

Population Ageing in Rwanda: Current Needs, Future Projections, and Implications for Policy

Final Report: January 2018

Rachel Sabates-Wheeler (PI)

Emily Wylde (co-PI)

Martina Ulrichs

Isabella Aboderin

Jeannette Bayisenge

Albert Irambeshya



This document is an output from a project funded by the UK Department for International Development (DFID) through the Research for Evidence Division (RED) for the benefit of developing countries. However, the views expressed and information contained in it is not necessarily those of, or endorsed by DFID, which can accept no responsibility for such views or information or for any reliance placed on them.

| | | |
|-----|---|----|
| 1 | Introduction..... | 3 |
| 1.1 | Background and Context..... | 3 |
| 1.2 | Objectives..... | 3 |
| 1.3 | Research Framework..... | 4 |
| 1.4 | Understanding the role of demographic, societal, and economic change..... | 8 |
| 1.5 | Understanding policy options in the dynamic context..... | 9 |
| 2 | Methodology..... | 9 |
| 2.1 | Stakeholder survey analysis..... | 9 |
| 2.2 | Quantitative analysis..... | 10 |
| 2.3 | Qualitative research..... | 11 |
| 2.4 | Modelling exercise..... | 14 |
| 3 | Ageing in Rwanda: the Wellbeing of Older Persons at Present..... | 17 |
| 3.1 | Demographics..... | 17 |
| 3.2 | Household structures and kinship networks..... | 18 |
| 3.3 | Poverty and well-being..... | 23 |
| 3.4 | Domestic reproductive contributions..... | 45 |
| 3.5 | Health..... | 45 |
| 3.6 | Access to services and programmes..... | 46 |
| 4 | A Changing Society: Implications of Social and Economic Dynamics for Older People in Future 48 | |
| 4.1 | Demographic trends..... | 48 |
| 4.2 | Economic change..... | 52 |
| 4.3 | Societal change and family bonds..... | 53 |
| 5 | Policy Implications and Options: Meeting the Needs of Older People..... | 55 |
| 5.1 | Identifying an ‘unmet need’ for support..... | 55 |
| 5.2 | Potential policy options and programmes..... | 57 |
| 6 | Conclusions and Recommendations..... | 59 |
| 6.1 | Conclusions..... | 59 |
| 6.2 | Recommendations..... | 61 |
| | Annex 1: Microsimulation Model Technical Note..... | 62 |

1 Introduction

1.1 Background and Context

Many countries in sub-Saharan Africa are undergoing a major demographic transition, but Rwanda's is unique for many reasons. It has simultaneously made very rapid improvements in life expectancy and total fertility as a result of significant investments in the health system and reductions in poverty. This means that Rwanda, if the right investments are made, can expect a potential first 'demographic dividend' in the near future. The concomitant growth in the country's already considerable number of older people (aged 60 years and over), however, poses an additional challenge to be addressed as part of Rwanda's positioning both for a first and for a possible second demographic dividend.¹

Other structural and contextual shifts are occurring related to rapid urbanisation (and the associated migration and changes in household structures and familial support networks) and an expanding formal labour market. All of these changes have implications for how the Government of Rwanda will support an aging population and a changing demographic profile, especially in the area of social protection provision.

Rwanda's social protection sector has evolved rapidly over the last decade, characterized by a high degree of government ownership. However, given the projections for an aging population, there is a need to consider how the sector will respond to the country's changing demographic profile over the coming 10-30 years.

1.2 Objectives

The overall objectives of this study are to:

- Consolidate the existing literature and demographic data for Rwanda;
- Identify longer-term challenges to, and opportunities for, harnessing Rwanda's demographic transition, through a social protection lens;
- Articulate a set of recommended priority actions to support policy-makers and development partners to plan for Rwanda's changing population and age structures and support sustained inclusive growth for poverty reduction.

In order to inform discussions of social protection policy options in the short-, medium-, and long-term, this study analysed both quantitative and qualitative data on the experiences of older people in Rwanda, along with the wider literature and evidence base from the region and beyond. It also undertook a detailed policy simulation exercise to assess both the needs of older people and the impact of policy options.

¹ As a result of a "first" **demographic** transition, age structures of populations become older. ... These social and economic changes motivate people to accumulate greater personal wealth—a process known as the "**second**" **demographic dividend**.

1.3 Research Framework

The study takes a multi-disciplinary approach, drawing on concepts, literature, and evidence from economics, demography, sociology and gerontology. Our conceptual framework therefore takes a holistic view of poverty and vulnerability especially in later life and of the nature of demographic, societal, and economic changes over the long term in order to best understand policy options in this dynamic context.

Defining ‘older’ people

There is no universally accepted age to define ‘older’ people. It is often based on concepts of chronological time, a change in physical capabilities, and/or a change in social roles (related to work, child rearing, etc), but these will of course be specific to particular social and economic context. In Western countries, the standard tends to be 65, as this has been (until recently) a common age at which people are expected to retire. In the African context, however, ‘retirement’ as such is not as relevant a concept, with few workers eligible for a pension or able (or wanting) to stop working. As such, the WHO has adopted the age of 50 for the purposes of collecting data on older people in the region².

Here we use 60 as the cut-off. Although it is inevitably somewhat arbitrary, this is consistent with the UN agreed standard, as well as the definition used by NISR for ‘elderly’ in its 2012 Thematic Report: Socio-Economic Status of Elderly People.³

Understanding poverty vulnerability of older people

Concerns about a vulnerability of older adults have been central to much of the debate on ageing in sub-Saharan Africa. An established literature posits, particular vulnerabilities of older persons—and their heightened exposure, relative to younger-aged adults, are to ill-health and disability from non-communicable diseases⁴, poverty and social exclusion⁵. The drivers of such outcomes among older adults are understood to emerge from a spectrum of factors, which can also interact:

- **Poverty over the lifecourse:** Older people may be subject to an accumulation of harmful exposures and limited opportunities over the lifecourse, especially where lives have been lived within contexts of poverty (WHO, 2015; Aboderin, 2010).
- **Youth and working-age:** A lack of schooling and consequent illiteracy for many; absent opportunities for gainful work, saving or investing during younger years; or exposure to chronic sickness are three prominent examples of poverty that continue to reverberate and indeed magnify as people age. (Negin & Cumming 2010; Hontelez *et al.* 2011; Zhao & Goetz, 2011; Aboderin, 2011, WHO, 2015). In the Rwandan context, the genocide and the many

² Kowal and Dowd (2001): Definition of an older person. Proposed working definition of an older person in Africa for the MDS Project. Geneva: World Health Organization.

³ It is also more likely to be a useful cut-off for the purposes of social protection policy than 50, at least for now, as categorical transfers tend to start with a focus on the oldest age groups.

⁴ WHO, 2015; Debpur et al. 2013; Payne et al. 2013; Kowal et al. 2010, Gómez-Olivé, et al. 2010; Wandera et al. 2014; Aboderin & Beard, 2015

⁵ Kakwani & Subbarao, 2005; Aboderin & Ferreira, 2008; Ferreira & Lindgren, 2008

years of violence and unrest that preceded it had important implications for poverty, asset building, and health, particularly for populations who were internally displaced or refugees, many for very long periods.

- **Older years:** In most SSA countries, more than 60 per cent of older men and 50 per cent of older women remain in the labor force. However, older adults are predominantly engaged in vulnerable and low paid employment, specifically in smallholder agriculture, where functional limitations combined with limited education may constrain their productivity (Aboderin, 2012, 2015; Payne *et al* 2013; Li & Sicular, 2013; Skirbekk, 2008);
- **Intergenerational support roles and burdens of older people,** engendered, in the Rwandan context, particularly by the genocide and to a lesser extent the HIV/AIDS epidemic (UNICEF, 2007). Such roles include caregiving to grandchildren orphaned by the epidemic or to adult children infected by it, or the maintenance of kin who are unemployed or otherwise unable to earn a livelihood. Older people are also expected to care for grandchildren whose parents have migrated. Notwithstanding potential positive effects, the strain of having to provide such support may affect older persons' material, physical and emotional well-being negatively (Schatz & Seeley, 2015; Chepngeno-Langat, 2014; Kohler *et al.* 2012);
- **Strains in the adequacy of family-based intergenerational support mechanisms and networks** (Aboderin, 2004b; Gureje *et al.* 2006; Berthe *et al.* 2013, 2014; Ramlagan, Peltzer & Phaswana-Mafuya, 2013; Kohler *et al.* 2012; Schatz & Seeley, 2015). Such strains variously arise due to (i) a sheer absence of adult children or other younger generation adult kin – for example due to the genocide, rural-urban migration (van der Geest, 2002) or selective HIV/AIDS-related mortality; (ii) constrained resource capacities of younger generations coupled with resource allocation norms that prioritise the needs of the young above those of the old (Aboderin, 2004b, 2006) or (iii) possibly changing norms of family support provision to older relatives (Aboderin, 2004b, 2006);
- **Health and well-being:** Older people face inevitable declines in physical and mental capacity that occur in the process of ageing toward later life but whose onset, nature and extent is tremendously variable and depends in large part on health systems and environment responses (WHO, 2015);
- **Lack of formal social protection:** An extremely low coverage of formal old age pensions - only 17% of older people in SSA are estimated to receive such income (ILO, 2014), and a virtual absence of comprehensive systems of long-term care provision for older adults with a significant loss of mental or physical capacity (WHO, 2015; Scheil-Adlung, 2015);
- **...and health and other services:** Older people have circumscribed access to basic services, in particular to health care and education (Mc Intyre, 2004; Aboderin & Beard, 2015). A key supply-side factor underpinning such access limitations is a profound non-preparedness of SSA health and education systems to respond to old age-related needs – as they remain oriented to addressing challenges of younger age groups specifically infants,

children and reproductive age adults (Aboderin & Beard, 2015; WHO, 2015)⁶. Such an orientation reflects priorities enshrined in the Millennium Development Goal agenda, which, between 2000 and 2015, provided an overarching frame for SSA countries' health and social sector investments - and which excluded any direct consideration of older adults (Aboderin & Beard, 2015; Aboderin & Ferreira, 2008). Specific impediments to health care access within this context include geographical or physical factors such as long distances to, or forbidding waiting times or arrangements in, facilities; as well as financial impediments due to high transportation costs or fees for private-sector providers. Private services are typically sought in response to the absence, or perceived low quality of care in public clinics or hospitals. Demand-side barriers may include a limited understanding or appreciation of the merits of service use in older age (Aboderin & Beard, 2015).

In contrast to, and partly as a reaction to an often dominant focus on the vulnerability of older age – and attendant views of older adults as ‘unproductive’ and dependent – a second strand of perspectives in the research and advocacy discourse on ageing in SSA has sought to highlight older adults' positive contributions to families, communities and societal development (Aboderin & Ferreira, 2008; HelpAge/UNFPA, 2012). Above all, such a lens has drawn on evidence of older adults' prominent role as prime caregivers to children who have been orphaned. More recently, perspectives have highlighted older people's engagement in small-holder agriculture, which remains the backbone of many African economies (Gorman, 2013), and the positive impact on labour force participation of working-age adults enabled by the support of older people.

⁶ A lack of health system preparedness is exemplified in the virtual absence of appropriately trained or qualified personnel with basic competencies in relevant aspects of gerontology or geriatrics (Cassim & Aboderin, 2017; Frost et al. 2014).

Box 1: Gender and vulnerability in old age

A salient notion in discourses on older adults' vulnerability in SSA (as elsewhere) is that older women are systematically disadvantaged compared to older men (Aboderin, 2010; Knodel & Ofstedal, 2003). Indeed, older women's typically greater longevity itself is often construed as a *detriment* - as it implies a greater risk of being widowed or living alone (Knodel & Ofstedal, 2003). Specific domains in which older women have been observed to be worse off than their male counterparts in some settings include health status (Gomez-Olive et al. 2010; Mwanyangala et al. 2010; Kyobutungi, Egondi & Ezech 2010) and access to health (Albanese et al. 2011) or financial services (Zins & Weill, 2016).

While still under-theorised, a female disadvantage in later life is seen as a result of cumulative differential economic and social roles, exposures, power and opportunities between men and women over the lifecourse. This resonates with a 'double jeopardy' notion (Chappel & Havens, 1980), which sees such a gender disparity in older age as the confluence of two negative statuses: being a woman and being an older person. However, evidence also points clearly to areas - such as closer ties with, loyalty and support from younger generation kin - in which older women can have an advantage over men, and which likely have a bearing on risks of poverty and other negative social outcomes (Aboderin, 2010; Knodel and Ofstedal, 2003). Thus, while a differential impact of ageing on women and men is not in doubt, blanket assumptions of female disadvantage are unwarranted. Rather, there is need to recognize a likely variation in the relative status of older women and men across different dimensions of well-being or support, and across different socio-cultural contexts (Chant, 2010; Calasanti, 2004).

Cutting across the dominant perspectives in the debate on ageing in SSA, a more recently emerging strand of thinking has sought to underscore the critical importance of:

- i. Resisting frequent tacit assumptions about a homogeneity of SSA's older population by recognizing and focusing analyses on the differentials and inequalities that exist in this group within and among countries, along health, social and economic axes (Aboderin & Ferreira, 2008; Aboderin, 2016).
- ii. Moving beyond the often dichotomous 'vulnerability' and 'positive contributors' views to appreciate the range of older adults key roles', circumstances and influences - whether positive or negative, active or latent, at family, community or societal levels - and to elucidate their *relevance* to broader SSA development agendas - in particular those focused on reaping a demographic dividend (Aboderin, 2015; AUC, 2017a).

The approach here is to take this latter point to heart, attempting to take a balanced and nuanced approach to the relevance of older people, by understanding the range of their experiences, in terms of both poverty and vulnerability as well as capabilities and contributions.

In doing so, we also draw on some of the insights from the National Transfer Accounts project, which aims to measure economic flows across age groups⁷. Of central importance to the research is the recognition that inter-generational transfers are very much two-way (from parents to children and vice versa) and must be understood over the entire course of a life cycle; not only do parents receive support from their children in older age, but they provide bequests and assets as well.

To understand older people's well-being, it is important to understand how individuals at different ages fund their consumption. In older years, this can be from relying on continued work, public transfers, familial support, asset income, and dis-saving. In practice, the latter is fairly uncommon in developing countries, as few individuals have had an opportunity to save. Labour income tends to fall with age, whether because of a preference for more leisure or, more relevant in the context of high levels of poverty, when physical and cognitive decline make continued work difficult. Family support can be important, but where poverty levels are very high, it might be difficult for younger generations to support older ones. A reliance on assets may therefore be the main avenue for funding consumption in older years, and this will have important implications in terms of inequality and distribution; where initial asset holdings are unequal they will remain so in older age. Public transfers, then, are the only mechanism for addressing inequalities across the population (whether across generations or individuals).

1.4 Understanding the role of demographic, societal, and economic change

An important aspect of this study is the long-term nature of the research questions; not only is there a need to understand the experiences of older people and their needs now, but also in a future in which rapid demographic, economic, and social changes are expected to take place.

- **Demographic:** As a result of declining fertility and longer life expectancy, Rwanda's population will become considerably older over the next 30 years, with both the number and share of older people growing rapidly. At the same time, Rwanda will continue its trends towards urbanization. Population projections together with persistent high fertility rates suggest that the population will continue to grow, putting increased pressure on already scarce land resources.
- **Economic:** Rwanda's economy is expected to transform enormously over the coming decades, during which time government aspires for the country to attain middle-income status. Important macro-economic trends include not only overall economic growth, but particularly the sectoral shifts away from agriculture and, to some extent, an increasing formalization of the economy. Primary and secondary education have expanded rapidly in the last twenty years and will continue to do so, with positive implications for the productivity potential of the workforce. However, such trends will not affect everyone equally; one of the most devastating impacts of the genocide was the near-total collapse of the school system and consequent major gaps in education for the cohort of children who

⁷ Lee, Ronald, Andrew Mason and Daniel Cotlear (2010). Some Economic Consequences of Global Aging: A Discussion Note for the World Bank. HNP Discussion Paper. Washington, DC: World Bank.

are now in middle-age. Younger cohorts with more education will therefore disproportionately benefit from these positive economic forces over the coming decades, while others are likely to be left behind by rapid economic and technological change without active government engagement.

- **Social:** The broader economic and demographic trends are expected to engender pronounced and rapid change in social structures, dynamics and contexts. The directions that such shifts will take remain hard to predict. A dominant view, inspired by modernization theory, expects a progressive nuclearization of families and a weakening of intergenerational bonds as a result of greater education and urbanization. However, such assumptions remain contested and poorly substantiated — and remain a question for empirical inquiry (Aboderin, 2004a).

1.5 Understanding policy options in the dynamic context

Given the dynamic context, it is important to understand that policy options to be considered by Rwanda must go beyond those targeted directly at older people, although these are, of course, of central importance. Specifically, there is a need to think ahead and consider how policies across the entire life cycle as well as those addressing macro-structural factors, may impact outcomes in old age. This focus informs the research presented later in this report.

2 Methodology

This study utilized a range of different research methods, starting with a wide review of the literature on aging and social protection. The other methods comprised:

1. Stakeholder survey analysis;
2. Quantitative analysis of Rwandan survey data;
3. Qualitative fieldwork;
4. A combined demographic, micro, and macro economic modeling of future trends over the medium- to long-term.

Findings of the literature review, stakeholder survey analysis, and initial quantitative analysis were elaborated in the inception report, and are not repeated here. The emphasis in the remainder of this report is on setting out the evidence generated and insights gained through the more in-depth quantitative analysis of Rwandan household survey data, qualitative fieldwork, and the modeling exercise. We begin with a description of the [aims and] design of each of these approaches. This is followed by a discussion of the generated findings in terms of (i) the wellbeing of older persons at present, (ii) the implications of social and economic dynamics for older persons in the future and (iii) policy options for meeting the needs of older persons.

2.1 Stakeholder survey analysis

We conducted a range of key stakeholder interviews with key personnel in Rwanda in order to:

- Build awareness and buy-in for the study;

- Ensure that the research is policy relevant, reflecting the concerns and interests of key stakeholders, especially government decision-makers; and
- Explore potential engagement channels that will integrate the research into existing or future *government* processes such as medium-term plans, policy and sector reviews, joint government-donor reviews, sector working group reports, etc.

A write up of the themes emerging from these surveys, together with a list of the people interviewed can be found in the inception report.

2.2 Quantitative analysis

The quantitative work undertaken here is based mainly on the original analysis of the raw data from EICV4 (the Integrated Household Living Survey, Round 4), Rwanda's latest round of its household consumption and expenditure survey, complemented with already-produced data from the 2012 Census by the National Institute of Statistics for Rwanda (NISR), and population projections from the United Nations Population Division.

This analysis was designed to dig deeper into aspects of the current experience of poverty and vulnerability as well as health and well-being of older persons currently in Rwanda. We were also able to provide a more precise assessment, than hitherto available, of the contributions and needs of Rwanda's older population and the current gaps in policy and programming related to social protection. Building on the preliminary findings in the inception report, the key research questions for this phase are:

- What factors explain differences in relative poverty between households with and without older people, and within different types of households with older people?
- What are the sources of livelihood for older persons, and how does this fit into our understanding of earnings and consumption over the life course, and inter-generational transfers?
- What kind of provision for private support in old age is available to older people? How many have adequate provision from their own personal or familial resources? What is the 'unmet need' for social protection?

This understanding of the current context for older people is then used as evidence for assumptions and plausible scenarios about changes in demography and the economy over the next thirty years that were then used in the modeling exercise, to project forward a likely picture of how the three over-arching policy questions will evolve over time:

- If current trends continue, what will the 'unmet need' for old age social protection be, in terms of coverage, familial support, poverty, etc?
- How will these 'unmet needs' change in the face of changing patterns with respect to: migration, household demographics (kinship structures), employment, etc?
- What would the impact of policy options be, in terms of costs and benefits: universal old age pension, expansion of informal sector savings?

2.3 Qualitative research⁸

In this section we provide an overview of the objective and methods for the qualitative research. The qualitative fieldwork had three main objectives:

1. to **validate and contextualise emerging findings** from the literature review on demographic structures and future trends in Rwanda;
2. to **fill identified knowledge gaps** particularly in relation to issues that will increase in importance over the next decades, but that have currently been neglected in existing policies, programmes as well as research studies;
3. to **understand perceptions** of current generations in Rwanda regarding issues relevant to social protection and aging, such as family support structures, intergenerational co-residence, access to services and gender.

The table below provides a brief overview of the key research themes and specific questions that were addressed during the qualitative fieldwork.

Table 1: Qualitative Research Framework

| Research theme | Questions |
|---|---|
| 1. Drivers of poverty and vulnerability in old age | <ul style="list-style-type: none"> ➤ What characterises poverty in old age? Has this changed in the past two decades? ➤ Is poverty in old age different for men and women? ➤ Is old age linked to greater vulnerability? What factors increase the vulnerability of people in old age? Does this differ between men and women? ➤ What distinguishes poor and non-poor older people? ➤ In how far does Ubudehe 1 category capture vulnerability in old age? |
| 2. Family structures and informal support mechanisms for older people | <ul style="list-style-type: none"> ➤ Who looks after older people? ➤ What support mechanisms are in place at family/community level? Who has access to them? ➤ How have family and intergenerational structures changed over the past two decades? Are these changes different for male and female household members? ➤ How have these affected older people and their livelihood needs? Do they affect older men and women differently? ➤ Do urbanisation and migration affect intergenerational support structures for older people? |
| 3. Perceptions of older people and their contributions to family/community | <ul style="list-style-type: none"> ➤ What role do older men and women play in the household? ➤ How are older people viewed within their communities? How does this differ across types of older people? ➤ How are older people currently contributing to their families (e.g. domestic work, care work)? ➤ How does this differ across men and women (especially domestic |

⁸ A complete write up of the findings from this research can be found in an accompanying report.

4. Access to government services (with focus on VUP/Mutuelle de Santé)

- care burden on older women)?
 - How are they contributing to their communities?
 - What kinds of government services are provided for older people? Who has access to them and who doesn't?
 - Are all older people eligible for this support? If not, why not?
 - For those who access services, how adequate are these in meeting the needs of older people? Does adequacy depend on whether they are men or women?
 - How can the services mentioned be made more adequate/accessible for older people?
 - How has access to these services affected the lives of older people (including impact on social networks)?
 - What are the unmet needs of those who can't access services? Do needs differ between older men and women?
 - How do older people without access to services cope?
 - What types of services are missing (with a focus on non-cash types of support, e.g. support groups, access to information, care services)?
-

Site selection

The qualitative research was conducted in two provinces of Rwanda (City of Kigali, Southern Province), with two sites being selected in each province -one urban and one rural district. The two provinces were chosen to represent urban and rural areas in Rwanda. Hence, the City of Kigali was chosen because it is the most urbanised province. According to the Fourth Rwanda Population and Health Census (RPHC 4), Kicukiro is the most urbanised district in the City of Kigali, with 87.9 percent of its total population living in urban areas. Gasabo is the least urbanised district in the province, yet it still counts as peri-urban, with 69 percent of its population living in urban areas.

Southern Province was selected as the second province since it is the most rural province in the country, with only 1.2 percent of its population living in urban areas (RPHC4, 2014, Table 8, p. 10). Huye district was chosen as the most urban district of Southern Province, with 16.1 percent of its population living in urban areas, and Gisagara as the most rural one, with an urban population of only 1.2 percent. Gisagara is also one of the poorest districts in the country, with 53.3 percent poverty incidence and 20.6 percent extreme poverty incidence (Fourth Integrated Household Living Conditions Survey (EICV4), 2015, Table 8, p. 22).

Table 2: Population (%) identified as poor and extremely poor by district 2013/14 (EICV4 2015)

| Districts | Poverty incidence | Extreme poverty incidence |
|--------------------------|-------------------|---------------------------|
| Kigali City | | |
| Kicukiro (urban) | 16.3% | 6.5% |
| Gasabo (peri-urban) | 23.4% | 11.3% |
| Southern Province | | |
| Huye (urban) | 32.5% | 5.7% |
| Gisagara (rural) | 53.3% | 20.6% |

Data collection

In these sites the qualitative fieldwork focused on consulting different actors at the district, sector, cell and village levels. This was achieved through semi-structured key informant interviews (KIIs), which were conducted with government staff in charge of social affairs and social protection (e.g. Director of Social Affairs, Vice Mayor of Social Affairs), as well as local government representatives (e.g. *umudugudu* (sub-division) leader, other leaders).

Additionally, focus group discussions (FGD) were held at the village level in order to capture the perceptions of the population on: changing family structures; the role of older people in the community and households; and, accessibility of services for older people. In each site, four FGDs were organised which represented the following groups:

- 1) direct support beneficiaries of the Vision 2020 Umurenge Programme (VUP),
- 2) women above 65 years of age,
- 3) men above 65 years of age; and,
- 4) men and women between 20 and 50 years of age. The selection of FGD participants was conducted in collaboration with the local authorities and facilitated through the Ministry of Local Government.

Table 3: Number of interviews, by type of interview and location

| | Focus group discussions | Key informant interviews |
|--------------------------|-------------------------|--------------------------|
| Kigali City | | |
| Gasabo | 4 | 8 |
| Kicukiro | 4 | 5 |
| Southern Province | | |
| Huye | 4 | 6 |
| Gisagara | 4 | 7 |
| Total | 16 | 26 |

In order to capture the richness of respondents' accounts, the fieldwork team used a digital device to record the KII and FGDs, in addition to taking written notes. Recordings of KII and FGDs only occurred if participants gave their expressed consent. At the end of the fieldwork the local researchers transcribed the notes from the KII and FGDs as part of a fieldwork report

Data analysis

Each of the interviews and FGDs were translated, transcribed and coded before undertaking a textual analysis of the accounts. The following sections will summarize the key findings emerging across all sites, following the structure of the four key research themes outlined in the research framework.

2.4 Modelling exercise

Most existing population projections have tended to rely on fairly aggregated models, which provide information on age and gender projections for the population over a medium- to long time horizon. While such models are becoming more sophisticated, incorporating probabilistic approaches to provide a credible range of likely outcomes, their relevance for the current research exercise is limited by the fact that they cannot provide forecasts of important issues such as migration, poverty, household composition, etc.

By contrast, microsimulation is a kind of policy simulation – allowing for ‘ex ante’ evaluation of potential policy and programme impacts - that relies on micro data, in this case a representative household survey, in contrast to macro models that rely on a ‘representative agent’. While macro models can sometimes be simpler because they rely on an aggregated picture (basing assessments of impact on an average household, for example), they are unable to provide an accurate picture of the heterogeneity within a population. Where the distributional impact is important, and where there is a wide diversity of experiences across and within households in terms of living conditions, microsimulation approaches are helpful. They are also better able to replicate the complexity of policy structures and programme eligibility criteria (such as those used by VUP), and allow for detailed scenario analysis or “what if” testing of different options to measure impact on different groups of the population (allowing a look at impacts on older adults and women specifically).

Microsimulation models can be static (looking mainly at first-round impacts without making assumptions about second-round behaviour effects) or dynamic (incorporating behavioural impacts). Dynamic models have been developed, for example, to explore the likely effects of social protection programmes on labour force participation or education, and could also be applied to a wide range of other areas such as take up of health insurance or decisions about migration.

In the economic literature, microsimulation models tend to take a fairly simple approach to ‘ageing’ of the dataset, for example simply applying adjusted population weights forward based on existing macro population projections. In the demographic literature, however, there have been some important developments of microsimulation models to ‘age’ the database in terms of demographic drivers, including fertility, mortality and household formation.⁹

The marriage of these two approaches – economic policy microsimulation and demographic microsimulation – allows this study to explore its research questions to the fullest extent. By unpacking demographic projections and exploring the interaction at an individual and household level of expected changes in fertility, mortality, and household formation alongside socio-economic characteristics related to poverty and migration, we are able to identify and explore the key implications of ageing for policy (i.e. how rationales for policy interventions are likely to evolve over time) and potential impacts of various policy and programme responses.

⁹ Zaghene, Emilio (2015) “Microsimulation in Demographic Research.” In: James D. Wright (editor-in-chief), *International Encyclopedia of the Social and Behavioral Sciences*, 2nd edition, Vol 15. Oxford: Elsevier. pp. 343-346.

Table 4, below, illustrates the way in which the key modules in the dynamic model interact, allowing multiple complex processes in terms of demographic, economic, and social change to be captured. For example, the ageing of the population obviously influences all the other modules, as age plays a role in education, marriage, fertility, earnings, and urbanization, while marriage and household formation has a major impact on earnings and poverty, as land bequests from parents to children play a large role in determining well-being of both.

Table 4: Dynamic microsimulation module interaction

| Module in Row impacts Module in Column ... | Mortality | Marriage/ household formation | Fertility | Education | Urbanisation | Earnings | Transfers to parents |
|---|----------------------------|---|----------------------------------|---------------------------------|----------------------------------|---|---|
| Age | Probability depends on age | Probability and mate matching algorithm depends on age | Probability depends on age | Probability depends on age | Probability depends on age | Probability depends on age | Probability depends on age |
| Mortality | | If household head dies, new head takes over (spouse, children, etc) | | | | Dependent on household size | |
| Marriage/ household formation | | | Probability depends on marriage | | | Land bequests | |
| Fertility | | | | | | Probability of working depends on N children | |
| Education | | Part of mate matching algorithm | Probability depends on education | | Probability depends on education | Probability or work, sector and wage earnings depend on education | |
| Urbanisation | | | | Probability depends on location | | Earnings depend on location | Probability and amount of transfer depend on location |
| Earnings | | | | | | | Probability and amount of transfer depend on consumption/earnings |

At its simplest, the simulation model takes the following steps:

1. The dataset is 'aged' to reflect the evolution of the population in terms of demographics (fertility, marriage, household formation, fertility), migration, employment, and welfare. (see the discussion below and in the Annex for more detail)
2. Beneficiary households are identified for potential programmes/ policies
3. The programme 'treatment' is applied: for example, household earnings and consumption are increased by the value of a social pension, plus any secondary benefit streams (such as returns to investments made out of the transfer)
4. Post-treatment household poverty is estimated and compared against the baseline (pre-treatment) situation.

A further important extension is the incorporation of a macro-economic model, to give a complete picture of the macro-fiscal implications of ageing. This is especially important for understanding policy options over the medium- to long-term, as countries face both opportunities from the demographic dividend as well as challenges from increasing budgetary demands caused by increasing life expectancies and changing needs for more complex and costly health and social care services. The approach used here is a 'top-down' integration of the macro with the micro, so that the macro model provides high-level trends in the sectoral composition of the economy and labour force, prices and factor returns, and government expenditure.

This allows a comprehensive look at how the complex and inter-related changes are likely to occur and the way in which government spending (in general and on older people) might evolve to respond to these. By integrating the micro and the macro approach in this way, we are able to harness the power of the micro model to look at crucial household-level behavioural decisions and the *distributional* effects of structural changes at the macro level. The sequential approach, rather than a recursive top-down and bottom-up integration, does mean that not all inconsistencies between the micro and macro are resolved; micro decisions do not feed back up into the macro model, so there is not a full general equilibrium integration of the two (say, in terms of prices), and there are inevitably inconsistencies in the data sources used for the micro and model. These drawbacks are fairly minor, however, given the focus of the research¹⁰.

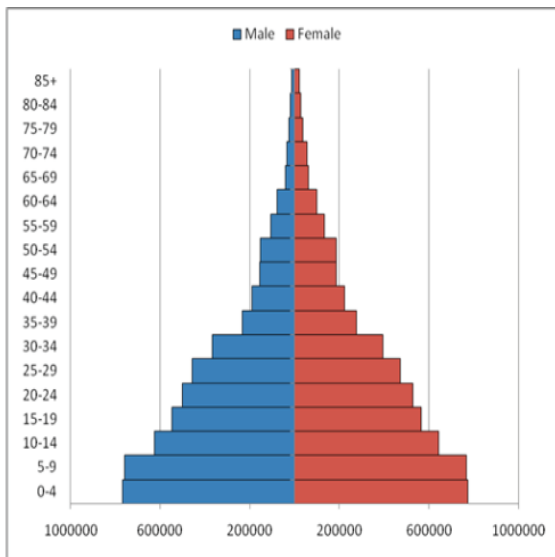
3 Ageing in Rwanda: the Wellbeing of Older Persons at Present

3.1 Demographics

Currently older persons in Rwanda (60 and above) represent 4.9% of the total resident population. Reflecting a common female advantage in life expectancy, the share of older women in the total female population (5.6%) clearly exceeds the corresponding figure for older men in the male population (4.1%).

¹⁰ See Bourguignon, Francois, Maurizio Bussolo and John Cockburn (2010) "Macro-Micro Analytics: Background, Motivation, Advantages and Remaining Challenges. International Journal of Microsimulation, 3(1).

Figure 1: Age pyramid of the resident population in five-year age groups, 2012



Source: Fourth Rwanda Population and Housing Census (NISR 2013: 7)

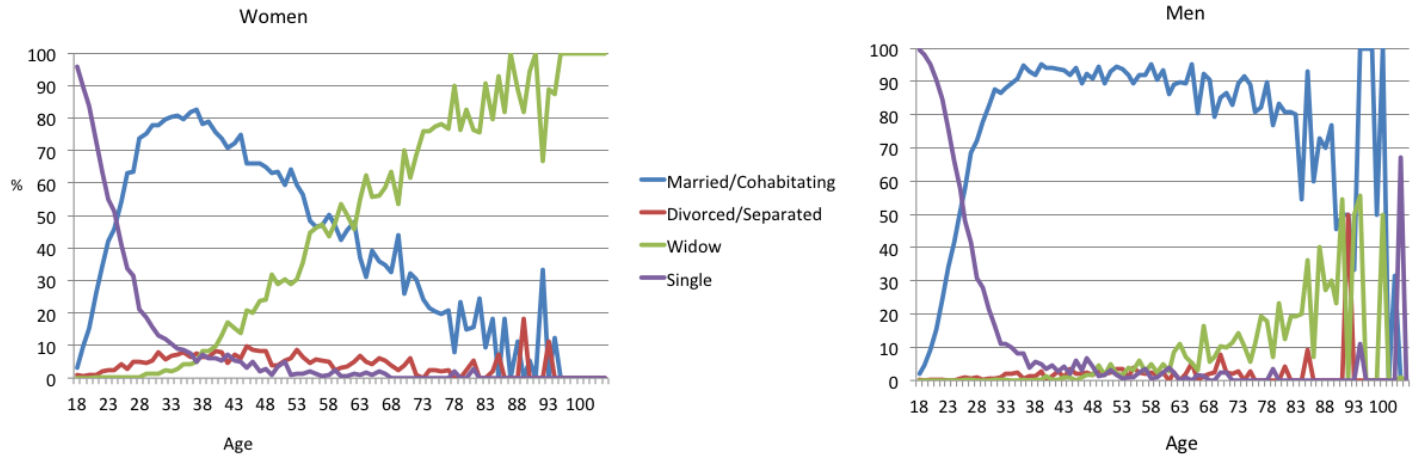
3.2 Household structures and kinship networks

Marriage

Marriage amongst the current group of older people is near-universal; individuals never having married are extremely rare. What is most striking is the comparison between women and the fact that men are far more likely to remain married even in their older years, whereas for women by age 60 there are as many widows as those who are currently married, and widowhood increases rapidly (and marriage declines rapidly) from 60 onwards.

This reflects two things: firstly that women are more likely to live longer and therefore to be widowed in the first place, but also that men are much more likely to remarry if they are widowed. These trends are very similar to those found by Van De Walle et al (2016) in their analysis of DHS data from 29 countries in Africa, although for Rwanda there are more widows at younger ages, reflecting the impact of the genocide.

Figure 2: Marital status by age and sex



Source: EICV4 2013/14

Household composition

A majority (68%) of older people live with working-age adults, particularly in urban areas, and over half live with working age adults and children. Across all households nationally, 13% contain an older person, and 7% are households with older people, working-age adults and children.

Table 5: Household composition by location and presence of older people

| | All households | | | Only households with Older Persons | | |
|--|----------------|-------|-------|------------------------------------|-------|-------|
| | Urban | Rural | Total | Urban | Rural | Total |
| Older Persons only | 0.7 | 2.05 | 1.84 | 7.96 | 14.44 | 13.77 |
| Older Persons & working age | 2.01 | 2.3 | 2.25 | 22.89 | 16.18 | 16.88 |
| Older Persons & working age & children | 5.51 | 7.12 | 6.87 | 60.7 | 50.0 | 51.12 |
| Older Persons & children | 0.74 | 2.75 | 2.43 | 8.46 | 19.37 | 18.23 |
| Working age & children | 69.57 | 75.72 | 74.74 | | | |
| Working age only | 21.38 | 9.93 | 11.75 | | | |
| Missing | 0.09 | 0.12 | 0.12 | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |
| Any Older Persons | 9.0% | 14.2% | 13.4% | | | |

Source: EICV4 2013/14

Household composition depends on the age, sex, marital status and location of older people, and we see that both men and women in urban areas are more likely to live with working-age adults.

In rural areas, at all ages, women are more likely than men to be living with working-age children, perhaps reflecting cultural norms for children to support (and take in) their widowed mothers while widowed fathers retain their own household. For both men and women, the incidence of

living with working-age adults decreases steadily from age 65-79, most likely the result of the children they had been living with. getting (re-)married and leaving to form their own households, and the younger spouse becoming older as well (whereas at the younger end of the old-age spectrum, men in particular may be over 60 but have a wife who is still working-age).

For older men, this pattern of increasingly living without working-age adults continues for older ages, while for women it reverses. This could reflect the fact that as women become older and have more issues with disability and health they become more likely to move in with remaining children than men, even if that means relocating to urban areas, perhaps because they are less likely than men to own their homes and may therefore be compelled to co-habit with their children.

Figure 3: Household composition of older people by location, age, and sex



Source: EICV4 2013/14

This is also suggested by the figures below: older men are almost universally heads of their household, and only around 1% live in a household headed by a son, daughter, or in-law, compared to around 7% of women.

Table 6: Relationship to household head by sex, all older persons (65+)

| | Male | Female | Total |
|-------------------------|------|--------|-------|
| Household head (HH) | 98.1 | 66.5 | 78.5 |
| Spouse of HH | 0.2 | 25.0 | 15.6 |
| Parent or parent-in-law | 1.2 | 7.1 | 4.8 |
| Other relation | 0.6 | 1.4 | 1.1 |

Source: EICV4, 2013-14

A key point from these findings are that in rural areas, where the majority of older people live, very large numbers live without any working-age adults – 40-50% depending on age for women, and this increases significantly for men as they age. So older people in older-only households (or older person + children) are likely to be older than those living with working-age adults.

To really understand the well-being of older people, however, it is critical to dig further into household composition, and some very interesting findings emerge. What is particularly striking is that households with older people and working-age adults (with or without children) are not those where older people are living with their married adult children in a nuclear family. Instead, we see that:

- The working-age adults who live with older people are almost exclusively *unmarried*, either because they are young and have yet to get married and form their own household, or because their marriages have dissolved, in which case they – majority women – move back in with their parents.
- Twenty percent of apparently ‘multi-generational’ households are in fact nuclear families, where the children are the *children* of older people, not their grandchildren. (See Annex 1)
- Those households that are truly ‘multi-generational’ are almost exclusively made up of older people, their adult (mostly female) children who are single parents, and their children.

Households with older people, working-age adults and children are therefore fundamentally very different from those with just working-age adults and children (who are mainly nuclear families headed by a married couple).

Table 7: Detailed breakdown of household composition amongst older people

| | Total |
|--|--------------|
| Older people alone | 22.86 |
| Older people + children | 24.28 |
| Older people + working-age adult | 15.16 |
| Older people + working age + children | 37.71 |

Source: EICV4, 2013-14

This is corroborated by a look at the age and marital status of adult children living with older people. Female adult children tend to be older than males, because men living with their older

parents are almost exclusively single, whereas women are more likely to return to their parental home after the dissolution of their marriage.

Table 8: Age of adult children of old-age heads, by household composition

| | Male | Female |
|--|------|--------|
| Older Persons only | | 68.0 |
| Older Persons & working age | 30.7 | 33.0 |
| Older Persons & working age & children | 25.9 | 30.5 |

Source: EICV4, 2013-14

Table 9: Marital status of adult children of old-age heads

| | Male | Female | Total |
|-------------------------|------|--------|-------|
| Single | 96.1 | 75.3 | 83.7 |
| Married/living together | 1.5 | 1.6 | 1.6 |
| Divorced/separated | 1.7 | 16.3 | 10.4 |
| Widow/widower | 0.6 | 6.8 | 4.3 |

Source: EICV4, 2013-14

As a result, these households are disproportionately female-dominated, as shown in the table below. On average 70% of working-age adults in ‘multi-generational’ households (with older people, working-age, and children) are female, as are 82% of households with older people and children and 70% of households with older people only. This has very important implications for the poverty and vulnerability of these households, as it suggests that a majority of these households are likely to be disadvantaged in terms of earnings because they are lacking a male working-age breadwinner.

Table 10: Share of adults and working-age adults female, by household composition

| | % of adults female | % of working-age adults female |
|--|--------------------|--------------------------------|
| Older Persons only | 70.1% | |
| Older Persons & working age | 55.4% | 47.4% |
| Older Persons & working age & children | 63.5% | 69.1% |
| Older Persons & children | 82.5% | |
| Working age & children | 58.1% | 58.1% |
| Working age only | 44.3% | 44.3% |
| Total | 57.6% | 56.9% |

Source: EICV4, 2013-14

3.3 Poverty and well-being

Measuring the poverty and vulnerability of older people in a quantitative sense is challenging, because consumption, income, transfers, and assets are all measured at the household level, with assumptions about older people receiving their fair share. Poverty amongst older persons is therefore normally measured in terms of the incidence of poverty (among various dimensions) of households with older people compared to those without, as shown in the table below.

Table 11: Poverty incidence by household composition

| | Extreme Poverty | Poverty |
|--|-----------------|---------|
| Older Persons only | 15.0 | 4.2 |
| Older Persons & working age | 17.0 | 5.1 |
| Older Persons & working age & children | 33.7 | 12.9 |
| Older Persons & children | 35.9 | 12.6 |
| Working age & children | 39.3 | 16.0 |
| Working age only | 9.8 | 1.9 |
| Total | 34.4 | 13.6 |

Source: EICV4, 2013-14

However, it may be highly misleading to assume that older people living alone are less poor than households with children based on these statistics alone, for several reasons:

- 1) These measures of relative consumption poverty are very sensitive to assumptions about economies of scale within households; different assumptions about the relative consumption needs of children versus adults and the implications of household size on consumption needs (for ‘public’ goods like shared housing, utilities, etc versus ‘private’ goods like food, education, etc) leads to very different conclusions about the relative consumption of households.
- 2) Older people do not appear to have particular advantages in terms of the allocation of their expenditure across categories; indeed, they may be somewhat disadvantaged in terms of diet quality.
- 3) Assessing the relative welfare of households with older people requires a more detailed and nuanced understanding of the dynamics of household composition and assets.

We can address each of these in turn, to help unpack our conceptualization of poverty and vulnerability amongst older people.

Understanding assumptions about economies of scale and how these influence conclusions about relative poverty

Unfortunately, there is no one “correct” way to handle equivalence scales; theory tells us that, naturally, consumption of children will be lower than that of adults (though this will of course vary across the age of children and the cost of investments in nutrition, health, and education) and that there are economies of scale within households (so that costs of living do not rise equally with each additional member, due to the use of shared goods such as shelter and consumables for example).

Normally it is assumed that in developing countries economies of scale are fairly negligible, while equivalence scales are likely to be more important, because food, which is a private good, is a larger share of expenditure (in contrast to developed countries where investments in children are costly and therefore equivalence scales may be less relevant but there may be economies of scale in things like housing).

However empirical investigations have not been able to robustly confirm this theoretical starting point¹¹. There is therefore no ‘correct’ way to handle adjustments based on household size. Best practice is instead to undertake sensitivity analysis to understand the impact of different plausible values for equivalence scales. Formally, equivalence scales are normally represented using the following, where A is the number of adults, C is the number of children, α is the share attributed to children, and θ the parameter for economies of scale. α and θ lie between 0 and 1. When α and θ are both equal to 1, the equivalence scale is a per capita measure, and the closer θ is to one, the fewer economies of scale there are.

$$E = (A + \alpha C)^\theta$$

There are different approaches to the household size adjustment calculations. If the poverty line represents the level of consumption required per adult, then different assumptions about the equivalence scale and household economies of scale will have different implications for the overall incidence of poverty (since they have different implications for the number of adult equivalents in each household¹²). In this instance, however, it was important to keep the *level* of poverty constant (at the official poverty rate) under the different equivalence scale assumptions. This is achieved by ‘pivoting’ the equivalence scale adjustment around a ‘base’ household size (assumed here to be a two-adult, two-child household), so that the different equivalence scale scenarios have different implications for the *relative* poverty of different groups (households with greater or fewer numbers of adults vs children) while holding the overall *incidence* of poverty at the national level relatively constant¹³.

In Rwanda, the official equivalence scale used by NISR is fairly detailed by age and sex, as shown in the table below. However, when we compare to the scale used in Uganda, which is based on caloric requirements by age, we see that Rwanda’s scales are quite a bit higher for children.

¹¹ For a good discussion, see Angus Deaton (1997: 241-268) *An Analysis of Household Surveys*. Washington DC: World Bank.

¹² The poverty incidence will necessarily be lower using any kind of equivalence scale when compared against a per capita scale, because individual consumption is assumed to be higher for all households with children. For example, for a 2-parent, 2-child household, with a consumption of 200,000 per month would have an individual consumption of 50,000 assuming a per capita scale. However, if children only require 0.8 of each adult, there would be 3.6 adult equivalents instead of 4, leading to an individual consumption of 55,555 per month.

¹³ For a more detailed discussion of this methodology see Angus Deaton and Christina Paxson (1997) “Poverty Among Children and the Elderly in Developing Countries”. Research Program in Development Studies, Princeton University.

Table 12: Comparison of Equivalence Scales used in Rwanda and Uganda

| Age range Rwanda | Scale Rwanda | | Age range Uganda | Scale Uganda |
|--------------------|--------------|--------|------------------|--------------|
| | Male | Female | | |
| Less than 1 year | 0.41 | 0.41 | <1 | 0.27 |
| 1 to 3 years | 0.56 | 0.56 | 1 | 0.38 |
| | | | 2 | 0.45 |
| 4 to 6 years | 0.76 | 0.76 | 3 to 5 | 0.52 |
| | | | 5 to 6 | 0.62 |
| 7 to 9 years | 0.91 | 0.91 | 7 to 9 | 0.70 |
| 10 to 12 years | 0.97 | 1.08 | 10 to 11 | 0.73 |
| 13 to 15 years | 0.97 | 1.13 | 12 to 13 | 0.80 |
| | | | 14 to 15 | 0.88 |
| 16 to 19 years | 1.02 | 1.05 | 16 to 17 | 0.95 |
| 20 to 39 years | 1 | 1 | 18 to 30 | 1.00 |
| 40 to 49 years | 0.95 | 0.95 | 30 to 59 | 0.98 |
| 50 to 59 years | 0.9 | 0.9 | | |
| 60 to 69 years | 0.8 | 0.8 | | |
| More than 70 years | 0.7 | 0.7 | 60+ | 0.82 |

We can therefore compare the official NISR adult equivalent measures with the adjusted scale using Uganda's scale by age, as well as two measures that take economies of scale into consideration (assuming parameters of 0.9 and 0.75). The table below shows the difference in adult equivalents for each household type.

Table 13: Average Total Household Adult Equivalents Under Different Assumptions

| | Household Size | Official AE | Adjusted Equivalence Scale | Adjusted Equivalence Scale + Economies of Scale .9 | Adjusted Equivalence Scale + Economies of Scale .75 |
|--|----------------|-------------|----------------------------|--|---|
| Older Persons only | 1.23 | 0.96 | 1.01 | 1.00 | 1.00 |
| Older Persons & working age | 2.68 | 2.40 | 2.43 | 2.22 | 1.93 |
| Older Persons & working age & children | 4.94 | 4.49 | 4.12 | 3.55 | 2.86 |
| Older Persons & children | 2.79 | 2.49 | 2.23 | 2.05 | 1.81 |
| Working age & children | 4.93 | 4.56 | 3.97 | 3.43 | 2.77 |
| Working age only | 1.88 | 1.93 | 1.83 | 1.71 | 1.54 |

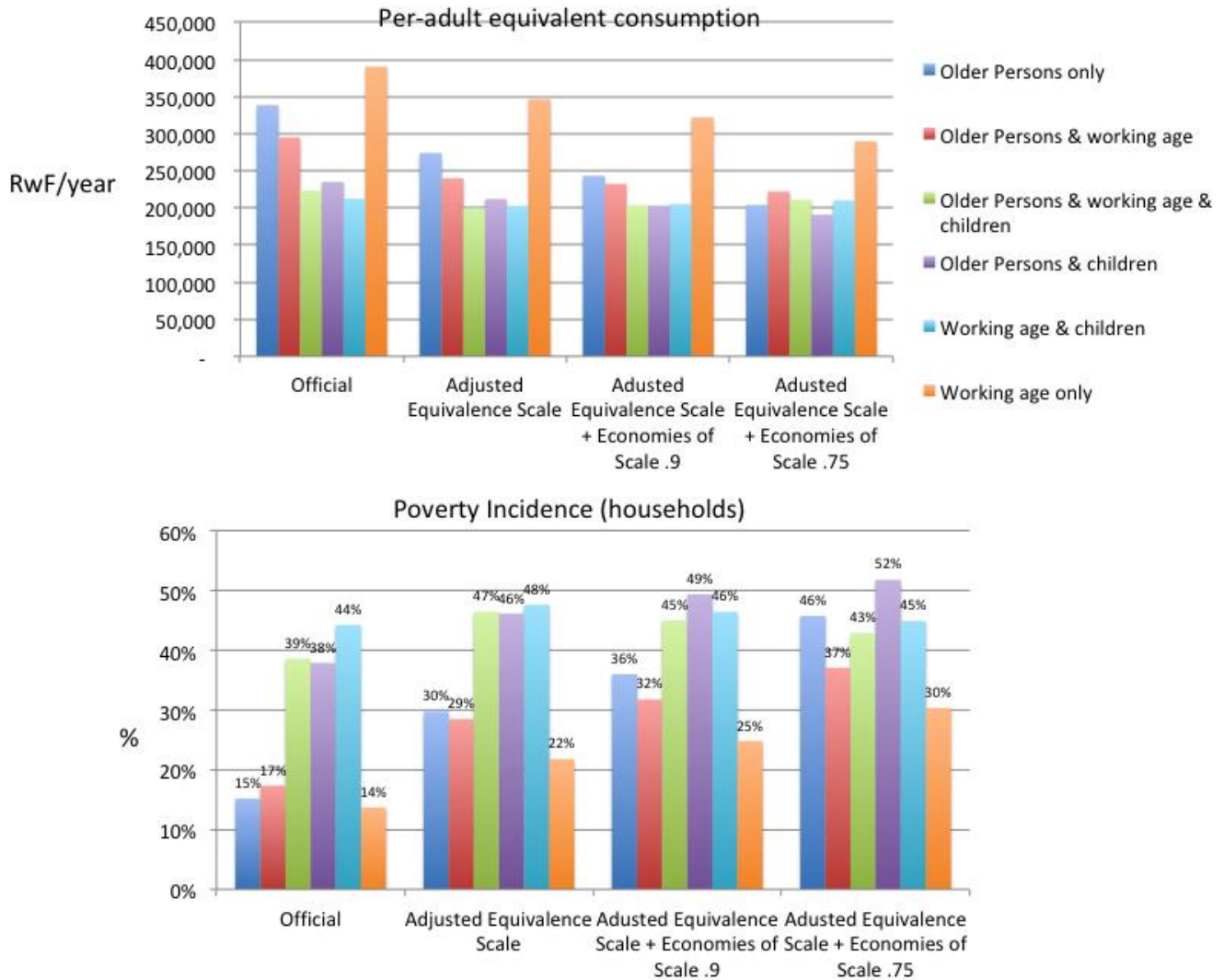
Source: EICV4, 2013-14

The impact of these different assumptions is very large, as illustrated in the figures below. Moving from left to right on the charts, we see that adjusting the equivalence scale lessens the difference between households with older people only and those with working-age adults and children. Including a parameter for economies of scale further serves to lessen the differences between household types (aside from households with working-age adults only, as these are universally the best off), and assuming a parameter of 0.75 for economies of scale results in a lower average per-adult for households with older people only compared to those with working-age adults and children.

Similarly, the poverty incidence of households with older people increases significantly once equivalence scales are adjusted and economies of scale are considered, rising from 15% using the official rate to 36% with a parameter of 0.9 and 44% with a parameter of 0.75, compared to the incidence of poverty amongst households with working-age adults and children of 46%.

Any conclusions about the relative poverty of older people must therefore carefully consider how sensitive the findings are to these assumptions.

Figure 4: Per-adult equivalent Consumption and Poverty incidence by household composition



Source: EICV4, 2013-14

An in-depth look at consumption patterns

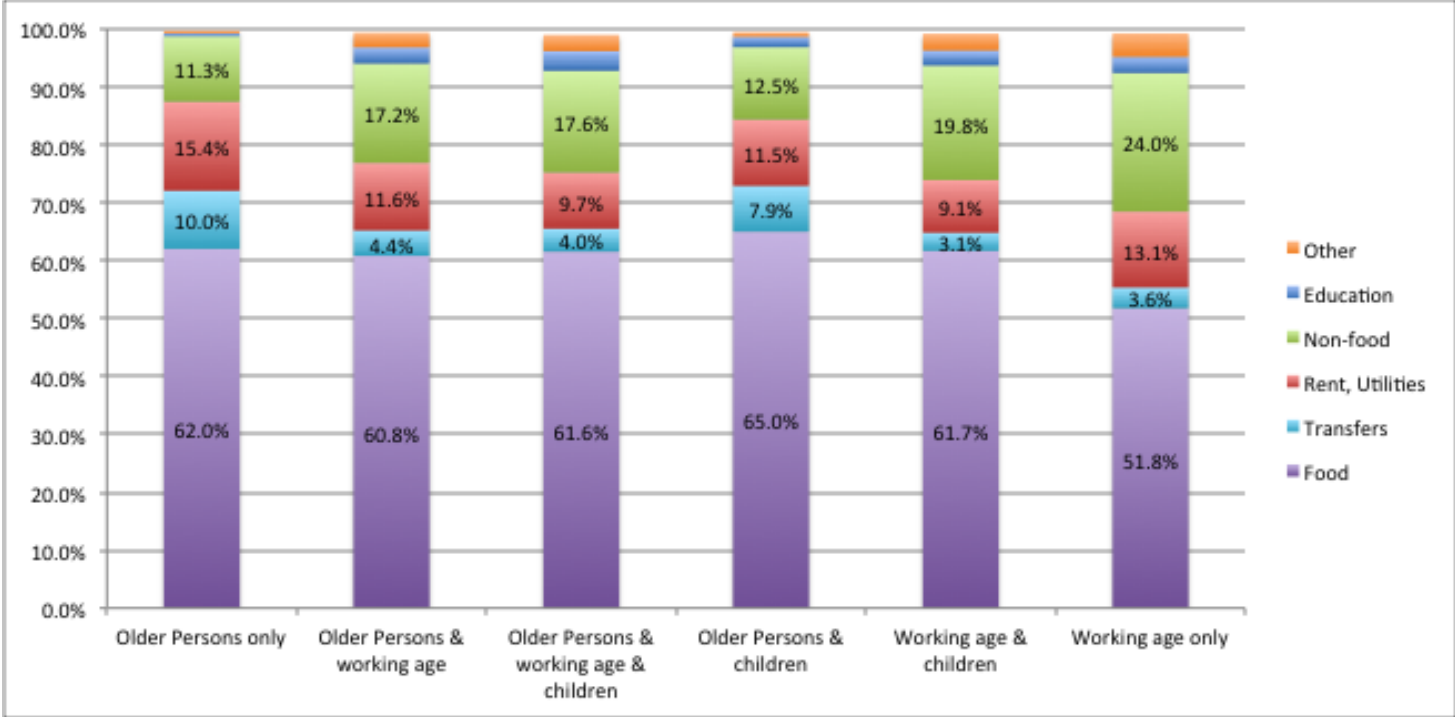
Bearing these findings on the importance of assumptions in mind, the next key question becomes whether there are indeed economies of scale that would make the official consumption aggregate biased against older people? To do this we can take a closer look at the consumption patterns of households with and without older people.

Share of consumption on food

The first indication that poverty in households with older people and no working-age adult may be higher than official estimates is that the share spending on food is the same across households with older people only as in those that have working-age adults and children without older

people; if households with only older people were really less poor, we would expect to see a smaller share of spending on food.

Figure 5: Shares of consumption by household composition



Source: EICV4, 2013-14

Diet quality

Looking at food consumption in more detail, we would expect that if older people living alone were better off, they would have a more high-quality diet¹⁴. However, when we look at the share of food expenditure on meat/poultry/fish, dairy, fruit and veg, and legumes, we see that these make up a very small share of consumption for all household types, but especially for households with older people and no working-age adults.

¹⁴ Of course, it could also reflect different dietary preferences in old age, but since expenditures on higher-quality food items like meat/poultry/fish, dairy, fresh fruit and vegetables and legumes tends to increase with the level of household consumption, irrespective of age, these patterns are likely to be at least indicative of financial barriers to higher-quality diets.

Table 14: Share of food consumption on food types, by household composition

| | Meat/Poultry/Fish | Dairy | Fruit & Veg | Legumes |
|--|-------------------|-------|-------------|---------|
| Older Persons only | 0.3% | 0.2% | 1.3% | 1.5% |
| Older Persons & working age | 0.6% | 0.3% | 1.5% | 1.0% |
| Older Persons & working age & children | 0.7% | 0.5% | 1.8% | 3.0% |
| Older Persons & children | 0.0% | 0.3% | 1.0% | 1.2% |
| Working age & children | 1.1% | 0.5% | 2.7% | 1.5% |
| Working age only | 1.8% | 0.8% | 4.7% | 2.4% |

Source: EICV4, 2013-14

Rent

Another interesting point is that the amount per adult equivalent for rent (or imputed rent) is much higher for older people, which makes it seem as though they choose to 'spend' more on their accommodation. However, in practice, especially in rural areas, the addition of children may not change the value of a dwelling, but consumption would go down significantly because the same costs are shared across more adult equivalents. With any additional children sharing the same physical space, there are likely in fact to be large economies of scale with respect to imputed housing costs. Indeed, with respect to the construction materials of the household's dwelling and the type of lighting, latrine, and cooking fuel, older people living without any working-age adults are more disadvantaged than other household types, suggesting that their additional consumption of housing is not for 'luxury' but rather a reflection of a lack of economies of scale.

Understanding '(self)-selection' into households without working-age adults: a look at work, earnings, assets, transfers and 'retirement'

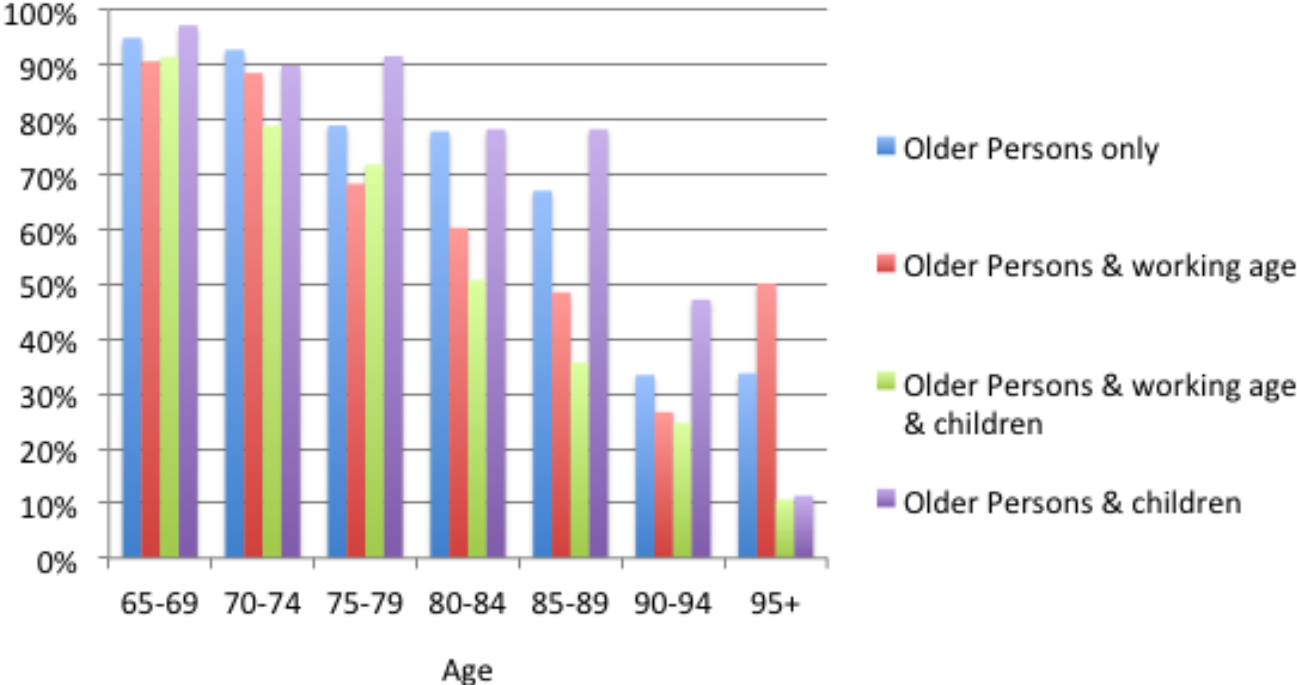
These realities of household composition are important because they represent more fundamental aspects of the patterns of asset accumulation and asset transfers over the life course, and implications for poverty in old age. In so doing, they also upend some typical assumptions about what familial support for older people looks like, since the model of 'nuclear family of adult children plus older person' is clearly not actually very common in reality.

Continue to work long into old age: no real concept of 'retirement'

What is quite striking is that older people continue to work long into their old age; labour force participation amongst older people is nearly universal for those aged 65-69, falling very slowly with age so that it remains well over 50% even for those up to 80-84 years old. Work is especially high amongst those of older ages in households without other working-age adults, so it would appear that having working-age adults in the house does provide some benefits in terms of the decreased obligation (or ability) to work, even if not in terms of increased household consumption

(since the earnings of working-age children might offer an opportunity to offset the loss in earnings of older people as they scale back their economic activities)¹⁵.

Figure 6: Labour force participation by age and household composition

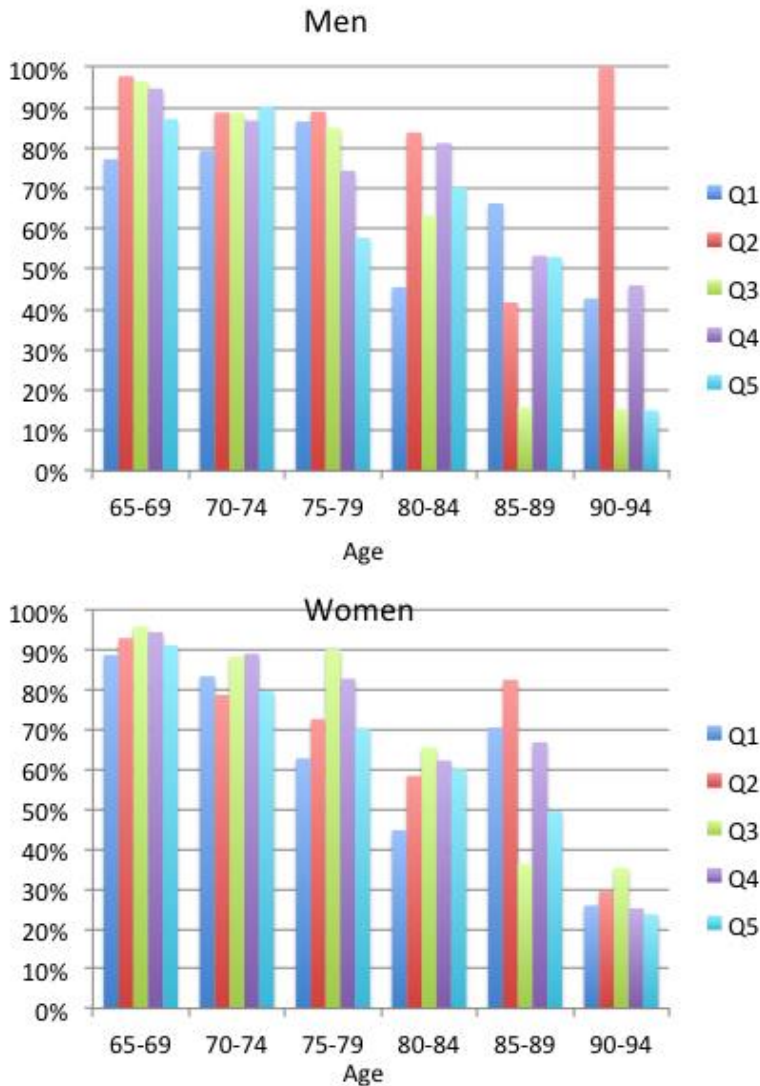


Source: EICV4, 2013-14

When examined by age, sex, and consumption quintile, it is interesting that for most groupings participation is higher amongst older people in higher consumption quintiles, which might be the opposite of what one might expect in terms of older people being able to ‘afford’ to retire. This supports the idea that – in the absence of any social protection – labour availability is key to well-being in old age; the poorest older people are likely to be those who are disabled and physically unable to continue working. This is especially true in the context of a largely agricultural economy, where labour is physically demanding.

¹⁵ The value for those aged 95+ in households with older persons and working-age adults appears to be inconsistent with these general trends, however the sample size above 95 years is very small, so it is important not to read too much into that one number. Overall the trends are consistent.

Figure 7: Labour force participation amongst older people, by sex, age, and consumption quintile (Q1 = poorest, Q5 = richest)



Source: EICV4, 2013-14

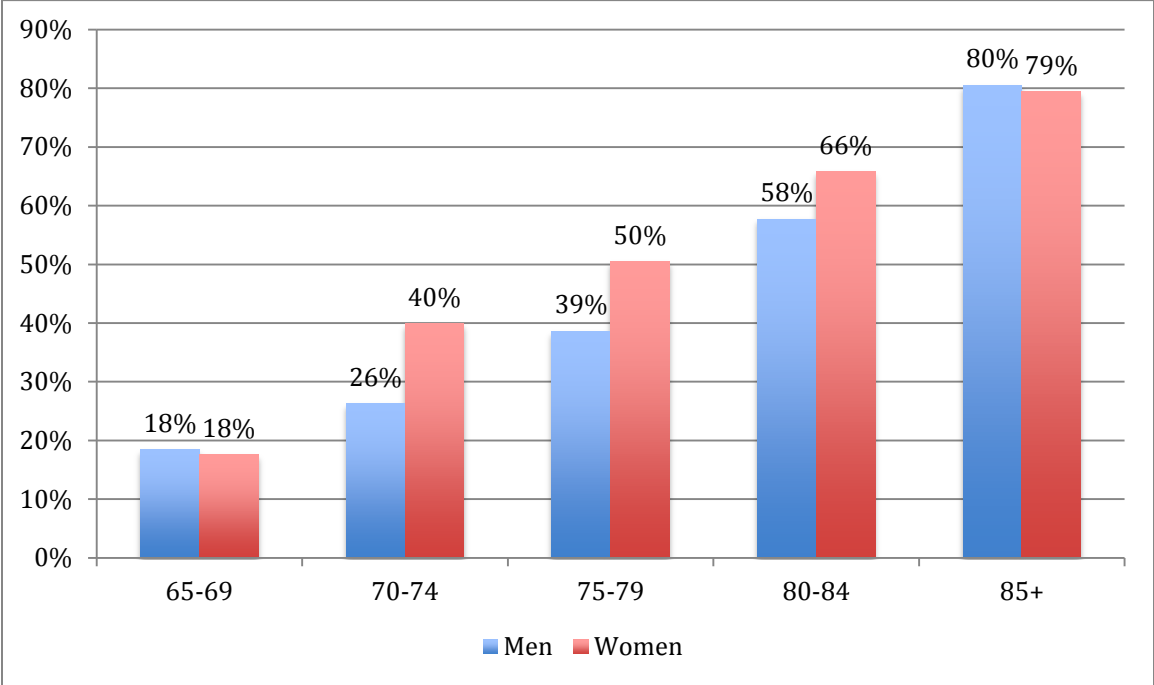
As would be expected, the incidence of disability increases with age, and these trends are very much in line with the trends in workforce participation; 18% of older people aged 65-69 have some kind of disability while 80% do by the time they reach 85. Disability is higher amongst women in the age range from 70-84, while men appear to ‘catch up’ by 85.

Given that rates of disability are higher than labour force participation, it seems that many older people continue to work even with some kind of disability¹⁶. Although the qualitative work found

¹⁶ This may partly reflect a quirk of the household survey instrument, where ‘old age’ is one of the ‘types’ of disability, so some of this reported disability may merely be people reporting their old age. However, these figures are more or less in line with findings from Uganda for people reporting ‘some’ difficulty across a range of dimensions, so those

that older people were themselves keen to continue contributing economically, there is a point at which some would, if given the choice, prefer to stop undertaking paid or unpaid productive work¹⁷, especially where it is physically demanding.

Figure 8: Rates of disability by age and sex



Source: EICV4, 2013-14

Pensions and savings

In the context of high levels of poverty and the lack of formal employment, only a fraction of older people will have contributed to a pension. In addition, due to the lack of development of the financial sector those with a pension receive a lump sum¹⁸, and probably use that to purchase assets, so it is somewhat difficult to really understand who receives a pension or not. This could be why ‘other pension’ category has more data: maybe they invest their lump sum into some other kind of account, and then draw this down over time.

reporting disability in terms of ‘old age’ in Rwanda may be using that as a description for a range of impairments of varying severity. For context, the Ugandan survey instrument uses a more detailed and robust framework for assessing disability across different dimensions and at different scales of intensity. There, 20% of 66-75s and 43% of over-85s are defined as partially disabled. See Wylde et al (2012) for a more detailed discussion of the definition of disability in Uganda and the implications for work at older ages.

¹⁷ By ‘work’ here we mean any productive activities (whether remunerated or not) as opposed to reproductive ones. So work includes subsistence farming, unpaid work on family farms or in household enterprises, as well as paid work outside the home.

¹⁸ Callund Consulting (2014) Feasibility Study on the Development of an Informal Sector Pension Scheme (ISPS), Final Report, September 2014.

Older people, especially in rural areas, rarely benefit from formal pensions (which are reported in the EICV4 as either RSSB/Caisse Sociale, private pensions (combined into ‘pensions’ in the definition here) or ‘Old Age Grant’ income source. The latter and the RSSB/Caisse Sociale pension are listed as a type of public support in the survey¹⁹). Households with older persons, working age adults, and children are the least likely to be in receipt of any kind of pension, while those with older persons only are most likely, suggesting that there may be some element of choice for those few older persons with pension provision to live independently, whereas those without rely more on multi-generational family support structures.

Table 15: Percentage of households with older persons receiving pensions, by household type

| | Pension | Old Age Grant |
|--|---------|---------------|
| Older Persons only | 0.9% | 7.5% |
| Older Persons & working age | 5.9% | 5.0% |
| Older Persons & working age & children | 2.7% | 2.5% |
| Older Persons & children | 1.9% | 6.7% |
| working age & children | 0.5% | 0.1% |
| working age only | 0.9% | 0.2% |

Source: EICV4, 2013-14

Land

In the context of the life cycle, land ownership needs to be understood in terms of the pattern of bequests to children²⁰. In Rwanda, parents do not necessarily accumulate land until their death, and then leave all of it to their children. Rather, they provide some portion of it to their children upon their marriages, so the parents’ landholdings diminishes before their old age, with any remaining land then inherited by children upon their parents’ death.

Another critical aspect is the gendered nature of land bequests and inheritance. Traditionally land was bequeathed to sons upon their marriage, while women were expected to join their husbands households²¹. Female children would not generally inherit land upon their parents’ deaths either, and indeed widows might not be able to retain control or ownership over land when their husbands die.

There has been quite a lot of emphasis in recent years on improving women’s access to land as part of the extensive land registration process that was completed in 2015. An evaluation of the land tenure regularization pilot found that indeed land access improved for legally married

¹⁹ The distinctions in the survey instrument are not entirely clear, for example the difference between the RSSB/Caisse Sociale old age, disability, survivors benefit versus the ‘Old Age Grant’, or why these are listed as public provision.

²⁰ Lee, Mason, and Cotlear (2010) Some Economic Consequences of Global Ageing. World Bank

²¹ Although there were traditional mechanisms to transfer land to girl children in certain circumstances, as mentioned in Box 3.

women, and equal inheritance by gender was promoted²². However, there is acknowledgement that while the laws have changed to allow women to inherit land equally, in practice very little has changed. This is not the failure of the registration process per se, but rather the lack of awareness of the new law on the ground, strong cultural preferences towards favouring sons with land bequests, and, crucially, the fact that around 1/3rd of marriages that are common law unions are not covered by the law. (See Box 2 and 3 below for a brief outline of the history of land policy in recent years).

This is an important part of our understanding of which older households are better off than others, and unpicking this issue of landholdings is important for determining which households have adequate old-age provision now, as well as how this is likely to evolve over time (since land is a finite resource in a way that other assets are not).

²² Ayelew Ali, Daniel, Klaus Deininger, and Marcus Goldstein (2011) Environmental and Gender Impacts of Land Tenure Regularization in Africa: Pilot Evidence from Rwanda. Policy Research Working Paper 5765, World Bank.

Box 2: History of land law in Rwanda

The 1962 Rwandan Constitution recognized Belgian colonial land tenure law, stating that lands occupied by the original inhabitants were to remain in their possession, lands belonging to persons who were not original inhabitants had to be registered, all unoccupied lands belonged to the state, and all sales or gifts of land were to be approved by the Minister of Agriculture. A 1976 law further required that such authorization could only be granted when the seller has at least 2 ha remaining and the buyer does not possess more than 2 ha. At the same time, inheritance law provided that land would be subdivided among male heirs.

When subdivisions became too small another plot could be cleared or bought. However, with increasing population density and land scarcity, this meant families had to travel further to find new land to acquire, with landholdings becoming highly dispersed and high levels of internal migration for arable land.

After the genocide, and the subsequent massive migration of people both internally and across borders, the need for land reform became even more urgent. The many Rwandans who had fled earlier waves of persecution as refugees in neighbouring countries and who returned after the genocide, the 'old case' returnees, had no claim on any land, as per the Arusha Peace Agreement. Government instituted group settlements (*imidugudu*) which provided a temporary solution to a lack of shelter, but new laws were needed to release arable land and allow for new production and tenure relations, not only to address the pressures of post-genocide population movements but also extreme population pressure and mounting environmental degradation.

In practice, the vast majority of land rights had been usufruct and land acquisition governed by customary practices. Even where transaction records existed, all land transactions in the past were virtually illegal. Only a limited number of plots in urban areas and religious centres had titles. Land security was therefore tenuous, with a very large number of land disputes.

The 2004 Land Policy and related 2005 Land Law (updated in 2013) were developed to provide land security, encourage consolidation of land, and promote environmental conservation through a system of land registration and management.

The Land Law states that: i) all land has to be registered; ii) land consolidation is encouraged and will be approved by the minister responsible for agriculture in conjunction with local authorities; iii) land has to be protected and conserved; iv) monitoring of land use is assigned to land commissions whereas registration is assigned to land officers; v) failure to use, protect and conserve land properly can result in requisition or confiscation; vi) land ownership is only provided through leases of up to 99 years; vii) marshlands remain state property; viii) transfer of title deeds requires prior consent of all family members, ix) there will be a land tax; and x) undeveloped land reverts to the state's private domain after three years.

Source: Musahara, Herman (2006) "Improving Tenure Security For The Rural Poor. Rwanda – Country Case Study" FAO Support to the Legal Empowerment of the Poor (LEP) Working Paper #7

Box 3: Land and Gender

Gender inequities in land use and ownership are stark. Sons customarily inherit land, although there were some traditional means of giving land to daughters as gifts upon their marriage or birth of a grandchild, or by the chief to women who were abandoned by their husband. However, most of these are no longer practiced because of land scarcity (Pottier, 2002).

Recognizing the need to address inequities in land ownership by women, legislation passed in 1999 (known as the law of succession) stated that both daughters and sons have equal rights to inheritance, either before or after the death of a parent. However, the law only applied to legally married women. The other informal marriages were not legally recognized due to the expense of doing so, and therefore wives and children of such customary marriages were therefore not eligible to claim land under the law. There was also a loophole, in that the land law stated that women could inherit land as per the inheritance law, while the inheritance law stated that the land law would guide how women could inherit land*.

Another major barrier, however, even beyond the legal provisions, has been customary attitudes to land ownership, with a strong preference to retain inheritance only amongst male heirs*. Knowledge of the law is not widespread, but even where women were aware of their rights and attempted to claim land disputed by family members (for example women living in consensual unions and polygamous wives, illegitimate daughters, women being denied the right to inherit land by their brothers and widows being evicted from matrimonial property by their in-laws), their legal recourse is weak. According to Abbott and Malunda (2015)**,

“Most land disputes are dealt with by the family meeting (Inama y’Umuryango), local leaders (Umurenge Committee) or cell executive committee, with only a very small minority of cases being dealt with by the Abunzi or the courts.

It is generally only after the local dispute resolution mechanisms have been exhausted that disputants can seek redress through the courts. Local dispute resolutions mechanisms are intended to arbitrate between the contesting parties, not to make legal decisions in line with the law. Women often report agreeing to accept less land than their legal entitlement in the interests of maintaining good relationships with their family or because they have little option. Most women cannot afford to pursue a case in the formal courts.”

A new Inheritance Law of 2016 (or law of succession) has been passed to address some of these issues, including extending rights to widows.

This new law is viewed as being an important development for women’s rights, but also for the well-being of older people more generally, as they cannot be forced to bequeath land to their children before their death. It will, however, remain to be seen how this change in the law translates into changes in practice, given the reliance on local dispute mechanisms, and the very entrenched nature of gender relations. It also leaves a gap for the 1/3 of married women who are not in formal unions***. Another issue in the land law and law of succession is that only land over 1 hectare (100 ares) is allowed to be subdivided, with smaller plots being owned jointly****. Given that the vast majority of plots are already below this size, in practice it may mean many women having to negotiate their claim to their share with male family members.

Nevertheless, these changes are certainly an essential starting point for improving women’s access to the most important asset in old age.

* Polavarapu, Aparna (2011) "Procuring Meaningful Land Rights for the Women of Rwanda," Yale Human Rights and Development Journal: Vol. 14: Iss. 1, Article 3.

**Abbott, Pamela and Dixon Malunda (2015) “Promise and the Reality: Women’s Rights in Rwanda” Institute of Policy Analysis and Research, Rwanda Working Paper No. 5, January 2015

*** NISR and ORC Macro Rwanda DHS 2014/15.

****Chronic Poverty Resource Center (2011) Challenges and Opportunities in Land Rights in Rwanda. Policy Note, February 2011 and Ayelew Ali et al (2011)

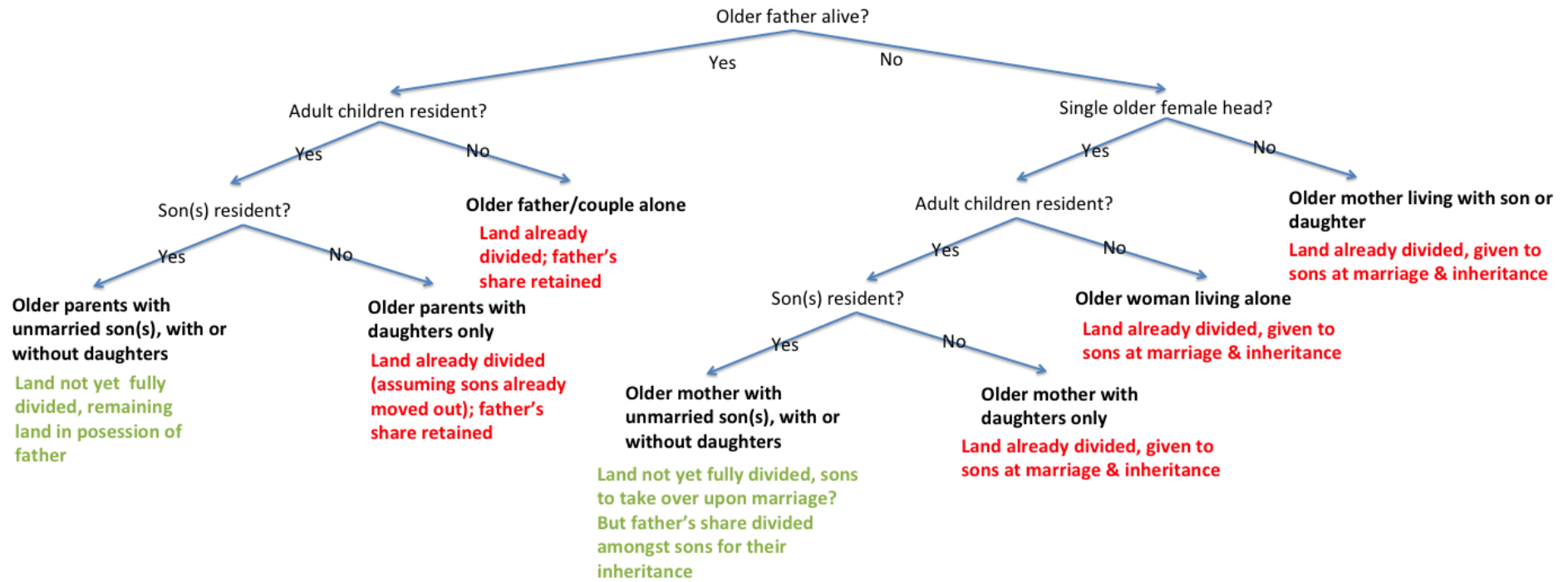
Understanding current landholding patterns and well-being amongst older people

Based on our understanding of inter-generational transfers in the Rwandan context, our initial hypothesis would be that landholding (and poverty) depends on the life cycle of older people **and** their children. Amongst older people living with working-age adults, we would therefore expect there to be a difference between older people who have adult sons living at home (who are not yet married, and therefore the family plot has not been divided²³) versus adult daughters (who might not be expected to inherit under traditional custom, unless there are no sons). Similarly, amongst older people living alone, there would be a difference between women and men, with men more commonly retaining their land.

In terms of a decision tree, we can separate households in terms of the following classification:

²³ We see in the data that the vast majority of adult sons living with their parents are unmarried.

Figure 9: Decision tree understanding co-residence of older people and adult children and landholding/land bequests



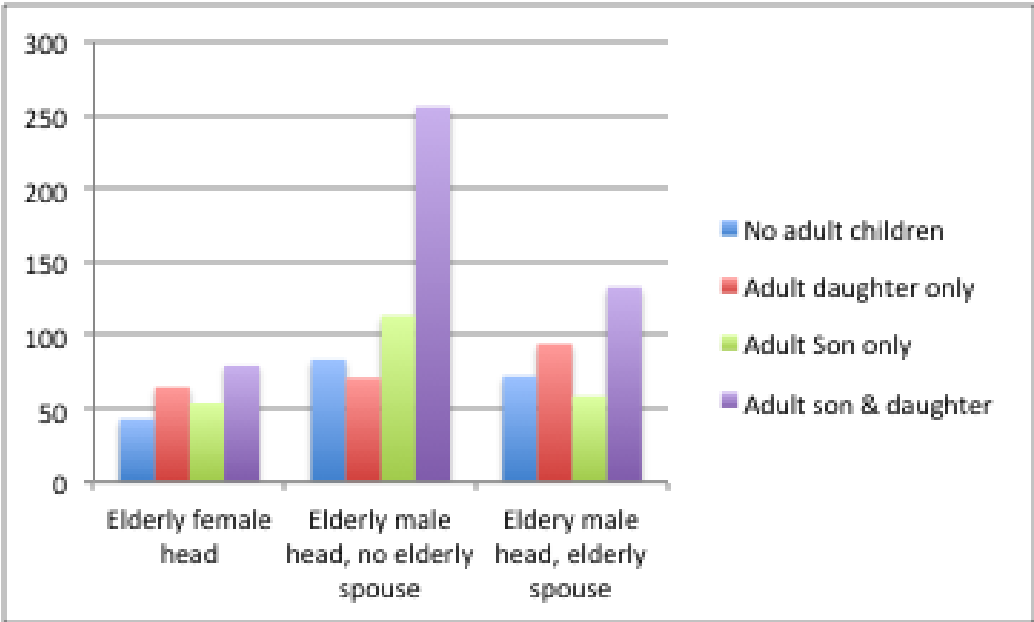
We see that the data does indeed generally conform to this pattern, with households headed by an older female having much less cultivated land than households headed by an older man. In terms of children’s residence, older parents have less land when there are no adult children, suggesting they have indeed already partially bequeathed their land to children upon their marriage.

Landholdings by parents are higher when only adult sons are present compared to only adult daughters for households with older male head and non-old spouses (i.e. where there is an older head, and a younger wife, meaning that the adult children are likely to be younger and hence not yet married). So this also confirms our hypothesis that in these cases land has not yet been partially bequeathed upon their sons’ marriages. (For older female head or older couple households, there is less land when adult sons are present, but in these cases the sons are likely to be older and have some extenuating circumstances why they are not living in their own nuclear family – this needs further exploration in the data).

Interestingly, older parents have more land when their adult daughters are present compared to those who have no children present at all; this may suggest that some parents do bequeath land to their adult daughters, not only sons, upon their marriages, which would be expected as land laws with respect to equal inheritance begin to be implemented more fully.

Interestingly, where both adult sons and daughters are present, land cultivation is higher, again probably because these are likely to be households where children are younger and not yet married. (But note that the big spike in this for households with older fathers and working-age mothers is largely the result of an extreme rightward skew in the data; the median values show the same general trend, but without a big spike).

Figure 10: Land cultivation by headship and adult child residence, ares*



Source: EICV4, 2013-14

* an are is 1/100th of a hectare

These patterns would also be expected to be function of gender and age of older people:

- Men of all ages generally retain their landholdings (after marital bequests) as head of household
- Women may retain landholdings (after marital bequests) until a certain age, then when are no longer able to farm themselves may be subsumed into children's household and lose their status as household heads (even if they legally still own the land).

Table 16: Land owned and cultivated, ares*, by household composition and poverty status

| | Land Owned (in ares) | | Land cultivated (in ares) | |
|--|----------------------|------|---------------------------|------|
| | Non-poor | Poor | Non-poor | Poor |
| Older Persons only | 35.3 | 28.8 | 42.6 | 33.1 |
| Older Persons & working age | 52.1 | 27.9 | 59.5 | 33.3 |
| Older Persons & working age & children | 117.8 | 43.3 | 139.7 | 50.4 |
| Older Persons & children | 49.2 | 26.5 | 55.9 | 30.0 |
| Working age & children | 53.6 | 32.4 | 71.0 | 43.4 |
| Working age only | 28.6 | 26.1 | 44.9 | 34.9 |

Source: EICV4, 2013-14

* an are is 1/100th of a hectare

These findings are corroborated by the qualitative research, where owning land was also considered to be a factor that reduced poverty and vulnerability in old age, as long as it allowed older people to live off it. This required them to either be fit enough to cultivate it or to pay someone to do so. Respondents, however, also said that it was difficult to live off the land, since the size of their landholdings has shrunk after distributing it across their children. While having large families was generally considered to be a blessing (if the younger generations effectively provided support for the old), it was perceived to be a curse if it left older people with too little land to live off.

"Here is an example: if my father gave birth to 11 children while Xavier's father gave birth to 6 children only, though both of the fathers would own the same size of land, on one side, the land will be distributed to many children while on the other, it will be shared among a little number of children. It is clear that Xavier's father saving (a part of the land) is there and it will help him survive while my father has left with only the area in which his house is built meaning nothing at all." (male Respondent, FGD 20-50 year old, Gisagara)

Others said that women were more vulnerable and more likely to be poor, particularly when their husband passed away. Since women face more constraints in ensuring legal ownership of their property than men they could lose access to all their husband's assets once he dies (even if they are legally entitled to own the land). Women are also less likely to remarry than men, meaning that they have to fend for themselves with fewer assets.

"It cannot be the same for men and women. It depends on the living conditions. In our village, most of the old people are females, and I have seen that those old women are most vulnerable than old men"

because of our culture. In last days, there was a culture of giving heritage to boys only, and this caused that men became the only owners of the all family properties. It is why in general old women are most vulnerable than old men." (Village Leader, Gasabo)

Other assets

Households with older persons have on average more assets (such as livestock) than those without, although there are large differences between households where older people are the only adults, and those where there are both older people and working-age adults. It is the latter that have far more assets in terms of livestock, while older people on their own (with or without children) have less. The value of farm assets is much higher amongst households with no older people, although, again, for households that do have older people, it is those with working-age adults that have more assets.

Assets in households with older people are higher per capita, as would be expected, but because earnings are lower this doesn't mean older people are richer; assets are the main store of wealth in the context where formal savings almost non-existent.

Table 17: Average number of livestock and value (RwF) of farm assets, by household composition

| | Cattle | Sheep | Goats | Mean Farm Assets (value RwF) |
|--|--------|-------|-------|------------------------------|
| Older Persons only | 0.2 | 0.1 | 0.4 | - |
| Older Persons & working age | 0.6 | 0.1 | 0.9 | 387 |
| Older Persons & working age & children | 1.1 | 0.3 | 1.1 | 351 |
| Older Persons & children | 0.5 | 0.2 | 0.7 | 240 |
| Working age & children | 0.6 | 0.2 | 0.7 | 918 |
| Working age only | 0.4 | 0.1 | 0.4 | 4,649 |

Source: EICV4, 2013-2014

Similarly, with respect to the construction materials of the household's dwelling and the type of lighting, latrine, and cooking fuel, older people living without any working-age adults are more disadvantaged (See Annex 1).

Transfer income

Support from non-resident adult children is fairly common, but tends to be negligible in terms of value. The median value of transfers (in cash and in kind) from children is just 2-8% of household consumption, and only around 6% of older-person-only households and 8.4% of older people living in households with just older people and children receive annual transfers equal to at least half the poverty line, or RwF 80,000 per year in 2013/14²⁴.

²⁴ This is about 80% of the extreme or food poverty line per person.

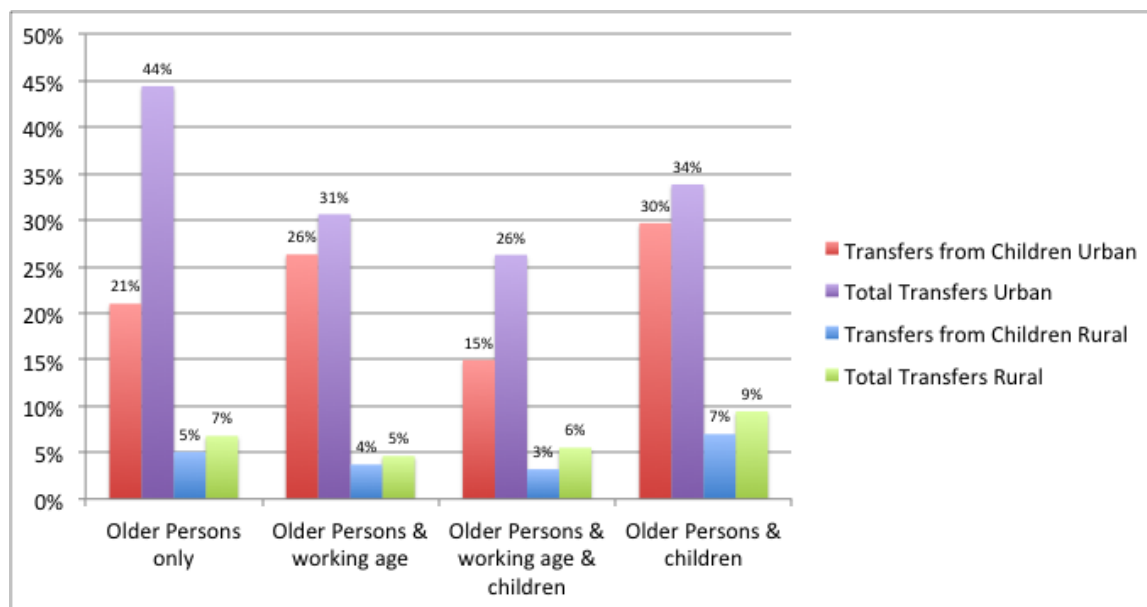
Table 18: Transfer rates and transfer values by household composition

| | % Receiving transfer | Mean transfer value | Median transfer value | Median per-adult equivalent consumption | Median total household consumption | Median transfer as % of median household consumption |
|--|----------------------|---------------------|-----------------------|---|------------------------------------|--|
| Older Persons only | 76.5% | 53,655 | 21,350 | 214,811 | 264,987 | 8% |
| Older Persons & working age | 69.5% | 519,672 | 14,700 | 224,938 | 594,259 | 2% |
| Older Persons & working age & children | 64.2% | 109,484 | 14,400 | 184,140 | 766,326 | 2% |
| Older Persons & children | 84.0% | 44,496 | 17,500 | 177,607 | 432,022 | 4% |
| Working age & children | 14.9% | 36,358 | 10,100 | 177,505 | 769,332 | 1% |
| Working age only | 17.6% | 43,854 | 10,000 | 263,488 | 566,654 | 2% |

Source: EICV4, 2013-2014

As expected, households with older people are more likely than those without to receive income transfers from urban areas, although, surprisingly, households with and without older people are equally likely to receive transfers from rural areas. Similarly, households with and without older persons are equally likely to *make* transfers to urban or rural areas. This suggests that there is a high degree of informal support, irrespective of the composition of households. However, we do see that households with older people receive larger transfer values and send lower amounts than those without older people, suggesting an overall net gain in financial and in-kind support for older people.

Figure 11: Percent of older people receiving adequate income transfer support by location and household composition



Source: EICV4, 2013-2014

In addition, transfers from urban areas are greater in value, suggesting some have children who have migrated to good jobs sending more significant financial support (although they would be less able to provide care and other forms of social support).

From the qualitative research, having children per se, whether living in the community or further away, was not considered to be a factor that necessarily reduces poverty in old age. Across all sites older people complained that their children did not look after them, due to a range of reasons. In many cases life was considered to be 'harder' and respondents mentioned that working age adults themselves are struggling to provide for themselves. Some older people acknowledged that their children were simply unable to support them, whereas others complained that people have become 'selfish' and refuse to support others, even their parents, without receiving anything in return. Those who have children to look after them were considered to be better-off.

"Most of them are childless. Here, I mean they may have ones who are now married and busy with their family problems. In this condition, a child cannot do anything supportive to his/her parents because sometimes he/she may be even incapable to satisfy his/her own needs. Out of this way of living, I can say that the living conditions of old people in our village are very low as far as they have no-one to cater for them." (Village Coordinator, Kicukiro)

These findings are in line with qualitative evidence from other sub-Saharan African contexts which suggests a normative 'hierarchy of priorities' in terms of allocation of household or family resources, with the needs of younger members prioritized over those of older people (e.g. Aboderin, 2004b; 2006; also comment in Aboderin & Beard, 2015).

The lack of support from their families is perceived to be a recent phenomenon, which was not as prevalent a few decades ago. Respondents thought that it used to be more common for children or grandchildren to support older people. Grandchildren do not provide the same support to older people as they used to, and do not tend to live with them unless they are born out of wedlock (see section 3). Since children need to attend school they are less likely to stay home to help the grandparents with domestic duties.

"No-one can give you his/her child to help in you in drawing water, collecting firewood or cooking. They say that their children have to attend school and not livie with their grandmother". (Female Respondent, FGD 65+, Gasabo)

While support from families is considered to be an important factor to reduce poverty in old age, it seems to be largely absent or insufficient. According to respondents, families that do support their older members are those who have the means to do so, and who 'still live in unity'. Several respondents also said that working age adults would like to support their older parents, but are unable to do so since they have to look after their families.

"Normally, all of us have a duty of supporting our old parents. But today, children have really given up their responsibility of supporting their old parents. As the one in charge of social affairs, I always deal with the cases related to no assistance of old people by their children. For some, the reason is very often the fact of being busy searching food for feeding one's family and satisfaction of other

needs for the family. Imagine a person classified at 3rd category/rank of Ubudehe, he/she is supposed to work hard for satisfying his family's needs. Do you think this one, always struggling, will have time to look after his old parents? I think it is impossible. He will do this not because he hates his parents but because of having not enough time to both solve family and parents' problems at the same time. After getting married, he will not go back to his parents' family to provide his support as he used to do it when he was once single." (Vice Mayor, Gisagara)

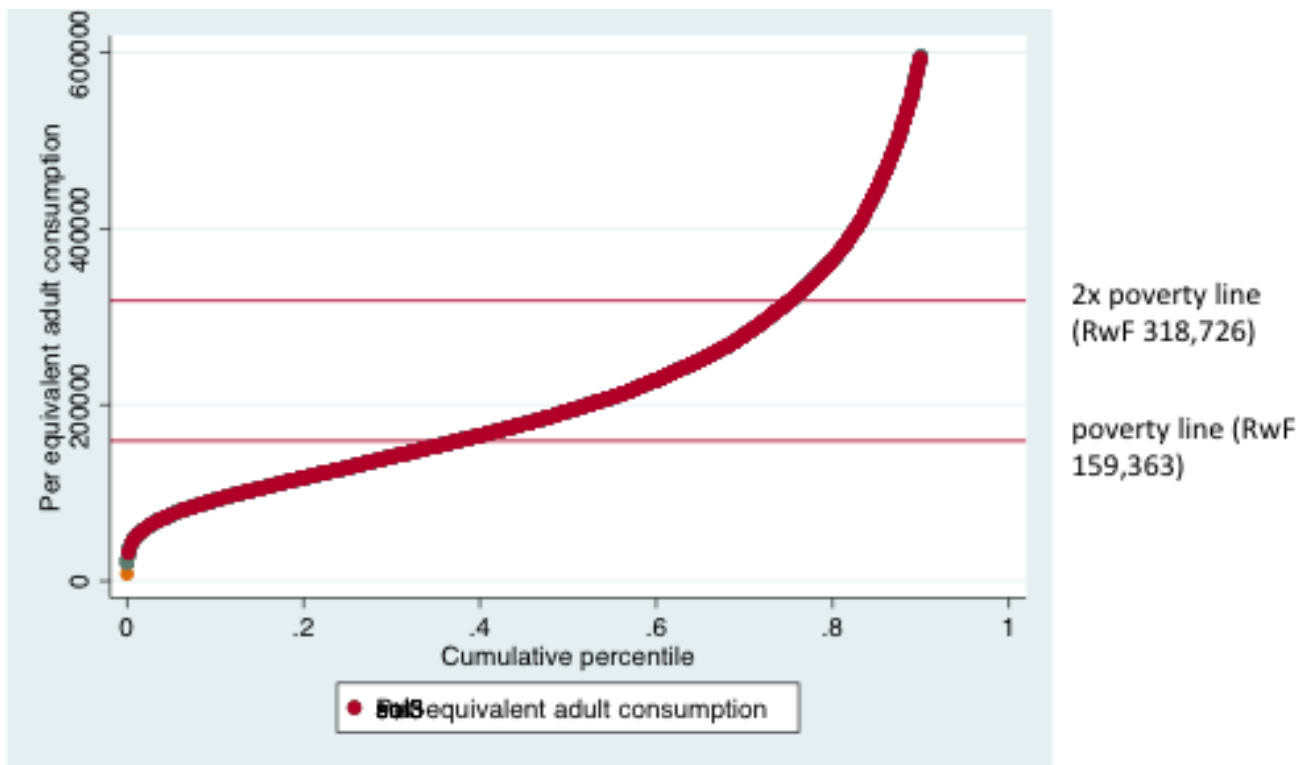
Another factor that has heavily influenced family dynamics and structures is the genocide. Several respondents said they could not answer the question about family support, since they were the only ones who survived the genocide. In the complete absence of a family, older people lack the emotional and financial support that could otherwise be provided by their children and grandchildren.

"Today the family and its structure have collapsed. There are so many problems related to the fact that many Rwandan families in general lost their children and relatives." (Vice Mayor, Huye)

Vulnerability to poverty

The consumption distribution is very flat, suggesting that even if older people are not under the poverty line (the bottom horizontal line in the figure below), many are vulnerable to falling into poverty especially since they lack assets to cope with a negative shock. Around 75% of households are within two times the poverty line (the upper horizontal line).

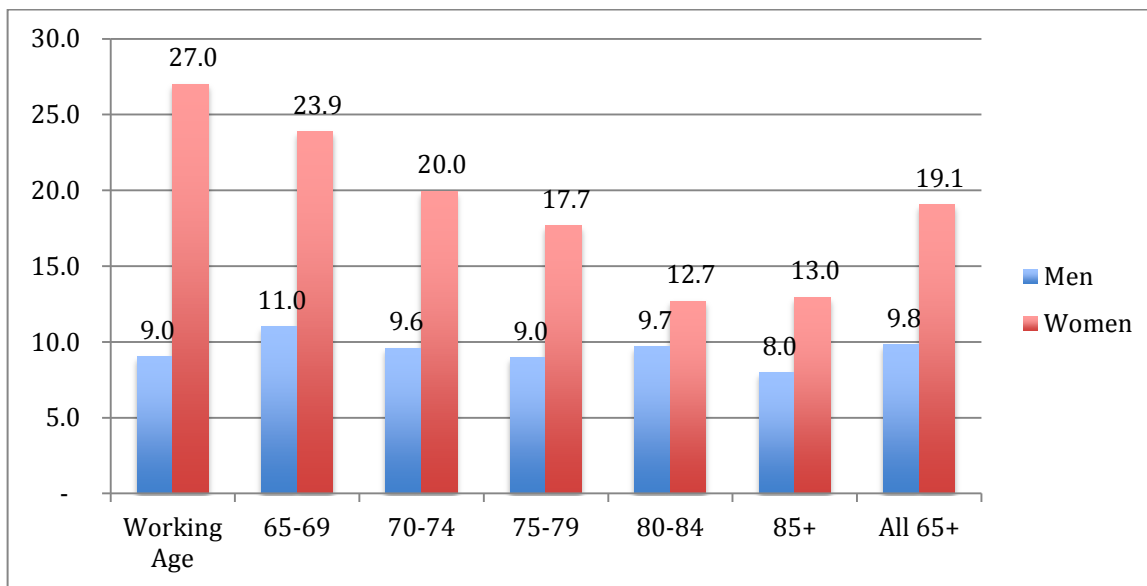
Figure 12: Distribution of consumption amongst older people aged 65+



3.4 Domestic reproductive contributions

In addition to employment, women in particular continue to play a large role in reproductive roles within the household. The figure below shows the average number of hours per week spent on domestic duties (fetching water, firewood, cooking, etc. .). For women aged 65-69 this goes down only slightly from the hours spent amongst working-age women, but then continues to fall as they get older. For men, there is initially a very slight increase from those of working age but then the number of hours remains fairly constant (and well below that of women). Interestingly, single older men have a similar domestic burden to women (26 hours per week), while single older women have a lower domestic burden than those who are married.

Figure 13: Average number of hours per week on domestic chores, by sex and age



Source: EICV4, 2013-14

3.5 Health

Health insurance coverage is key among older adults given the prevalence of illnesses and disability in this group. Health insurance coverage (in the form of the Community Based Health Insurance or ‘mutuelle de sante’) is an important prerequisite for accessing health care. Table indicates that 87% of older people are covered by medical insurance, the same percentage as for the population 0–59.

Table 19: Percentage of elderly people with medical insurance compared to younger people (aged 0– 59) by sex, area of residence and province

| | Elderly people (60 and above) | | | Younger people (0-59) | | |
|--------------------------|-------------------------------|---------|------------|-----------------------|-----------|------------|
| | Male | Female | Both sexes | Male | Female | Both sexes |
| Rwanda | 84.0 | 88.4 | 86.7 | 86.0 | 87.6 | 86.8 |
| Area of residence | | | | | | |
| Urban | 70.9 | 87.5 | 80.3 | 84.2 | 88.4 | 86.2 |
| Rural | 85.7 | 88.5 | 87.4 | 86.4 | 87.5 | 86.9 |
| Province | | | | | | |
| Kigali City | 78.8 | 86.7 | 83.4 | 83.3 | 86.6 | 84.9 |
| South | 72.9 | 81.4 | 78.0 | 77.5 | 79.5 | 78.6 |
| West | 88.7 | 91.5 | 90.4 | 89.1 | 90.3 | 89.7 |
| North | 92.4 | 93.6 | 93.1 | 91.7 | 92.3 | 92.0 |
| East | 87.2 | 90.5 | 89.1 | 88.9 | 90.4 | 89.7 |
| Count insured | 174,142 | 269,325 | 443,467 | 4,176,963 | 4,509,455 | 8,686,418 |

Source: Fourth Rwanda Population and Housing Census.

Among older adults who are insured, a large majority (88%) are covered by the Mutuelle de Sante, with the remainder insured under RAMA, which mostly targets public sector employees.

A similar pattern emerges for younger population groups. Despite the high coverage statistics, older people in Ubudehe 1 who are meant to be provided with free Mutuelle de Sante, are often more likely to be excluded and left uncovered. This implies that there are some constraints in the ability of Mutuelle to reach the most vulnerable.

3.6 Access to services and programmes

VUP provides some additional support to extremely poor older people (defined as those in the lowest Ubudehe category) who live in household with no labour capacity (i.e. no working age household members). Despite the fact that VUP Direct Support has now been scaled up to all 416 sectors of Rwanda and is viewed by Government of Rwanda as having reached 100% of the eligible extreme poor, very large gaps in coverage remain. Analysis of coverage data shows that only 40% of eligible older people (those in the former Ubudehe categories 1 & 2) living without any working-age adults - who should have been eligible for the programme as a result of their extreme poverty and lack of other support²⁵ - were actually being reached by Direct Support. The remaining 60% of eligible older people were not covered at all, representing errors in VUP targeting according to their existing guidelines. Similarly, when analysed by consumption poverty status, just half of extremely poor households with only older members were included in the programme, and only 17% of households with only older persons and children were included.

²⁵ VUP eligibility has changed since the time of the EICV4 data collection, with new Ubudehe classifications and a different cut-off so that only the lowest category is now eligible. The analysis here uses the older system because that was what was in place when the data was collected.

These represent significant errors of exclusion due to the inaccuracy of Ubudehe categorisation. For households with older people and working-age adults, just 3% had ever benefited from VUP public works in areas where the programme was being implemented (and implementation of PW was only in 240 out of 416 sectors, so under-coverage in practice is even greater across the country as a whole).

This suggests that even amongst the currently intended eligible beneficiaries, the present VUP programme exhibits major gaps in coverage.

These findings are consistent with discussions from the qualitative research. VUP direct support is now only available to older people in the lowest category of the recently revised Ubudehe system who are considered to be extremely poor and to live in households with no working age adults. According to respondents, VUP does not effectively cover all eligible older people in need due to budget constraints and quotas. Respondents thought that a large number of older people in need were not included in the VUP direct support, and some older people complained that they had lost eligibility to the direct support due to the Ubudehe re-categorisation process. Many had placed formal complaints but did not often receive a response.

Furthermore, if older people in Ubudehe 1 live in extremely poor households that would normally be eligible for VUP, but these households also include working age adults, then they are not eligible for monthly Direct Support transfers, but are instead expected to participate in Public Works (which is problematic, since Public Works are currently only operational in 240 of the 416 sectors). In cases where households participate in Public Works the VUP transfer is not amended by household size (as it is for Direct Support) and does not go directly to the older person. Respondents also considered it problematic that older people are not categorised in Ubudehe 1 because they have family members - regardless of whether these family members actively support the older person. There are cases where older people are very vulnerable with no family support, yet are not eligible for assistance due to their miscategorisation in the Ubudehe system.

"For example, I'm telling you that I have many children in town, they do not help me, and the VUP refused to support me because I have those children. Local authorities told me that, those children have to take care of you, but they do not." (Female respondent, FGD 65+, Gisagara)

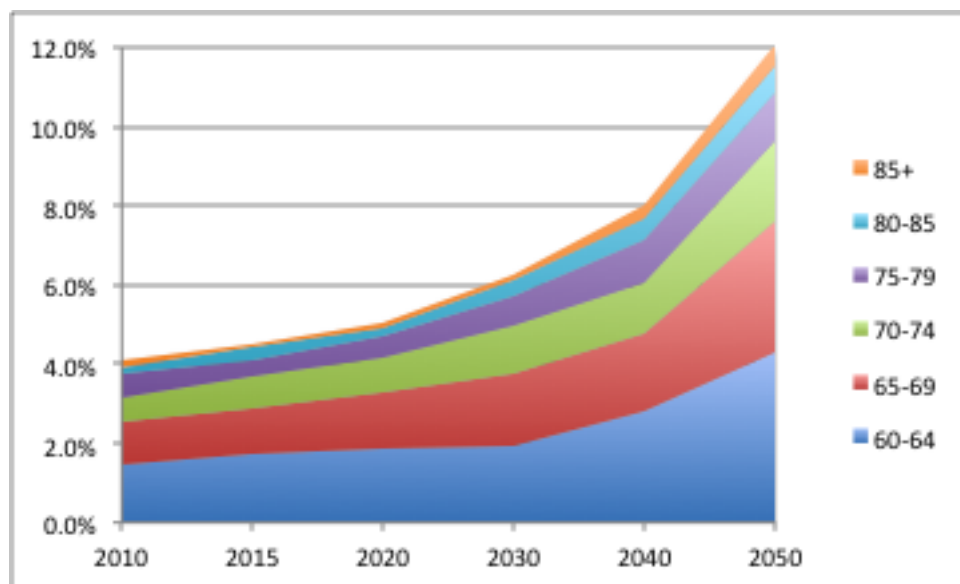
"VUP doesn't reach all old poor people. We have cases of old poor people who still have mature children registered with them, and yet they have left the house and live in towns. This consequently impacts on those old people as it hampers them being added on the list. They are considered as having working force at home that can help them. But it is not the case since those young children are no longer living at home. This situation does not only impact on direct support but also on Mutuelle. You may find a household requested for example to pay Mutuelle of 6 children and yet two of them have already left the house. But as long as they are registered on the household head, he/she will not get Mutuelle unless he/she pays for all household members." (Village leader, Huye)

4 A Changing Society: Implications of Social and Economic Dynamics for Older People in Future

4.1 Demographic trends

Many countries in sub-Saharan Africa are undergoing a major demographic transition, but Rwanda's is unique. It has simultaneously made very rapid improvements in life expectancy and total fertility as a result of significant investments in the health system and reductions in poverty. This means that Rwanda's potential 'demographic dividend' will provide opportunities in the near future, but the large growth in the number of older people will also create challenges that will need to be addressed.

Figure 14: Older people as a share of total projected population, 2010-2050



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, custom data acquired via website.

In addition, the legacy of the genocide is a major driver of this overall population ageing, and its consequences will cast a long shadow over Rwanda's demographic transition for decades to come. Adult males were disproportionately targeted in the war, as reflected in the steadily declining male/female ratio in the older population from just below 85% in 1995 to under 65% in 2050 (right side of the figure below), in stark contrast to the ratios in Kenya and Tanzania. Rwanda's older population will therefore be increasingly made up of women, many of them widows²⁶, who are particularly disadvantaged in old age as a result of inequities in asset ownership, particularly

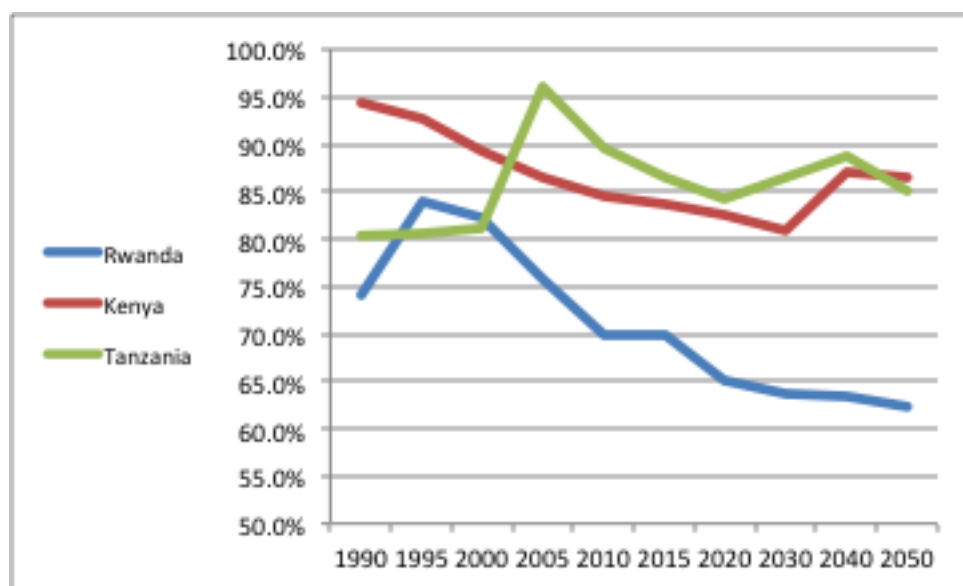
²⁶ 58% of older women are widows compared to just 16% of men. National Institute of Statistics of Rwanda (NISR), Ministry of Finance and Economic Planning (MINECOFIN) [Rwanda], 2012. Rwanda Fourth Population and Housing Census. Thematic Report: Socio-economic status of elderly people.

land²⁷, as well as access to formal employment and therefore pension provision, while at the same time they bear a heavier domestic burden.

Traditional norms in Rwanda place a moral obligation on younger generations to take care of their elders (*'an old, slow rabbit must be fed by its children'* is a traditional saying). All indications are, however, that the fulfillment of such a duty by family members is often undermined. Reasons include the earlier death of children during the genocide (Strochlic, 2014) or competing obligations on the part of children, or grandchildren who are now beginning their own families with few resources to support ageing parents/grandparents.

These dynamics will continue for several more decades, as the wave of adults in 1994 slowly advances in age, and are likely to be compounded by trends in urbanization and associated social change.

Figure 15: Old-age male/female ratios in Rwanda, Tanzania, and Kenya 1990-2050²⁸



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, custom data acquired via website.

The trend of urbanisation is expected to continue rapidly, with the percentage living in urban areas increasing from 20% currently to just under 40% by 2050²⁹. These population movements

²⁷ Bayisenge, J. (2014). Land Issues in Rwanda: Gender Perspectives and Social Work Implications. In H. Spitzer, M. J. Twikirize, & G. G. Wairire (Eds.), *Professional Social Work in East Africa: Towards Social Development and Poverty Reduction and Gender equality*

²⁸ Rwanda's data for 1995 exhibits some sharp movements compared to 1990 and 2000. This is likely to be caused by the massive movement of populations after the genocide, when refugees exiled to Uganda and the Congo in the decades before the genocide returned to Rwanda, others fled from Rwanda to the Congo, and hundreds of thousands moved to IDP camps on the border with Tanzania and elsewhere. There were particularly sharp decreases in the population of children and elderly women in 1995 in the population data, suggesting that they might have fled in greater numbers while adult men and younger women stayed behind.

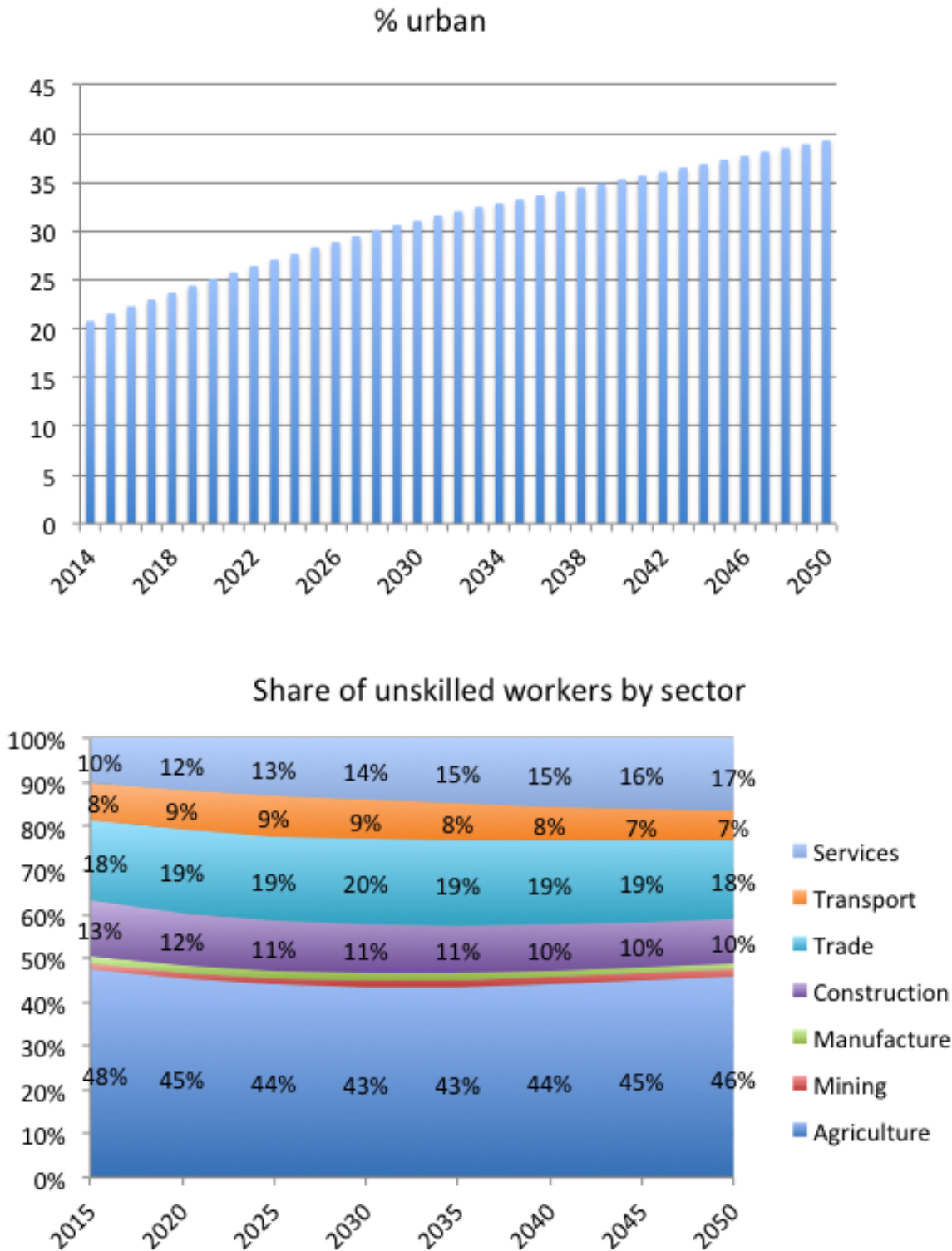
reflect both push and pull factors. Land scarcity is of course a major push factor, while employment opportunities and active policies to promote urbanisation are expected to continue to pull the population towards towns and cities.

The urban population will age more quickly than rural areas, with the total number of older people in urban areas quadrupling over this period, compared to rural areas where it will double³⁰. This means that urbanization policies will also need to take ageing into account in terms of housing, transport, infrastructure, healthcare services etc.

²⁹ There is a large discrepancy between the estimates in the World Urbanization Prospects 2015 revision and the estimates from EICV4, with the former at 28% for 2014 and the latter showing 20%. We resolve this by using the NISR's EICV4 estimate as the starting point for 2014, and then use the rate of change from the World Urbanization Prospects.

³⁰ NISR (2012)

Figure 16: Share of the population living in urban areas and shares of the unskilled labour force by sector



Source: Author estimates (% urban) using NISR and World Population Prospect data and CGE model (sectoral shares).

4.2 Economic change

In terms of economic growth, Sub-Saharan Africa is one of the fastest growing regions in the world, with an average growth of 5 per cent per year since the 1990s (UNECA, 2015). The CGE model estimates that the share of the unskilled labour force in agriculture will fall somewhat from 46% to 43% by 2035 and the rise again to 46%, while there will be a slow but steady decrease in the share of construction workers and a large increase in the share working in the service sector, as shown in the figure above³¹. This relative lack of economic diversification has contributed to subdued labour productivity growth, and the region struggles with increasing agricultural productivity. The large informal economy is further hampering economic growth, with high productivity gaps between informal and formal enterprises (AfDB, 2012; Stampini et al. 2011).

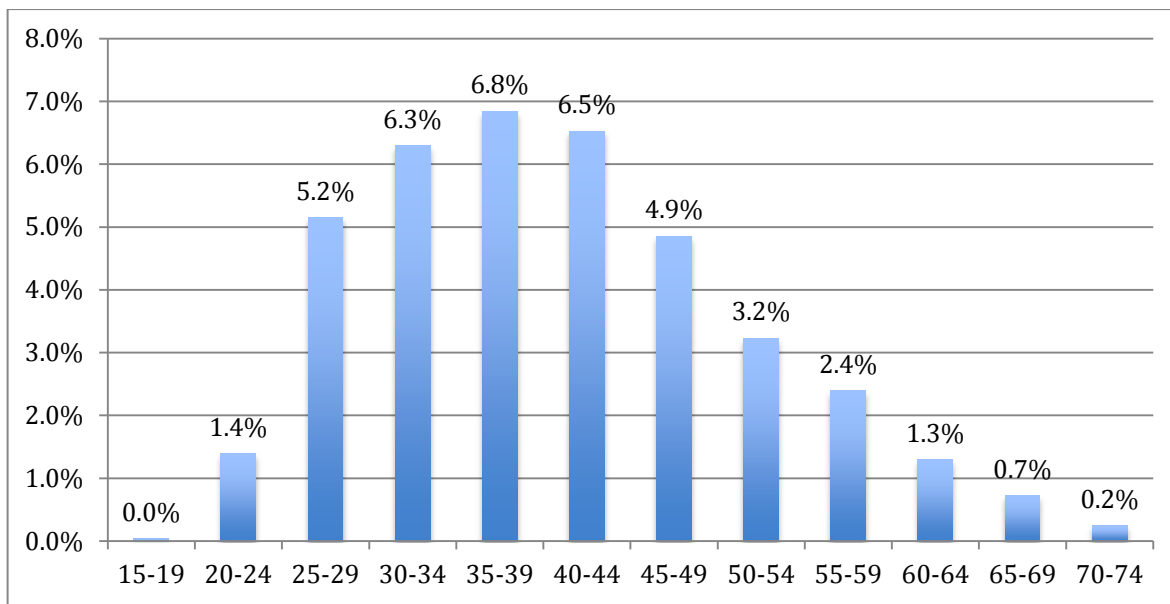
Despite exceptionally high economic growth in the non-farm sector in LICs in SSA, the sector alone will not provide sufficient wage employment given the current demographics and future trends. Wage and salary employment in private non-agricultural enterprises is still rare in SSA (9 per cent of total employment) and is unlikely to grow in the near future since the numbers of young people entering the labour market exceed the capacity of the formal private sector to absorb them; for example, even if the formal sector were to grow at 10 percent per year for ten years (which would be impressive), the share of the labour force in formal wage jobs would be at most 20% (Fox and Sohnesen 2014; Benjamin and Mbaye, 2014).

This highlights the persistence of the informal sector as a source of income for the poor and puts pressure on policymakers to design social protection programmes for the informal workers of today to avoid impoverishment of future generations of older people. A study on several countries in Sub-Saharan Africa, including Rwanda, highlighted that household enterprises have become an important income-generating strategy for workers who only completed primary education and who do not want to work in agriculture, and its potential for providing employment in the future could be harnessed through more tailored policies and programmes. (Fox and Sohnesen, 2014).

In the context of high levels of poverty and the lack of formal employment, only a fraction of older people will have contributed to a pension. Current pension participation peaks amongst 35-39 year-olds at 6.8%, reflecting increasing participation in the formal sector amongst younger cohorts. While this figure is expected to continue to increase over time, the current group of working-age adults – and therefore the older people of the coming decades – are already largely left behind in terms of formal pension provision for their old-age, pointing at an urgent need to consider how Social Protection policy can be adapted to cope with future generations of poor older people.

³¹ The model assumes that the share in unskilled labour will remain relatively constant at over 90% of the labour force, but the changes in sectoral shares are fairly similar in the skilled and unskilled workforce.

Figure 17: Share of adults contributing to pension, by age



Source: EICV4 2013/14

4.3 Societal change and family bonds

The qualitative research provided some insights into the effects of these broader economic and demographic changes that have been beginning to take place. Older people seem to understand that their children would like to look after them, but are simply unable to do so. In other cases however there seems to be a disinterest from young adults to look after their parents, which is explained by a rise in a 'selfish' attitude where younger generations are mainly concerned with earning money and neglect their families. This is even the case when children live in close proximity to their older parents. Several respondents mentioned that their grandchildren and children would not help them with household tasks, such as fetching water, without being paid for it. Respondents generally believed that intergenerational support structures used to be better in the past.

"The intergenerational structures have totally changed in negative way. People are busy, they do not have time to take care of these old people, some of them are also jobless, they have no means to help these old people. Now the government is in charge of taking care of old people, especially those who do not have someone from their families to help them. This reduce those conflicts which can be in different families due to those changes." (Executive Secretary, Gasabo)

The unsustainability of traditional livelihoods, particularly agriculture in rural areas, has pushed younger people to the cities. Additionally, older people are less able to offer anything to their children, either because their property has been divided up or because they own very little.

Respondents were also asked whether they thought that increased migration into cities is a factor that affects the support they receive from their families. The majority of respondents across all sites perceived that migration of the working age adults into urban areas had a major, mostly negative, effect on the care provided for older people. Although several people acknowledged that many migrated out of necessity, they did also believe that the move into towns led to not only a physical but also emotional distance between older people and their children.

"People who migrate do not think about parents left in the village. Grandchildren, children, they all go into towns and leave us old people helpless in the village." (Respondent, FGD Direct Support, Huye)

In many cases younger adults who moved to the town did not support their parents by sending money and visited them rarely. This has led to a deterioration in the relationship between older people and their children, who in many cases feel closer to those people living in their proximity, such as friendly neighbours.

"Let me use one or two Rwandan proverbs to make me understood. It is said that "a neighbour around you is better than a brother abroad". For an old man or an old woman, this means that when he/she faces a problem, he/she immediately seeks the solution from his/her neighbour before informing his/her son or daughter living in Kigali or Gisenyi. For this old person, the child who is far is not as important as the one near his parent. This child cannot know parents' everyday life while away. The parent may even not have telephone to communicate the issue to his/her child. Therefore, the impact is to be hopeless, a thing that shortens his/her lifetime." (Respondent, FGD 20-50 year old, Gisagara)

Impact of genocide

The majority of respondents, however, did believe that the genocide has had an impact on the deteriorating family structures and the lack of inter-generational support. As a consequence of the genocide whole generations are missing, which in many cases left people without any family members at all. For the older people who lost all their family this means that they live by themselves with no one to care for them.

"Yes, genocide has changed many things. We have people whose families were totally exterminated. They live alone a total poverty. You can't talk of family structure when you are alone." (Respondent, FGD 20-50 year old, Huye)

Apart from the loss of life, the trauma caused by the genocide has ripped apart social relations at the family and community level, where people who used to help each other out turned into perpetrators and victims. Respondents frequently mentioned that as a result of the genocide 'there is no more love' in the society and people care less for one another, including for older people.

"The genocide impacted on the level of love. People do not love each other as it used to be. Furthermore, the fact that there are some people who lost all their family members has changed their mindset and the way they used to socialize." (CEDO, Gasabo)

"Yes, on one hand, the genocide has been the cause of these changes, for example: Me, I'm the genocide survivor and I was not comfortable since I saw my neighbors who killed my family members are there without being judged. I could not get any support from my neighbors because there I could not feel well when I saw them. I have got headaches and psychological diseases. I got treatments from the special hospital where they take care of people who have mental problems. Nowadays, I am well but not very well because there are still some conflicts between us as a result of Genocide." (Female respondent, FGD 65+, Huye)

The genocide also led to a large flow of people fleeing from their homes as the violence was happening, as well as people moving away from their home towns to escape the horror associated with that specific place. As a result families were torn apart and family members are spread across the country.

"Survivors of the genocide have fled their home lands, where their homes used to be. They have separated in the search of new settlements and if possible better lives. Families are now living separately." (Respondent, FGD 20-50 year old, Kicukiro)

The wide range of consequences of the genocide on family structures, property and physical and mental wellbeing were also considered to be drivers of poverty among respondents.

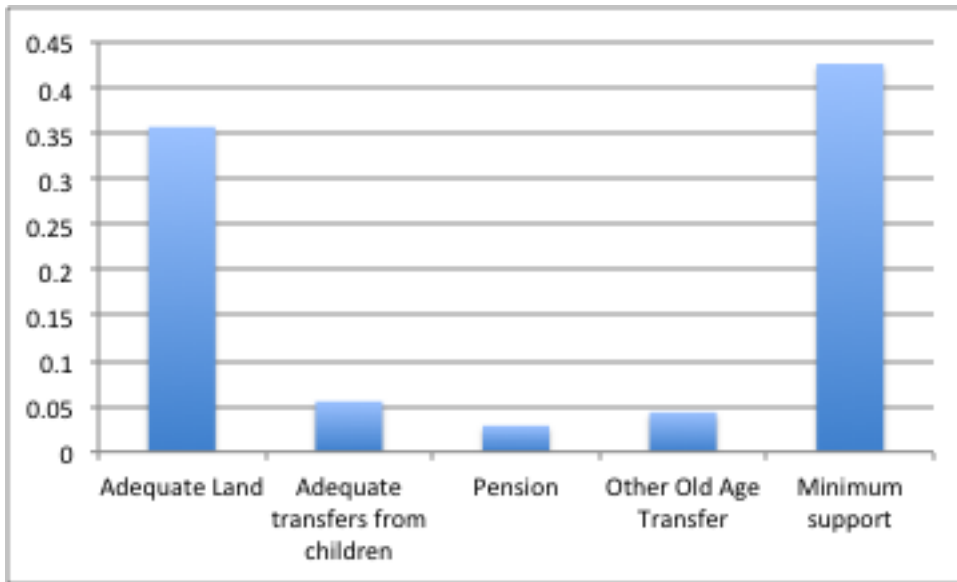
"There are some old people who became poor because of the genocide. They now live in loneliness after their families were completely destroyed." (Respondent, FGD 20-50 year olds, Kicukiro)

5 Policy Implications and Options: Meeting the Needs of Older People

5.1 Identifying an 'unmet need' for support

Of major policy relevance is understanding the poverty and vulnerability of older people in general but in particular in the context of identifying 'unmet need' for support, and how this will unfold over time. Currently nearly 60% of older people, or 110,000, have a particularly large 'unmet need' for social protection, where this is defined as the percentage of older people who are lacking in either sufficient land (defined as half a hectare), adequate income transfers from children (equivalent to half the poverty line per adult equivalent), or some kind of pension income. (This excludes VUP provision for the moment, because the point is to illustrate the large gaps in private provision for support in old age as a starting point).

Figure 18: Percent of households with older people having adequate private provision for old age



Source: EICV4 2013/14

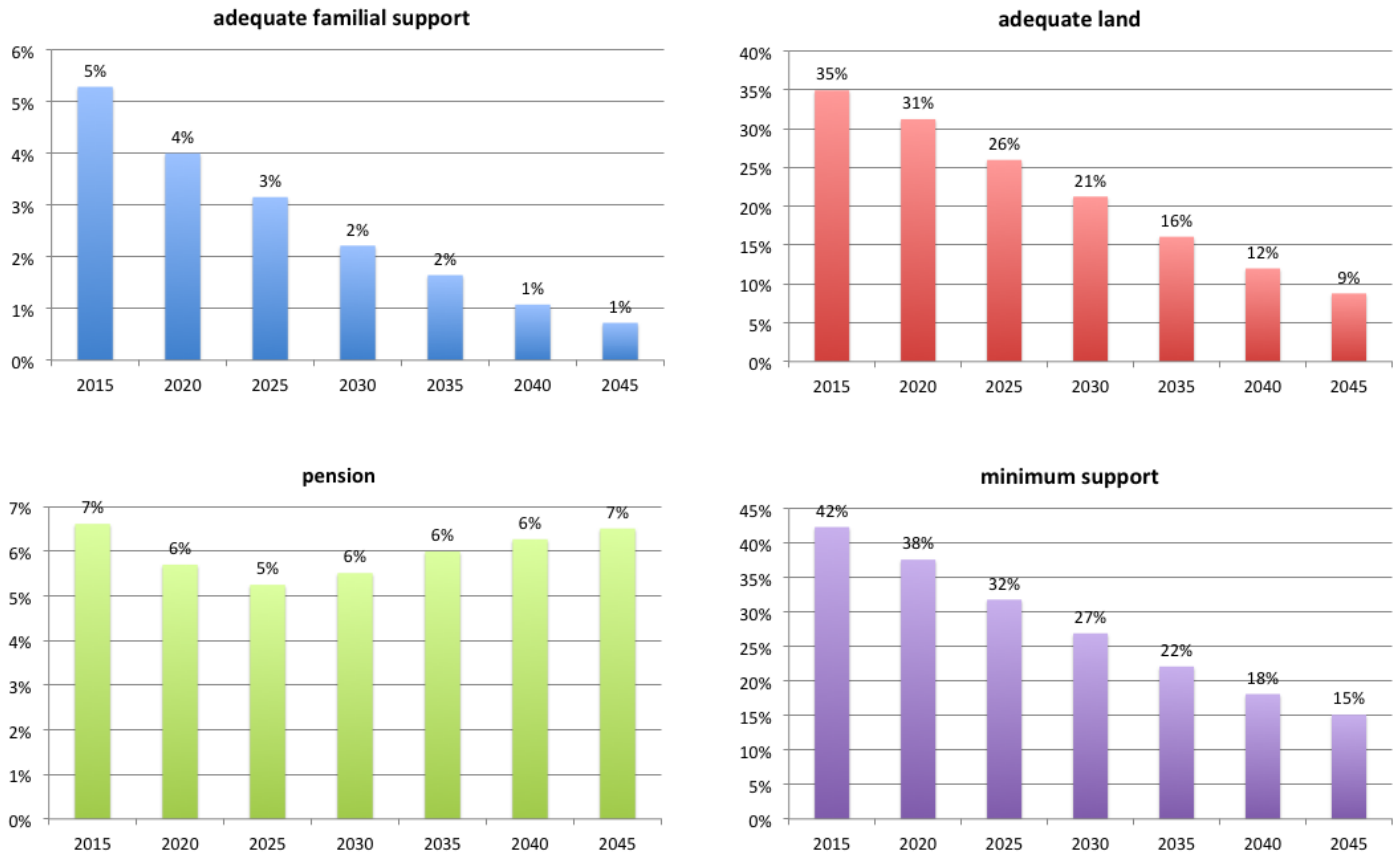
NB: Adequate land is defined as having half a hectare³²; adequate transfers from children are those that are equal to the food poverty line.

This definition is, of course, fairly generous, since many who have this minimum level of support are still very poor, because this is still not sufficient to lift older people entirely above the poverty line. This is because while land is currently the main store of wealth for older people, they may not have adequate labour capacity to make use of it. Similarly, pensions and other old-age transfers are often inadequate in value, even where they are in place.

A key question for the research is not only what the current 'unmet need' is, but also how this will evolve over time, given expectations about urbanization and demographic change. The results of the macro-microsimulation are shown in the figure below. Most importantly, the percentage of older people with adequate landholdings falls from just under 35% to 9% over the period, as landholdings are further and further subdivided across generations. As the main store of wealth, and in the absence of pensions, this is an especially worrying finding. The share of older people with some kind of pension is estimated to remain fairly constant at 5-7% over the period, reflecting the expected slow pace of formalization of employment (and, crucially, the fact that older people in 2045 are already 30 years old now and therefore already contributing – or more likely not – to their pension). Adequate familial support is estimated to actually decrease over the period, from an already negligible 5% to less than 1%. Overall, therefore the percentage with some kind of minimum private support in older age is estimated to fall from 42% to 15%.

³² This is the level of land size that tends to separate the poor from the non-poor.

Figure 19: Macro-microsimulation estimates of financial support in old age for those age 60+



The model therefore provides a way to formalize the full range of complex socio-economic interactions, and shows that, in the absence of policy, Rwanda’s growing number of older people will have little to rely on in terms of private provision of social protection.

5.2 Potential policy options and programmes

The two main policy options to address the social protection needs of older people in the context of high levels of informal employment are some kind of a non-contributory social pension (an ‘old age grant’) and the promotion of long-term savings for the informal sector.

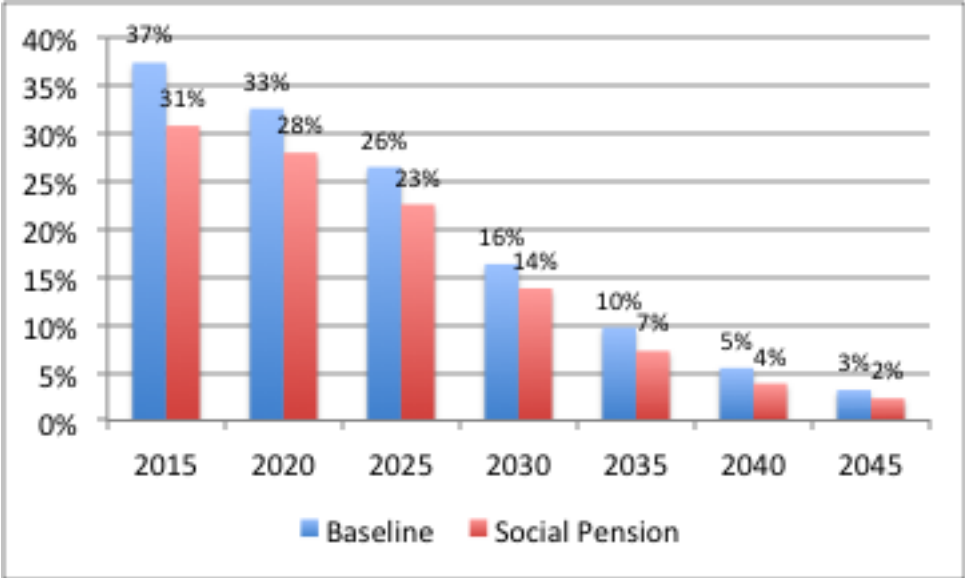
The microsimulation model allows us to estimate the projected impacts on old-age poverty of the former³³. As we see in the figure below, implementing a non-contributory social pension would reduce poverty amongst older people significantly over the coming years, assuming transfers to all people aged 65 and older, a constant real poverty line, and transfers at the size of the current VUP

³³ Further model development could allow additional analysis of a non-contributory pension.

direct support value for a 1-person household of 7,500 RwF per month³⁴. The difference in percentage points is largest in the early years (assuming this was implemented from 2015, just after the EICV4 survey), when poverty would fall from 37% to 31% amongst older people (age 60+). However, as a percentage change, the impact on poverty incidence amongst older people actually increases over time, growing from an 18% decrease in 2015 to 27% by 2040.

Poverty amongst older people would fall naturally over time thanks to changes in the economy (namely increasing real returns to land and labour), but even a very modest social pension as modeled here would have a large relative impact to reduce it more quickly. Clearly, a more generous transfer value would increase this impact even further; the value of 7,500 RwF per month is equivalent to just 56% of the general poverty line, so not large enough in itself to lift all households (particularly those with many members) over the poverty line. The impact in terms of poverty depth is even larger, as many households will be lifted closer to the poverty line, even if not entirely above it.

Figure 20: Impact of universal categorical social pension (for those aged 65+) on poverty amongst older people aged 60+



A major question is of course the affordability of such a categorical transfer, particularly given the fact that the number of people aged 65 and older will increase by more than five times over the next fifty years. The table below shows that in spite of an increasing older population, the cost as a share of total government expenditure would actually fall, from 2% in 2015 to just 1% in 2050. This is because real GDP and real government expenditure will increase far more quickly than the number of older people, so although older people as a share of the population will be greater, the fiscal space to accommodate social programmes will be even greater still.

³⁴ In Rwf 2014 real terms, in other words assuming the real value is maintained by increasing the nominal value in line with inflation.

Of course, this assumes a constant real value of the pension over thirty years. In practice, there may be political pressure to increase the real value of the transfer as real GDP per capita increases. However, even if the transfer were set at 20% of GDP/capita, by 2050 the share of total GoR expenditure would be just 6.4%. This would of course not be insignificant, but for a programme reaching nearly 10% of the total population at that point, neither would it be unrealistic.

These estimates show that a non-contributory pension is feasible both now and in the future in terms of cost. There would be ways to even minimize the initial expenditure further by, say, phasing in beneficiaries by age, starting with the oldest first and progressively lowering the age until everyone 65 and older was included.

Table 20: Projected number of beneficiaries and cost for a social pension for all 65+

| | RwF Million, real 2015 | 65+ | RwF Million, real 2015 | |
|------|---------------------------|------------------|---------------------------|---------------------------------|
| | Total Expenditure | N Elderly | Pension Cost | % of GoR Expenditure |
| 2015 | 1,631,800 | 322,000 | 31,878 | 2.0% |
| 2020 | 2,270,625 | 414,000 | 40,986 | 1.8% |
| 2030 | 4,557,173 | 688,000 | 68,112 | 1.5% |
| 2040 | 8,812,962 | 961,000 | 95,139 | 1.1% |
| 2050 | 16,474,566 | 1,642,000 | 162,558 | 1.0% |

6 Conclusions and Recommendations

6.1 Conclusions

The quantitative and qualitative analysis presented here has shown that:

- Once economies of scale within the household are taken into consideration, poverty amongst older people is similar to poverty amongst the population overall. Official estimates of poverty that do not factor in economies of scale may therefore under-state the relative poverty of older people.
- Understanding the relationship between household composition and poverty is essential, to better understand the evolution of poverty over the life course, and the nature of inter-generational transfers. We find that:
 - **Around half of older people live in households with working-age adults, but these do not necessarily represent households who are well-positioned to provide support for their older parents.** This is because:
 - The working-age adults who live with older people are almost exclusively *unmarried*, either because they are young and have yet to get married and form their own household, or because their marriages have dissolved, in which case they – majority women – move back in with their parents.

- Twenty percent of apparently ‘multi-generational’ households are, in fact, nuclear families, where the children are the *children* of older people, not their grandchildren.
 - Those households that are truly ‘multi-generational’ are almost exclusively made up of older people, their adult (mostly female) children who are single parents, and their children.
 - **As a result, these households with older people and working-age adults are disproportionately female-dominated, and therefore likely to be disadvantaged in terms of earnings because they are lacking a male working-age member.** Households composed of older people, working-age adults and children are therefore fundamentally very different from those with just working-age adults and children (who are mainly nuclear families headed by a married couple).
- **Furthermore, related to household composition and intergenerational transfers, a key to understanding welfare in old age is landholdings.** In the absence of formal pensions or significant savings, land remains the most important store of wealth for people to rely on in old age. Land, however, also plays an important role in intergenerational transfers in the form of bequests to children while parents are still living (namely at the time of sons’ marriages). Rwanda’s older people are therefore very highly dependent on land for their well-being in old age, but the majority do not have large enough landholdings to be considered sufficient to avoid poverty. Parental bequests to children only exacerbate this situation, and women are particularly vulnerable. While legal provision for women has changed in important ways recently, cultural norms presenting barriers to land security are likely to be more binding.
- **At the same time, high levels of overall poverty also means that children of older people are generally unable to support their parents fully in old age,** with most transfers to parents representing only a very minimal portion of their consumption.
- **Although Rwanda’s economy is expected to grow impressively over the next thirty years, these trends for older people are estimated to continue.** Landholdings, in particular, will grow smaller and smaller with each generation, without the necessary concomitant growth in pension savings or familial support.
- Over the next thirty years, therefore, the cohort of older people will likely be left behind, and poverty will fall slowly in the absence of any public social protection provision.
- **An old-age grant to all 65 and above would make a significant dent in poverty amongst older people, even at a relatively low transfer value. In spite of a quickly-growing share of the population above 65, such a grant would take up 2% of government expenditure initially, but falling to 1% over time.**

6.2 Recommendations

In the immediate term, the VUP Direct Support component should be expanded to reach more older people. First, it should be sure to cover all of those currently eligible by Ubudehe category (i.e. without able-bodied working-age adults) who are not already enrolled in the programme, especially those supporting children and women living alone. Second, it could be expanded in a phased manner to include those in Ubudehe category 1 even with working-age adults, since it is unfair to penalize older people whose children need to live with them for whatever reason.

Also important, in the short term, is the continued support for women's land rights, with a particular focus on implementing the Inheritance Law and ensuring that older women are able to retain their land when their husbands die. This could involve support to Abunzi and law and justice professionals to make legal rulings that are gender-sensitive, as well as wider promotion of knowledge about women's rights to land. Extending the law to include women in customary unions will also be crucial to ensuring the security of around 1/3 of married women currently excluded by the law.

Over the medium term, there should be a move towards a categorical targeting approach to social protection provision in the form of a universal social pension, to meet the needs of current older people. At the same time, development of long-term savings promotion for the informal sector should be implemented, to help meet the pension and asset protection needs of the next generation of older people.

It will also be important to begin to establish frameworks for the gradual implementation of long-term care for older people. This could be initiated in the context of a 'cash plus' component to VUP. Currently there are very few care facilities for older people in Rwanda. Traditional family and support mechanisms are further under strain due to processes of urbanisation and a 'modernisation' of Rwandan culture. One way of filling this gap in institutionalised care facilities for older people through existing social protection programmes could be to make care work one of the public works activities under the VUP. This would not only provide subsidized care for older people, but would also train younger working age adults in a profession which could later on become valuable in the pursuit of paid employment.

Annex 1: Further tables

Annex Table 1-1: Detailed breakdown of household composition amongst older people

| | Total |
|---|--------------|
| Older people alone | 22.86 |
| Older head alone | 14.84 |
| Older head and older spouse | 8.02 |
| | |
| Older people + children | 24.28 |
| Older head, no spouse, grandchild | 14.73 |
| Older head, older spouse, grandchild | 9 |
| Older head, older spouse, child child ³⁵ | 0.32 |
| Older head, no spouse, child child? | 0.23 |
| | |
| Older people + working-age adult | 15.16 |
| Older head, working-age spouse | 1.62 |
| Working-age head, older spouse | 0.19 |
| Older head, no spouse, adult child | 6.04 |
| Older head, older spouse, adult child | 4.16 |
| Older head, working-age spouse, adult child | 1.99 |
| Older parent of head, adult child | 0.75 |
| Working-age head, older spouse, adult child | 0.13 |
| Older parent of head, adult child, adult grandchild | 0.28 |
| | |
| Older people + working age + children | 37.71 |
| Older head, no spouse, adult child, grandchild | 11.52 |
| Older head, working-age spouse, grandchild | 1.4 |
| Older head, working-age spouse, adult child, grandchild | 2.77 |
| Older parent of head, adult child, grandchild | 0.6 |
| Older parent of head, adult child, great grandchild | 0.03 |
| Older parent of head, adult child, adult grandchild, great-grandchild | 0.13 |
| Older parent of head, adult child, adult grandchild, child grandchild | 0.43 |
| Older parent of head, adult child, adult grandchild, child grandchild | 0.12 |
| Older head, no spouse, adult child, child child, | 0.4 |

³⁵ i.e. 'child child' here refers to the child of head who is <18, whereas 'adult child' is the child of the head who is an adult

| | |
|---|------|
| grandchild | |
| Older head, working-age spouse, child child, grandchild | 0.94 |
| Older head, working-age spouse, adult child, child child, grandchild | 1.41 |
| Working-age head, older spouse, grandchild | 0.3 |
| Working-age head, older spouse, adult child grandchild | 0.3 |
| Working-age head, older spouse, child child, grandchild | 0.04 |
| Older head, older spouse, adult child, grandchild | 6.61 |
| Older head, older spouse, child child, grandchild | 0.06 |
| Older head, older spouse, adult child, child child, grandchild | 0.43 |
| Older parent of head, adult child, adult grandchild, great-grandchild | 0.09 |
| Older parent of head, adult child, grandchild | 2.33 |
| Older parent of head, adult child, grandchild, great-grandchild | 0.06 |
| Older parent of head, adult child, adult grandchild, grandchild | 0.41 |
| Older head, no spouse, adult child, child child | 0.19 |
| Older head, no spouse, child child | 4.53 |
| Older head, working-age spouse, adult child, child child | 2 |
| Working-age head, older spouse, child child | 0.1 |
| Working-age head, older spouse, adult child, child child, grandchild | 0.03 |
| Older head, older spouse, adult child, child child | 0.48 |

Source: EICV4, 2013-14

Annex Table 1-2: Type of Lighting by household type

| | electricity | oil lamp | firewood | lantern | piles | other | Total |
|--|-------------|----------|----------|---------|-------|-------|-------|
| Older Persons only | 3.85 | 4.23 | 24.26 | 18.87 | 43.53 | 5.26 | 100 |
| Older Persons & working age | 16.88 | 6.81 | 8.26 | 18.78 | 40.26 | 9.01 | 100 |
| Older Persons & working age & children | 16.18 | 6.83 | 7.56 | 13.55 | 45.6 | 10.29 | 100 |
| Older Persons & children | 4.53 | 3.52 | 17.61 | 17.8 | 49.15 | 7.39 | 100 |
| working age & children | 18.73 | 5.11 | 4.65 | 13.32 | 45.75 | 12.44 | 100 |
| working age only | 34.47 | 3.68 | 4.25 | 9.15 | 33.43 | 15.02 | 100 |
| Total | 19.83 | 5.04 | 5.53 | 13.15 | 44.17 | 12.29 | 100 |

Source: EICV4, 2013-14

Annex Table 1-3: Type of cooking fuel, by household type

| | firewood | charcoal | other | Total |
|--|----------|----------|-------|-------|
| Older Persons only | 93.57 | 2.9 | 3.53 | 100 |
| Older Persons & working age | 90.76 | 8.31 | 0.93 | 100 |
| Older Persons & working age & children | 91.33 | 8.23 | 0.44 | 100 |
| Older Persons & children | 96.74 | 3 | 0.26 | 100 |
| working age & children | 84.91 | 14.02 | 1.08 | 100 |
| working age only | 63.3 | 31.61 | 5.08 | 100 |
| Total | 83.28 | 15.17 | 1.54 | 100 |

Source: EICV4, 2013-14

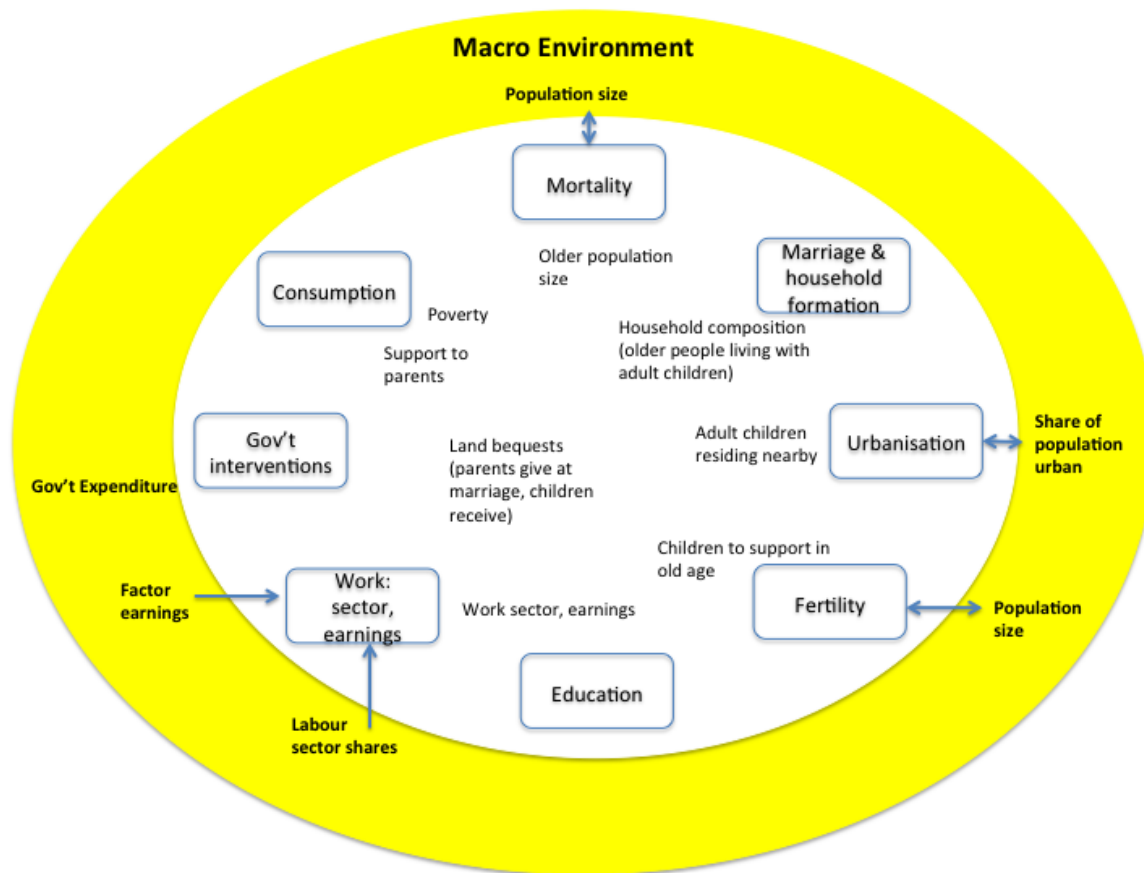
Annex 2: Microsimulation Model Technical Note

Dynamic micro-simulation methodology

Dynamic simulation models ‘age’ the dataset based on a set of key life events for each individual: mortality, marriage, household formation, fertility, education, labour force participation, earnings, savings, etc. The included modules are shown in the diagram below. The arrows pointing to and from the macro environment illustrate where micro processes are calibrated with national-level parameters so that individual estimates aggregate to realistic values.

The arrows pointing only from the macro environment to the micro modules show how the ‘top down’ integration from macro to micro works: the macro model produces estimates for the share of labour by sector as well as an index of real factor earnings for labor (low- and high- skilled), land, and capital.

Annex Figure 2-1: Micro-macro simulation modules



Calibrating population in the EICV4 with the 2012 Census

Although the EICV uses the census as its sampling frame, there are inevitable differences in the population estimates in the sample survey compared to the census. Not only are there aggregate differences in terms of total population and number of households, but the EICV has particular issues with accuracy at the tails of the age distribution (as is typical of sample surveys³⁶).

To address this, we do a one-off calibration, whereby population weights are adjusted so that there is alignment between the EICV and the census by age group and sex.

Mortality

Age-specific mortality assumptions come from the UN Population division estimates, which provide the number of deaths for each sex and age group for each five-year period in the model. We adjust these to annual values, and then apply stochastically to the dataset. If the aggregation of individual mortality is for some reason not in line with the expected aggregate values³⁷, the model adjusts (stochastically) to ensure overall calibration with the estimated trends.

Marriage

There are two stages to the marriage module: the probability of getting married (entering the marriage market), and then actually matching two individuals.

The probability of being married is dependent on age and level of education. It also varies considerably by gender, both in terms of the age at first being married as well as the likelihood of remarriage later in life.

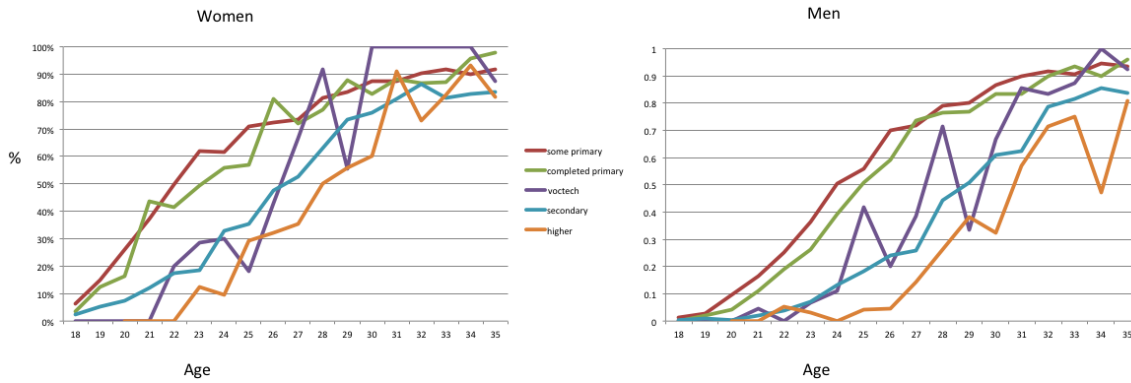
As shown in the figure below, there are large differences whether men and women have ever been married by education level, with women getting married earlier than men across the board, and marriage occurring later with higher levels of education for both. Whereas half of women with only some primary education are married by age 22, it is not until age 28 that half of women in higher education are married. For men there is a further delay, with 50% of those with only some primary married by age 24 and age 31 for those with higher education. By age 35 over 90% of all men and women have been married.

(Note that marriage before age 18 is extremely rare – below 1-2% - for both men and women, so we do not address child marriage here).

³⁶ INSERT REF

³⁷ Which is not uncommon in moving from micro-level phenomenon in the context of a sample survey to aggregated figures. This can be the result of the nature of the sample dataset used in the micro model, whereby each individual record in the sample 'represents' a certain number of individuals in the population, and therefore the micro model can be 'lumpy' in its estimates of rare phenomena and require correction when aggregated.

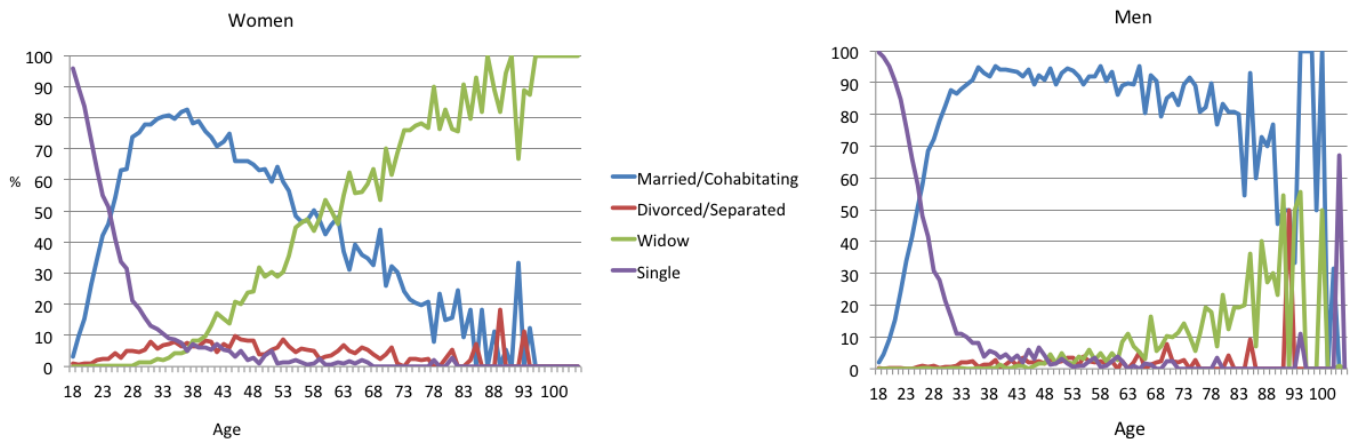
Annex Figure 2-2: Ever married by age, sex, and education, EICV4



As well as looking at whether individuals have ever been married, it is interesting to look at current marital status, as in the figures below. What is most striking in the comparison between women and men is that men are far more likely to remain married even in their older years, whereas for women by age 60 there are as many widows as those who are currently married, and widowhood increases rapidly (and marriage declines rapidly) from 60 onwards.

This reflects two things: firstly that women are more likely to live longer and therefore to be widows in the first place, but also that men are much more likely to remarry if they are widowed. These trends are very similar to those found by Van De Walle et al (2016) in their analysis of DHS data from 29 countries in Africa, although for Rwanda there are more widows at younger ages, reflecting the impact of the genocide.

Annex Figure 2-3: Marital status by age and sex, EICV4



Bearing these factors in mind, we model the probability of entering the marriage market in each year using a logistic regression of currently married status on age, age squared, education level, and sex.

The next step is then to match all those entering the marriage market with a spouse. In practice, we know that there is a high degree of homogamy, with spouses tending to have similar characteristics such as age, education levels, earnings, etc.

For Rwanda, we can look at the correlation between husbands' and wives' education levels, as in the table below. While husbands tend to have somewhat higher levels of education than their wives overall, there is a large degree of correlation between the two, with better-educated men tending to marry better-educated women.

We might expect to see some cohort effects, with education playing an increasing role in marriage decisions of younger couples, and indeed the overall pattern amongst husbands aged 35 and younger is in fact very similar to the one below for all men, but with the rates of correspondence between educational levels being even slightly higher. As the overall levels of education in the population rise (with the rapid expansion of education in the last decade in particular), we might expect these trends to continue.

Annex Table 2-1: Education of wives by education of husband, EICV4

| | Wife's education | | | | | |
|---------------------|------------------|-------------------|---------|-----------|--------|-------|
| | ALL AGES | | | | | |
| Husband's education | some primary | completed primary | voctech | secondary | higher | total |
| some primary | 72 | 22 | 2 | 4 | 0 | 100 |
| completed primary | 48 | 40 | 3 | 8 | 0 | 100 |
| voctech | 31 | 34 | 15 | 16 | 3 | 100 |
| secondary | 28 | 22 | 5 | 39 | 6 | 100 |
| higher | 2 | 5 | 5 | 38 | 49 | 100 |
| | MEN 35 and UNDER | | | | | |
| some primary | 75 | 18 | 1 | 6 | 0 | 100 |
| completed primary | 51 | 35 | 1 | 12 | 0 | 100 |
| voctech | 31 | 23 | 17 | 26 | 3 | 100 |
| secondary | 32 | 19 | 2 | 43 | 4 | 100 |
| higher | 1 | 4 | 5 | 35 | 55 | 100 |

Looking across age, education, and location characteristics we can see that there is generally the expected pattern of homogamy exhibited in the current population of married couples, with the median difference in age 3 or less for men 40 and younger, the median difference in educational category zero, and the majority (over 2/3ds) of spouses coming from the same district at birth.

Annex Table 2-2: Differences in age, education, and birth location amongst current spouses, by age of husband, EICV4

| Husband Age | Mean difference in age | Median difference in age | Mean difference in educational category | Median difference in educational category | % from same location at birth |
|-------------|------------------------|--------------------------|---|---|-------------------------------|
| 14-19 | -1.454545 | -1 | 1.2 | 0 | 0.6363636 |
| 20-24 | 0.18125 | 1 | -0.2439613 | 0 | 0.6983471 |
| 25-29 | 1.248175 | 1 | -0.0535088 | 0 | 0.7102396 |
| 30-34 | 2.308263 | 2 | 0.0238569 | 0 | 0.7164021 |
| 35-39 | 3.440422 | 3 | 0.2211809 | 0 | 0.7409639 |
| 40-49 | 5.472795 | 5 | 0.2277992 | 0 | 0.7316429 |
| 50-59 | 6.953503 | 5 | 0.1048951 | 0 | 0.7688972 |
| 60-64 | 7.320961 | 5 | 0.1885714 | 0 | 0.7995642 |
| 65-69 | 9.67803 | 6 | 0.2386364 | 0 | 0.7310606 |
| 70-74 | 10.53039 | 8 | 0.0566038 | 0 | 0.7900553 |
| 75-79 | 14.072 | 11 | 0.0465116 | 0 | 0.7222222 |
| 80-84 | 16.03846 | 14 | 0.047619 | 0 | 0.6826923 |
| 85+ | 21.64063 | 18 | 0.25 | 0 | 0.7692308 |

Bearing this homogamy in mind, there are two methods used in dynamic micro-simulation models to match individuals: stable or stochastic models, with stable models using optimization techniques and stochastic models being based on Monte Carlo simulations. It was found that stable models tended to be poorly correlated with marriage characteristics found in practice, with both too many ‘ideal’ and ‘extreme’ matches relative to the actual population (Perese 2002). Many of the long-established dynamic microsimulation models have therefore moved to a stochastic approach as a result of the theoretical shortcomings of the stable technique.

Here we model our approach based on the one outlined by Perese (2002), which overcomes shortcomings in some of the main earlier approaches and is used by the US Congressional Budget Offices Long-Term (CBOLT) model. The key steps are as follows:

- The list of entrants to the marriage market is randomly sorted for men and women, and the lists are truncated to ensure the same number are on each list (with excess of either sex being returned to the pool for potential selection in the next year).
- The matching process is male-led, meaning that it is done sequentially for each man until he finds a match, and then continues with the next one).

- The probability of a match is estimated using a potential pairs regression of existing spousal pairs in the EICV4 dataset³⁸. This is based on differences in spousal age, education, and location. The regression results are shown below:

Annex Table 2-3: Logistic regression, potential pairs on actual marriages

| is_match | Coef. | Std. Err. | z | P>z | [95% Conf. | Interval] |
|-------------------------------------|------------------|-----------|------------|------|------------|------------|
| Age difference (woman - man) | | | | | | |
| 9 to -5 | 1.593913 | 0.0470995 | 33.84 | 0.00 | 1.5016 | 1.686227 |
| 4 to -5 | 2.219862 | 0.045447 | 48.85 | 0.00 | 2.130788 | 2.308937 |
| 1 | 2.260488 | 0.0585088 | 38.64 | 0.00 | 2.145813 | 2.375163 |
| 0 | 2.161455 | 0.0603145 | 35.84 | 0.00 | 2.043241 | 2.279669 |
| 1 | 1.541944 | 0.0755076 | 20.42 | 0.00 | 1.393952 | 1.689937 |
| 2-4 | 0.7475038 | 0.0692349 | 10.8 | 0.00 | 0.611806 | 0.8832016 |
| 5-9 | -0.5482151 | 0.1022427 | -5.36 | 0.00 | -0.7486071 | -0.347823 |
| 10+ | -2.827957 | 0.1996972 | -14.16 | 0.00 | -3.219356 | -2.436557 |
| Difference in years of Education | -0.0023921 | 0.0011093 | -2.16 | 0.03 | -0.0045663 | -0.0002178 |
| Born in same district | 4.327899 | 0.0323809 | 133.66 | 0.00 | 4.264434 | 4.391364 |
| _cons | -10.64701 | 0.0435212 | -244.64 | 0.00 | -10.73231 | -10.56171 |
| Logistic regression | Number of obs | = | 23,882,768 | | | |
| | LR chi2(10) | = | 24765.32 | | | |
| | Prob > chi2 | = | 0 | | | |
| Log likelihood = - 33973.177 | Pseudo R2 | = | 0.2671 | | | |

- A normalization factor is applied, which is the highest probability of a match between that man and all other women in the pool.
- For each potential match, a random number is drawn, and if that number is greater than or equal to the predicted probability of the match divided by the normalization factor, the match is made. If not, this step is repeated with the next woman on the list until a match is made.

³⁸ This involves creating a nxn matrix of all potential pairs of spouses in the dataset, with the dependent variable taking a value of 1 for actual spouses and zero for all other pairs. We use a 25% sample because the full dataset is too large (and would yield a nxn matrix of over 95 million observations; the 25% sample yields over 23 million).

- Once a match is made, the matched pair is removed from the list, and the process repeats with the next man and the women remaining in the pool.

The results from this process are then recalibrated with national-level age-specific marriage rates to ensure that the matching algorithm yields the expected results.

Household formation and land bequests

Although in the African context we might expect to see many multi-generational household compositions, in fact when we analyse the EICV4 data we find that only a very small percentage of married couples live with both their parents. Less than 2% of ever-married men age 30 and younger are the son (or son-in-law) of the head of household, and this figure falls further for men over 30. We therefore conclude that even if they live in close proximity (and may share agricultural plots), newly-married couples generally form their own independent households.

For the purposes of the model, we therefore assume that all children leave to form their own unit. Women join their husband in their husband's location, if this is different to the wife's.

Land bequests are, as we have seen in the main report, an important component of the well-being of older people, since it is, and will remain, the main store of wealth for the vast majority of households. Parental bequests to children upon marriage are therefore important to capture, in order to determine which older people will have adequate land holdings with which to support themselves. In the baseline scenario we assume that bequests are made only to male sons upon marriage, since this is currently the most common practice. In Scenarios 2 and 3 we assume that the new Inheritance Law and earlier laws governing land ownership will be fully implemented, so that daughters will be given land upon marriage as well as sons.

In all cases, we assume that parents divide 50% of their existing land amongst their remaining children in the household.

Fertility

Age-specific fertility rates are modeled based on estimates from the UN Population Division, with new births modeled stochastically based on the probability of giving birth, which is estimated using a logit regression on age, education, and number of existing children.

Education

For individuals of school-going age (7 through 25), we model the probability of continuing education in each year. This is based on a logit regression of age, sex, location, number of children, whether parents are present and household characteristics (consumption, head age, head female, head education). In the baseline scenario (Scenario 1), we assume that current trends prevail in terms of primary and secondary completion. In Scenarios 2 and 3, we assume that education levels will increase over time.

Urbanisation/migration

There is then an additional step of determining urbanization/internal migration. The rate of migration is given by the World Urbanization Prospects (UN Population Division), and households are selected stochastically based on estimated probabilities using a logit regression of age and education of the household head (estimated coefficients are based on households who have migrated internally in the last five years before the EICV4 survey)..

Employment and earnings

In order to account for the fact that there will be broad economic sectoral shifts at the macro level– and concomitant urbanization/internal migration – we also model employment in the microsimulation. As with marriage, this takes place in two steps: first the probability of being in the labour market, and second what sector (agriculture, manufacture, construction, etc) and type of work (wage labour, household enterprise, or farming) and level of earnings.

Both of these steps are initially estimated based on logistical regressions of employment (participation and type) based on age, sex, location, and education. (As per Lay 2010)

These initial estimates are then calibrated stochastically with the macro CGE model every five years, to ensure that high-level trends in sectoral shifts are reflected in the micro characteristics of the population modeled.

Earnings increases are determined in line with the CGE model's estimates of factor earnings for land and labor.

Consumption and poverty

Ideally, both consumption per adult equivalent (and therefore poverty) would be determined by household earnings, based on the estimated earnings and marginal propensity to consume. Unfortunately, however, earnings are estimated with a high degree of uncertainty in the EICV4 data, because wage data is not precise enough to allow a full estimation of annual earnings³⁹. Attempting to estimate poverty directly from estimated earnings would therefore be problematic.

Instead, we predict both total consumption and poverty based on regressions.

The CGE Macro Model

A dynamic computable general equilibrium (CGE) modelling approach is used to generate disaggregated long-run projections of household income, factor prices, consumer prices and other economic variables for Rwanda up to 2050.

³⁹ The survey is helpful in that it records every job done by every individual, but we do not have an accurate number of days per year worked for each job, making it difficult to accurately extrapolate from wages reported for a given period to an annual value.

This memorandum provides a concise non-technical outline of the model structure, data sources for the calibration of the model and the scenario design.

The Model

CGE models consider all sectors in an economy simultaneously and take consistent account of economy-wide resource constraints, intersectoral input-output linkages and interactions between markets for goods and services on the one hand and primary factor markets including labour markets on the other. CGE models simulate the full circular flow of income in an economy from (i) income generation through productive activity, to (ii) the primary distribution of that income to workers, owners of productive capital, and recipients of the proceeds from land and other natural resource endowments, to (iii) the redistribution of that income through taxes and transfers, and to (iv) the use of that income for consumption and investment.

In terms of theoretical pedigree, the CGE model for Rwanda employed in this study can be characterized as a dynamic extension of a standard comparative-static single-country CGE model for a developing country in the tradition of Dervis, de Melo and Robinson (1982), Robinson et al (1999) and Lofgren et al (2002). Models belonging to this class have been widely used in applied development policy research. The dynamic extension of the comparative-static framework incorporates capital accumulation, population growth, labour force growth and technical progress.

Domestic Production and Input Demand

Domestic producers in the model are price takers in output and input markets and maximize intra-temporal profits subject to technology constraints. The technologies for the transformation of primary inputs into real outputs are described by sectoral constant-returns-to scale production functions. Intermediate input requirements are described by a Leontief technology specification.

Primary Factor Supply

The model distinguishes skilled and unskilled labour. The dynamic labour supply paths are exogenous and both types of labour are intersectorally mobile. The supply of agricultural land likewise grows at an exogenous time-variant rate. The productive capital stock in each sector a evolves according to the dynamic accumulation equation

$$K(a,t+1) = I(a,t) + (1 - \delta(a))K(a,t),$$

where K denotes the installed real capital stock, $I(a,t)$ is real gross investment flowing to sector a in period t and δ is the rate of physical capital depreciation. Sectoral gross investment is a positive function of a sector's rate of return to capital relative to the economy-wide average return to capital, i.e. the sectoral allocation of aggregate real investment is determined by return differentials. Once installed, capital is sector-specific (i.e. immobile across sectors) while new capital is intersectorally mobile.

Final Domestic Demand

Consumer behavior is derived from intra-temporal utility maximizing behavior subject to within-period budget constraints. Utility functions take the Stone-Geary form, yielding a Linear

Expenditure System (LES) demand specification. The commodity composition of investment and government demand is kept constant according to the observed shares in the benchmark SAM while the total volumes of government and investment demand grow in line with aggregate income and are determined by the macro closure rules detailed below.

International Trade

In all traded commodity groups, imports and goods of domestic origin are treated as imperfect substitutes in both final and intermediate demand. Agents' optimizing behaviour entails that the expenditure-minimizing equilibrium ratio of imports to domestic goods in any traded commodity group varies endogenously with the corresponding relative price of imports to domestically produced output in that commodity group.

On the supply side, the model takes account of product differentiation between exports to the rest of the world and production for the domestic market in all exporting sectors. The technologies for conversion of output into exports are described by sectoral constant-elasticity-of- transformation (CET) functions. This entails that the profit-maximizing equilibrium ratio of exports to domestic goods in any exporting sector is determined by the price relation between export and home market sales.

Rwanda is treated as a small open economy – i.e. changes in the country's export supply and import demand quantities have no influence on the structure of world market prices.

Equilibrium Conditions and Macro Closure

The prices for goods, services and primary factors are flexible and adjust in order to satisfy the market clearing conditions for output and factor markets. Foreign savings and hence the current account balance follow an exogenous time path. This time path is kept fixed across the simulation scenarios considered in subsequent sections in order to enable meaningful welfare comparisons across the scenarios. This external sector closure entails that the real exchange rate adjusts endogenous to maintain external balance-of-payments equilibrium. A standard macroeconomic closure rule (Lofgren et al, 2002) is adopted, according to which household saving rates and the government share in aggregate absorption are exogenous and aggregate investment is saving-driven.

Data Sources and Model Calibration

Benchmark Data

The model is calibrated to a social accounting matrix (SAM) which reflects the input-output structure of production, the commodity composition of demand and the pattern of income distribution for Rwanda at a disaggregated level at the start of the simulation horizon 2011. The SAM has recently been constructed at the International Food Policy Research Institute (IFPRI, 2014). Pradesha and Diao (2014) provide details of data sources and describe the SAM compilation process.

The present study uses an aggregation of the IFPRI Sam that distinguishes nine production sectors (Table 1), nine corresponding commodity groups, four primary production factors (high- and low-skilled labour, capital and agricultural land, and two household groups (rural, urban).

Annex Table 2-4: Model Sectors and Shares in GDP 2011

(Contribution to GDP at factor cost in percent)

| Production Sector | GDP Share |
|---------------------------|------------------|
| Agriculture | 33.7 |
| Mining | 1.4 |
| Tea and Coffee Processing | 2.0 |
| Food Processing | 2.7 |
| Other Manufacturing | 2.2 |
| Construction | 9.5 |
| Trade Services | 14.5 |
| Transport Services | 5.0 |
| Other Services | 29.1 |
| Total | 100.0 |

Source: IFPRI (2014) and author's calculation.

Model Calibration

The numerical calibration process involves the determination of the initial model parameters in such a way that the equilibrium solution for the benchmark year 2011 exactly replicates the benchmark SAM. The selection of values for the sectoral factor elasticities of substitution, and the target income elasticities of household demand is informed by available econometric evidence from secondary sources and uses estimates provided by the GTAP behavioral parameter database (Hertel and van der Mensbrugghe, 2016). The region-specific income elasticity estimates reported in that source for a representative single aggregated household are further differentiated across the lower and higher income households in the model, e.g. for necessary goods such as food products with an observed higher budget share in low-income households, the initial elasticities are raised vis-à-vis the central GTAP values and vice versa for high-income households and 'luxury' goods. Moreover, the income elasticities are gradually shifted over time as per-capita income of both household grows. Values for the elasticities of substitution between imports and domestically produced output by commodity group are drawn from Diao et al (2010: Tab. C2).

Given the selection of these free parameters, the various share parameters of the model – including the effective initial direct and indirect model tax rates – are then entirely identified by the benchmark SAM. Several of the model parameters, such as the factor productivity parameters governing the rate of autonomous technical progress are time-variant in the dynamic simulation analysis. The dynamic calibration of these time-variant parameters is discussed in the context of the description of the dynamic baseline construction process below.

3. Scenario Design

3.1. Baseline Scenario

The construction of the baseline scenario starts from the 2011 benchmark equilibrium. Population and labour force growth is based on the UN DESA (2015) medium-variant projections commonly used in contemporary long-run scenario studies. According to these projections, the total

population of Rwanda rises from 11.6 million in 2015 to 21.2 million in 2050. The urban population share is assumed to grow in line with UN DESA (2016) projections.⁴⁰

Annex Table 2-5: Average Annual Growth Rates –Baseline Scenario

(Growth rate per annum in percent)

| | Population | Labour Force | Land | GDP | GDP per capita |
|----------------|-------------------|---------------------|-------------|------------|-----------------------|
| 2012-15 | 2.44 | 2.91 | 1.13 | 6.45 | 3.54 |
| 2016-20 | 2.28 | 2.99 | 1.09 | 6.54 | 3.55 |
| 2021-25 | 2.04 | 2.98 | 1 | 6.86 | 3.88 |
| 2026-30 | 1.89 | 2.47 | 0.96 | 6.48 | 4.01 |
| 2031-35 | 1.76 | 2.31 | 0.9 | 6.13 | 3.82 |
| 2036-40 | 1.60 | 1.93 | 0.86 | 5.88 | 3.95 |
| 2041-45 | 1.39 | 1.63 | 0.8 | 5.63 | 4.00 |
| 2046-50 | 1.18 | 1.28 | 0.76 | 5.48 | 4.20 |

The second main exogenous driver of economic growth besides labour supply growth in the model is the economy-wide total factor productivity (TFP) growth rate, which reflects the speed of autonomous technical progress. In the development of the baseline scenario, the time path for the annual TFP growth rate is determined indirectly by imposing a target growth path for Rwanda’s real gross domestic product (GDP) (Table 2) and by calibrating the TFP parameter of the model dynamically to match this target growth path. Technically, to obtain the TFP growth path the model is first simulated in a dynamic calibration mode in which GDP is exogenized while the TFP parameter is treated as an endogenous variable. When the model is then simulated in normal mode, with GDP as an endogenous variable and exogenous imposition of the TFP growth path obtained in the dynamic calibration run, the model solution exactly replicates the target GDP growth path.

The GDP baseline scenario growth rates up to 2015 are reported actual growth rates (World Bank Group, 2015, 2017) and the expert projections up to 2019 are taken from World Bank Group (2017). From 2020 onwards, OECD ‘Shared Socioeconomic Pathway 2’ (SSP2 aka ‘middle of the road’)⁴¹ GDP projections are used (see Table 2). These projections as well as the projections for agricultural land expansion in Rwanda (Table 2) are obtained from internal IFPRI data files for a recent global multi-country study by Rosegrant et al (2017).

Broadly in line with the median projections across a range of global models reported in Wiebe et al (2015) for an SSP2 scenario, the baseline scenario also assumes a gradual rise in world market

⁴⁰ The 2011 urbanization rate used by Pradesha and Diao (2014) for the construction of the SAM is consistent with NISR (2014) data but considerably lower than the 2010 urban share in UN DESA (2016). Thus, in the construction of the dynamic baseline, the projected growth rates of the urban share from UN DESA (2016) are applied using the 2011 urban share from Pradesha and Diao (2014) as starting point. Correspondingly, the urban share rises from 14.8 percent in 2011 to 29.8 percent in 2050.

⁴¹ See O’Neill et al (2017) for the SSP concept and a characterization of the SSP scenario family widely used in contemporary long-run scenario studies.

agricultural prices (by 20 percent) and processed food prices (by 5 percent) relative to other world market prices over the simulation horizon.

With respect to government activity, it is assumed that with rising real GDP the share of government spending in domestic absorption gradually increases from 11.8 percent in the initial benchmark equilibrium to 20 percent in 2050, and direct tax rates on capital and labour income are gradually raised correspondingly.

It is further assumed that with rising per-capita income the average propensity to save of rural households gradually rises from its initial low level of 3.5 percent to 10 percent by 2050, while the saving propensity of urban households (which is already comparatively high in the initial benchmark equilibrium) stays put at 14.8 percent.

Female Labour Market Participation Change Scenario

This scenario assumes a gradual increase in the female labour force participation rate over the period 2020 to 2050 from 86.3 percent to 90 percent in 2050, i.e. by 2050 the female labour force participation rate is 3.7 percentage points higher than in the Baseline Scenario. These assumptions entail that by 2050 the total labor force is 2.1 percent higher than in the Baseline scenario.

Household Saving Propensity Change Scenario

In this scenario rural and urban household saving rates rise gradually from 2020 onwards, so that by 2050 these rates are 5 percentage points higher than in the baseline. Rural and urban household saving rates rise gradually from 2020 onwards, so that by 2050 these rates are 5 percentage points higher than in the baseline. The additional savings are invested domestically and thus raise the domestic productive capital stock. From a macroeconomic perspective the results are akin to the gradual introduction of a funded pension system in which current contributions are invested to finance future pay-outs.