



Breaking barriers: addressing inequities in Alzheimer's disease diagnosis and treatment in Africa

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Introduction: Alzheimer's disease represents a substantial and escalating public health threat across Africa. Alzheimer's disease leads to substantial cognitive impairment and memory loss, placing a heavy burden on the affected individuals and their families, friends, and caregivers. It affects 2.67 million people in Africa, the majority of whom live in sub-Saharan Africa. The prevalence of this disease is expected to rise drastically to approximately 150 million individuals worldwide by 2050, as estimated by the WHO.

Aim: This paper offers an integrative profile of Alzheimer's disease in Africa, spanning known genetic and modifiable risks, discusses the existing challenges in diagnosis and treatment, projections on prevalence and disability-adjusted life year burden through 2050, and priority policy responses needed to rebalance the equation.

Methods: This paper examines available literature to summarize current knowledge on risk factors, diagnosis, treatments, and burden of Alzheimer's disease in Africa. Gather epidemiological assessments, clinical guidelines, and commentary related to Alzheimer's disease in Africa.

Results: The data reveals concerning realities regarding Alzheimer's disease diagnosis and care in Africa. Diagnostic infrastructure shortcomings, resource limitations, and knowledge gaps emerge as recurring barriers. Positron emission tomography scans, cerebrospinal fluid assays, and other mainstay detection modalities common in developed countries show restricted availability.

Conclusion: Addressing Africa's Alzheimer's disease crisis demands a multipronged strategy to uplift diagnostic capacities, treatment availability, specialist training, public awareness, and coordinated policymaking. Prioritizing biomarkers and imaging to confirm early neurodegeneration is foundational, alongside drug access expansion.

Key words: Africa, Alzheimer's disease, dementia, neurodegenerative disorders, sub-Saharan Africa

Introduction

Alzheimer's disease can simply be defined as a disease that affects the memory functioning and the mental functions of the body due to the structural change of the brain tissue, such as cells and neuronal damage. The disease is characterized by the infiltration and build-up of neuritic plaques and neurofibrillary tangles from proteins and amyloid beta-peptides^[1]. This neurodegenerative disorder is regarded as the sixth leading cause of death and the most common cause of dementia worldwide. The prevalence of Alzheimer's disease is said to be about 30 million people worldwide^[2].

The WHO estimates that by 2050, the prevalence of Alzheimer's disease will be on the rise, whereby 150 million

people will be living with the disease with an increment of 204% as compared to 2017^[3]. Another study indicated that by 2050, the prevalence of Alzheimer's disease will increase from 57.4 million to 152.8 million cases^[4].

African studies have been highly limited on the issue of Alzheimer's disease despite the fact that there has been a projection that by 2050, more than 68% of those with dementia will be residing in low and middle-income countries, of which the majority of them reside in Africa, specifically sub-Saharan Africa^[3]. The major risk factors associated with Alzheimer's disease in Africa are low education, hypertension, smoking, and obesity. Growing trends of modifiable risk factors raise the risk of

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increased rates of disease in Africa. Some of the other non-modifiable risk factors include age and genetics^[3].

Alzheimer's disease causes significant cognitive decline and memory loss, which can lead to depression, anxiety, confusion, frustration, and irritability in patients. This can also cause caregivers to experience feelings of helplessness, guilt, and stress from witnessing their loved one's cognitive decline. Also, Alzheimer's disease can be financially draining for both patients and their families due to the cost of medical care, medication, and caregiving services. In many African countries with limited healthcare resources and social security programs, families may bear the brunt of the financial cost alone. A review article, *Dementia in Africa*^[3], indicated that in 2015, the cost for dementia was 6.2 billion USD, of which about 70% was attributed to the cost of the informal sector.

A systematic analysis study done in 2012 indicated that the prevalence of Alzheimer's disease is 2.4%, equivalent to 2.76 million people of the population in Africa, with 2.1 million of them living in sub-Saharan Africa. Other causes of dementia included vascular dementia. Also, the prevalence was highly seen to be within the female gender^[5]. Another study done in Hai, Tanzania, indicated that the prevalence was 3.7%, with other factors carrying its weight in causing dementia, such as vascular dementia^[6]. Still, research is limited in Africa on the best approach to promote the prevention of the disease in Africa.

This paper will highlight the risk factors, diagnosis, and treatment of Alzheimer's disease in Africa. Also, it will address the burden of the disease within the continent.

Risk factors, diagnosis, and treatment of Alzheimer's disease

Alzheimer's disease is associated with many risk factors that are generally categorized into two main categories: either genetic or acquired risk factors (Table 1). Genetic risk factors account for about 70% of all risks, and they can be either early onset, which affects people under 65 years and usually occurs due to *APP*, *PSEN1*, and *PSEN2* gene mutations that take about 4–5%, or late-onset, which affect people with 65 years or older mainly associated with *APOE* gene polymorphism^[7,8].

Acquired risk factors for Alzheimer's can be classified into two categories: those that increase the risk and those that reduce it. The most common risk factors that increase the likelihood of developing Alzheimer's is cerebrovascular disease. These diseases cause changes in the brain that raise the risk of dementia, such as vasculopathy, infarcts (both hemorrhagic and small/large ischemic cortical), and alterations in cerebral white matter. Additionally, comorbidities such as diabetes, hypertension, obesity, dyslipidaemia, and depression also contribute to the acquired risk factors. In particular, type 2 diabetes and hypertension have been found to significantly impact cerebrovascular health, while dyslipidemia, which is associated with high cholesterol levels, primarily affects the blood-brain barrier and increases the risk of Alzheimer's. Lastly, lifestyle factors like marital status (widowhood), stress, inadequate sleep, and smoking also contribute to the acquired risk factors^[7–9]. On the other hand, protective factors for Alzheimer's include cognitive reserve, physical activity, good diet, and vitamin D and estrogen adequate levels^[7,8,10].

The current diagnostic methods for Alzheimer's disease primarily rely on PET scans using tracer molecules. These scans have a specificity of 100% and a sensitivity of 96%, even in milder cases. Another diagnostic approach involves analyzing CSF protein biomarkers, which also have a similar accuracy range of

HIGHLIGHTS

- Alzheimer's affects 2.67 million people in Africa, of which the majority live in sub-Saharan Africa. The prevalence of this disease is expected to rise drastically to approximately 150 million individuals worldwide by 2050, as estimated by the WHO.
- Genetic risk factors account for about 70% of all risks, and they can be either early onset, which affects people under 65 years and usually occurs due to *APP*, *PSEN1*, and *PSEN2* genes mutations that take about 4–5%, or late-onset which affect people with 65 years or older mainly associated with *APOE* gene polymorphism
- The current diagnostic methods for Alzheimer's disease (AD) primarily rely on positron emission tomography (PET) scans using tracer molecules. These scans have a specificity of 100% and a sensitivity of 96%, even in milder cases. Another diagnostic approach involves analyzing cerebrospinal fluid (CSF) protein biomarkers, which also have a similar accuracy range of 85–90%.
- Policymakers, healthcare leaders, patient advocates, and scientific partners must join forces behind comprehensive efforts supporting early detection, compassionate, continuous care, stigma reduction, and research breakthroughs that bend the arc of cognitive crisis toward hope.

85–90%. However, it is advisable to prioritize biomarker testing as it allows for early detection before the onset of symptoms when there are no pathological changes or cognitive impairments yet. One such biomarker is phosphorylated tau 181 (P-tau181), which aids in confirming the diagnosis and determining the prognosis of the disease. Additionally, MRI can be utilized to detect structural and functional changes in the brain^[7,9–12].

Currently, the treatment options for Alzheimer's disease focus on managing neurotransmitter imbalances to alleviate symptoms, as there is no specific curative treatment for the underlying pathology. Three acetylcholinesterase inhibitors – donepezil,

Table 1

Genetic and acquired factors towards Alzheimer's disease.

Acquired factors	Genetic factors
1. Hypertension Hypoperfusion to the brain Ischemia Brain hypoxia Blood-brain barrier breakdown	Amyloid Beta Precursor Protein (APP) gene Encodes precursor protein cleaved to form a number of peptides. Cerebral amyloidosis, Strokes, dysplasia.
2. Obesity Insulin resistance Higher BMI > 30 kg/m ²	Presenilin 1 gene (PSEN1) Makes protein called presenilin Myoclonic jerks, spastic paresis, early behavioral symptoms
3. Hyperlipidemia Neuroinflammation BBB breakdown	Presenilin 2 gene (PSEN2) Mutations in which underlie familial Alzheimer's disease (FAD) Apathy, depression
4. Diabetes mellitus Insulin resistance Hyperglycemia Inflammation Cerebrovascular damage	

rivastigmine, and galantamine – target either cholinergic or glutamatergic neurotransmission to help control these disturbances. Additionally, there is ongoing research into the use of artificial intelligence for cognitive impairment care. Furthermore, investigations are being conducted on anti-amyloid and anti-tau agents, as well as alternative strategies that target misfolded tau proteins and promote neuronal regeneration using immunotherapy and gene therapy approaches. Psychoeducation is also utilized to support individuals with Alzheimer's disease. It is important to note that early diagnosis enables access to treatment options and cost-effective caregiving^[9–11,13].

The fight against Alzheimer's disease in Africa is hindered by major challenges such as inadequate medical facilities, staff shortages, high costs, and stigma. These barriers lead to delayed and imprecise diagnoses with severe consequences. The limited availability of vital data makes it difficult to predict and address public health needs accurately. Furthermore, a severe shortage of sophisticated diagnostic tools like PET scans and CSF protein assays means that detection happens far too late when irreversible neurological damage has already occurred. Due to the lack of attention in the academic world, there are not many psychiatrists or geriatricians who have the necessary skills to distinguish Alzheimer's disease from other similar conditions, such as vascular and Lewy Body dementias. These distinctions hold significant implications for treatment strategies. Furthermore, the limited availability of approved medications for Alzheimer's also poses a challenge, leading to disruptions in therapeutic care for the majority of patients.

There is a dangerous misconception that dementia is just a natural part of aging instead of a serious medical condition. This widespread belief dissuades individuals from reporting symptoms and can even cause them to turn to supernatural explanations instead of seeking proper care. Tragically, these barriers only serve to worsen the already dire prognosis and create additional harm for caregivers. In Africa, where cases of Alzheimer's are rapidly increasing, we must address the underlying issues of unavailability of diagnostics and treatments, limited specialists, financial limitations, cultural stigma, and lack of knowledge. Only by improving affordability, awareness, and accessibility of life-changing diagnosis and support can we begin to solve the urgent crisis of Alzheimer's in Africa^[14].

Addressing the burden of Alzheimer's in Africa

Alzheimer's disease is a multifaceted and devastating condition that not only affects individuals but also has a significant impact on their families and caregivers. To address the burden of Alzheimer's disease in Africa, several key strategies can be implemented to improve diagnosis capacity, increase awareness, provide support for caregivers, emphasize the importance of research, and develop policies to support dementia care.

Firstly, it is crucial to improve the diagnosis capacity in African countries. This involves developing and enhancing healthcare systems to ensure adequate access to diagnosis, treatment, and care for individuals with Alzheimer's disease. This may include establishing specialized facilities, offering targeted training programs for healthcare professionals, and conducting research to enhance understanding of the disease. Secondly, raising awareness through public campaigns plays a vital role in addressing Alzheimer's disease in Africa. These campaigns can help educate communities about the disease, its impact on individuals and

families, and the available resources for patients and caregivers. By challenging the stigma surrounding Alzheimer's disease, these campaigns encourage dialog that breaks down barriers and facilitates access to support services and timely diagnosis^[15]. Finally we should explore alternative, cost-effective diagnostic approaches such as paper-based cognitive tests like the Mini-Mental State Examination, which can be administered by trained healthcare workers to identify cognitive impairment. Additionally, mobile apps and computer-based cognitive tests can provide scalable and accessible ways to screen for cognitive decline, especially in rural or underserved areas.

Moreover, a comprehensive understanding of the socio-economic factors driving Alzheimer's disease inequities in Africa is crucial for developing targeted interventions. Poverty remains a significant barrier, limiting access to healthcare services, proper nutrition, and early diagnosis. Low education levels may contribute to knowledge gaps about the disease, delaying care-seeking and perpetuating stigma. Furthermore, disparities in access to healthcare facilities, particularly in rural regions, exacerbate delays in diagnosis and treatment. Cultural beliefs and practices can also influence health-seeking behaviors, underscoring the need for culturally sensitive approaches. An in-depth examination of these intersecting socioeconomic determinants is warranted to elucidate the root causes of inequities and inform tailored strategies that address the unique challenges faced by underserved communities in the African context.

Additionally, we must prioritize strong support systems for caregivers of Alzheimer's patients, recognizing the immense toll that this progressive illness takes on them physically, emotionally, and financially. Within families, caregivers often sacrifice their well-being, careers, and resources to care for their loved ones as they struggle with the devastating impact of cognitive and behavioral decline. Thankfully, respite services offer temporary relief from the demands of round-the-clock caregiving, providing substitutes for days or weeks at a time. Additionally, counseling services can help address the inevitable stress, grief, and need for coping mechanisms that come with a difficult diagnosis like Alzheimer's.

Furthermore, the ever-increasing prevalence of Alzheimer's disease in Africa calls for immediate action in expanding research efforts to provide tailored solutions to the region. To make accurate projections and target at-risk populations, it is crucial to first conduct comprehensive epidemiological analyses of both incidence and risk factors. Additionally, delving into the genetics and proteomics underlying the manifestation of the disease may reveal vital biological insights and potential therapeutic targets. We must prioritize these areas in order to effectively combat the impact of Alzheimer's disease in Africa. By perfecting tools that allow for timely and affordable diagnoses, we can improve clinical perspectives and interventions.

Africa faces a larger gap when taking research on Alzheimer's disease into account. Major areas such as research towards diagnostic tools, modern required interventions, and modern-based interventions require more support and to be taken into account in the fight against this burden. The WHO Global Plan should be used to develop dementia research globally and to define the research agendas that are required.

Additionally, exploring the potential of traditional medicines and community-based care models may unearth sustainable practices within local communities. One promising strategy is the implementation of community-based screening and diagnosis

programs. In rural India, the Alzheimer's and Related Disorders Society of India has successfully trained community health workers to conduct door-to-door screening and refer potential cases to mobile clinics staffed by specialists^[16]. This decentralized approach has increased early detection and access to care in underserved areas. By collaborating with patients, scientists, providers, and health authorities, we can target tangible breakthroughs in reducing risk, diagnosing, modifying diseases, and providing supportive care that caters to Africa's unique needs and resources. Through international partnerships and funding opportunities, we can propel this research engine forward and alleviate the impact of dementia in the region over the next few decades.

Policy development is a critical element in addressing the burden of Alzheimer's disease. National-level policies should be developed and implemented to support dementia care and management. This may involve enacting regulations concerning medication provisions, caregiver assistance programs, long-term care facilities, and funding for Alzheimer's disease research. However, a significant research gap exists in understanding the most effective policy interventions tailored to the African context. While general frameworks like the World Health Organization's Global Action Plan provide guidance, more region-specific evidence is needed on optimal strategies for resource allocation, health system strengthening, and ensuring equitable access to care.

Despite the challenges posed by insufficient healthcare infrastructure, limited awareness, and scarce resources, some successful programs have been implemented to provide support, care, and resources for those affected by Alzheimer's disease in Africa. Prominent examples include the Global Action Plan on Public Health Response to Dementia adopted for 2017–2025, which focuses on raising awareness, reducing disease risk, and facilitating early diagnosis through research. Another notable initiative is iSupport, a skills and training program that specifically targets people with dementia by providing training and support. Additionally, the Mental Health Gap Action Program aims to scale up services for mental, neurological, and substance use disorders in low-income and middle-income countries^[16]. However, evaluations of these programs' long-term impacts and scalability within the African setting are still lacking.

By implementing evidence-based strategies, building upon successful pilot programs, and investing in implementation research, it is possible to develop robust policies that effectively address the multifaceted burden of Alzheimer's disease in Africa. Cross-sectoral collaborations among policymakers, researchers, healthcare providers, and community stakeholders will be vital to inform context-specific solutions and drive sustainable progress.

Conclusion

The highly alarming prevalence and projected growth trajectory of Alzheimer's disease in Africa and sub-Saharan nations calls for prompt and dedicated attention from regional policymakers, medical professionals, advocacy partners, researchers, and the global health community alike, given the extensive multilevel burdens surfacing. If left unaddressed, the hardships of preventable or delayed diagnosis, fragmented medical management, uninformed caregiving, and complex systemic costs will only broaden from the individual patient to envelop families,

communities, workplaces, and entire national welfare systems in the form of displaced productivity and overextended social support obligations. With the WHO forecasting over 150 million global dementia cases concentrated disproportionately in lower-income regions by 2050, we must urgently enact a proactive, evidence-based policy agenda addressing this worsening trajectory.

Strategic investments to expand diagnosis rates, access to medications, clinical trial participation, caregiver networks, and public understanding alongside innovative workforce expansion can help curb the most devastating and expensive manifestations of uncontrolled Alzheimer's prevalence increases going forward. However, meaningful progress relies on committed regional and international cooperation among stakeholders to forge wise, ethical, and adequately financed solutions to this endemic threat to human dignity for current and future generations of Africans. Policymakers, healthcare leaders, patient advocates, and scientific partners must join forces behind comprehensive efforts supporting early detection, compassionate, continuous care, stigma reduction, and research breakthroughs that bend the arc of cognitive crisis toward hope.

In the USA, the USAgainst Alzheimer's Action, introduced and founded in 2010, has provided relentless advocacy force towards ending Alzheimer's disease while calling for greater urgency from the government and towards policymakers driving effective treatment, prevention, and ultimately, its cure. Similar strategies can be implemented in Africa by providing power to the board in fight towards Alzheimer's disease while joining forces with other various international stakeholders in the fight for the condition in Africa.

The first paragraph establishes the urgency of escalating Alzheimer's disease prevalence in Africa and framing the multi-tiered costs of inaction from the societal down to family/individual levels.

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