elderly	
Country	Group-Specific	National	Group-specific	National	Group-Specific	National	Group-Specific	National
	1	2	3	4	5	6	7	8
Burundi	-69.7	-0.4	-23.1	-0.3	-0.5	-0.4	-1.9	-0.2
Burkina Faso	-100.0	-0.2	-100.0	-0.5	-2.1	-1.5	-3.6	-1.0
Cote d'Ivoire	-100.0	-0.5	-100.0	-0.7	-2.5	-1.9	-22.1	-5.0
Cameroon	-100.0	-0.3	-100.0	-0.3	-1.2	-1.0	-5.9	-1.3
Ethiopia	-93.4	-0.5	-92.2	-0.8	-1.7	-1.4	-5.5	-1.0
Ghana	-58.8	-0.5	-71.8	-1.2	-1.4	-1.1	-4.0	-0.8
Guinea	-100.0	-0.4	-97.7	-1.5	-2.4	-1.7	-2.8	-0.8
Gambia	-100.0	-0.1	-100.0	0.0	-1.4	-1.0	-2.3	-0.7
Kenya	-66.3	-0.8	-99.1	-1.1	-1.4	-1.2	-7.5	-1.4
Madagascar	-100.0	-0.5	-100.0	-0.6	-1.3	-1.2	-8.5	-1.0
Mozambique	-76.4	-0.5	-77.8	-0.7	-0.3	-0.3	-3.4	-0.5
Malawi	-60.9	-0.5	-46.0	-0.8	-0.6	-0.5	-2.1	-0.3
Nigeria	-91.3	-0.6	-100.0	-0.8	-0.6	-0.5	-6.9	-1.2
Uganda	-92.8	-1.0	-88.3	-1.6	-1.5	-1.3	-5.5	-0.9
Zambia	-99.8	-0.5	-100.0	-0.5	-0.6	-0.5	-2.7	-0.4

The results are considerably different if one were to consider the impacts on *poverty gap* ratio, rather than head count poverty. Table 9 reports results of the simulations with respect to impacts on the poverty gap ratio for households headed by the elderly, and those not headed by the elderly. Unlike in the case of head count poverty, targeting all elderly headed households for a social pension results in a much more pronounced reduction in the national poverty gap ratio than if it were targeted to non-elderly-headed households**.** What this clearly implies is that most elderly headed households have higher poverty gap ratios (i.e., their welfare condition is much worse) and so any assistance targeted to them reduces the poverty gap ratio substantially even if

it does not enable them to cross the poverty line. Though not as large, targeting households with elderly and children alone brings impressive reductions in the poverty gap ratio in Ghana, Guinea, Kenya, Malawi and Uganda – detailed results for impacts on the poverty gap ratio for various household types are shown in Appendix Table A4.

In summary, the simulations suggest that the gains in poverty reduction (both group-specific and national) obtained by targeting a social pension to elderly-headed households and elderly and children groups, are much stronger than the gains in poverty reduction obtained by an universal pension to all of the elderly regardless of household types and poverty status. However, implementing a pension program targeted to specific household types may pose enormous difficulties. The potential for adverse incentive

Table 9: % change in poverty gap of household type due to targeting .5% of GDP

	Not Headed By the elderly		Headed By the Elderly	
Country	Impact on The group	National Impact	Impact on The group	National Impact
	1	2	3	4
Burundi	-1.3	-1.2	-8.3	-1.1
Burkina Faso	-4.0	-2.9	-12.5	-3.4
Cote d'Ivoire	-5.8	-4.5	-26.6	-5.9
Cameroon	-4.1	-3.2	-17.8	-3.9
Ethiopia	-2.3	-1.9	-11.0	-2.0
Ghana	-2.6	-2.0	-10.5	-2.3
Guinea	-4.2	-2.9	-10.4	-3.2
Gambia	-2.5	-1.7	-6.7	-2.2
Kenya	-3.0	-2.4	-15.3	-2.8
Madagascar	-3.4	-3.0	-26.4	-2.9
Mozambique	-1.5	-1.3	-8.9	-1.3
Malawi	-1.5	-1.3	-9.5	-1.5
Nigeria	-3.1	-2.5	-14.0	-2.7
Uganda	-3.3	-2.7	-14.1	-2.5

effects can be large. For example, if "single" elderly are targeted for a social pension, it is just possible an elderly person (a grandma or a grandpa) currently living in an extended

family household setting might be "kicked out" to fetch a pension. If a household type such as "elderly and children" are targeted, it is just possible extended family households might "adjust" their family structure to fit in with the category for which a pension is eligible. Thus, while some of the household types with the elderly identified above are undoubtedly prone to higher levels of poverty than the average, targeting those specific categories might be difficult in practice.

Bearing the above practical difficulties in mind, one could consider only two categories of the elderly regardless of which household setting they are living: all elderly persons, and all ***poor*** elderly persons (i.e., the elderly living in households living below the national poverty line.) In the first the only requirement for targeting is an assessment of the "elderly status" of the person living in the household, and in the second case an assessment of the elderly status as well as the poverty status of the household would be required. The household characteristics, including the categories identified above may be good candidates for a social pension, and can be used to design a proxy means test to determine the poverty situation of the household.

The simulations also assume that the pension, though delivered to the elderly person, is shared within the household – a realistic assumption in the African context. The poverty reduction impacts of targeting to ***all*** elderly persons, ***all poor*** elderly persons, are shown in Table 10 (for head count poverty) and Table 11 (for the poverty gap ratio).[11] As can be expected, providing a social pension with resources equal to 0.5% of GDP only to ***poor*** elderly leads to almost twice as much reduction in national poverty than if the resources are spent on social pension to ***all*** of the elderly. For example, in Burundi, whereas extending social pension to all of the elderly (60+) leads to 0.42% reduction in national poverty, it leads to 0.92% reduction if it were targeted to poor elderly. Moreover, in the same country, targeting the program to all of the elderly (60+) seems (column 1) to be an inferior option (in terms of national poverty reduction impacts) compared with the option of devoting the same resource to all households whether or housing the elderly (column 5). The results are similar for all countries, and for the poverty gap ratio.

Tables 10 and 11 also contain simulations for the age group 65+. Whether targeting 65+ group leads to a greater (lower) reduction in the incidence of national head count poverty and poverty gap ratio depends on the initial poverty situation of these two groups in each country. Thus in Burundi targeting a social pension to 65+ yields a greater reduction in national poverty than targeting it to persons 60+, and the opposite is true for Burkina Faso. However, in 11 out of 15 countries, social pension targeted to the poor elderly aged 65+ yields a greater reduction in national poverty than targeting the pension to 60+. The simulation results point to the same direction in impact for the poverty gap ratio.

[11] For purposes of this simulation, we are abstracting from the administrative costs of targeting which undoubtedly will be incurred, both for identifying the elderly, and the poor among the elderly.

Table 10: Percentage change in national headcount ratio by targeting .5% of GDP

Country	All elderly 60 years+	65 years+	Poor elderly 60 years+	65 years+	All persons
	1	2	3	4	5
Burundi	-0.42	-0.54	-0.92	-0.79	-0.48
Burkina Faso	-1.63	-1.69	-2.99	-2.93	-1.44
Cote d'Ivoire	-3.17	-2.60	-4.88	-3.34	-1.82
Cameroon	-0.98	-1.51	-2.32	-2.41	-1.33
Ethiopia	-1.00	-0.98	-2.32	-2.24	-1.55
Ghana	-0.78	-0.89	-2.07	-2.21	-1.01
Guinea	-1.44	-1.31	-3.49	-3.73	-1.15
Gambia	-0.73	-0.84	-1.13	-1.25	-0.81
Kenya	-1.08	-1.06	-2.15	-2.14	-1.31
Madagascar	-1.18	-1.37	-2.45	-2.16	-1.24
Mozambique	-0.44	-0.42	-0.66	-0.75	-0.37
Malawi	-0.53	-0.54	-0.76	-0.77	-0.33
Nigeria	-1.03	-0.91	-1.66	-1.90	-0.70
Uganda	-1.11	-1.18	-2.38	-2.45	-1.06
Zambia	-0.41	-0.46	-0.54	-0.61	-0.59

Table 11: Percentage change in poverty gap ratio by targeting .5% of GDP

Country	All elderly 60 years+	65 years+	Poor elderly 60 years+	65 years+	All persons
	1	2	3	4	5
Burundi	-0.92	-0.91	-1.46	-1.39	-1.14
Burkina Faso	-2.78	-2.56	-4.25	-3.53	-3.08
Cote d'Ivoire	-3.99	-3.16	-5.34	-3.59	-4.90
Cameroon	-2.92	-2.71	-4.23	-3.45	-3.38
Ethiopia	-1.71	-1.62	-3.34	-2.81	-1.92
Ghana	-1.88	-1.83	-3.75	-3.42	-2.06
Guinea	-2.97	-2.85	-5.89	-4.75	-3.01
Gambia	-1.87	-1.73	-2.65	-2.45	-1.85
Kenya	-2.16	-1.99	-3.55	-3.08	-2.50
Madagascar	-2.06	-1.78	-3.00	-2.12	-2.99
Mozambique	-1.10	-1.05	-1.62	-1.51	-1.32
Malawi	-1.27	-1.22	-1.73	-1.66	-1.29
Nigeria	-2.05	-1.72	-3.18	-2.55	-2.54
Uganda	-2.26	-2.18	-3.76	-3.25	-2.70
Zambia	-1.52	-1.46	-1.88	-1.78	-1.45

Another way to assess the superiority (or lack thereof) of targeting the poor elderly versus all elderly, and various household structures in which the elderly are living, is to compute the targeting indicator (see Appendix for methodology). This is done in Tables 12. If the computed targeting indicator is greater than 1, then the same amount of budget targeted to that group as social pension will result in a greater reduction in ***national*** poverty than universal targeting (i.e., providing universal benefit of social assistance to all households). The results show that targeting a social pension to the *poor elderly* 65+ is the best option in every country, compared with the policy of an universal social pension to *all* of the elderly; moreover in 9 countries, the impacts in poverty reduction are stronger if the eligibility is restricted to 65+ rather than 60+.

Table 12: Targeting indicator : Impact on Headcount ratio

	All elderly		Poor elderly		
Country	60 years+	65 years+	60 years+	65 years+	All persons
Burundi	0.88	1.12	1.93	1.65	1.00
Burkina Faso	1.14	1.18	2.08	2.04	1.00
Cote d'Ivoire	1.74	1.43	2.67	1.83	1.00
Cameroon	0.74	1.14	1.75	1.81	1.00
Ethiopia	0.65	0.63	1.50	1.44	1.00
Ghana	0.77	0.88	2.05	2.19	1.00
Guinea	1.25	1.13	3.02	3.24	1.00
Gambia	0.90	1.04	1.39	1.53	1.00
Kenya	0.82	0.81	1.64	1.63	1.00
Madagascar	0.95	1.10	1.98	1.74	1.00
Mozambique	1.21	1.16	1.80	2.04	1.00
Malawi	1.60	1.62	2.28	2.31	1.00
Nigeria	1.48	1.30	2.38	2.72	1.00
Uganda	1.04	1.11	2.24	2.30	1.00
Zambia	0.69	0.78	0.91	1.04	1.00

We now replace the fixed budget constraint with a fixed benefit level. If the objective were to provide a social pension equal to 70% of the national average poverty threshold to all elderly, and to poor elderly, (a) how much does this cost, and (b) what are its poverty reduction impacts. The results are summarized in Tables 13 and 14.

Two findings are worth stressing. First, it is a very expensive policy and most countries of Africa may not *afford.* Even if one were to take the poor among 65+ as the target group, for most countries the fiscal cost would be higher than 0.5%, and in some countries it is close to 1% of GDP or more (Table 13). It is very doubtful if this level of spending on an universal social pension program for the elderly is *justifiable* on welfare grounds especially in countries where there may be other groups who may be poorer and more vulnerable on average than the elderly.

Table 13 Cost of social pension (70% of poverty Threshold) as % of GDP

	All elderly		Poor elderly	
Country	60 years +	65 years +	60 years +	65 years +
Burundi	3.05	2.09	1.81	1.26
Burkina Faso	2.11	1.39	1.19	0.79
Cote d'Ivoire	1.11	0.69	0.52	0.33
Cameroon	1.55	0.96	0.97	0.63
Ethiopia	3.74	2.36	1.63	1.03
Ghana	3.30	2.29	1.50	1.04
Guinea	2.66	1.62	1.17	0.72
Gambia	2.83	1.89	1.93	1.24
Kenya	2.06	1.42	1.11	0.76
Madagascar	1.15	0.72	0.64	0.40
Mozambique	2.92	1.75	1.93	1.15
Malawi	3.13	2.18	2.24	1.55
Nigeria	1.68	0.99	1.00	0.55
Uganda	1.86	1.27	0.97	0.69
Zambia	1.68	1.06	1.33	0.84

One way to make the social pension affordable is to *lower* the benefit level, *means-tested* (restricted to the poor elderly), and *eligibility restricted* to 65+. If one were to fix the benefit level at 35% poverty threshold, the budgetary cost would be exactly equal to one half of the reported results. For example, in Zambia, with a benefit level of one-third of the poverty threshold, and eligibility threshold restricted to 65+ and the pension means-tested and restricted to the poor, the cost would drop to 0.42 percent of GDP, abstracting from the administrative cost of means testing. Provided the administrative cost of means-testing is not large, this level of spending may be affordable even in low income countries with a high incidence of poverty.

Second, the program (if targeted to the poor elderly) would significantly reduce the national (head count) poverty ratios (Table 14) even with a benefit level of 35% of the poverty threshold. Though we have not shown the results, the impacts on the reduction in the national poverty gap ratio is also impressive and in the same direction

Caveats and Limitations: While the above simulations do cast doubts on the fiscal affordability and desirability (on welfare grounds) of universal social pensions for the elderly, and underscore the gains in targeting social pensions to those most in need, *more work is needed to assess the administrative costs and feasibility of implementing a means-tested social pension*. Second, the potential adverse incentive effects also need to

Table14 : Percentage change in national headcount by targeting assistance equal to 70 % and 35% of average **poverty line to poor elderly**

	Poor Elderly 60 +		Poor elderly 65 +	
Country	Pension = .70% Poverty threshold	Pension = .35% of Poverty threshold	Pension = .70% of Poverty threshold	Pension = .35% Poverty threshold
Burundi	-2.98	-1.49	-1.96	-0.98
Burkina Faso	-5.72	-2.86	-3.78	-1.89
Cote d'Ivoire	-4.92	-2.46	-3.07	-1.53
Cameroon	-4.59	-2.29	-2.91	-1.45
Ethiopia	-5.16	-2.58	-3.28	-1.64
Ghana	-6.06	-3.03	-4.18	-2.09
Guinea	-7.28	-3.64	-4.57	-2.28
Gambia	-5.56	-2.78	-3.61	-1.80
Kenya	-4.68	-2.34	-3.11	-1.50
Madagascar	-3.13	-2.56	-1.90	-0.95
Mozambique	-3.66	-2.33	-2.12	-1.06
Malawi	-4.41	-2.20	-3.02	-1.50
Nigeria	-4.07	-2.03	-2.14	-1.07
Uganda	-4.45	-2.22	-3.13	-1.56
Zambia	-2.43	-1.21	-1.51	-0.75

be taken into account while designing even a targeted social pension program. From the perspective of avoiding such adverse incentive effects and potential (artificial) changes in household types and compositions in response to a social pension program targeted to a specific household type, it appears preferable to target the pension to ***all poor elderly i.e., all poor households in which the elderly live,*** for the pension benefit. [12] In brief, while there is a case for *targeted* non-contributory social pensions for the elderly from a (national) poverty reduction stand point, caution is needed in selecting the right targeted approach while operationalizing a social pension policy.[13]

[12] Bearing in mind fiscal affordability and sustainability over time, it is not surprising that countries such as India have restricted the old age pension only to the poor among the elderly.

[13] There is only limited experience with respect to social pension programs in Africa, and evaluations of such experience is even scarcer. Two notable exceptions are South Africa and Namibia. The eligibility for the South African social pension program is determined by age. So it is simple to administer though the requirement of birth certificates might exclude some eligible individuals. An evaluation by Case and Deaton (1998) has shown that the program, though universal, is largely pro-poor, and women benefited more than men due to the higher life expectancies of the former over the latter. Their analysis of behavioral responses is not definitive. Subbarao (1996) noted that the eligibility for the Namibian social pension program is also determined by age, and is largely pro-poor. However, exclusion errors were pervasive due to its complex, and documentation-intensive registration procedures. The experience thus far in Africa is limited to middle income countries where affordability is less of a concern. However, in low income African countries where competition for scarce resources is fierce, universal (untargeted) social pensions is neither desirable on welfare grounds nor is it fiscally sustainable. For an overview of targeting approaches, see Coady, Grosh and Hoddinott.(2004).

The choice between keeping the eligibility for a social pension universal versus keeping it means-tested is much debated in the literature. This study extends the debate by introducing the poverty reduction impacts of various options. The main finding is that with a budget limit of 0.5 per cent of GDP – a fiscally sustainable cost for most countries – if one were to choose 65+ as the cut off point for eligibility, targeting (and means-testing) the pension to the poor among the elderly, rather than rendering the eligibility universal, appears to yield the best possible results in poverty reduction of both the elderly in need and for national poverty reduction. In other words, bearing all factors into consideration, the case for universal untargeted social pensions for the elderly appears rather weak. Perhaps with a higher age cut off point, say 75+, it might be possible to render eligibility universal and also keep the fiscal cost within the 0.5 percent of GDP for most countries, but then the benefits of the social pension will be so limited in scope as to be almost inconsequential in terms of poverty reduction of the majority of the elderly and on national poverty. On the other hand keeping it universal with an eligibility cut off at 60+ will be unjustifiable on welfare grounds, apart from being fiscally so expensive as to be unsustainable for most countries.

It is often asserted that considerations of fiscal sustainability are far fetched because they ignore the potential for economic growth in these low income countries. Simulations done by Smith and Subbarao (2003) show that typical low income countries, even to keep the absolute number of the poor constant, need to grow at 5 to 7 per cent per annum, whereas the actual (realized) growth of GDP for most low income African countries was less than 3 per cent per annum in the recent past. This suggests that the fiscal leverage from economic growth is likely to be extremely limited, if not nil, for low income countries of Africa in the medium term, and so the argument that universal social pensions can sustained in a "growth scenario" is tenuous at best.

In sum, it appears desirable, in the larger interest of the elderly themselves, to *target the pension to the poor among the elderly keeping the age cut off at 65+*, and encourage country-specific work on the feasibility of creative and cost-effective approaches to targeting. As pointed out by Coady, Grosh, Hoddinot (2004) in their survey of approaches to targeting, often a single cross-section household survey would be enough to assess the costs and benefits of various approaches to targeting (simple means tests, proxy means tests, categorical, self-selection, community targeting) in a given country situation. This survey also notes that often it should be possible to combine different approaches: in this case a social pension to the elderly above 65 years of age (categorical) could be combined with means testing (individual assessment), and if the benefit level is kept low enough to be unattractive to the non-poor was done in Nepal,[14] it could induce self-selection as well. In addition, recent innovations in delivery such as imposing conditions for the receipt of transfer can avoid adverse incentive effects and leakages.

[14] See R. Palacios and S.I. Rajan (2004) "Safety Nets for the Elderly in Poor Countries: The Case of Nepal", Draft. The World Bank.

VI. Children with the Elderly: Are they worse off or better off?

As noted at the beginning of the paper, one of the consequences of AIDS pandemic has been that the elderly, especially grandparents, have become caregivers of children in many countries. (Subbarao and Coury, 2004) In Uganda, Malawi and Zambia, close to one out of five children now live with the elderly. One important question that is worth examining is whether children living the elderly headed households, or living with elderly only, suffer from education disadvantage, compared with the average, and compared with children living with households with no elderly.

To address the above question, we fitted a logit with the dependent variable, a dummy, which takes 1 if the child is in school and 0 if not in school. Independent variables include household welfare measured by the household's per capita expenditure divided by the poverty line, a dummy variable for elderly-headed households and a dummy for urban/rural residence. This is not a completely specified model of the determinants of schooling; that is not our objective. Our purpose is limited to assessing the specific disadvantage, if any, suffered by children if they happen to be living in a particular household environment. Because of the limited nature of this specification, the model results cannot be used for answering the wider question of all the factors governing a child's schooling. Results are reported in Table 15 for male children and Table 16 for female children.

Table 15: Elasticity of probability of male children attending school

	Welfare		Elderly head		Urban areas	
Country	Elasticity	t-Value	Elasticity	t-Value	Elasticity	t-Value
Burundi	0.2674	10.7	-0.0034	-0.6	0.0154	3.8
Burkina Faso	0.1620	8.0	0.0015	0.2	0.1920	25.9
Cote d'Ivoire	0.2543	9.8	-0.0047	-0.7	0.1535	10.9
Cameroon	0.0437	2.0	0.0338	3.9	0.0235	1.8
Ethiopia	0.1467	6.0	-0.0005	-0.1	0.1470	27.9
Ghana	0.1019	8.5	-0.0019	-0.8	0.0310	5.9
Guinea	0.3465	9.0	-0.0076	-0.6	0.3045	18.3
Gambia, The	0.0452	1.8	-0.0120	-0.8	0.0620	2.8
Kenya	0.0120	2.2	-0.0042	-2.6	0.0027	1.5
Madagascar	0.1017	7.2	-0.0021	-0.9	0.0137	2.7
Mozambique	0.1277	7.8	0.0024	0.4	0.0631	8.4
Malawi	0.0378	3.0	-0.0067	-1.6	0.0164	3.4
Nigeria	0.0149	1.8	0.0317	7.4	0.1505	16.7
Uganda	0.0999	11.9	0.0071	3.6	0.0046	2.1
Zambia	0.1039	11.6	0.0026	0.9	0.0913	14.8

The results reported in Tables 16 and 17 are the elasticity of probability of male and female children attending school. In Burundi, if per capita welfare improves by 1%, the probability that a male child attend school will increase by 0.27 per cent with a highly significant t value. Thus, in richer households, a greater percentage of *male* children go to school – a very plausible and predictable result. The elasticities with respect to elderly-headed dummy are significant and positive in Cameroon, Nigeria, and Uganda. In other words, in these three countries, if children shift from non-elderly headed households to elderly-headed households, the probability of *male* children attending the school increases. As can be expected, in urban areas the elasticity is generally positive and high in all countries, implying that male children in urban settings are most likely to attend schools. It also implies that the potential adverse impacts on schooling is nil for male children living with the elderly.

The results are quite the opposite for *female* children in some, but not all, countries. In Burundi, Burkina Faso, Cote d'Ivoire, Ghana, and Guinea, the probability of female children not attending the school increases when they shift from non-elderly headed to elderly headed households. The opposite is the case in Cameroon, Nigeria, Uganda and Zambia. In other words, in these four countries, female children living in elderly homes do not suffer from schooling disadvantage.

The policy conclusion of this very limited exercise is very simple and straightforward, viz., it is important to be aware of gender differences in schooling outcomes when children are looked after by elderly-headed households.[15] While our study does not offer a conclusive proof, a social pension *targeted* to poor, elderly-headed households may have the potential for reducing the female disadvantage in schooling. More work is needed for understanding the gender impacts of a social pension program.

[15] A similar gender disadvantage in schooling was obtained for Rwanda by Siaens, Subbarao and Wodon (2004) where it was shown that orphaned girl children fostered by female headed households were less likely to be in school than others.

Table 16: Elasticity of probability of female children attending school

	Welfare		Elderly head		Urban areas	
Country	Elasticity	t-Value	Elasticity	t-Value	Elasticity	t-Value
Burundi	0.2946	10.8	-0.0259	-3.9	0.0262	5.6
Burkina Faso	0.1848	8.2	-0.0580	-4.0	0.2494	27.6
Cote d'Ivoire	0.2010	7.3	-0.0140	-1.8	0.2001	11.0
Cameroon	0.0701	2.6	0.0383	3.7	0.0516	3.4
Ethiopia	0.1985	6.9	0.0087	1.4	0.2075	32.8
Ghana	0.1046	7.4	-0.0119	-4.2	0.0227	3.7
Guinea	0.4070	9.3	-0.0344	-1.7	0.4465	17.2
Gambia, The	0.0861	3.0	0.0221	1.3	0.0488	1.9
Kenya	0.0487	6.1	0.0012	0.7	-0.0016	-0.9
Madagascar	0.0666	4.6	-0.0011	-0.4	0.0127	2.2
Mozambique	0.2235	10.2	0.0031	0.5	0.0952	10.5
Malawi	0.0200	1.8	-0.0004	-0.1	0.0101	2.1
Nigeria	0.0002	0.0	0.0350	6.9	0.2308	22.3
Uganda	0.1334	15.0	0.0096	4.6	-0.0021	-1.0
Zambia	0.1257	12.9	0.0056	2.1	0.1163	17.5

VII. Conclusions and Implications for Policy.

The main objective of the study is to delineate the poverty among the elderly in 15 low income Sub Saharan countries and to assess the role of social pensions for the elderly. The study finds that, when defined by household structure, the elderly only, elderly with children, and the elderly-headed households are poorer than others in eleven out of fifteen sample countries. In four countries, groups other than the elderly seem to be at a higher risk of poverty, such as children and families with many children. Thus, while certain groups of the elderly undoubtedly face a greater risk of being poor, the elderly as a whole do not seem to be over-represented among the poor. *The findings suggest that even in the eleven countries where certain categories of the elderly happen to be at a higher risk of poverty, the case for an universal social pension for* ***all*** *of the elderly is weak both on welfare grounds, and on considerations of fiscal affordability.* For example, for a typical country considered in our sample, an universal social pension for all of the elderly above 65 years of age would cost about 2 per cent of GDP, a level comparable to, or higher than, the current levels of spending on health care. Increasing the age cut-off to 70+ or 75+ might lower costs, but few would be eligible for the pension, and it would have little impact on poverty reduction at the national level.

The study finds, however, that there ***is*** a case for a non-contributory social pension to ***some*** of the elderly in ***all*** countries. Further detailed analysis and simulations suggest that from the perspective of maximum impacts on reduction in poverty among the poor

elderly, and for ***national*** poverty reduction, there appears to be a need for a non-contributory pension program ***restricting the eligibility to the poor among the elderly.*** Considerations of affordability and fiscal sustainability suggest that it is best to limit the benefit level to about one-third of the poverty threshold, eligibility age threshold to be 65+, and explore alternative non-income-based methods of targeting to restrict the pension ***only to the poor*** among the eligible elderly (i.e., 65+).

A targeted approach has undoubtedly some limitations. Even the best targeted approach entails an irreducible element of randomness that leads to inclusion and exclusion errors.[16] Fortunately, several recent innovative approaches in targeting including proxy means tests coupled with conditional transfers offer much scope for reducing the errors in targeting, especially since most African countries now have at least one large, nationally representative household survey in the post-HIV AIDS period (around the year 2000). [17] Moreover, recent project experience with providing cash assistance to families hit by drought in Ethiopia, or to families supporting orphans in Burkina Faso, suggests that community-driven approaches can be successful in reaching the needy in Africa.[18] Given the heterogeneity of the situation of the elderly across the fifteen countries, more country-specific work is needed to explore administratively feasible, cost-effective, and non-income-based targeting options.

[16] As Subbarao et. Al. (1997) study noted, "screeing out the poorest (exclusion errors) is a bigger problem than including the non-poor (inclusion errors) in the targeting of any safety net transfer program; too much fine tuning in targeting may actually hurt the poor if the program loses political support.
[17] See Coady, Grosh and Hoddinott (2004).
[18] These experiences will be analyzed as soon as follow-up survey information is collected.

Appendix 1.

METHODOLOGY

Suppose we want establish a social assistance program (targeted either to the elderly as a social pension, or a conditional grant to children or to any other identified vulnerable group) in a poor country. Since the resources available to the country's government are limited so our scheme should be such that it should lead to a maximum reduction in *aggregate* (national-level) poverty. To achieve this objective, we first need to fix a poverty measure, which we want reduce. In the literature, there exist many poverty measures, which indicate different facets of poverty. Focusing on a single poverty measure may not be desirable. Our study will focus on three poverty measures:

1. Head-count ratio
2. Poverty gap ratio
3. Severity of poverty

These three measures are more than adequate to capture different facets of poverty among vulnerable groups including the elderly. All the measures belong to a single class of additive separable poverty measures:[1]

$$\theta = \int_0^z P(z, x) f(x) dx \qquad (1)$$

where x is the income or expenditure of a person, which is a random variable with density function f(x) and z is the poverty line. $P(z, x)$ is a homogenous function of degree zero in z and x such that

P(z,x) = 0 if x=z

$$\frac{\partial P(z,x)}{\partial x} < \mathbf{0}$$

$$\frac{\partial^2 P(z,x)}{\partial x^2} > \mathbf{0}$$

Foster, Greer, and Thorbecke (1984) proposed a class of poverty measures that is obtained by substituting

$$\mathrm{P(z, x)} = \left(\frac{z-x}{z}\right)^{\alpha} \qquad \textbf{(2)}$$

[1] This class of measures exclude Sen's (1976) and Kakwani(1980) poverty measures, which are based on interdependent utility function and therefore are not additively separable.

in (1), where α is the parameter of inequality aversion. For $\alpha = 0, \theta = H$, that is, the headcount ratio. This measure gives equal weight to all poor irrespective of the intensity of their poverty. For α =1, each poor is weighted by his or her distance from the poverty line relative to z. This measure is called the poverty gap ratio. For α =2, the weight given to each poor is proportional to the square of his or her income shortfall from the poverty line. This measure is called the severity of poverty ratio.

3: EXACT TARGETING

The class of poverty measures given in (2) is basically a function of income shortfalls of all individuals from the poverty line. The income shortfall is positive for all poor and zero for all non-poor. It is obvious that an optimum assistance scheme will be the one, which gives money to the poor proportional to their income shortfall. Suppose p(x) is the pension that is given to a person with income x, then our pension scheme will be given by

$$P(x) = k(z-x), \text{ if } x<z$$
$$= 0, \text{ if } x \geq z \qquad (2)$$

where k lies in the range $0 < k \leq 1$. The per person cost of this pension scheme to the society will be given by

$$c = kH(z - \mu^*)$$

where μ^* is the mean income of the poor. k is determined from how much the society can afford to pay this cost. Suppose for example, a country can afford to spend 100ρ percent of its GDP on pensions, then

$$k = \frac{.\rho \times GDP}{H(z - \mu^*)N}$$

where N is the population of the country. If k=1, then poverty is completely eliminated in the country within one year. If a country can afford to eliminate poverty within one year, should it do it? This scenario may sound very attractive, but there is one serious problem. The parameter k is closely related to an incentive effect of poverty reduction. Suppose a pensioner earns an extra dollar of income, then his or her pension will reduce by k dollars, the net benefit of earning one dollar of income to the pensioner will be (1-k) dollars. If k=1, then the pensioner will gain nothing by working. As a matter fact, he or she may stop working completely and receive the maximum benefit of (z-x) dollars. This may lead to a reduction in the country's GDP resulting in lower affordability. The smaller is the k, the greater will be the incentive for the poor to work. This kind of pension scheme is in operation in some developed countries such as Australia but value k is kept at a level much lower than 1.

What is the cost (as percentage of GDP) that will eliminate poverty completely? This can calculated by the formula:

$$CGDP = \frac{H(z - \mu^*)}{PGDP}$$

where PGDP is the per capita GDP. This cost can be calculated for any type of vulnerable group such children, elderly and so on. The total cost of eliminating poverty in the whole population will be equal to sum of the costs of eliminating poverty in individual groups.

The targeting schemes presented in this section may be called exact targeting because they provide benefits to each individual proportional to his or her income shortfall from the poverty line. These schemes can be more readily implemented in the rich industrialized countries, where most of the earning activities take place in formal sectors of the economy. These schemes will not be operational in developing countries, which have large informal sectors, where it is not possible to identify accurately people's incomes. In these countries, we need to design universal targeting pension schemes.

4: UNIVERSAL TARGETING

In the universal schemes, we give the same benefits to all individuals who satisfy certain easily identifiable criteria. For instance, we may give pensions to elderly persons who have to support children or we may give pensions to those who are handicapped, or conditional grants to poor families with children currently not in school. In this section, we present designing of such schemes with a major objective of reducing *aggregate* national-level poverty.

First, we attempt to answer the question: what will be the percentage reduction in poverty when we give everyone in the population one unit of a country's currency? To answer this question, we first need to choose a poverty measure. Let us first focus on the entire class of poverty measures defined in (1), which can be written as

$$\theta = \int_0^H P(z, x(p))dp \qquad (3)$$

where H is the head-count ratio. Differentiating (3), we obtain

$$d\theta = \int_0^H \frac{\partial P}{\partial x} dx(p)dp \qquad (4)$$

If we assume that everyone gets the same benefit, dx(p) will be the same for everyone, then equation (4) can be written as

$$\eta_\theta = \frac{1}{\theta}\frac{d\theta}{dx} = \frac{1}{\theta}\int_0^z \frac{\partial P}{\partial x} f(x)dx \qquad (5)$$

η_θ is the percentage change in poverty when we give everyone one unit of the country's currency. η_θ will always be negative because poverty will always decrease when we give positive benefits to people. We may call η_θ as the absolute elasticity of poverty.

Note that the absolute elasticity changes over time, so we denote $\eta_{\theta t}$ as the absolute elasticity in year t.

Suppose a government spends 100ρ percent of its GDP on pensions for the elderly, then the money available per person will be $\rho \times GDB / N$, which if given to everyone will change the aggregate poverty between year t-1 to year t by $100\rho \times PGDP \times \eta_{\theta t}$ percent (PGDP is the per capita GDP). Thus, we have the relationship:

$$\theta_t = \theta_{t-1}(1 + \rho \times PGDP \times \eta_{\theta t}) \qquad (6)$$

Suppose θ_0 is the poverty level in the base year, then equation (6) will allow us to compute the incidence of poverty in any year.

Equation (6) allows us to measure the long-term impact of the universal pension (or any other social assistance) scheme on poverty. However, the economy does not remain static over time. The per capita GDP changes every year. The poverty will reduce over time because of two factors: first growth increases people's income and secondly more money is available to people every year through increases in pension (social assistance).

Let us assume that the per capita GDP is growing at an annual rate of 100g percent. Suppose further that growth process is such that everyone gets the same proportional benefits or in other words everyone's income is increasing at the same rate of 100g percent, the proportional change in poverty can the be derived from (4) as

$$\frac{d\theta}{\theta} = \frac{g}{\theta}\int_0^z \frac{\partial P}{\partial x} x f(x) dx \qquad (7)$$

which gives

$$\delta_\theta = \frac{1}{\theta}\int_0^z \frac{\partial P}{\partial x} x f(x) dx \qquad (8)$$

as the growth elasticity of poverty (Kakwani 1993).

Note that growth elasticity is always negative because poverty decreases when everyone receives the same proportional income. Further it does not remain constant over time. Kakwani and Son (2004) have shown that it declines over time when growth takes place. So we denote this elasticity in year t by $\delta_{\theta t}$

If there were no universal pension or social assistance scheme, poverty will change between year t-1 and year t by $100 \times g \times \delta_{\theta t}$ percent. Then the poverty level in the tth year will be given by

$$\theta_t = \theta_{t-1}(1 + g \times \delta_{\theta t}) \qquad (9)$$

Given the incidence poverty in the base year given by θ_0, equation (9) can be used to calculate the incidence of poverty in any year.

Since the poverty is affected by *both* growth and social assistance scheme, the poverty level in year 1 will be given by

$$\theta_t = \theta_0[1 + \rho \times PGDP \times \eta_{\theta 1}](1 + g \times \delta_{\theta 1}) \qquad (10)$$

and for other years when t=2,3,------,n, it will be given by

$$\theta_t = \theta_{t-1}[1 + \rho \times PGDP \times \eta_{\theta t} \times (1 + g)](1 + g \times \delta_{\theta t}) \qquad (11)$$

Equation (11) takes account of the fact that when growth takes place, the more money is available every year for targeting.

(8)

If we substitute g=0, when there is no growth in economy, (11) will lead to (6), in which case poverty will reduce only due the universal pension scheme. If we substitute $\rho = 0$, when there is no pension scheme, in which case poverty will change only because of economic growth, (11) will lead to (9). Note that if growth is negative, poverty will increase.

The United Nations has set eight millennium development goals, one of which is to reduce poverty to half in 25 years. Equation (11) should allow us to determine the social assistance rate (targeted not necessarily to the elderly, but to the most disadvantaged group in society) that will meet this goal.

5: TARGETING SPECIFIC GROUPS

The universal scheme may be too costly to operate. Another alternative is to target specific groups so that we achieve a maximum reduction in total poverty *with given (limited) resources.*

Suppose that there are K mutually exclusive socio-economic groups in the population. Since the poverty measures given in (3) are additively decomposable we can write

$$\theta = \sum_{k=1}^{K} a_k \theta_k \qquad (12)$$

where a_k is the population share of the kth group and θ_k is the poverty level in the kth group. This equation implies that the total poverty is the weighted average of poverty levels in different groups with weight proportional population shares.

Differentiating (12) both sides, we obtain

$$\eta_\theta = \frac{1}{\theta} \sum_{k=1}^{K} a_k \theta_k \eta_{k\theta} \qquad (13)$$

where $\eta_{k\theta}$ is the absolute elasticity of poverty for the kth group. If everyone in the kth group received one unit of country's currency, poverty in the kth group will change by $100 \times \eta_{k\theta}$ percent. Let write

$$\eta^*_{k\theta} = \frac{a_k \theta_k}{\theta} \eta_{k\theta} \qquad (14)$$

which implies that if everyone in the kth group receives one unit of country's currency, then total poverty in the country will change by $100 \times \eta^*_{k\theta}$ percent.

Suppose that we give pension only to individuals in the kth group and the total money available for distribution is $\rho \times GDP$ so every person in the kth group will receive a pension of $\rho \times PGDP / a_k$ so the percentage reduction in total poverty in the country will be given by $100\rho \times PGDP \eta^*_{k\theta} / a_k$, which in view of (14) is equal to $100\rho \times PGDP \theta_k \eta_{k\theta} / \theta$. As we demonstrated above, if we did the universal targeting, then with the same amount of money, the percentage reduction in poverty will be $100\rho \times PGDP \times \eta_\theta$. This leads us to propose a targeting indicator for the kth group as

$$\lambda_k = \frac{\theta_k \eta_{k\theta}}{\theta \eta_\theta} \qquad (15)$$

If λ_k is greater than 1, we can say that with the same amount of money, targeting the kth group will result in greater poverty reduction than the universal targeting. It can be shown that

$$\sum_{k=1}^{K} a_k \lambda_k = 1 \qquad (16)$$

which implies that the weighted average of target indicators of different groups with weight proportional to the population shares is equal to 1. It means that for some groups λ_k will be greater than one and for others it will be less than 1. The larger the value of λ_k, the greater will be the percentage poverty reduction for the kth group compared to the universal targeting. Thus, we can use λ_k as a criterion for targeting a group.

This analysis would be made operational using the Foster, Greer and Thorbecke (1984) poverty measures given in (2). We would present our empirical results for three members of this class, namely, when $\alpha = 0,1 and 2$.

Appendix 2 : Poverty Lines

The study used the national poverty lines, which were obtained from various poverty assessment reports, which are listed below. These poverty lines are very crude and do not take account of different needs of household members by age and sex. They also do not take account of the economies of scale, which operate in large households. We modified these poverty lines using the following common methodology.

1. In many countries, the poverty lines were not available for the survey years. We used the consumer price index to adjust these lines so that they correspond to the survey years.
2. The national poverty lines obtained from poverty assessment reports were single poverty lines and thus made no allowance for different needs of household members, which do vary with age and sex. We made the decision that different needs of individuals can adequately be approximated by the calorie requirements, which are estimated for individuals of different age and sex. We obtained the calorie requirements that are widely used in Africa. These requirements are given in Table A1.The household surveys in each country had information on age and sex of each household member. We allocated the calorie requirements as given in Table A1 to each household member. Adding up the calorie requirements of each member and dividing by household size, we obtained the per calorie requirement of each household. We could then calculate the per capita calorie requirement of the whole population by the weighted average of the per capita calorie requirements with weights proportional to population of individuals represented by the sample households. These average calorie requirements, presented in table A2, vary across countries because of differences in countries' population composition. .

3. Average poverty lines in the survey years as obtained in (1) were allocated to each household in proportion to their per capita calorie requirements so that average poverty line for the country as a whole is the same. The average poverty lines are presented in Col 2 of Table A2.

4. Finally we made an adjustment for the economies of scale. The larger households will have lower per capita poverty line than the smaller household. The economies of scale parameter was assumed to be equal to 0.7, which that the larger households will incur about 30 % less expenditure than the smaller households but still will enjoy the same utility level. Thus, the per capita poverty line for the ith household will be given by

$$(pline)_i = k(apline)n_i^{0.7} / n_i$$

where k is the constant of proportionality and (alpine) is the average poverty line.. The parameter k is determined so that mean of $(pline)_i$ .across all households is equal to the average poverty line (alpine). This ensures that the adjustment for economies of scale does not change the mean of the poverty line.

Table A1: Calorie requirements by age and sex

	Age	Requirement
Children	0 to 1	800
	1 to 3	1300
	4 to 6	1800
	7 to 10	2000
Males	11 to 14	2500
	15 to 18	3000
	19 to 50	2900
	51+	2300
Females	11 to 50	2200
	51+	1900

Table A2: 'Average calorie requirements and poverty lines

	Cal requirement	Poverty line
Burundi	2150	63760
Burkina Faso	2140	47736
Burkina Faso	2152	53639
Cote d'voire	2266	166758
Camroon	2164	139186
Ethiopia	2164	862
Ghana	2192	680270
Guinea	2140	291386
Gambia	2191	2607
Kenya	2147	10521
Kenya	2198	13277
Madagascar	2171	674128
Madagascar	2178	766139
Mozambique	2165	1859424
Malawi	2188	3829
Nigeria	2253	11285
Uganda	2139	223118
Zambia	2193	428305

Appendix Table A3

Head count ratio by household types

Country	No elderly persons	Elderly persons only	Elderly & children only	Mixed Households with elderly	Not headed by elderly	Headed by elderly	All persons
Burundi 98	61.6	67.5	58.6	59.0	61.4	59.8	61.2
Burkina Faso 98	48.9	47.0	59.3	58.1	51.0	57.5	52.6
Cote d'voire98	33.1	46.1	60.7	47.1	34.5	46.9	36.7
Camroon 96	58.7	45.9	32.8	66.7	58.6	70.8	60.9
Ethiopia00	40.3	42.4	42.3	43.5	40.1	45.2	40.9
Ghana 98	40.9	32.4	57.7	52.1	42.2	49.6	43.6
Guinea94	34.8	37.5	58.4	42.8	37.0	41.1	38.1
Gambia 98	53.9	58.6	31.7	72.0	58.5	72.0	62.2
Kenya97	47.9	45.4	55.2	59.3	48.1	58.8	49.7
Madagascar 01	62.3	50.0	62.1	60.5	62.1	61.1	62.0
Mozambique96	69.2	53.8	75.5	67.6	68.8	69.8	68.9
Malawi 97	62.3	62.9	82.3	71.8	62.4	73.8	63.9
Nigeria 96	61.6	34.3	64.2	72.8	62.5	67.9	63.4
Uganda99	48.6	56.4	65.2	45.1	48.3	47.4	48.2
Zambia98	64.4	72.0	90.2	78.6	64.8	80.1	66.7

Appendix Table A4

Percent reduction in total (national) poverty gap by targeting household types: (.5 % of GDP)

Country	No elderly persons	Elderly persons only	Elderly & children only	Mixed households	Not headed by elderly	Headed by elderly
Burundi 98	1.16	0.85	0.97	1.08	1.16	1.06
Burkina Faso 98	4.36	2.48	3.68	5.51	4.60	5.44
Cote d'voire98	4.31	3.94	7.47	6.86	4.58	6.62
Cameroon 96	3.23	1.67	1.47	3.86	3.24	4.07
Ethiopia00	1.92	1.41	1.70	2.04	1.92	2.06
Ghana 98	1.94	1.00	2.50	2.54	2.02	2.33
Guinea94	2.75	1.82	4.08	3.45	2.97	3.20
Gambia 98	1.50	0.95	0.72	2.28	1.73	2.21
Kenya97	2.43	1.58	2.47	3.06	2.44	2.92
Madagascar 01	3.02	1.63	2.79	3.00	3.01	2.97
Mozambique96	1.32	0.72	1.26	1.35	1.31	1.34
Malawi 97	1.26	0.90	1.57	1.48	1.27	1.46
Nigeria 96	2.45	0.98	2.33	3.10	2.51	2.79

Uganda99	2.75	2.01	3.29	2.56	2.75	2.55
Zambia98	1.40	1.07	1.74	1.76	1.41	1.75

Appendix Table A5

Sources of poverty lines

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