How Skip-Generation and Other Older Person Household Compositions in sub-Saharan Africa
Relate to Material Well-Being

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ABSTRACT: Demographic realities mean skip-generation households are common and increasing in sub-Saharan Africa. We test how this household type fares in comparison to four other types. Skip-generation older person households are hypothesized to do particularly poorly in countries with high AIDS mortality. Data come from recent Demographic and Health Surveys. Material well-being is operationalized using a durable wealth score (DWS). Results indicate older person only households have the lowest average DWS followed by skip-generation. Households containing adult children are best off. Tests that descriptively connect material well-being of skip-generation households across countries fail to confirm a robust link between DWS and level of AIDS mortality. Older persons may benefit materially when a grandchild moves in following an AIDS death in the family by increased support of other family members or support from grandchildren themselves. Older person households with absent adult children are at a disadvantage regardless of the reason for absence.

This manuscript presents the relationship, across sub-Saharan African countries, between several types of household compositions of older adults - a characteristic that is an important indicator of access to support - and the material well-being of households within which older persons live (Bongaarts and Zimmer 2002; Davis et al. 1997). The relationship is important due to a combination of unique challenges facing older persons in the region. Across all developing countries, older persons are at risk of living in poverty and as a result are susceptible to experiencing low levels of well-being across many dimensions, such as material, physical and emotional (Barrientos, Gorman and Heslop 2003; Gupta, Pattillo and Wagh 2009; Lloyd-Sherlock 2000). The probability of living in poverty in sub-Saharan Africa is particularly high and risks of old-age poverty are extreme (Adeyemi, Ijaiya and Raheem 2009; Barrett, Carter and Little 2006; Collier 2007; Ezeh et al. 2006; Kakwani and Subbarao 2007). Understanding determinants of material well-being among elders in the region is thus an important step towards reduction in poverty and improvement in overall well-being.

But, older persons in the region face additional obstacles that may make them even more vulnerability to low quality of life in comparison to others. More than those at other ages, they are at risk of physical functioning limitations and non-communicative chronic diseases. This results in a subsequent need for physical and material support; assistance that has, within the sub-Saharan African culture, been traditionally provided by adult children and other family members (Aboderin 2006; Adamchak et al. 1991). But, an HIV/AIDS epidemic that is resulting in high mortality within families, labor migration, and modest reductions in fertility may be reducing availability of adult children, who are the traditional providers of old-age support. Indeed, households containing older persons and their grandchildren in a skip-generation situation, which is defined as a household containing one or more older person and at least one of their

grandchildren 15 or younger but none of their own children aged 16 and older, are on the rise and the trend is likely to continue (Apt 2007). The HIV/AIDS epidemic itself has been implicated as a major force leading to increased numbers of skip-generation households in high AIDS-mortality countries (Kakwani and Subbarao 2007; Kautz et al. 2010; Zimmer 2009). Consequently, for many older adults, the time of life when they are most in need of support may also be a time when they are required to contribute to the care of youngsters while they may or may not be getting material support from their own adult children or other family members. Despite these challenges and the dynamic nature of household composition in the region, older persons in sub-Saharan Africa remain somewhat of a 'black box'. Certainly, very little is known regarding whether, and to what extent, their well-being is a function of household composition.

AGING, HOUSEHOLD COMPOSITION AND VULNERABILITY

Population aging, defined as a growth in the number and proportion of older people within a population, is taking place throughout the developing world. As an ongoing process, it is occurring more rapidly in developing than developed countries (Kinsella and Phillips 2005; United Nations 2007). For instance, those 60 and older constituted about 22% of the population of the world's more developed regions in 2010, and this will increase to about 31% by 2040 according to United Nations medium variant estimations. At the same time, about 9% of the population in the world's less developed regions was aged 60 and older, but this will almost double to 17% over the same time period (United Nations 2009). Thus, while populations in the more developed world will, for some time, consist of a larger percent of older persons, growth in the aged population is much higher in the developing world (Velkoff and Kowal 2006).

While it is not often thought of as an aging region, sub-Saharan Africa is part of this global process. Its 60 and older population is increasing at an astounding rate of 3.2% annually – a rate at which doubling occurs in only about 20 years - and will increase from approximately 43 million persons in 2010 to over 110 million by 2040. As a comparison, the global population is growing at a rate of about 1% annually; a rate at which doubling takes about 70 years.

Population aging results in challenges for the developing world. These tend to be overwhelming in the poorest countries that do not have the resources available to support an overhaul in population age structure. Health care systems, as one example, which in younger aged countries tend to be geared toward children and maternal health, need to be restructured to additionally deal with non-communicative chronic diseases common among the aged. Furthermore, these poorest of countries cannot provide public forms of social security available to those in other parts of the world. As some put it, they are growing old before rich, in contrast to developed countries that were already rich before old (Long and Pfau 2009). This is the case in Sub-Saharan Africa where normative systems of material well-being revolve around the family, particularly adult children, who traditionally provide caretaking and material support for their aging parents (Aboderin 2006; Apt 1992).

Additional phenomena are working in tandem to decrease the propensity of older persons to be supported by their adult children (Kakwani and Subbarao 2005; Kakwani and Subbarao 2007). Many families suffer from severe poverty, and some evidence suggests rates are increasing (Collier 2007). As a result, the traditional family orientated social security safety net is becoming increasingly unreliable. At the same time, the AIDS epidemic in much of the sub-continent is resulting in heightened death rates for working aged adults. As such, the epidemic is

taking away, through mortality, substantial numbers of those who are the traditional caretakers of older persons.

The epidemic may also have ways of increasing the cost burden among older persons and hence households containing an older adult. There is the loss of income from working aged adult children that die, the bearing of costs for the caretaking of those that are ill, costs for their subsequent funerals, and expenditures associated with caretaking of grandchildren left behind (Adeyemi, Ijaiya and Raheem 2009; Clark 2006; Knodel, Watkins and VanLandingham 2003). Older persons may find the need to sell durable goods or borrow money and go into debt in order to pay for costs associated with an adult child's AIDS illness and subsequent death. Additionally, the HIV virus often runs through a family, and subsequently AIDS tends to kill both an adult child and their spouse, leaving behind a 'double orphan' who often ends up living in an older adult household (Zimmer 2009).

Another impact on the material well-being of older persons is the movement of working aged adults in search of labor. Labor-based migration can increase the numbers of skip-generation households and put burdens on elders to become household breadwinners and caretakers for grandchildren left behind (Hosegood and Timaeus 2006; Kakwani and Subbarao 2007; Zimmer 2009). But, migration can also have positive impacts in the form of remittances from children living elsewhere (Gupta, Pattillo and Wagh 2009; Isiugo-Abanihe 2002; Madhavan 2004).

It is clear that both household composition and material well-being among older persons in sub-Saharan Africa need to be examined within specific contexts that include population aging and factors that make older persons in the region vulnerable to material support losses. Generally, a household containing an older adult living with one or more adult child is common,

normative and expected in the region (Aboderin 2006; Bongaarts and Zimmer 2002). But, AIDS

deaths result in a higher proportion of skip-generation households, particularly within high HIV

prevalence countries (Kautz et al. 2010; Madhavan and Schatz 2007; Ntozi and Nakayiwa 1999;

Zimmer 2009). Another possible household composition that may occur frequently with

increasing AIDS deaths is older persons living alone, with spouse only, or with other older

persons (Kakwani and Subbarao 2005). Additionally, while living alone is not common within

the sub-Saharan African context, skip-generation households are; even in countries with low

HIV prevalence (Zimmer and Dayton 2005). Leaving a child behind to be fostered by

grandparents while parents are absent working elsewhere is simply a normative part of life in

sub-Saharan Africa.

Research Questions

      While research has shown that the AIDS epidemic can change household composition for

older persons in sub-Saharan Africa, the question of whether this change has a substantial impact

on material well-being has not been addressed (Kautz et al. 2010). Nonetheless, some studies

provide expectations. Kakwani and Subbarao (2007) show, using data from 1996 to 2000, that

the chance of a household being in poverty is higher when there is an older adult present. They

find the chance is particularly extreme for households containing an older adult in Malawi and

Zambia, countries with high HIV prevalence. They also show elevated rates of poverty in

households containing older persons and younger children. According to the authors, the finding

"confirms a generally held impression that poverty among older persons is intensified when they

become caregivers for children" (Kakwani and Subbarao 2007).

Others have noted that an AIDS death may have an impact on material well-being within older adult households through decreasing the income that comes in from adult children and increasing household expenses needed to support grandchildren (Adeyemi, Ijaiya and Raheem 2009; Hosegood and Timaeus 2006; Knodel and Im-em 2004; Oppong 2006; World Health Organization 2002). In contrast, Gupta, Patillo and Wagh (2009) shows that remittances from adult children can have a substantial impact on the reduction of poverty in the region, suggesting that skip-generation households may benefit materially from their adult children's absence if the reason for the absence is migration rather than mortality. The proportion of skip-generation households that are due to migration should be high in low HIV prevalence countries, while the proportion due to mortality high in high HIV prevalence countries.

Thus, while it is fairly certain that demographic realities are resulting in increasing numbers of skip-generation households, it is unclear how this relates to the loss of material well-being. Using comparable data across 13 countries that took part in the Demographic Health Survey (DHS) between 2006 and 2008, we ask: (1) Do households described as skip-generation older adult households score lower with respect to material well-being than other types of older adult households? (2) Does the link between the skip-generation household and material well-being vary across countries depending upon the robustness of the AIDS epidemic within the country? While older adults living alone may also be disadvantageous, with this exception, and based on the discussion thus far, we hypothesize yes to both of these questions.

DATA

Data come from DHSs conducted in 13 sub-Saharan African countries over the period 2006 to 2008. The DHS program involves representative probability sample surveys of households and

household members in developing countries, organized and implemented by OCR Macro International in collaboration with within country statistical organizations. The purpose is to obtain information on a variety of demographic and health variables, such as household member characteristics, socioeconomic status and wealth, fertility practices, nutrition, maternal and child health and other information needed for demographic analyses and policy. The DHS has been implemented in 89 countries worldwide since the mid 1980s (Measure DHS 2011).

The DHS consists of several sections, including a household component that charts household composition using a question about relationship of each member to the household head as well as their age, sex, marital status and a few other key demographic characteristics. From this, it can be determined whether a household contains one or more older persons, which for this study is defined as age 60+, and whether there is one or more offspring, grandchild, spouse or other person, relative or non-relative, of any of these older persons also in the household. A selected list of country and sample characteristics of interest are provided in Table 1. The table also shows the average of these characteristics and, where appropriate, the sum across countries. The countries represent a range of population size and national wealth. Nigeria is by far the most populous. Based on Gross National Income (GNI) statistics obtained from the Population Reference Bureau (2007; Population Reference Bureau 2008; Population Reference Bureau 2009), Namibians are the wealthiest on average and Liberians the poorest. Most of the other countries are quite poor with GNI's in the 1,000 to 2,000 range. In total, a pooled sample across countries includes almost 35,000 households containing at least one older adult. There are over 147,000 household combined across the 13 DHSs, meaning that about 1 in 4 households contains an older adult. In total, these 13 countries constitute about 40% of the region's total population.

Table 1 about here

Weights are included with the DHS data, which are used to assure that the sample is representative of households within each country. Since data are pooled across countries, and sampling fractions for households are different for each country, this weight is adjusted so that the pooled sample is representative of households across the 13 countries. That is, the adjusted weight is one that assumes that the roughly 147,000 households selected for observation were based on a random sample that began with a sample frame consisting of all households across the 13 countries. These weights are used in the analysis.

CONSTRUCTING DURABLE WEALTH SCORES

The concept of material well-being in this study is operationalized using a Durable Wealth Score (DWS). This DWS is consistent with the DHS Wealth Index, a measure that is often employed to assess the affluence or living standard of a household relative to other households in the same survey in the absence of detailed information on income, the value of owned resources or consumption expenditures (Rutstein and Johnson 2004). A fundamental characteristic of the index is its relativeness, a feature that gives it predictive power valuable for hypothesis testing, particularly when other measures of income are not collected, which is often the case across the poorest of global settings (Montgomery et al. 2000). The DHS Wealth Index itself has been used in many household survey-based analyses due to other advantageous qualities including the ease of obtaining the information necessary for its construction, its reliability, and its internal and criterion validity as a proxy for affluence or standard of living (Filmer and Prichette 2001; Montgomery and Hewett 2005). For the current analysis, it is the ideal outcome measure since durable wealth is synonymous with the concept of material well-

being. This is because higher durable wealth scores, as will be seen below, translate directly into more assets and more valuable assets existing within households, thus more and more valuable material goods. Furthermore, it is the only measure related to household material wealth that is available and comparable across such a broad set of sub-Saharan African countries.

The index is constructed as a linear computation involving the sum of weighted scores assigned to the ownership of specific household assets, with the weight of each asset assigned by Principal Component factor scores. The types of assets that are commonly recorded in the DHS are things like radios, televisions, refrigerators, bicycles, motor vehicles, and so on. The information collected on specific items differs across DHS countries. For this study, all assets available in a specific country's DHS survey were used to create a DWS for that country. This means that the specific items that are used to determine a score differ for different countries. A list of the assets by country is shown in part A of Appendix I under the heading 'Durable items'.

A score was determined for each household in the 13 DHSs regardless of whether the household contained an older adult. As is customary when using this index, the resultant scores were standardized across countries and, in this case, also across rural and urban areas, to have a low of 0, a high of 100, and a mean of 50 within each country and rural or urban area. If households with older persons were on average the same with respect to material well-being as other households, then the sub-sample of older adult households within each country and area would also have a mean of 50. As it happens, older adult households are among the poorest. To illustrate this, Table 2 displays the mean DWSs for the over 147,000 households in the sample by household age composition. Households containing only one or more older adult have a mean DWS of just 32.7 across the countries. In contrast, households containing only one or more working age adult have a mean DWS of 52.0, while households containing one or more working

age adult and one or more child has a mean DWS of 52.9. These results substantiate Kakwani and Subbarao (2007) since older adult households in sub-Saharan Africa are shown to have the lowest material well-being.

Table 2 about here

Levels of actual material well-being differ across countries. Because income in Namibia is substantially greater than income in Liberia, pooling data from these countries would result in scores being primarily on the upper end in the former and the lower end in the latter. This can result in cross-country biases when associating household composition with the DWS. Also, because the specific items used in each country differ, the meaning of a score is different for each country. It is for this reason that scores are standardized for each country, and as such, each country's index is a *relative-to-country* latent conception of material well-being. It is for similar that reasons wealth scores are standardized for rural and urban areas. Poor urban households may contain a few assets even if they are located in a slum area of the city, perhaps due to the availability of electricity. A household in a rural area with the same assets may be considered well off in comparison. Combining rural and urban would impair the relative nature of the index.

In order to provide some intuitive sense of what a particular score means, Appendix II shows the actual assets that exist in a real set of randomly selected households with DWSs of about 0, 25, 50, 75 and 100 in rural and urban areas in three countries. The Appendix table demonstrates how a higher score translates into a greater number and value of assets while the same score relates to the ownership of different numbers and types of items across rural and urban areas in the same country and across countries.

The difference between the DWS used in this study and the standard DHS Wealth Index is that the latter includes not only durable goods but items such as availability and source of drinking water, materials from which a house is constructed and the existence and type of toilet facility used by the household, as part of the scale construction. These can be considered as non-liquid or fixed assets and are indicators of affluence that are not readily bought and sold. For reasons described in detail below, the current analysis uses fixed wealth as a predictor of durable wealth rather than as part of the index.

DEFINING HOUSEHOLD COMPOSITION

Definitions of older adult living arrangements normally revolve around the existence or non-existence of spouses, children and grandchildren in the household (De Vos 2004). This study constructs a five category measure for household composition that is consistent with this notion. (1) Older adult households: These contain only older persons, or only older persons plus their spouses, regardless of the age of the spouse. In all but a small percentage of cases, this means an older adult living alone or with spouse only. (2) Skip-generation households: These contain one or a greater number of older persons and one or more of their grandchildren but no offspring of the older persons are in the household. About half of these households are pure skip-generation in that there are no others in the household except for older persons and their grandchildren, and the other half contains other members, such as other relatives. (3) Adult child households: These contain one or more older persons and at least one of their own adult children but no grandchildren. (4) Three-generation households: These contain at least one older adult living with a grandchild and an own child. (5) Other: The last category contains older persons living with other family or non-family members besides spouse, children and grandchildren.

In order to be considered as living with a grandchild, the grandchild must be 15 or younger. In order to be considered living with an adult child, the child must be older than 15. The purpose of this age criteria is to isolate the impact of living with grandchildren to those that are not old enough to be considered head of household. There are in fact virtually no cases where a grandchild or adult child 15 or under is listed as head of household. Therefore, the term 'adult children' means, in all cases that the household in question contains an older adult and one of their children that is at least 16 years of age, and the term 'skip-generation' means in all cases that the household in question contains an older adult and one of their grandchildren under 16 years of age. Grandchildren over 15 and children under 15, though relatively rare, are placed into the 'other' category.

More than two-thirds of all of the roughly 35,000 households in these data contain six or fewer persons, only one in 10 contain more than 10 persons, the mean household size is 5.5 and the median is 5. So, while the majority of households are not complex, there are also a fair number of complex households containing several families. If analyzed on a family or individual level, these complex households could contain more than one category as defined above. We are unable, due to the nature of the data, to analyze on a family level. Therefore, some classification decisions for complex households are necessary. If there is at least one three-generation family in the household then it is considered a three-generation household. If no three-generation families exist, but an adult child of at least one older adult is present, then the classification is an adult child household. Households can only be classified as skip-generation if none of the older persons in the household has an adult child present.

There are also consistency problems in defining a household across countries and within countries across cultural, geographic and political boundaries. The DHS attempts to be as

consistent as possible, defining a household for all countries as 'a group of people that usually lies and eats together,' with the prevision that if people eat in one household and sleep in another, they are considered to be a member of the household wherein they sleep (ORC Macro 2006).

RESULTS

Distributions for Household Composition

Table 3 shows the distribution of household composition within each country. Countries are arranged from top to bottom according to their CCDR. The bottom two rows are summary measures. One is the average distribution for the 13 countries. The other is the pooled sample distribution, weighted to be representative of the population of households in the 13 countries. Looking at the summary measures, the most common household composition is the three-generation.

Table 3 about here

The three-generation is most frequent composition in 11 of the 13 countries. There is variation in the distribution of household composition across countries. For instance, the percent of households categorized as older adult ranges from a low of 8.5 percent in Niger to a high of 25.8 percent in Nigeria, while skip-generation ranges from a low of 10.6 percent in Mali to a high of 27.5 percent in Zimbabwe. The percent of skip-generation households are most obviously associated with CCDR. It is a common household composition, representing about one in four older person households, in the four highest CCDR countries. In these four countries, skip-generation households are more common than adult child households. In low CCDR countries skip-generation households are much less common and adult child households

much more so. Niger and Liberia, low CCDR countries, have very high percentages of three-generation households. Although it has minimal variation, the other household composition is somewhat more common in low CCDR countries.

The Association between Household Composition and DWS

Table 4 displays the results of Ordinary Least Squares regressions that predict DWS. Model 1 shows whether there are any differences across countries. Since DWSs are standardized across countries and rural/urban areas, there is indeed very little variation remaining to be explained. The r-square for model 1 is only .002.

Table 4 about here

Model 2 adds household composition. The r-square increases to explain 6.3% of the variation in DWS. All compositions are significantly different from the three-generation household, which is the most favorable. Adult child households do not however differ much and also offer a relatively favorable situation for older persons. The other household composition scores about eight points lower than the three-generation. The skip-generation household composition scores between 13 and 14 points lower, and the older adult household composition, which is the least favorable, is more than 18 points lower than the three-generation.

Additional controls that are available and important in determining household material well-being are added in Model 3. These include the following: (1) Whether or not one or more of the older persons in the household lives with a spouse. This is particularly important to account for since one of the household composition categories is the older adult only composition. But, this could mean an older adult living alone or with a spouse, and living with a spouse is favorable for this category as well as for others. (2) Age of the oldest household member. (3)

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Whether the older persons in the household are female versus being male or there being a combination of male and female older persons. (4) Household size. This is particularly important to account for since the categorization of household composition does not indicate whether the household is large and/or complex. For instance, skip-generation households include those that contain a number of other relatives plus those that only contain an older adult and a grandchild. The measure used is a residual household size which is calculated as the total number of household members minus one if there is an older person's spouse present, minus one if there is an older person's adult child present, minus all persons under age 16. The reason for a residual rather than a total household size is that, first, the spouse and child are already accounted for in other variables and should not be double counted, and second, more adults in a household will bring more durable wealth, but such is not necessarily the case for younger persons. (5) Whether any older person in the household has formal education. (6) Whether the head of the household is a female. (7) Whether the head of the household is an older person.

The last control variable is (8) fixed wealth. This is constructed in a similar fashion as the DWS, but with country specific non-liquid items available with each country's own DHS. These are listed in part B of Appendix II under the heading 'Fixed items'. The inclusion of a fixed wealth score when predicting durable wealth using cross-sectional data is suggested by Linnemayr (2005), who noted that while causality cannot be assured given cross-sectional data, one is in a better position to conjecture that a difference in wealth across household composition, when controlling for fixed wealth, is a function of the household composition. This is because if an older adult finds they need extra money, for example, for the caretaking of a grandchild when own children are absent, they may cease to purchase or sell durable items, but they are unlikely to move residences. In fact, fixed wealth is a good measure of long-term material well-being.

Therefore, change in household composition is more likely to impact on the DWS while not impacting on fixed wealth.

In Model 3 the effect of household composition on DWS is reduced, but not to the extent that composition becomes unimportant. Older adult households remain worse off, scoring about 10 points lower than the three-generation. Skip-generation households are also not favorable, being on average seven points lower after controls are added. Clearly, households that contain an adult child, whether with or without grandchildren, are most favorable.

Other covariates prove to be significant and important predictors of DWS. When adding them, the r-square increases to explain over 38% of the variation. The presence of a spouse of an older person, older persons being female, household size, older persons having education and fixed wealth are all positively associated with DWS. Age of the oldest household member, having a female and an older person household head are negatively associated. These results suggest that older persons living alone would have very low DWSs. The presence of a spouse adds over three points to the score, while each additional adult household member adds almost 2 points. The impact of fixed wealth is particularly robust. Each point on the fixed wealth index, which is structured in the same fashion as the DWS, adds 0.5 points. For instance, a household with a fixed wealth score of 50, which would represent the country by region average, would score 10 points better on the DWS than a household with a fixed wealth score of 30.

It may be surprising that if older persons in the household are female as opposed to male or both male and female, it results in a higher DWS. There are two possible reasons for this. The first is that the impact of sex is mostly felt if the female is the head of household. Second, there is some evidence that older women in Africa and other developing countries are treated with greater respect than are older men due to a concept that has been called the 'patriarchal

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bargain,' whereby offspring feel closer emotionally to their mothers than their fathers due to the time and bond that is formed between child and mother when children are young (Kandiyoti 1988; Yount 2005). For this reason, offspring may better support their older mothers than their older fathers.

The associations with country dummy variables remain small. Older persons in Namibia, on average, live in households with higher DWSs than those in other countries. Namibia's higher scores are likely a function of better developed social security programs for older persons, which may itself be a function of its relatively high economic standing as measured as GNI per capita (Barbone and Sanchez 1999; Frayne 2004). It is difficult to say why other countries would have higher or lower DWSs, although it is the case that country effects remain relatively unimportant compared to household composition and other covariates.

Predicting Specific DWSs by Household Composition and Country

A last model which is not shown added country by household composition interactions. The interactions increase the r-square from Model 3 by only .002. Therefore, we can conclude that DWS by household composition is fairly consistent across countries. To show this, we used the coefficients from the interaction model to calculate predicted DWSs. In doing so, all control variables were set at their country by household composition mean values. For instance, the predicted DWS for skip-generation households in Zimbabwe multiplied coefficients for control variables by the mean for that variable among skip-generation households in Zimbabwe. These products were summed, added to the constant then added to the main and interaction effects for country and household composition. This provides us with an estimate of DWS for each country by household composition that is very close to the observed raw data means.

Figure 1 shows the results. The X-axis indicates household composition arranged from the predicted lowest to highest DWS based on the OLS regression model. High CCDR countries are plotted as solid lines and low CCDR countries are plotted as dotted lines. Country indicator names are placed on the graph near to the end of their prediction line, with high CCDR countries on the left and low CCDR countries on the right. The graph illustrates an almost a linear increase in DWS when moving across household compositions, with some flattening between the adult child and three-generation household type. There appears to be very little slope variation and thus, the association between household compositions is remarkably consistent across all 13 countries. Note also that Namibia appears as an outlier in the older adult only household, likely a function of the social security policies mentioned above (Barbone and Sanchez 1999; Frayne 2004).

Figure 1 about here

Figure 2 is a scatterplot that is presented to provide a closer look at the specific DWSs for skip-generation households across countries with different levels of AIDS mortality. CCDRs are shown along the X-axis and DWSs along the Y-axis. Also shown is the linear equation, the linear trendline predicting DWS and Pearson's r. The hypothesis that skip-generation households fare worse in high AIDS-mortality is not supported by this figure. In fact, although the association is not significant, as indicated by r, the association is positive. An increase of 1 point in the CCDR is predicted to increase the DWS by .025. Two of the highest AIDS-mortality countries, Uganda and Zimbabwe, have amongst the highest DWS for skip-generation households. The correlation is non-significant according to Pearson's r, and is modestly robust at +0.306

Figure 2 about here

Is there an Indirect Association?

While the skip-generation household is not conforming to the hypothesized direction when examined in the context of AIDS mortality, it is still possible that there is an indirect association between AIDS mortality and material wealth operating through household composition. This is because high CCDR associates with a greater proportion of skip-generation households, as seen in Table 3. In turn, skip-generation households have relatively low DWSs in comparison to households with adult children. Therefore, the distribution of household composition may be a factor pushing down material well-being for older persons in high AIDS mortality countries.

We tested this using a standardization procedure that involved calculating two DWSs for each country. The first is the predicted DWS shown in Figure 1. The second is a DWS predicted using a standardized household composition distribution. The standard was the average across all countries shown in Table 3. In the highest AIDS mortality countries, the standard household composition distribution will have a smaller proportion of skip-generation households than has the country itself. Fewer skip-generation households result in higher DWSs. The opposite is the case in the lowest AIDS mortality countries. Here, the standard household composition distribution will have a larger proportion of skip-generation households than the country itself, and so the DWS predicted by the model should be higher than the one predicted by the standard distribution. We subtracted the standardized DWS from the DWS predicted in the model. For countries with high AIDS-mortality, this should result in a negative number. For low AIDS mortality countries, the subtraction should produce a positive number.

The result of this procedure is seen in graphical form in Figure 3. CCDR is again along the X-axis. The Y-axis presents the subtraction result between predicted DWS using the model minus the predicted DWS using the standard household composition, with the result of the subtraction expressed as a percent difference. Again, the linear equation, the linear trendline predicting the percent difference and Pearson's r are also shown. We expect to see a negative association moving from left to right. Indeed, the most negative result is found in Zambia, a country with very high AIDS mortality, where the DWS based on the model is 3.5 percent lower than the DWS based on the standard distribution. The second most negative result is found in Uganda, a country that also has a high level of AIDS mortality. The most positive result is in Niger, where the DWS based on the model is almost 3 percent higher than the one based on the standard distribution. The second most positive result is in Liberia. Both of these countries have very low AIDS mortality.

Figure 3 about here

Clearly the association is negative, as expected, but it is only modestly robust. Pearson r between CCDR and DWS differences expressed as a percent is -0.346, as shown on the figure, and is non-significant. Swaziland and Tanzania are part of the reason for the lack of a strong association. Despite having high proportions of skip-generation households, these two countries have better DWSs than would be the case if their household compositions were equal to the standard. Empirically, the reason can be seen by referring back to Table 3. While these countries have higher than average proportions of skip-generation households, they also have lower than average proportion of adult only households, and the latter produce very low DWSs. In addition, some countries with low AIDS mortality have a higher than average proportion of older adult households. These include Ghana and Nigeria, and explain empirically why DWS

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predicted by the model in these countries is lower than the one predicted using the standardized distribution.

CONCLUSION

Understanding the factors that influence material well-being is important if there is to be reduction in poverty and its consequences in sub-Saharan Africa. This region of the world contains the highest percentage of poor households and, not coincidentally, the lowest life expectancy, the highest prevalence rates of HIV and several other infectious diseases, the highest rates of infant mortality and other indicators of low quality of life.

In understanding material well-being, it is important to pay attention to the region's older persons. They are a group that has been woefully ignored in much of the research that is taking place in the region despite their growing importance as a population segment. Population aging is occurring in sub-Saharan Africa just as it is across the globe, in part due to declining levels of fertility, which have the impact of reducing the number of young into society and increasing the percent of those in other age groups (Darkwa and Mazibuko 2002). One out of every four households in the region contains an older adult. Migration and mortality due to AIDS is contributing to making older households an even larger component of the societies (Aboderin 2006; Apt 2007).

This paper asked whether the skip-generation household has lower material well-being than households with other compositions. Importantly, given the trend toward increasing proportions of skip-generation households in the literature reviewed, we found this household type to be much worse off than household compositions that include living with an adult child. Households that contain one or more older adult and one or more of their grandchildren but no

adult children score about 13 points less on average on the DWS than three-generation households. The difference can be partially explained by other household characteristics such as household size and sex and age of the household head. Controlling for these other variables, skip-generation households still score almost 7 points lower than three-generation. However, and notably, we also found that an older adult household, which consists of older adults only, or older adults only and their spouses, are even worse off, scoring more than 18 points lower on the DWS when not adjusted and more than 9 points lower when adjusted for other characteristics. Results of other covariates showed that if the older adult household contains the spouse of the older adult, and several other household members, the average DWS will increase.

One of the factors that may be contributing to changing material well-being for older adults in the region is the AIDS epidemic that is of immense consequence to many aspects of life in high HIV prevalence countries. Thus, the current study also asked whether associations between the material well-being in household types associate with rate of AIDS mortality within a country. We expected that skip-generation households would fare worse in high AIDS-morality countries since the missing generation is more likely the result of death and therefore a direct loss of support rather than other reasons for absence, such as labor migration. The results, data and nature of the analysis allow us to conjecture on this. Much of the between country variation in DWS is accounted for by standardizing scores by country and rural/urban area. There is very little country level variation in slopes related to household composition as was seen in Figure 1. Also, whatever variation does exist, it was not found to be related to the number of individuals that have died due to AIDS as a proportion of population size in that country, measured as the CCDR. Additionally, Figure 2 showed very little variation in average DWS for skip-generation households by AID mortality. If anything, the modest non-significant

association was positive, meaning that skip-generation households in some high AIDS mortality countries are better off than skip-generation households in some low AIDS mortality countries.

Still, there is the possibility of an indirect impact of AIDS mortality on material well-being. Skip-generation households are found more often where there is high AIDS mortality (Kautz et al. 2010; Zimmer 2009). In turn, skip-generation households are not a very favorable household composition. We found only modest evidence of this indirect link. We compared DWS scores for each country predicted by our model, which are similar to the raw DWS scores, with DWS scores based on a standard household distribution, with the standard being the average across countries. We would have expected that in the high AIDS mortality countries the DWS predicted by the model would be lower than the DWS predicted by the standard distribution. This was the case in Zambia and Uganda, but not in Swaziland and Tanzania. In Zimbabwe and Namibia, also high AIDS mortality countries, the two DWSs were about equal.

We are left to speculate upon the reason for the lack of strong associations between level of AIDS mortality in a country and material well-being of specific household types. Certainly, it appears that the proportion of older adult only households varies quite a bit across countries and not necessarily in concurrence with AIDS mortality. In some countries there may be a trade-off between the older adult only and skip-generation household. Perhaps when adult children die and move in with grandparents, the presence of a grandchild brings some material benefit. This may be because other family members help or the grandchild themselves produces some wealth. So, there may be some benefit of an AIDS death to material well-being of older adults in some countries. But, any benefit is likely to be country specific.

Conversely, we expected countries with low CCDRs to have higher country level DWS scores predicted by the model than predicted using the standardized household composition

distribution. This was the case in Congo, Liberia, Mali and Niger. It was not the case in Nigeria and Ghana. The two DWS scores in Benin were about equal. In these cases, the non-conforming countries had relatively high frequencies of older adult households. It is difficult to speculate upon the reasons for high proportions of older adult households in these countries, although we suspect this may be a function of cultural norms. The conclusion we come to is that the indirect impact of AIDS mortality on material well-being is likely complex and cannot be teased out of the current cross-sectional analysis. What is required is more detailed data, either longitudinal or retrospective, that can allow for the determination of how households actually change when there is a death in the family, and how that change alters material well-being within the household. While an indirect association is modestly suggested here, it cannot be confirmed.

It may be that in some places when there is a death in a family grandchildren go to live with family members that have the greatest resources. So, orphaned grandchildren may move in with grandparents only when the grandparents are relatively wealthy, an occurrence that would bring up the DWSs for skip-generation households. It is for this reason that the current analysis broke up wealth indices into durable and fixed, and predicted durable adjusting for fixed. Fixed wealth is unlikely to change with changing living arrangements. But, changes in household composition can impact on durable wealth in a number of ways. With respect to HIV, research has shown costs related to caretaking of their sick child, costs for their funerals, and eventually caretaking of grandchildren left behind (Knodel, Watkins and VanLandingham 2003). A change in household composition may provoke the need to sell off or at least not buy durable goods. But, this is unlikely to impact on fixed wealth with is more long-term. Thus, adjusting for fixed wealth provides a little more confidence that associations seen are causal rather than being endogenous correlations.

The way the DWS was constructed needs to also be considered when interpreting results. A preferential operationalization for material well-being would include a measure of consumption (Montgomery et al. 2000). In addition, the DWS index was purposely constructed to be standardized across countries and rural/urban areas. This removes much of the overall country level variation in material well-being. This was done not only because specific items that are used to measure DWS in each DHS survey differ, but also to isolate the impact of household composition without biases based on the overarching levels of material well-being within a country and between rural and urban areas. Again, further research with more detailed data on households within individual countries is needed to better illuminate how changes in composition associate with changes in material well-being.

Despite limitations, the current study has shown strong associations existing between the household composition of older adults and material well-being, which suggest clear policy. Older persons should not be ignored when it comes to assessing material well-being and the chances of living in severe poverty in poor regions of the world. Indeed, older persons in sub-Saharan Africa already represent the poorest of the poor (Barrientos, Gorman and Heslop 2003; Kakwani and Subbarao 2007). Older persons in developing countries generally tend to be vulnerable to low quality of life across a number of dimensions. This analysis has shown that living without children is a determinant of poor material well-being. Yet, this is a situation that is likely to increase over time due to, if nothing else, past reductions in fertility and migration of adult children. Older persons already face challenges related to aging, such as increasing chances of functional disability and non-communicative disease. Pension and other security programs need to consider older persons as a paramount segment with particular needs which are

being affected by changing household dynamics. Any policy related to alleviating poverty that does not consider older persons and these dynamics would be flawed.

The current study suggests that when a child is absent the older adult household has lower material well-being regardless of the reason for the absence. This conclusion is contrary to the commonsense view of a positive impact of labor migration and remittances. But, without further research using data that is sensitive to changes over time and reasons for the absence of adult children, we cannot be certain of the causal connection.

It is hoped that this analysis will increase the dialogue on the well-being of older adult households and possibly lead to broader discourse on wealth inequality in sub-Saharan Africa and throughout the developing world. Older persons are already vulnerable to the impacts of poverty in developing countries. Where there is a robust AIDS epidemic, more skip-generation households are likely. This can increase the vulnerability of a population segment that is already susceptible to negative consequences of aging and the changing nature of intergenerational relations. Yet they are frequently ignored when it comes to examining factors related to socio-economic development. As the percent that are in older ages increases across the developing countries, this is likely to change.

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Table 1: Sample and country characteristics

	Year of DHS	Population in millions[1,2]	Life expectancy males[1,2,4]	Life expectancy females[1,2,4]	GNI PPP per capita (USD)[1,2]	Number of households in DHS[3]	Number of households containing someone aged 60+[3]	HIV Prevalence rate[1,2]	Cumulative crude deaths due to AIDS (CCDR)[1,5]
Benin	2006	8.7	53	55	1,160	17,511	4,032	1.2	4.0
Congo	2007	3.8	51	53	2,750	8,886	1,721	3.5	24.4
Ghana	2008	23.9	58	59	1,430	11,778	2,910	1.9	1.1
Liberia	2007	3.8	44	46	290	6,824	1,383	1.7	11.7
Mali	2006	13.9	48	49	1,130	12,998	3,441	1.3	5.6
Namibia	2007	2.1	50	53	5,120	9,200	2,319	15.3	30.0
Niger	2006	14.4	44	44	830	7,660	2,173	0.7	2.6
Nigeria	2008	148.1	46	47	1,940	34,070	8,331	3.1	19.5
Swaziland	2008	1.1	33	34	5,010	4,843	1,125	26.1	75.3
Tanzania	2007	38.7	49	51	1,200	8,497	2,208	6.2	39.6
Uganda	2006	27.7	47	47	1,490	8,870	1,727	6.7	46.4
Zambia	2007	11.5	38	37	1,000	7,164	1,417	15.2	84.3
Zimbabwe	2007	13.3	38	37	1,940	9,285	2,184	18.1	116.9
Average		23.9	46.1	47.1	1,945	11,352	2,690	7.8	35.5
Sum		311.0	---	---	---	147,586	34,971	---	---

[1] In year of the DHS.
[2] Source: Population Reference Bureau. (2006, 2007, 2008, 2009) *Population Data Sheet*, Washington DC: PRB.
[3] Source: DHS.
[4] At birth.
[5] CCDR = [(Σ deaths due to AID from 1990 until year of DHS) / (Population in year of DHS)] X 1,000

Table 2: Summary findings for DWS across all 13 countries by age distribution of household members[1]

Household composition	Pooled Sample N	Mean DWS for pooled sample
One or more working age adult	24,721	52.0
One or more working age adult and one or more child	87,503	52.9
One or more working age adult and one or more older adult	5,306	47.9
One or more working age adult, one or more older adult, and one or more child	21,539	50.5
One or more older adult and one or more child	3,004	35.3
One or more older adults	5,122	32.7
Total	147,195	
P-Value[2]		.00

[1] 149 households (0.10% of total) classified as children only and 233 (0.16% of total) as having no permanent residents are omitted from this table. N's are weighted. Working age adults are those 15 to 59. Children are those under 15. Older adults are those 60 and older.

[2] F-Test for differences of means.

Table 3: Percent household composition distribution by country, with countries arranged from highest to lowest CCDR

Country	Older adult	Skip-generation	Adult child	Three-generation	Other	Total
Zimbabwe	11.0	27.5	14.0	34.5	13.0	100
Zambia	20.9	22.9	14.5	29.2	12.5	100
Swaziland	12.2	24.6	10.6	41.8	10.8	100
Uganda	17.4	25.7	11.9	31.2	13.7	100
Tanzania	14.6	15.5	14.3	39.2	16.4	100
Namibia	13.3	17.0	13.7	41.4	14.7	100
Congo	16.9	11.3	18.8	39.4	13.6	100
Nigeria	25.8	10.9	28.6	21.7	13.0	100
Liberia	10.6	15.1	13.1	46.0	15.2	100
Mali	14.2	10.6	30.1	27.7	17.4	100
Benin	21.2	11.5	23.3	29.9	14.2	100
Niger	8.5	19.3	18.1	37.1	17.1	100
Ghana	22.8	12.9	24.7	26.2	13.4	100
Summary:						
Average	16.1	17.3	18.1	34.3	14.2	100
Pooled sample	20.9	14.6	22.9	27.8	13.8	100

Table 4: Ordinary Least Squares Regression estimates predicting DWS

	Model 1	Model 2	Model 3
Household compositions			
Older adult		-18.2**	-9.7**
Skip-generation		-13.5**	-6.9**
Adult child		-1.9**	-1.3**
Three-generation (contrast)		---	---
Other		-7.9**	-4.7**
Control variables			
Older person's spouse in hh			3.3**
Age of oldest hh member			-0.1**
Older person(s) females			3.0**
Residual hh size			1.7**
Any education in hh			10.0**
hh head is female			-8.2**
hh head is older person			-5.0**
Fixed wealth score			0.5**
Country variables			
Benin	-3.7	-2.2	1.5
Congo	1.3	1.9	0.4
Ghana	-2.0	-0.0	1.2
Liberia (contrast)	---	---	---
Mali	0.6	1.1	2.4
Namibia	2.2	2.9	6.5**
Niger	0.3	0.7	1.2
Nigeria	-1.7	0.6	2.2
Swaziland	-0.8	0.4	3.7*
Tanzania	-2.1	-1.2	3.3*
Uganda	1.3	3.8*	4.3**
Zambia	-2.9	-0.2	-0.1
Zimbabwe	2.2	3.7*	3.6*
Constant	47.1	52.5	22.8
Fit statistics			
F-ratio	6.0***	145.8**	325.1**
ΔF^1	6.0**	564.2**	2,246.0**
R-square	.002	.063	.381

** p < .01   * .05 > p > .01

[1] Compared to previous model, except Model1 which is compared to an intercept only model.

Figure 1: Predicted DWS by country and household composition
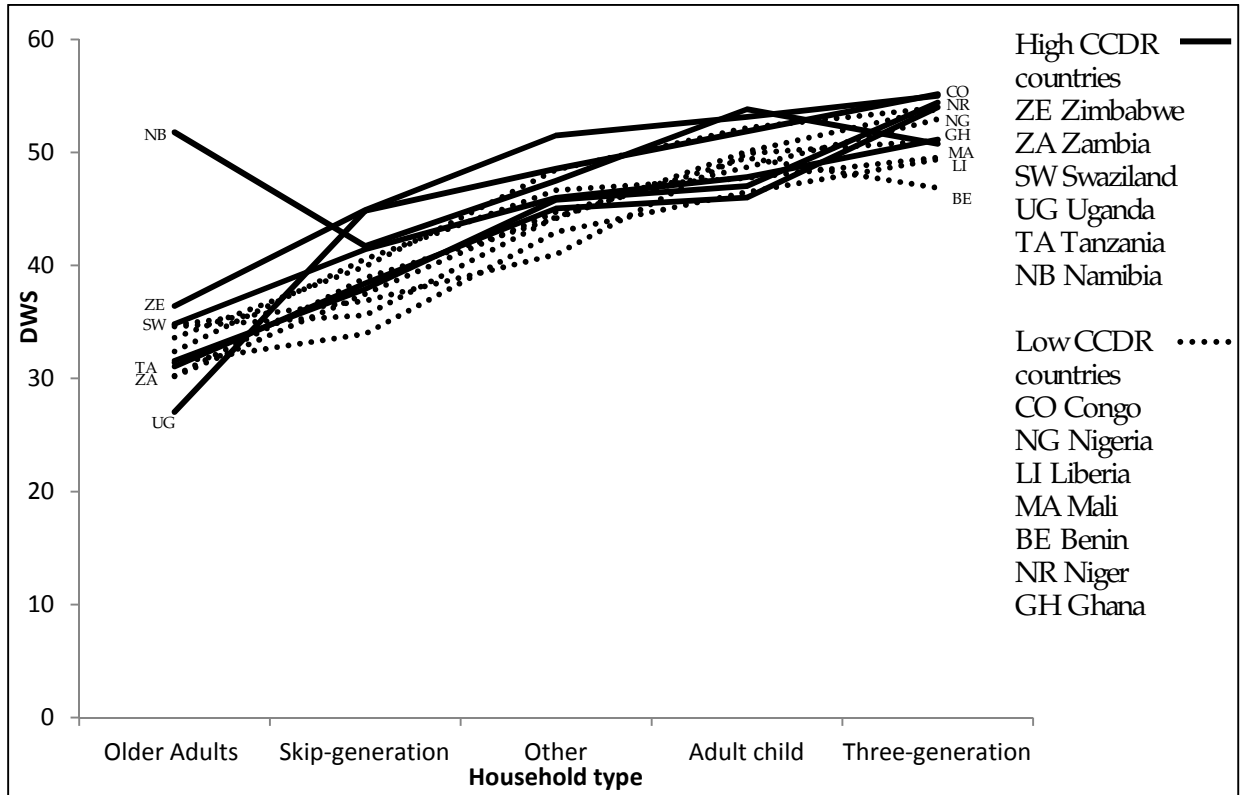
Figure 2: DWS for skip-generation households based on the predictive model by CCDR
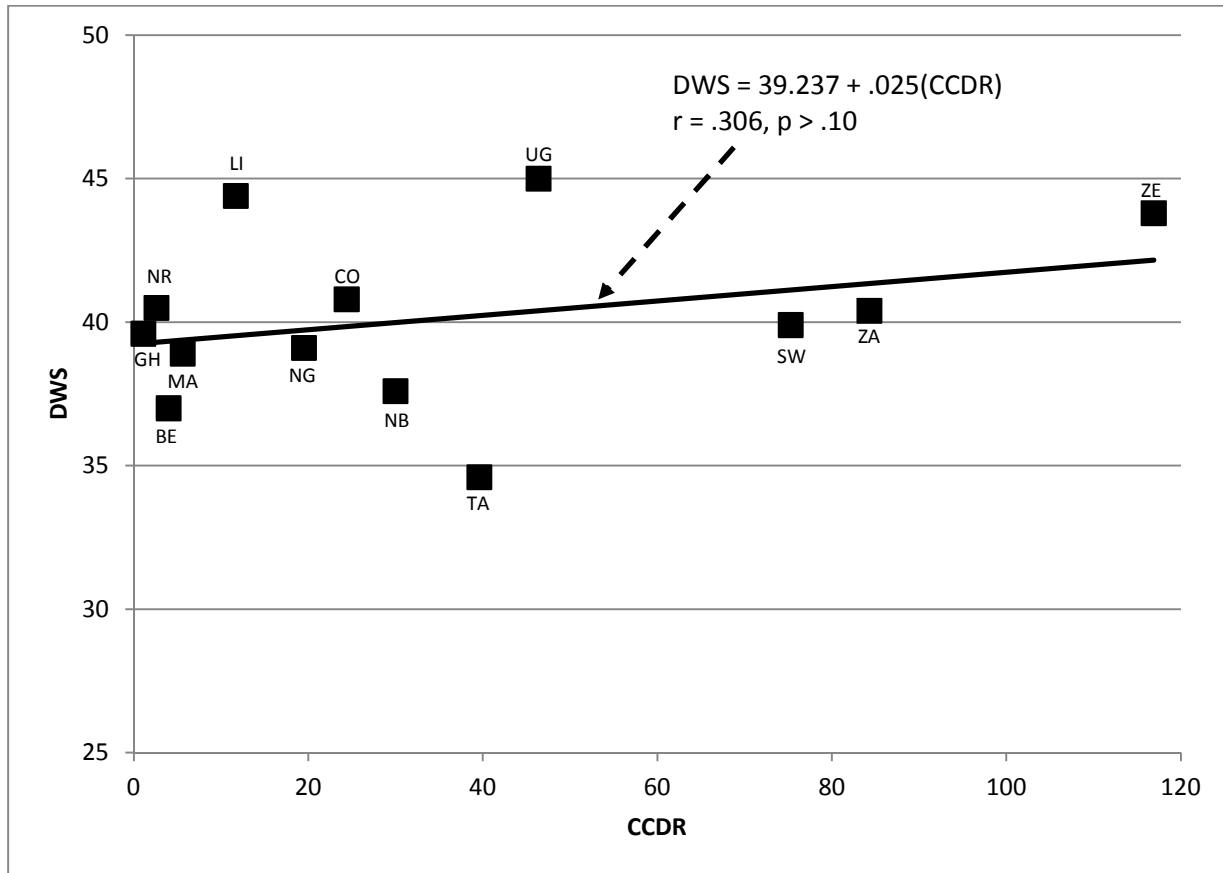
Country codes:

BE Benin	CO Congo	LI Liberia
GH Ghana	MA Mali	NB Namibia
NG Nigeria	NR Niger	SW Swaziland
TA Tanzania	UG Uganda	ZA Zambia
ZE Zimbabwe		

Figure 3: DWS based on the predictive model minus DWS based on the standard household composition, expressed as a percent, by CCDR
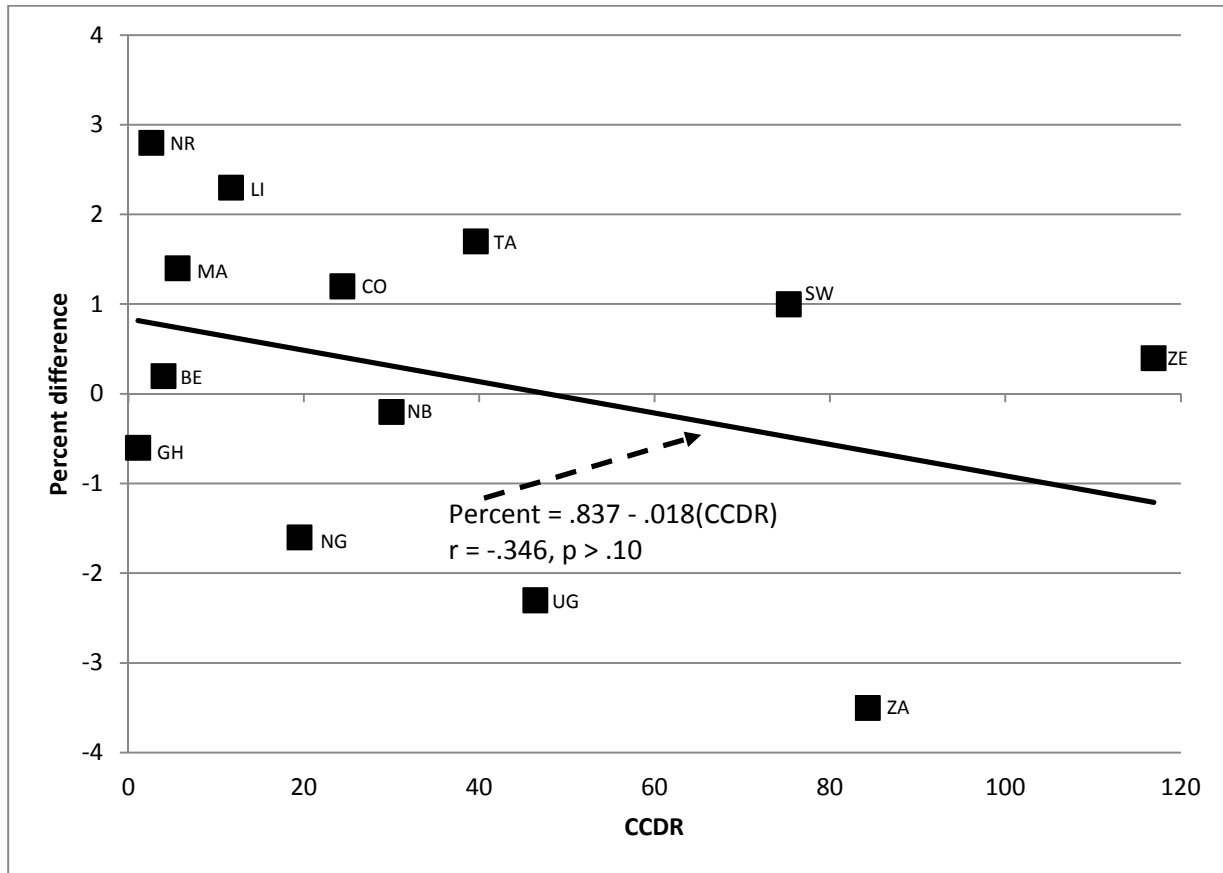
Country codes:

BE Benin	CO Congo	LI Liberia
GH Ghana	MA Mali	NB Namibia
NG Nigeria	NR Niger	SW Swaziland
TA Tanzania	UG Uganda	ZA Zambia
ZE Zimbabwe		

APPENDIX I: Items used for the Durable Wealth Score and Fixed Wealth Score by country

|	Congo	Namibia	Nigeria	Benin	Ghana	Liberia	Niger	Mali	Swaziland	Uganda	Zambia	Zimbabwe
A. Durable items												
1. Radio	X	X	X	X	X	X	X	X	X	X	X	X
2. Television	X	X	X	X	X	X	X	X	X	X	X	X
3. Refrigerator	X	X	X	X	X	X	X	X	X	X	X	X
4. Bicycle	X	X	X	X	X	X	X	X	X	X	X	X
5. Motorcycle/scooter	X	X	X	X	X	X	X	X	X	X	X	X
6. Car/truck	X	X	X	X	X	X	X	X	X	X	X	X
7. Telephone	X		X	X	X		X	X	X	X	X	X
8. Mobile telephone	X	X	X	X	X	X	X	X	X	X	X	X
9. Animal drawn cart		X	X	X	X		X	X		X	X	X
10. Own agricultural land		X		X	X				X	X	X	
11. Table					X	X				X	X	
12. Chairs	X			X	X	X				X	X	
13. Sofa set										X	X	
14. Bed	X			X	X					X	X	
15. Cupboard					X	X				X	X	
16. Clock					X					X	X	
17. Boat without motor				X	X					X	X	
18. Grill/heater	X											
19. Cassettee Player											X	
20. Lamps	X											
21. Stove/Cooker	X							X		X		
22. Hoe	X											
23. Sewing Machine	X			X	X	X		X			X	
24. Canoe, dugout	X		X									
25. Generator			X	X	X	X						
26. Refrigerator				X								
27. Watch		X			X	X					X	
28. Livestock		X	X		X	X					X	X
29. Air Conditioner			X					X	X			
30. Computer				X	X	X		X				
31. Electric Item			X									

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APPENDIX I: Continued

	Congo	Namibia	Nigeria	Benin	Ghana	Liberia	Niger	Mali	Swaziland	Uganda	Zambia	Zimbabwe
32. Fan										X	X	X
34. Plough											X	
35. Grain Grinder											X	
36. VCR/DVD				X	X			X			X	
37 Hammer Mill											X	
38. Wheel Barrow				X								
39. HiFi Stereo				X								
40. Foyer améliorés				X								
41. Food Cookers				X								
42. Washing Machine				X	X			X				
43. Rental House				X								
44. Iron				X								
45. Connection to Internet				X				X				
46. Mattress				X								
47. Improved traditional kitchen								X				
48. Freezer					X							
49. Camera					X							
B. Fixed items												
1. Modern source of drinking water	X	X	X	X	X	X	X	X	X	X	X	X
2. Modern toilet facility	X	X	X	X	X	X	X	X	X	X	X	X
3. Electricity	X	X	X	X	X	X	X	X	X	X	X	X
4. Modern floor	X	X	X	X	X	X	X	X	X	X	X	X
5. Modern wall	X	X	X	X	X	X			X	X	X	X
6. Modern roof	X	X	X	X	X	X	X		X	X	X	X
7. More than one room in house for sleeping							X	X				
8. Does not share toilet with other households	X	X	X	X	X	X	X	X	X	X	X	X
9. Has separate kitchen		X	X	X	X	X			X	X	X	X

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APPENDIX II: Examples of durable items in households by DWS and rural/urban residence for select countries

Approximate Score	Country	Urban	Rural
0	Namibia	None	None
	Nigeria	None	None
	Tanzania	None	None
25	Namibia	Mobile telephone, Watch	Radio
	Nigeria	Mobile telephone, Land	Land, Livestock
	Tanzania	Mobile Telephone	Bicycle
50	Namibia	Radio, Television, Refrigerator, Watch, Land	Telephone, Animal drawn cart, Livestock
	Nigeria	Air conditioner, Iron, Fan	Motorcycle
	Tanzania	Radio, Mobile telephone, Watch	Bicycle, Watch, Land
75	Namibia	Car/truck, Mobile telephone, Watch	Radio, Television, Bicycle, Land, Livestock
	Nigeria	Radio, Television, Mobile telephone, Electric Iron, Fan	Television, Mobile telephone, Land
	Tanzania	Radio, Television, Refrigerator, Bicycle, Iron.	Radio, Bicycle, Mobile telephone, Land
100	Namibia	Radio, Television, Refrigerator, Bicycle, Motorcycle/scooter, Car/truck, Telephone, Mobile telephone, watch	Motor cycle, car/truck, Mobile telephone, Watch, Land, Livestock, Herds or farm animals
	Nigeria	Radio, Television, Refrigerator, Motorcycle/scooter, Car/truck, Telephone, Generating set, Air conditioner, Computer, Electric Item, Fan	Radio, Television, Refrigerator, Bicycle, Motorcycle/scooter, Car/truck, Telephone, Mobile telephone, Land
	Tanzania	Radio, Television, Bicycle, Refrigerator, Motorcycle/scooter, Telephone, Mobile telephone, Watch, Paraffin lamp, Iron	Radio, Television, Bicycle, Refrigerator, Motorcycle/scooter, Telephone, Mobile telephone, Watch, Land, Paraffin lamp, Iron.