Chapter 1
"Leapfrog Technology": Locating Older (South) Africans at the ICT Interface

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The industrial revolution was another of those extraordinary jumps forward in the story of civilization.
—Stephen Gardiner (quoted by River, 2017: 1)

Abstract This chapter positions itself between the demographic and epidemiological transitioning of the youngest world region in terms of population with its leapfrogging of ICT, specifically cell phone technology. Against the background of poverty and the continuing HIV and AIDS epidemic in (South) Africa, this contribution examines the deep penetration and agentic uptake of cell phones by older persons. It situates these users within their physical and family environments, and within the broader dynamics of intergenerational encounters with younger people. Whereas cell phones are often associated with youth culture, this chapter argues that older persons are very much part of the presence, circulation, and use of information and communication technologies (ICT), albeit for most of them on a basic level. Key cross-cutting strategic considerations for their ICT uptake involve intergenerational investment; harnessing the potential of new technologies for older persons; and inclusion of their input in ICT responses to their needs. To further the aim of achieving a society for all ages, ICT responses are proposed in the domains of social and health care, service delivery, and later-life learning.

Keywords Demographic transition · Epidemiological transition · ICT penetration · Older persons · Socio-economic · (South) Africa

The fourth Industrial Revolution (4IR) represents rapid and extraordinary advances in technology (the internet, AI, robotics and others) and 5IR incorporates the humanism, purpose, and inclusivity sensitive to the needs of people and the environment.

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1.1 Introduction

Africa as a continent and South Africa as a country stand at the nexus of a major demographic and epidemiological transition with the fourth (4IR) and the fifth industrial (5IR) revolutions. Already the continent (including its older population) has leapfrogged into the digital age with a deep penetration and uptake of cell phone technology (Nallen, 2019). By moving straight to this form of mobile technology, many African nations and remote and under-resourced communities are able to sidestep extensive and expensive landline infrastructure. It is even expected that some places will leap directly to 5G (fifth generation mobile network) (Strickland, 2019). With the exception of certain urban areas elsewhere, Africa is popularly known as the "mobile-only continent" (Mail & Guardian, 2014).

For an initial and better understanding of how cell phone technology is used by older persons (60+), as well as the dependencies and dynamics around it, we recognize that contextual factors influence whether and how technology (a device, an app) is acceptable for uptake by and interventions for the broader population and specific population sectors. For example, we consider local conceptualizations of health: whether an intervention is regarded as moral and appropriate, its compatibility with customs, and the way in which family and wider social forces respond to technological devices and associated innovations linked to them. This chapter explores such contextual factors: the current sociopolitical and health trends in (South) Africa[1] as the background against which ICT penetration and uptake take place; and the status and scope of current ICT penetration in (South) Africa, specifically its interface with older populations.

(South) Africa is diverse and her people grow old in a variety of settings, with a wide and unequal range of opportunities, capacities, well-being and life expectancies. While many older persons live in poverty and ill-health, others enjoy wealth, influence or robust health. Despite and because of this huge diversity, a number of critical interrelated background trends need to be brought into play for better understanding of how older persons negotiate ICT.

1.2 Background Trends

Most (South) Africans, including older persons, broadly respond to ICT against the backdrop of a set of interrelated cross-cutting trends, including poverty that is exacerbated by rural–urban migration and HIV and AIDS; the epidemiological transition with its increase in non-communicable diseases (NCDs); and changing family dynamics.

[1] (South) Africa refers to both South Africa and Africa as a continent. Where not thus specified, to South Africa only.

1.2.1 Poverty, Unemployment, Illiteracy and Social Protection

Over the last decade, evidence on the situation of older persons evolved largely into two main streams: their vulnerability to poverty and ill health (Lloyd-Sherlock et al., 2014, 2020; WHO, 2017), and the significant contributions they—in particular older women—make to the welfare and capacity development of younger family generations and more generally to their communities (Cohen & Menken, 2006; HAI, 2015). Older persons' care roles in the context of HIV and AIDS and their use of pension income to support the education and health care of children and grandchildren are particularly emphasized (see IDPM/HAI, 2003; HAI, 2004, 2006; Murphy et al., 2017; Ralston et al., 2016).

Most singularly, entrenched poverty characterizes sub-Saharan Africa (SSA), with its huge population diversity. Of the 30 countries with the lowest human development ranking listed in the 2020 Human Development Report of the UN Human Development Index (UNDP, 2020), 28 are situated in SSA.

Although South Africa ranks 114th out of 189 positions in this index and is categorized as an upper middle-income country, it has one of the world's highest levels of economic inequality, with a Gini coefficient of 0.68 in 2015 (Stats SA, 2017; UNDP, 2020). As a legacy of previous policies related to colonialism and marginalization, the group most affected by this entrenched inequality is Black Africans (categorized as such by Statistics South Africa). South Africa's overall unemployment rate reached 32.6% in the first three months of 2021, while the official youth unemployment rate was a staggering 63% (Stats SA, 2021).

One of the most glaring remnants of the country's racial inequality is in the domain of education and literacy, and will remain significant across generations to come. The Bantu Education Act (47 of 1953) (Republic of South Africa, 1953) limited Black South Africans' access to quality education, and its aftermath reverberates beyond the establishment of a democratic South Africa in 1994 when such discriminatory acts were repealed. According to the 2011 census, even as 96% of White South Africans aged 60 and older had attained a secondary or higher level of education, only one quarter of older Black South Africans had been able to do so. While only 1% of older White persons had never received schooling, the rate among older Black adults was nearly 40% (Stats SA, 2014). From 1996 to 2016, the functional illiteracy rate of older adults fell from 62.6% to 47% (Stats SA, 2017). In spite of this improvement, the severe inequality that had for so long persisted in South Africa continued to make educational attainment a significant barrier to the employability of older persons, their skills transfer to younger generations, and their personal autonomy.

With 18.6 million beneficiaries of social security grants in 2020/21 (South Africa Social Security Agency, 2020), the South African government oversees, with Brazil, one of the most rapidly expanding social welfare systems in the developing world to address the issues of abject poverty and inequality. The four social assistance programmes in post-Apartheid South Africa that provide the largest benefits and

are most widely implemented are the Old Age Pension (OAP) at R1,890 ($137) per month, the Disability Grant at R1,890 ($137) per month, the Foster Care Grant at R1,050 ($76) per month, and the Child Support Grant at R460 ($34) per month (see Lund, 2008 for a history and more details of the respective programmes). Over 3.1 million people aged 60 years and older were recipients of the OAP in 2015 compared with 2.7 million in 2011. This number is expected to rise to around 4.0 million beneficiaries by 2021/22 (South Africa Social Security Agency, 2020). Since the implementation of a social security plan in 1928—however patchy and small in scope at that stage—African pensioners have been under considerable moral and normative pressure to share their grants downwards through the generations as an acknowledgement of kin relationships (Sagner & Mtati, 1999). Given the existing gap in the safety net for unemployed persons between 18 and 60 years, coupled with the high unemployment rate, there is an (often unrealistic) expectation among younger generations for support from their older relatives (especially grandmothers) to provide for basic needs as well as airtime/data for communicating purposes with significant others (Rey-Moreno et al., 2016).

Older persons use their pensions to support their own households (Knight et al., 2016) as well as grandchildren (e.g. by paying school fees), children orphaned because of AIDS, household members who are ill (Hosegood, 2009), and unemployed individuals (Klasen & Woolard, 2009). Some older adults are, however, increasingly frustrated that their pension is not being used to secure their own needs (Baart & Hoffman, 2021; Hoffman, 2016, 2019). This high asymmetrical dependency of younger generations on older generations for material support is exacerbated by the continuous impact specifically of rural–urban migration and the HIV and AIDS epidemic (Chepngeno-Langat, 2014; Hoffman & Roos, 2021; Schatz & Seeley, 2015).

1.2.2 Migration

Africa is experiencing other major demographic, social and environmental trends, key among them being migration and displacement, urbanization, and the growth of urban informal settlements. SSA is often regarded as the world's fastest urbanizing sub-region (Migration Data Portal, 2021). Urban areas had a population of 567 million people in 2015 and this number is set to double over the following 25 years. The global share of urban residents in Africa is projected to grow from 11.3% in 2010 to 20.2% by 2050 (United Nations, 2017). By 2025, it is expected that there will be 100 African cities with more than one million inhabitants each (Muggah & Hill, 2018). Such trends often signal the urbanization of poverty involving older persons as part of the urban migratory ecosystem, with the implication that they either migrate into overcrowded informal urban settlements or are left in rural areas in a milieu of rural stagnation (Hoffman & Roos, 2021).

The South African case is unique in that, under Apartheid, Black, Indian, and Coloured citizens' movements among geographic areas were severely limited by

legislation; the Group Areas Act (41 of 1950) (Republic of South Africa, 1950) was intended to keep these population groups separate, to restrict them mainly to rural, underdeveloped areas, and to prevent their mobility to urban areas (see Durrheim et al., 2011). The repeal of this Act in 1988 was followed by massive urbanization. In certain provinces, the exodus of working age individuals from a rural area to a city in another province dramatically swelled the proportion of older persons in the population of origin (Stats SA, 2017).

Rural to urban migration of younger kin for work and study opportunities impacts older persons' lives, for the most part adversely. Older parents left behind in a rural area have heightened vulnerability: they must prepare the land and grow crops without able-bodied assistance and are often left with grandchildren to raise. When older parents can no longer cope alone in a rural area, they may follow their migrant children to the urban area, where they have to contend with poor and overcrowded housing in informal settlements, an unfamiliar environment, and attendant urban social ills, all of which place them at risk of displacement and alienation (see Hoffman & Roos, 2021; Nxusani, 2004).

A strong circulatory migration pattern also exists whereby older rural dwellers visit an urban area and join their kin for a number of months each year in order to receive health care and other services. The older migrants then return to their rural homesteads for extended periods during which they sow and reap crops, tend livestock, visit family, and perform traditional rituals. Another trend that has been noted is that of young in-migrants to an urban area who contract AIDS and return to their ancestral rural home to be cared for by an older parent until they die (Nxusani, 2004; Migration Data Portal, 2021; Møller & Ferreira, 2003).

1.2.3 HIV and AIDS

South Africa has the most voracious and highest-profile HIV epidemic in the world, with an estimated 7.5 million people living with HIV in 2020—of an estimated population of 60 million—and with a concentrated toll on young adults (UNAIDS, 2020). The epidemic's long-term generational momentum affects both ascending and descending generations, as illustrated by the high proportion of affected grandchildren who live in households headed by older persons (mostly grandmothers), estimated to be up to 60% (Makiwane et al., 2004; Petros, 2010; UNICEF, 2007). With virtually no institutional care options for AIDS patients or orphans, grandmother-headed networks must provide the necessary shelter and care in-house.

Older carers' contribution to HIV and AIDS care management, as well as their own vulnerability and need for support, has been acknowledged in several global policy instruments (UN, 2002a, b), the African Union's Policy Framework and Plan of Action on Ageing (AU/HAI, 2003), and the Valletta Declaration on HIV and AIDS and Older Persons (Help the Aged/International Institute on Ageing [UN–Malta], 2005). These policy instruments and declarations all call for mainstreaming

older persons into the design and implementation of response programmes, both as care providers and as care recipients (Ferreira, 2006).

A substantial body of research spanning more than a decade has been carried out on the effects of the AIDS epidemic on older persons in SSA. Studies on the impact of the disease on older persons in African countries have mainly focused on associated morbidity and mortality rates (Ferreira et al., 2001; Lawn et al., 2008; WHO, 2006), and on resultant dysfunction in affected households (Hosegood et al., 2007; Hosegood, 2009; Nankwanga et al., 2013; Oramasionwu et al., 2011). In South Africa, localized qualitative studies, although not exclusively focused on AIDS, have assessed the perceived needs of older carers in poor settings (Ferreira et al., 2001; Ferreira & Van Dongen, 2004; Singo et al., 2015). Ferreira et al. (2001), Ogunmenfun (2007), and Petros (2010) have prioritized the needs of older caregivers affected by HIV and AIDS for governmental intervention. Kuo's (2010) study is one of the few employing quantitative research methods and focuses on assessing the well-being of adults, including older carers, who provide non-institutional care to children orphaned by AIDS in South Africa, and on identifying factors that mediate well-being. Other studies with implications for older carers have been conducted specifically on the effects of AIDS orphanhood and parental AIDS illness on children, particularly their mental and physical health and general educational outcomes (Cluver et al., 2007). The types of challenges faced by people caring for children orphaned and made vulnerable by HIV and AIDS in communities with high levels of poverty and unemployment are among the real issues to be considered when planning the possibilities of cell phone technology employed for information and support.

Overall, the studies highlight the burden of care (financial, emotional, and physical) and the multiple responsibilities of older carers, particularly women. General findings, furthermore, reveal inadequate support for and knowledge about the needs of older carers (who will care for the carers?). Published reports show loss of economic support in affected households through the illness or death of a breadwinner, insufficient material resources (money, food, and clothing) experienced by older carers, and challenges in accessing medical treatment for sick household members due to inability to pay for treatment or for travel to a health-care facility. Apart from the financial and practical effects of caregiving and loss of kin, older persons also experience grief, pain, and anxiety regarding the future. Many neglect their own health-care needs because of the time and resources they devote to caregiving (Ferreira et al., 2001; Kuo, 2010; Small et al., 2017).

1.2.4 Rise in Non-Communicable Diseases

The disease profile of more developed countries normally changes from that of infectious diseases, high child mortality, and malnutrition to a predominance of degenerative and chronic diseases. Developing countries, however, often shoulder a double burden resulting from the simultaneous occurrence of these communicable

and non-communicable disease spectrums. This situation reflects the epidemiological transition in the generally increasing shift of disease and death away from infectious diseases and poor nutrition towards non-communicable diseases (NCDs). While NCDs or chronic diseases are not infectious, they are likely to last longer and need to be managed (Kim & Oh, 2013; WHO, 2018).

More than 87% of health problems related to the global ageing population are due to NCDs such as cancer, diabetes, and heart disease (WHO, 2018). According to Aboderin and Beard (2014), older individuals in the African context are confronted with high levels of disability and ill health, especially stemming from chronic diseases (Institute for Health Metrics and Evaluation [IHME], 2020a, b). The most frequently reported NCDs in SSA are high blood pressure, diabetes, and arthritis, all of which require life-long management. This in turn places a strain on ageing-related resources and consequently on the availability of formal long-term care (Hajat & Stein, 2018). In the HIV-infected population, antiretroviral therapy is likely to increase the prevalence of NCDs, either through the association of drug regimens with NCD risk (Brown & Qaqish, 2006), or as a result of older adults' improved survival into advanced age in which NCD risk rises (Negin et al., 2012) with subsequent implications for social and health-care management.

Higher NCD prevalence has resulted in considerable functional impairment and disability among older adults across SSA. Unlike in high-income countries where, increasingly, modifiable factors mean that older age is no longer a reliable predictor of functional disability (Aboderin & Beard, 2014), data from SSA indicate that rates of illness and disability in older age are significantly higher than in younger age.

Families and communities thus experience mounting pressure to provide almost all long-term care for older adults in the region. However, there are already profound inadequacies in informal (familial) care provision because of economic and infrastructural pressure exacerbated by migration, as well as by mental and physical caregiver stress (Aboderin & Hoffman, 2017; Nyirenda et al., 2015), and the comprehensive social and demographic changes caused by HIV and AIDS (Kautz et al., 2010; Schatz & Gilbert, 2014).

1.2.5 Families and Intergenerational Relations

Africa understands families and their communities as key social groups —within which older persons' lives unfold and the challenges and opportunities of later life are to be understood. At the same time—and while recognizing the strain on families' capacities and resources—Africa looks to families and communities as a strength upon which development and care in the continent can and must build. Dominant policy instruments draw on the ideal and power of 'the African family' and regard family values and dynamics as a major moral asset in dealing with challenges associated with ageing (Aboderin & Hoffman, 2017). Multigenerational family structures remain prominent in South Africa, where over 75% of older adults live with children or other family members (Stats SA, 2017).

Taking the importance of families in Africa as point of departure, any development responses, across all strategic domains such as education and social and health care, ought therefore to consider where and how existing family, and intergenerational and community arrangements and initiatives can be leveraged and built upon. Such activity must ensure that the capacities and resources of families across contexts are adequately supported.

In a recent review of the ongoing African Union Plan and Action on Ageing (AUPFPAA, 2019), delegates from across the continent identified broad responses for homegrown Africa-relevant development based on families, namely:

- Develop a robust and grounded understanding of the heterogeneity in African family forms, circumstances and dynamics, and the experiences of individuals within them; of the norms and values that underpin families; and of the resources and capacities that families draw upon;
- Map and draw lessons from existing family- and community-based responses on broad development issues;
- Establish and sustain stakeholder-engagement mechanisms and platforms to ensure that families and communities are included in the development of responses for their own issues at hand;
- Include adequate resourcing to support the capacities of families and communities as part of intergenerationally focused responses.

1.3 Ageing in (South) Africa

Against the abovementioned background of interrelated socio-economic strains, opportunities, and dynamics, the population structure and epidemiological profile of (South) Africa are in the process of transitioning.

1.3.1 Demographic Transition

The *demographic transition* refers to the shift in society from high fertility and low life expectancy rates towards lower fertility and higher life expectancy rates (Guseh, 2016; Population Reference Bureau, 2019). Lower fertility rates and lower mortality rates are important drivers for this demographic transition (Bloom et al., 2015; UNDESA, 2017). The former are particularly important considering the unprecedented imbalance created by a disproportionate number of older persons in relation to younger age groups (Bloom et al., 2015; Guseh, 2016).

Africa, however, is and will remain demographically the youngest of all world regions, its large population share of children and youth representing promise for the continent's future. At the same time, while the proportion of older adults in Africa's

population is expected to remain below 10% in coming decades, their absolute number will grow rapidly—faster than in any other major part of the world.

Defined by chronological age as those aged 60 years and above, the number of older adults in Africa (already 74 million in 2020) is projected to nearly triple to 216 million by 2050. By 2030 alone, the continent will be home to an additional 30 million older persons. Not dissimilar projections emerge when using an alternative criterion to define an older person as someone with 15 years of remaining life expectancy (He et al., 2020).

While the fertility rate in SSA began to decrease over the period 1960 to 2018 (World Bank Group, 2020b), fertility rates in South Africa have decreased substantially, from a previous rate of 6.04 newborns per woman in 1960 (World Bank Group, 2020a) down to 2.32 newborns per woman in 2019 (Stats SA, 2019). Also in South Africa, the absolute number of older persons has been rising. In 2020, there were 5.4 million older persons aged 60 years and above (9.1% of the total population), and this number is expected to go up to 11.6 million by 2050 (Stats SA, 2020; UNDESA, 2017). As the number of older persons increases, so too will the demand for long-term care (LTC), given the simultaneous epidemiological transition (Daviaud et al., 2019; WHO, 2017).

1.3.2 Epidemiological Transition

The rise in the absolute numbers of older persons intersects with a rise in the burden of disease. The *epidemiological transition* is identified by a change in the primary causal factors leading to diseases and death, from communicable diseases and poor nutrition on the one hand to a predominance of NCDs on the other (Aboderin & Beard, 2014; Bloom et al., 2015).

The South African case is complex as it constitutes a quadruple burden of disease resulting from (1) communicable diseases (such as HIV and AIDS and tuberculosis (TB)), (2) NCDs (such as diabetes, cancer, hypertension, and mental illnesses), (3) injury and trauma, as well as (4) water-borne diseases that pose a high risk to South Africans, like malaria, which is endemic in small sectors in the country (WHO 2018). This onerous complexity will bring about disabled longevity for many. Older persons in South Africa can expect increased NCDs, mental illnesses related to ageing, and infectious diseases including coronavirus disease 2019 (Covid-19) and HIV and AIDS (Gouda et al., 2019; Solanki et al., 2021).

The numbers of NCDs in South Africa are rising among both rural and urban populations (Gouda et al., 2019; Mayosi et al., 2009). Age correlates strongly with functional disability at the population level from age 70, with those aged 80 and older reporting a threefold increased risk of poor functionality (Gómez-Olivé et al., 2010). Findings by Stats SA (2014) confirm that concurrent with higher ages older persons reported being severely challenged by all functional domains of sight, hearing, communicating, walking/climbing, remembering/concentrating, and self care. Similarly, Scheil-Adlung (2015) found that 86% of people 70 years and

older in South Africa had at least one functional disability. Older persons also often experience multimorbidity, in which they have to manage two or more NCDs (Banerjee, 2015). Clearly, multimorbidities can impact older individuals' capacity to carry out and manage necessary daily tasks (Su et al., 2016), such as bathing or eating independently (Carmona-Torres et al., 2019), and instrumental activities of daily living, such as preparing food, using the telephone, and shopping (Bonder & Bello-Haas, 2009; Guo & Sapra, 2020). In addition, more than 50% of older persons in South Africa had reported difficulties with moving around, 24.8% had reported difficulties caring for themselves, and 67.6% had reported some cognitive or mental challenges (He et al., 2012; Kelly et al., 2019; Phaswana-Mafuya et al., 2013).

Mental health issues are a further growing concern in terms of care management. For example, late-life depression and dementias already constitute an important public health problem, with devastating consequences. In the study by Peltzer and Phaswana-Mafuya (2013), functional disability, poor quality of life, and chronic conditions, including angina, asthma, arthritis, and nocturnal sleep problems, were associated with self-reported late-life depression symptoms. According to South Africa's 2011 census (Stats SA, 2011), there were approximately 2.2 million people in South Africa with some form of dementia; of the older population, about 7% suffer from dementia. The WHO Global Health Observatory data (WHO, 2019a) estimates that there is one psychiatrist per 100,000 of the South African population, and even fewer (0.4%) in the state sector: a situation deemed grossly inadequate. By comparison, the United States and the United Kingdom have 12.4 and 14.6 psychiatrists per 100,000, respectively. Of South Africa's 650 psychiatrists, only three are specialists in geriatric psychiatry; there are only five dedicated psychogeriatric units at South African universities, with Stikland Hospital in the Western Cape offering the only dedicated psychogeriatric unit and training facility in the country. The unit consists of three wards with a bed capacity of 77 (33 male and 44 female). It is oversubscribed, with a long waiting list. This lack of formal (institutional) capacity places greater reliance on family, friends, social support groups, district clinics, and home-based carers (Aartsma et al., 2019).

Compounding the chronic disease burden are the high numbers of people in South Africa living with communicable diseases such as HIV and AIDS and TB. The country's 2018 TB figures revealed as many as 301,000 active cases and 63,000 deaths (WHO, 2019b). It is noteworthy that the demand for LTC in later life has also been shaped by the effects of HIV and AIDS, and the ageing of persons living with HIV (Lloyd-Sherlock, 2019). The Black population in South Africa accounts for the majority of older persons infected with and affected by the virus. The widespread rollout of antiretroviral therapy (ART) in the country has transformed HIV into a manageable chronic condition, and as a result people with HIV are living into old age (Banerjee, 2015). The impact of HIV at the intersection of ageing and other multimorbidities is not yet known but is expected to bring an increasing care load.

The situation is exacerbated by Covid-19, the pandemic that has been high on the public health agenda. As its caseload and death toll increased, so its worsening impacts threaten to reverse all public health gains made in recent years. The severity

and mortalities of Covid-19 have been strongly associated with hypertension and diabetes. The ageing population, having the highest prevalence of multimorbidity, is thus at highest risk of adverse outcomes from Covid-19 (including the mental effects of social isolation). The disease—like any pandemic—impacts heavily on front-line health-care workers and caregivers alike, emphasizing the problem-solving possibilities of giving consideration to creative options involving technology (Jacobs et al., 2020).

The critical effects of the range of demographic and epidemiological transitions is echoed in the rising demand for social and health-related support and even LTC, and for the potentially supportive role that mobile and other technologies could play.

1.4 ICT Penetration in (South) Africa

In parallel with the major demographic and epidemiological transitions in Africa, and specifically SSA, acceptance and application of ICT is seeing exponential growth. By the end of 2019, 477 million people in SSA had subscribed to mobile services, accounting for 45% of the population—an increase of 21 million subscribers over the previous year. It was estimated that the mobile market in the region would reach half a billion subscribers in 2021 and a billion mobile connections in 2024. Smart phone adoption has also spread rapidly in SSA: the number of smartphone connections in SSA was expected to almost double over a period of five years to reach 678 million by the end of 2025—an adoption rate of 65% from the 50% of 2020. This growth has been motivated by the availability of cheaper devices and evolving financing models that allow low-income consumers to pay for 4G devices in daily instalments. However, with nearly 800 million people in the region still not connected to the mobile network, the digital divide persists within and across generations. Basic phones, such as flip phones or feature phones, are generally the most common types of mobile device owned by sub-Saharan Africans (Silver & Johnson, 2018; Silver et al., 2019; GSMA, 2020). The exception is South Africa, where a smartphone that connects to the internet and apps is the most accessed device in the country (ICASA, 2020).

According to the General Household Survey (GHS) (Stats SA, 2020), the proportion of households using only cellular phones as a means of communication increased steadily from 85.5% in 2015 to 89.5% in 2018 and to over 90% in 2019 (ICASA, 2020). The influx of mid- to low-cost smartphone brands in the South African market has boosted access to these devices (GSMA, 2020). Unlike the mobile telephony boom, the overall internet penetration in South Africa is lower. At the national level, the GHS reported that in 2018 the proportion of households with access to the internet was 64.7%. Access here means that at least one member in a household can connect with the internet either at home, at work, at a place of study or in an internet café. Within age groups, almost two thirds of those aged 25 to 34 were internet users in 2016, compared with fewer than one fifth of those aged 50 and older (Effective Measure, 2016).

On 30 September 2019, ICASA (2020) recorded 53.4 million smartphone subscriptions—up from 46.7 million a year earlier in 2018. The report showed total cellular phone voice subscriptions had risen by 5.7% from 91 million in 2018 to 96 million in 2019. Of this 2019 total, 82 million (85%) were prepaid subscriptions and 14 million (15%) were postpaid subscriptions; in urban areas, the total prepaid mobile phone subscriptions stood at 77.5 million and postpaid subscriptions at 13.7 million. According to ICASA, cellular data subscriptions increased by 18.8% from 65 million in 2018 to 78 million in 2019.

Although older persons in South Africa engage with basic technologies at higher rates than ever before, there is still a significant digital divide within and across generations. This trend is visible despite the lack of disaggregated data for older cohorts and reporting bias towards the younger generations in a range of reports on the status of ICT (Effective Measure, 2016; ICASA, 2020; Silver & Johnson, 2018). With little focus on older adults and lack of training options, the digital divide is perpetuated. A study conducted jointly by the University of South Africa and the University of Glasgow (van Biljon et al., 2013) underlined the fact that the older population was being neglected and marginalized by the technological transition processes. It pointed out that, apart from barriers typically associated with ageing, including vision and hearing loss, the primary impediment to accessibility was older users' discomfort with technology. Nevertheless, cell phones have become the most common form of basic technology uptake among those aged 60 and older.

1.5 Locating Older Persons at the ICT Interface

With mobile technology at the heart of SSA's digital journey, researchers, policymakers and practitioners in the region need to conduct research and implement policies and best practices with an eye on all key enablers for development towards a society that caters for all ages. With the final decade of the UN Sustainable Development Goals (SDG) well under way, mobile technology could potentially play an increasing (though not idealized) role in accelerating progress to achieve them amid acute resource and infrastructure limitations in the region (UN, 2015). As ICT interacts with demographic and epidemiological transitioning in the (South) African reality, key strategic departure points and domains should be considered with a specific ageing-inclusive focus.

1.5.1 Key Cross-Cutting Strategic Considerations

The realization of comprehensive, cross-sectoral responses in (South) Africa on ageing and older persons at the ICT interface remains sporadic. Too often, action on older persons and technology is viewed as detracting from investments in young persons or other core areas, and is deprioritized or not even considered (AARP/FP

Analytics, 2017). One of the barriers to progress is the absence of an identified strategic process for the inclusion of older populations in ICT advances that builds and clarifies the case and sets out critical priority directions as part of and contributory to efforts to achieve social and economic development objectives. Such a fit-for-purpose process needs to take into account the social, economic, physical, environmental, cultural, and political contexts, and the available technologies that have manifested in the region: the policy and legal architecture; the accumulated body of relevant scientific knowledge of ageing and older populations in (South) Africa; and learning derived from existing ageing responses.

– **Intergenerational investment to harness the potential of new technologies**

New technologies can play an important role in forging responses on ageing. Investments in older populations in terms of ICT are not, however, separate from, marginal to, or detract from core objectives to enhance the prospects of younger generations in pursuit of social and economic development. A recent corpus of intergenerational literature suggests the possibility that strategic investments to enhance capacities and well-being in older age can benefit both older and younger people today and in the future as well as fostering cohesive societies (see Kaplan et al., 2017, 2020). Such investment can harness the links between the lives of old and young, as well as the intergenerational influences that older adults wield on the exposures, opportunities, and perspectives of young people at family, community, and societal levels, and vice versa. Moreover, investment in capacities and well-being in linked/networked lives (Antonucci et al., 2019; Vacchiano & Spini, 2021) has the potential to leverage intergenerational transformative assets through technology as modus: the digital experience of younger generations shared with older persons and, in their turn, older persons' generativity through their investments in younger generations' education.

Any investment made—through technology—to adapt existing or forge new social, health, and economic systems and structures to enhance the capacities, engagement, and well-being of older persons should be developed in conjunction with older persons themselves. Across all strategic action areas relating to their needs it is critical for the perspectives of older persons to be at the centre of the design, planning, implementation, and subsequent reporting of technological responses. Their involvement eliminates exclusion in later life and recognizes, supports, and harnesses older persons' intergenerational roles and influences.

Efforts to build such ICT responses need to take into account and address digital divides between old and young as well as within the older population. These divides reflect different cultures, with various levels of technology-related comfort, acceptance, and skills among successive generations and cohorts of older adults, and will be perpetuated as new technologies are continuously introduced. At the same time, the use of ICT can represent an opportunity to foster intra- and inter-generational connections.

The policy and programmatic implications of such a developmental and generational approach need, in all cases, to consider inter- and intra-generational perspectives in planning, designing, and operationalizing ICT interventions for older

persons. More specifically, the approach calls for the creation, implementation, and monitoring of ICT policies and interventions which enable older persons to acquire ICT skills that are accessible, affordable, and appropriate, and that could be optimized in inter- and intra-generational programming.

– **Include and centre older persons in the development of ICT responses**

To repeat, it is critical that the perspectives of older persons are at the heart of the design, planning, implementation, and reporting on ICT responses to their needs. This means that mechanisms and platforms should be established to ensure that older persons, including those from marginalized and excluded groups, are consulted and actively participate in the processes of policy or programme conception, development, monitoring, and evaluation, principles that are well-established in the extant global policy architecture on older persons (AU, 2002, 2016; UN, 1999, 2002b).

1.5.2 Key Domains for Older Persons at the ICT Interface

Locating older persons at the ICT interface highlights a range of pertinent key domains within which ICT developments are currently active or should urgently be addressed and revisited. As an illustration, and apart from the huge role ICT already plays in general communication, crucial key domains for socio-economic development focus on social and health care, basic governmental service delivery and banking, and education in later life as three overarching drivers for sustainable development and growth.

– **Social and health long-term care**

The numbers of older persons who can no longer live independently without the assistance of others and who require care and support are set to rise. Worldwide (SSA included), it is anticipated that the social- and healthcare needs of older- growing populations will be greater than available resources (Aboderin & Beard, 2014). Aligned with African family values, most LTC for such older persons has thus far been provided by families—mainly by unpaid female family carers (Aboderin & Hoffman, 2017). The SSA region lacks extensive and accessible public LTC systems, and here technology could play a crucial part in supporting families and government care management structures.

Care is explained as a multi-dimensional construct (see Abebe & Aase, 2007; Chokwe & Wright, 2012; Ray & Turkel, 2012; Van der Geest, 2002; Watson, 2007; Yeates, 2011) and encompasses a range of interrelated dimensions:

– Health care: all basic or sophisticated medical care actions and interventions;
– Psychosocial care: intangible care activities (e.g. support) to promote the well-being and quality of life of older persons;
– Relational care: effective and meaningful interpersonal contact with peers or between generations (related or unrelated);

– Instrumental and physical care: tangible care, such as assistance with household chores, running errands;
– Structural care: the fair and just distribution of resources; inclusive and non-discriminatory activities and processes; and a physical environment that promotes active participation through policy implementation.

ICT can potentially intensify both social- and healthcare delivery to older persons by complementing existing under-resourced interventions and disburden social- and healthcare systems through innovative solutions over distances (WHO, 2017). Hence, the use of cell phones to assist remote populations to receive more efficient health treatments have proved successful. Initiatives are numerous, and cell phones are becoming legitimate tools for health care as illustrated with three examples (not necessarily focused on older persons).

– HelloDoctor (https://www.hellodoctor.co.za/) is available in 10 African countries; it provides free essential health education with daily healthcare advice vetted by doctors and direct access to talk to or text a doctor for medical advice over the phone.
– Peek Vision (https://peekvision.org/) gives access to eye care and created a smartphone camera adapter that helps to take retinal images in order to diagnose problems with vision. This intervention helps health services to deploy limited resources more effectively to supply cost-effective, targeted treatment.
– Vula Mobile—selected as a 2021 finalist for the Sustainable Development Goals (SDGs) Finance Geneva Summit, hosted by the United Nations Development Programme (UNDP)—connects healthcare workers with specialists by providing a safe and secure platform to refer patients and share advice with on-call specialists to obtain quick and efficient care for their patients (MTN Business, 2020). It offers access to more than 4000 doctors and health-care workers and helped almost 19,000 patients every month in 2020. There is normally no need for doctors to be physically present or even in the same country to offer support. This is a revolution for the current traditional health sector where, in rural South Africa, there is only one doctor to 4500 people, and a single specialist for every 18,500 (WHO, 2019a). Even when there is a clinic nearby, those in need of care still have to rely on an overburdened public healthcare sector. The range of specialities for which Vula Mobile caters includes ophthalmology; cardiology; ear, nose and throat; burns; family medicine; HIV and AIDS; and orthopaedics.

The evidence base for tangible health outcomes of similar promising initiatives from low- and middle-income countries is generally still weak (Tomlinson et al., 2013). At a conference of the UCL Institute for Global Health and the Umeå Centre for Global Health Research, Sweden, entitled "mHealth: Evidence from low- and middle-income countries" (2015), it was observed that many such initiatives are simply driven by new technological capacity rather than by knowledge of potential user populations and contexts. Moreover, development-orientated mHealth (mobile health) projects tend to find an easily identifiable, self-designated 'community', which is employed for pilot testing but is not representative of the wider population.

These approaches do not address the considerable hurdles to securing uptake within a larger population on a more sustained basis, let alone to securing uptake from older users. Commitments to user-centric interventions based on pilot testing rarely result in ongoing participatory design and long-term engagement with actual users (Tomlinson et al., 2013).

– **Service delivery**

South Africa has made substantial progress since 1994 to improve the quality of life of its people by extending basic services to previously un- and under-serviced households, particularly in rural and informal areas (Mutyambizi et al., 2020). Nevertheless, basic service delivery protests in the country have continued to rise after the end of Apartheid (Nengwekhulu, 2009; Nleya, 2011). Municipal IQ (2021) tracks the number of ongoing protests against municipalities' poor service delivery in South Africa and their data show 1225 service delivery protests between 2004 and 2016, with peaks of 237 and 218 in 2018 and 2019, respectively. Dissatisfaction with service delivery has often been cited as the main reason for the increase in protests within South Africa (Akinboade et al., 2014). Within this context, the South African Local Government Association (SALGA) commissioned Roos et al. (2014) to look into service delivery from local authorities to older persons, one of the most marginalized groups adversely affected in accessing basic services to which they have constitutional rights (Du Plessis, 2017). The main findings revealed a lack of access to information and coordination, which prompted the development of an *e*Intervention. This is in line with the South African *e*-Government framework and its ongoing vision of an inclusive digital society in which all citizens can benefit from the opportunities offered by digital and mobile technologies to improve their quality of life. The framework aims to optimize service delivery that provides universal access to government information and services at any time and anywhere, as well as socio-economic development opportunities; its use of ICT also envisages the empowerment of rural and traditional underserved communities (Mawela et al., 2017).

With regard to financial services, the rise of the platform economy (phone-based making or receiving payments and digital banking) in SSA is impressive and provides a further way of involving older persons, especially in view of their situation (in the South African case) as beneficiaries of what is often the only regular source of income in a multigenerational family. More generally, however, in 2019, the number of registered mobile money accounts in SSA reached 469 million, representing nearly half of total global mobile money accounts, and was expected to reach half a billion in 2020. East Africa is the most mature mobile money market in SSA with Kenya at the forefront, accounting for more than half of the total number of registered accounts in the region (GSMA, 2020). Around six in 10 cell phone owners have used their devices for online banking during 2020, with a high of 83% in Kenya, where M-Pesa (https://www.vodafone.com/what-we-do/services/m-pesa/m-pesa-faqs) is a dominant force, widely used by the people at the bottom of the economic pyramid for their daily needs, and the continent's most recognized example of technological leapfrogging (Silver & Johnson, 2018). Africans went from

having no bank accounts or appropriate banking infrastructures to having a widespread mobile money service: the most basic cell phones are now used as money-transfer devices. With over 500 million mobile-money users in 2020, Africa is by far the leading continent for mobile-money services (Velluet, 2020). Suri and Jack (2016) reported the notable long-term effects that mobile-money services had had on poverty reduction in Kenya, especially among households headed by women. These households saw far greater increases in consumption than households headed by men, prompting the question, what insights might a generational perspective add to this report?

– **Learning and education in later life**

Access to adult learning and education is recognized as an essential right. Increasing longevity expands opportunities for attaining basic and advanced education in adulthood and for capitalizing on it to foster inclusive, equitable, tolerant, sustainable, and knowledge-based societies (UNESCO Institute for Lifelong Learning, 2010). Lifelong learning, as generally understood, encompasses all forms of education and embraces a continuum from formal to informal learning. It is based on inclusive, emancipatory, humanizing, and democratic values, and views literacy as the most significant foundation upon which to build comprehensive and integrated life-wide developmental opportunities for people of all ages. Literacy, in other words, forms an essential part of building people's capabilities to cope with the evolving challenges and complexities of life, culture, economy, and society, including technology (Global Education Monitoring Report Team, 2020). Yet, according to the report many older people in SSA, especially women—given cumulative disadvantages over the course of their lives—still lack literacy, as well as access to learning, and education in later life remains minimal.

If user-centric context-appropriate approaches are required for the participation of older persons in cell phone uptake for interventions across strategic domains, late-life learning is imperative. However, just as there are insufficient education and training programmes in South Africa for older adults to gain productive skills, there are too few efforts specifically targeting seniors to help them with the knowledge and skills needed to use basic forms of technology. After 1994, the country's education system underwent significant reforms and budget increases to address the inequalities of Apartheid. In 2008, the government established the Kha Ri Gude ("Let Us Learn") Adult Literacy Programme. It had operated until 2016/17 throughout the country through the Department of Basic Education after which it was suspended by the parliamentary portfolio committee. This programme specifically targeted marginalized segments of the population, with 15% of the 163,833 South Africans over the age of 60 enrolled in 2016. In that year, Kha Ri Gude reached its target of having served 50% of all illiterate adults in South Africa (see McKay & Romm, 2019 for an assessment of the success of the programme). While various NGOs are dedicated to adult education, they do not focus on older persons because their funders do not believe this would be the most productive use of their financial support or investment. A further impediment is that government funding for education and training has imposed age limits on its beneficiaries (AARP/FP Analytics, 2017).

The massive adoption of cell phones across generations with ICT interventions across key development domains offers opportunities for the country and the continent to create its own growth model for the integrated long-term social and health care of its older populations.

1.6 Conclusion

Acceptance and application of ICT—especially mobile technologies—in (South) Africa is growing exponentially, with older persons both as active agents and beneficiaries of ICT utilization and interventions. After lagging behind the rest of the world in technological infrastructure for decades, Africa's enthusiastic response to mobile phone possibilities has enabled the continent to leapfrog its way into ICT. The potential of ICT to play an important role in development—economic, political, and social—is well documented and accepted (Neves & Vetere, 2019; Sayago, 2019). The scale and scope of the leapfrogging process could, however, in its bedazzled state overlook the small steps that are vital in encouraging technology acceptance and adoption by older users (Raiti, 2007).

A synthesis from a reading of the background literature about ICT in (South) Africa suggests some broad medium- and long-term responses by civil society and governments, specifically for older users:

- Map, draw lessons learned from, and build on, acceptable, affordable, culturally appropriate and accessible ICT interventions and programmes for older persons;
- Consider intergenerational perspectives in planning, designing, and operationalizing ICT interventions for older persons;
- Develop, implement, and monitor ICT policies and interventions that enable older persons to acquire ICT skills that are accessible, affordable, appropriate and could be optimized in intergenerational programming;
- Allocate adequate resources and infrastructure to ensure ICT that is accessible, affordable and appropriate for older persons;
- Urge governments to enact inclusive legislation and policies that guarantee that older persons will be able to acquire necessary ICT skills.

The mobile industry's contribution to the SDGs and the continent's wider development goals are demonstrated in three main strategies to which older generations could contribute and from which they could benefit (UN 2015):

- Deploying infrastructure and networks that act as a catalyst for a diverse and innovative range of services within the different domains of social and health care, education, and the economy;
- Ensuring access and connectivity by the provision of infrastructure and more affordable data through which the unconnected are connected so that no one, including older persons, is left behind;

– Enabling interventions and operationalizing relevant content against the conventional backdrop of considerable infrastructure and funding gaps.

The ageing of (South) Africa's population is, and must be recognized as, another key marker of the continent's unique demography and its inherent potential. The country and the continent now face the urgent challenge and opportunity to forge practices, systems, and institutions, as well as legal, policy, and technological/digital environments that will serve the needs and harness the capacities of present and future cohorts of older persons, in support of the continent's overall development aspirations.

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