Changing global ageing demography and implications for future disease outbreaks in Africa: A descriptive review

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Abstract

Despite pockets of incidences in different places, from all indications, the world might have experienced the worst phase of the COVID-19 pandemic. We must however admit the obvious – the pandemic caught the world unawares. The relatively high case-fatality rates and socioeconomic losses from the pandemic could have been effectively mitigated assuming the global healthcare systems were more proactive in their preparedness. However, dwelling on past shortcomings is unproductive. It is imperative that we swiftly learn from this experience and prepare for future disease outbreaks. Another pandemic in the future without adequate preparedness may be too grievous to the fragile interconnected global healthcare and economic systems. The objectives of the article are to discuss the global ageing population and the role such a phenomenon might have played in the recent global COVID-19 outbreak and may play in future disease outbreaks, especially in Africa. Accordingly, a review of related online full articles published from year 2010 from reliable scientific search engines was done. Results revealed that the world is presently experiencing a change in age demography to older age groups, and such a phenomenon may have played a significant role in the varying COVID-19 incidence and case-fatality rates that were recorded in different regions of the world. Due to the fast-changing age demography in Africa, the continent might suffer the most unfavourable outcomes from future disease outbreaks. Stakeholders must need to closely monitor the shifting age demographics in Africa and institute evidence-based health-promotional measures that will adequately prepare the continent to face future disease outbreaks.

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Abstracts

Despite pockets of incidences in different places, from all indications, the world might have experienced the worst phase of the COVID-19 pandemic. We must however admit the obvious – the pandemic caught the world unawares. The relatively high case-fatality rates and socioeconomic losses from the pandemic could have been effectively mitigated assuming the global healthcare systems were more proactive in their preparedness. However, dwelling on past shortcomings is unproductive. It is imperative that we swiftly learn from this experience and prepare for future disease outbreaks. Another pandemic in the future without adequate preparedness may be too grievous to the fragile interconnected global healthcare and economic systems. The objectives of the article are to discuss the global ageing population and the role such a phenomenon might have played in the recent global COVID-19 outbreak and may play in future disease outbreaks, especially in Africa. Accordingly, a review of related online full articles published from year 2010 from reliable scientific search engines was done. Results revealed that the world is presently experiencing a change in age demography to older age groups, and such a phenomenon may have played a significant role in the varying COVID-19 incidence and case-fatality rates that were recorded in different regions of the world. Due to the fast-changing age demography in Africa, the continent might suffer the most unfavourable outcomes from future disease outbreaks. Stakeholders must need to closely monitor the shifting age demographics in Africa and institute evidence-based health-promotional measures that will adequately prepare the continent to face future disease outbreaks.

Keywords: Ageing population, changing age demography, African population, COVID-19 pandemic, healthy lifestyles, future disease outbreaks.

Introduction

The latter end of the year 2019 will be remembered by the world as one of the most challenging periods in recent human history. In December 2019, there was an outbreak of COVID-19 in Wuhan, China, and in a few months, the disease spread to all regions and corners of the world.[1,2] For the next two years, this infectious disease kept the world on its knees, forcing most human socioeconomic activities to either slow down or completely shut down. In just two years and a few months, precisely from December 2019 to August 2022, COVID-19 had been diagnosed in about 560 million cases, resulting in about 6.5 million case fatalities.[3]

Although many countries, especially developed countries, can boast of fairly robust healthcare systems, the COVID-19 pandemic-induced global economic losses and the unprecedented disruption of human activities pointed in only one direction. The world was unprepared and off guard, or at best, inadequately prepared for the COVID-19 pandemic - a mistake that we cannot afford to repeat. Another major global disease outbreak(s) in the future without proper preparedness and adequate proactiveness could result in catastrophic consequences. The world's fragile economic and security systems may never fully recover from such an event.

Africa suffered the least from the COVID-19 pandemic compared to the rest of the world. The African continent recorded the lowest incidence and case-fatality rates from this infectious disease. According to the World Health Organization (WHO), as of the end of August 2020, only 9,269,451 confirmed COVID-19 cases were recorded in Africa, compared to 246,251,732 in Europe; 174,001,373 in the Americas; 80,959,738 in Western Pacific; 59,861,679 in South-East Asia; and 22,924,525 in Eastern Mediterranean.[3] COVID-19 case fatalities also followed a similar trend. As of the end of August 2020, only 174,235 COVID-19 case-fatalities were recorded in Africa, compared to 2,806,324 in the Americas; 2,069,339 in Europe; 794,681 in Southeast Asia; 346,976 in Eastern Mediterranean, and 254,979 in the Western Pacific.[3]

These results were surprising to many, due to her fragile healthcare system and many developmental challenges. Some had predicted that Africa might record one of the highest morbidities and mortality

rates from COVID-19, with the prediction of dead bodies littering the streets of some certain African countries.[4] The prediction was ultimately proven wrong. Many theories have been proposed as the reasons for the disparity in the COVID-19-related morbidity and case-fatality rates observed across different regions of the world. Particularly, there is curiosity on why the least prepared continent – Africa, seems to have suffered the least comparatively lower impact from the recent COVID-19 pandemic.

One major factor that might explain the different COVID-19 incidence, hospitalization, and case-fatality rates in different regions of the world is the changing global ageing demography. Further exploration of this phenomenon and the public health ramifications might explain the reason why Europe and America were significantly affected by the COVID-19 pandemic while Africa seems to have suffered the least impact. This information might also be crucial to effectively position the world's healthcare systems to adequately prepare for future disease outbreaks, with particular attention on Africa.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used for this review. The review was done from relevant literature in electronic databases in Google Scholar, Academia, ResearchGate, PubMed, and MEDLINE. The websites of reputable public health organizations and institutions, such as the World Health Organization (WHO), United Nations, National Institute on Ageing, National Bureau of Statistics of Nigeria, etc., were also visited for relevant and current information.

Some of the keywords that were searched include the COVID-19 pandemic, OR the ageing population, OR demographic and epidemiological transitions, OR future disease outbreaks and Africa, OR healthy lifestyles, OR healthy ageing. All searches were limited to the English language and the year 2010 and beyond. A total number of 5012 articles were retrieved. They were visualized, profiled, cleansed, prepared, analyzed, and summarized, out of which 42 most relevant articles were

utilized for the review.

Inclusion criteria

Topics relating to the global ageing population and epidemiological transitions in Africa, systematic reviews and meta-analyses, original observational studies; and articles written in the English language and published from 2010 and beyond were all included in the review.

Exclusion criteria

Commentaries, editorials, letters to the publisher, case reports, case series, nonrandomized studies, and any studies published before 2010 were excluded from the review.

Data Extraction

A standardized form was used to extract the relevant data based on the eligibility criteria. The components of the data extraction form include the authors, years of publication, location, study design, aims of the study, and results. To avoid a possible selection bias, the authors were guided throughout by the PRISMA guidelines.

Results

The Epidemiology of the Global Changing Ageing Population

Life expectancy is increasing at an alarming rate globally, and a good number of the global population are presently aged 60 years and above.[5,6] Never before in human history has a large number of people lived to older (60 years and above) or oldest (80 years and above) age, as noticed in this generation.[7] The percentage of the global older age (60 years and above) population has been increasing in a stepwise direction since 1950. The older age population was only 8% (200 million) of the world's population in 1950, it rose to 382 million in 1980, to 11% (760 million) in 2011, then to 900 million in 2015, and further to 962 million by 2017.[6,8,9]

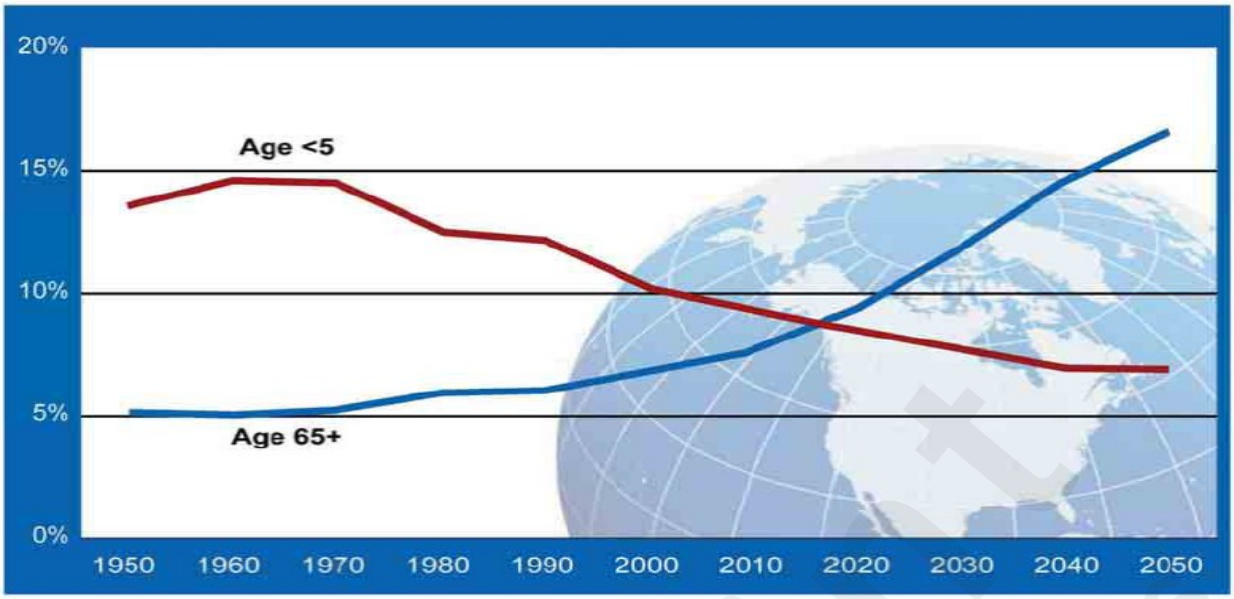
The absolute number of older persons (60 years and above) is increasing simultaneously in all countries and communities of the world and is expected to rise continuously globally. It is projected to nearly double to around 1.4 billion (16.5% of the world's population) by 2030, and nearly triple to

around 2.1 billion (22% of the world's population) by 2050, and most of the increase will likely be recorded in Africa and developing countries.[6-9] Similarly, in 2003, the global population of people who are 65 years and above was only 35.9 million, this rose by 24.7% to 44.7 million by 2013 and is expected to rise to more than double, to around 98 million by 2060.[10]

The percentage of people who are 60 years and above may have already exceeded 16.5% of the total population in some (if not most) developed European and North American countries.[7] By 2050, the percentage of people that are 60 years and above is expected to rise to 35% of the population in Europe, 28% in Northern America, 25% in Latin America and the Caribbean, 24% in Asia, 23% in Oceania, and 9% in Africa.[9] Also, by 2030, the global number of older persons (60 years and above), is expected to be more than that of children (10 years and below) (1.41 billion versus 1.35 billion); while by 2050, the number of older people worldwide is projected to be more than that's of adolescents and youth (at ages 10-24 years) (2.1 billion versus 2.0 billion).[9,11] This is the first time in human history that the world would likely have more people who are 65 years and above than children (5 years and below), regardless of their geographical location and socio-economic status (Figure 1).[12,13]

Even among the oldest population (80 years and above) in the world, life expectancy is also increasing. Presently, one in every eight older persons (60 years and above) are aged 80 years and above. The percentage of the oldest persons increased from 0.6% (15 million) of the world population in 1950 to around 1.6% (110 million) in 2011.[7] From 2017 to 2050, the global population of oldest persons is projected to increase more than threefold, rising from 137 million to 425 million, which will be about 4% of the world population by 2050.[14,15] These high and still rising absolute number and percentage of global older and oldest adults has a lot of implications on the present and future disease profiles and outbreaks.

Figure 1: The Percentage of Global Population between Young Children (< 5 years) and Older People (≥ 65 years): 1950-2050



Source World Health Organization.[3]

The Changing Ageing Population in Africa and the Developing Countries

For decades, Africa has always prided itself as the continent with the youngest age population. The present median age of people living in Africa is only 19.7 years, which has been projected to rise to just 26.4 years by 2050.[7] Only 5.5% of Africans are presently 60 years and above, and this is projected to increase by only 4.3% (i.e., to 9.8%) by 2050, compared to Asia and Latin America (which is expected to increase from 10% to 25%), and Europe and North America (which is expected to increase from 20% to 30%) within the same period.[7] Furthermore, over 41% of the country with the largest population in Africa, Nigerian, is presently under 15 years old. Only about 5% of Nigerians are presently 60 years and above, with a median age of only 18.1 years.[16] Indeed, the average age demography in Africa is young.

However, these statistics are fast changing. The population in Africa and most developing countries is fast ageing, at a greater pace than the developments in these countries, and quicker than the available resources.[9] Although the global changing ageing population was first noticed in the high-income developed countries, the phenomenon is fast catching up with Africa and with most developing countries.[6] It now appears that most countries in Africa and other developing countries are “getting old faster before they get rich”.[7]

While Africa at 9% is expected to house the least percentage of older people (60 years and above) by 2050, from all indications; the highest percentage transition and the most dramatic increase in absolute numbers from younger to older demographics is expected to occur in Africa. Between 2017 and 2050, the percentage change in the older population in Africa is expected to be 228.5%, followed at a distance by Latin America and the Caribbean (160.7%) and Asia (131.8%).9 While in absolute numbers, Africa is expected to have the third highest absolute number of older people by 2050 (Table 1).[9] The absolute number of older adults in Africa is expected to increase by more than threefold, from 69 million to around 226 million between 2017 and 2050, then to 716 million by 2100 (Tables 1 and 2).[9,10]

Specifically, in sub-Saharan Africa (SSA), the absolute number of older people is expected to rise significantly faster than anywhere else in the world and will likely increase from around 46 million in 2015 to around 157 million by 2050.[12] Furthermore, between 2017 and 2050, the population of older people in 25 countries of the SSA is projected to increase by more than threefold, while in four SSA countries (Malawi, Rwanda, Uganda, and Zimbabwe), the number of older persons will likely quadruple over the same period.[9] The most rapid increase in the absolute number of older persons in Africa will be expected in Eastern (such as Kenya), Western (such as Nigeria), and Central (such as Cameroon) African countries, while most of the Northern and Southern Africa countries will likely experience only modest absolute rise within the same period.[7]

Table 1. Estimated absolute number (millions) and distribution of older persons (60 years and above) by region, in 2017 and 2050

	Number of persons aged 60 years or older in 2017 (millions)	Number of persons aged 60 years or over in 2050 (millions)	Percentage change between 2017 and 2050	Distribution of older persons in 2017 (percentage)	Distribution of older persons in 2050 (percentage)
World	962.3	2080.5	116.2	100.0	100.0
Africa	68.7	225.8	228.5	7.1	10.9
Asia	549.2	1273.2	131.8	57.1	61.2
Europe	183.0	247.2	35.1	19.0	11.9
Northern America	78.4	122.8	56.7	8.1	5.9
Latin America and the Caribbean	76.0	198.2	160.7	7.9	9.5
Oceania	6.9	13.3	92.6	0.7	0.6

Source: United Nations.[9]

Table 2: Estimated Increase in absolute number (millions) of people aged ≥ 60 years in Africa and other continents, in 2010, 2050, and 2100

	2010	2050	2100	% Increase
Africa	56	215	716	1,179
Asia	414	1,253	1,473	255
Latin America & Caribbean	59	188	236	300
North America	64	121	166	159
Europe	161	242	219	39

Source: Beard *et al*.[7]

No other region of the world is likely to experience such exponential growth as Africa. The pace of increase may be so fast that most African (and some of the developing) countries will have much shorter periods to react or adjust their healthcare and economic systems to the demographic transition. There may not be enough time to formulate the necessary policies and build needed infrastructures to meet the health and socioeconomic needs of the anticipated high absolute number of the older population.[7,17] Other resources (such as finance, skilled capacity, etc.) might also not be enough to manage the anticipated negative health and socio-economic outcomes and impacts that the changing ageing demographic might bring on Africa.

Epidemics Implication of the Global Ageing Population: COVID-19 as a Case Study.

The changing global ageing demographics towards a much older population is considered probably the most significant public health, medical and socio-demographic problem of the 21st century.[11] This is partly because there exists a positive correlation between increasing age and declining health, resulting in gradual dysfunction in virtually all physiological processes in the body. The ageing process negatively impacts people's health primarily by causing a gradual and progressive loss in the body's ability and the internal biological processes to adjust appropriately to external behavioural and environmental assaults.[18-20] This with time results in progressive difficulty in maintaining the internal milieu and homeostasis of the body.[21]

Furthermore, the increasing wear and tear, and increased production of free radicals and pro-inflammatory biomarkers that are associated with advancing age, tend to create cascades of pathophysiological and psychosocial changes in the body. Some of these multiple, gradual, and often simultaneous age-related changes in the body include – the development of systemic chronic inflammation (SCI); multiple molecular and cellular damages and degradation; increase in the rate of incomplete or error in replication, repair, or destruction of cells; dysfunctional immune regulation; decrease neuroimmunoendocrine communication, and increase organ degeneration and atrophy.[18-20] All these health-compromising events often increase people's vulnerability or susceptibility to the negative effects of diverse external environmental factors (such as trauma, pollution, and infections), and unhealthy lifestyle factors (such as unhealthy diets, physical inactivity, poor sleep, stress, etc.).[3,12,22]

In most cases, these cascades of age-induced changes in the body eventually result in the increased risk of developing varying degrees of frailty, disabilities, and chronic non-communicable diseases (NCDs) – such as hypertension, heart diseases, diabetes mellitus, stomatitis, neurodegenerative syndromes (such as Alzheimer disease), benign prostatic hyperplasia, some cancers, many autoimmune diseases, and other chronic diseases of ageing (CDA).[23-25] In addition, the dysfunctional immune regulation and the decreased neuroimmunoendocrine communication that are often

associated with advancing age often result in increased susceptibility to severe forms of infectious diseases.[26,27] Increased susceptibility to the agents of some infectious diseases in more than expected number of people (host) in a community, usually in a 'favourable environment' are often the most important factors that result in disease outbreaks – be it epidemics or pandemics.[28,29]

Using the COVID-19 pandemic as a case study – multiple studies highlighted three basic socio-demographic factors as very critical in the relatively high infectivity, hospitalization, and case-fatality rates of COVID-19 that were recorded in most communities. These factors were the older age groups (around 60 years), the male gender, and ethnic minority groups (especially the black race).[30,31] Out of these, older age is arguably the most important factor.[31] Multiple studies suggested that the higher the age, the higher the probability of not only developing COVID-19 but also of developing a severe form.[31] For instance, a study that was done among 1,591 confirmed COVID-19 Italians observed that the median age of the patients was 63 years.[32] Other observational studies that were done on confirmed COVID-19 patients in China also revealed median ages of 47, 49, 50, and 55.5 years from different studies.[32]

Different studies have also associated high hospitalization and case-fatality rates in COVID-19 cases with older age groups. A study conducted among confirmed COVID-19 cases in China noticed that almost 50% of hospitalized patients (due to "refractory" COVID-19) were 60 years and above.[33] Another China-based study noticed a median age of 56 years among the 138 COVID-19 cases that were hospitalized for different COVID-19-related complications.[32] Likewise, a study that was done in 12 New York City area hospitals among 5,700 hospitalized patients, all with severe forms of COVID-19, noticed a median age of 63 years.[34] Furthermore, a meta-analysis revealed that the most important determinants of mortality in confirmed COVID-19 cases were advanced age (above 60 years) and age-related underlying chronic diseases.[32]

Since advancing age has a linear association with dysfunctional immunity and poor immune resilience, infectious diseases, especially those that have the potential to cause outbreaks, will almost

always take advantage of a high percentage of older adults in the community to cause significant havoc. Thus, the relatively higher infectivity, hospitalization, and case-fatality rates of COVID-19 that were recorded in many developed countries may likely have resulted from the high percentage of older adults in their communities. The relatively lower infectivity, hospitalization, and case-fatality rates of COVID-19 that were recorded in most African countries may likely be due to their younger population. For instance, studies suggested that the age range of 35-39 years was the most affected by COVID-19 in Nigeria[35], this contrasts with the median age group of 48-58 years in some developed countries, like China [36]

However, since about 22% of the world's population and 35% of some developed nations are expected to be 60 years and above by 2050, the world may likely continue to experience more disease outbreaks, possibly in pandemic forms. Moreover, seeing that Africa may house one of the highest absolute numbers of older adults (60 years and above) from 2030, the continent may soon lose its 'young population advantage' and experience frequent and possibly more severe disease outbreaks soon. By implication, without adequate preparation, the next major epidemic or pandemic might be too devastating to the fragile and ill-prepared healthcare and economic systems of most African countries, with a ripple effect on the interconnected global economy and security.

Discussion

Africa and the need to prepare for future disease outbreaks

Although present statistics strongly suggest that Africa is fast losing its 'young population advantage,' it appears the continent is the least prepared for its possible negative outcomes and impacts. In contrast to other continents, issues around the ageing population are barely considered by most policymakers in Africa. If considered at all, they are perceived at best as marginal to, and at worse a distraction from the major and pressing national and subnational developmental, economic, and security issues.[7] There seems to be a lack of strong political will to take appropriate proactive measures among leaders in Africa. This is despite the formal declaration of commitments to this

course by most African nations during the United Nation's Madrid Plan of Action on Ageing and the African Union's Policy Framework and Plan of Action on Ageing.[7]

Because other developmental challenges in Africa may likely persist by 2030 and beyond, the continent may be unable to surmount the challenge of the additional burden that an ageing population might bring to the table. The levels of development in most African countries might not be robust enough to effectively manage the anticipated rise in the absolute number of the older population and its possible associated increase in the prevalence of chronic NCDs (such as hypertension, type 2 diabetes mellitus, cardiovascular diseases, and some cancers), frequent outbreaks of infectious diseases, and high prevalence of age-related frailty/disabilities.[24,25] Such situations, if not well managed, might further crumble the fragile and infantile healthcare and socioeconomic systems in Africa. A situation that may be unsustainable and may even reverse all the hard-earned developmental indices that the continent has painstakingly accrued over the years.

Regardless of the present developmental challenges that are confronting Africa and the developing world, the issues around the ageing population must be recognized and prioritized as vital developmental issues for the future survival of Africans. If well managed, the ageing population phenomenon carries enormous beneficial developmental potentials[7,18], if not, it might be difficult for Africa to recover from its potentially catastrophic effects for many years. Unfortunately, Africa and the developing world do not have the luxury of time to take necessary actions. It took most developed countries decades, and sometimes a century, to adjust to their demographic transition. For instance, it took the population aged 65 years and above in France more than 100 years to rise from 7% to 14%, which is more than enough time for the country to put the necessary adaptive measures in place. However, it will likely take Africa and many developing countries only a few decades to achieve similar demographic change.[5] Consequently, African and developing nations need to act fast and decisively. The issues around the ageing population cannot and must no longer be ignored or postponed.

Strategies for mitigating the rising ageing population

One of the best strategies that Africa and the rest of the world can adopt is – adequate preparation for a future full of older citizens. This can be done through immediate and strategic investment in the education and health of the people throughout their life course.[7] Studies have identified good education as a protective sociodemographic factor that can play a significant role in achieving better health outcomes, especially in older age.[37,38] A well-educated population may be more likely to appreciate and understand the health challenges that changing demography poses, and more likely to make adequate individual and group preparation to effectively prevent or manage future disease outbreaks. Additionally, the more individuals are educated on the plausibility and strategies of achieving healthy ageing, the more favourable their health outcomes could be as they age.[39]

Secondly, there is a need to institute evidence-based health promotional policies and programs that will optimize the immune resilience and functional capacities of most people, starting from a young age. Such a strategy will likely ensure that the functional and reserved capacities of the immune and other related systems of most people are primed and resilient enough to withstand and mitigate external assaults from infectious diseases, thereby preventing, or at least, mitigating a severe form of future disease outbreaks.[12,40] Such proactive measures may also prevent or reduce the risk of developing many underlying chronic NCDs; most of which have the potential to either increase the susceptibility or severity of most disease outbreaks.[31]

From the available evidence, the most effective and sustainable health promotional strategy for optimizing people's immune resilience and functional capacities is for them to constantly engage in healthy lifestyle practices and avoid, or at least reduce, risky behaviours and harmful environmental exposures throughout their lifespan, starting from the younger age.[39,40] Some of the evidence-based healthy lifestyle practices that may promote stronger immunity and optimal functional capacity, up to and beyond, the older age group include – regular consumption of whole food plant-based diets; engaging in adequate physical activity, ensuring restorative sleep, good stress management, good

social connectedness; and avoidance of substance abuse (such as tobacco use).[39,40-43] Adequate investment and resources must be channelled in these directions by all stakeholders – at the individual, community, national, and global levels.

Furthermore, stakeholders should prioritize certain policies and programs for older persons, including intergenerational knowledge transfer, improved access to healthcare services, effective social pension programs, stronger support for informal and family-based support systems, and enhanced access to healthy nutrition.[7] Finally, the governments of different nations and all stakeholders must continue to closely monitor the fast-changing age demography and pattern of disease outbreaks in Africa and the rest of the world through well-funded research programs, and promptly implement the recommendations from such ventures.

Conclusion

The scientific world has learned a lot from the recent COVID-19 pandemic. The susceptibility, spread, and severity of the disease had a linear association with the rising global ageing phenomenon. Africa may have been spared the relatively high incidence, hospitalization, and case-fatality rates from COVID-19 partly because of its relatively young population. This will likely change a few years from now, as Africa may most likely record one of the highest absolute numbers of older adults (60 years and above), compared to the rest of the world. A high number of older adults (most of whom may have age-related immune dysfunctions and multiple NCDs) coupled with a 'favourable environment' (largely due to climatic change, unplanned urban settlements, etc.) are perfect opportunities for multiple, and possibly severe, disease outbreaks on the continent.

Although the global ageing population phenomenon cannot be stopped, it can be effectively controlled, and its possible negative health and economic outcomes minimized, by optimizing the human functional and reserved capacities and immune resilience. This can be done by implementing evidence-based measures that promote healthy lifestyles and sustainable positive behavioural changes, right from a young age. Such proactiveness and preparedness will likely translate to better

ability of the immune and other systems of most individuals to resist or control severe forms of possible future disease outbreaks.

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