Improving the prevention and management of multimorbidity in sub-Saharan Africa

Workshop report

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The Academy of Medical Sciences

ASSAf
ACADEMY OF SCIENCE OF SOUTH AFRICA

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All web references were accessed in August 2019

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Preface

Having two or more long-term conditions at the same time, known as multimorbidity, is a growing challenge globally. This workshop focused on finding out what is known about the extent and nature of multimorbidity and appropriate responses to it, where further research would be valuable and highlighted that addressing multimorbidity in a range of sub-Saharan countries will be heavily dependent on local contextual factors.

On 5–6 September 2019, researchers from across sub-Saharan Africa gathered in Sandton, Johannesburg, South Africa, to discuss the specific challenges in addressing multimorbidity in the region and the role that research could play. In particular, the ways research could improve understanding of multimorbidity in sub-Saharan Africa and identify the most effective ways to prevent and treat it. The meeting was jointly organised by the Academy of Medical Sciences, UK, and the Academy of Science of South Africa.

The meeting programme was developed by a steering committee chaired by Professor Alan Silman FMedSci, University of Oxford, UK, and Professor Karen Hofman MASSAf, University of the Witwatersrand, South Africa, and included researchers from multiple sub-Saharan African countries (Annex One). This report provides a summary of the key themes to emerge from the meeting, as well as a set of high-level multimorbidity research priorities for the region. It reflects the views expressed by participants at the meeting and does not necessarily represent the views of all participants, all members of the steering committee, the Academy of Medical Sciences, or the Academy of Science of South Africa.

Executive summary

Multimorbidity is a growing challenge in sub-Saharan Africa with the growing adoption of westernised lifestyles driving a new non-communicable disease (NCD) epidemic. However, limited data are available on patterns of disease and its full burden across the region. Chronic infectious diseases, particularly HIV/AIDS, tuberculosis and hepatitis, typically make a greater contribution to multimorbidity in sub-Saharan Africa than in high-income countries (HICs), and they therefore tend to affect younger age groups.

Patterns of multimorbidity are also significantly affected by the dual burden of widespread childhood malnutrition – which has long-term impacts on cardiometabolic health – and rising levels of obesity and being overweight as populations are increasingly exposed to obesogenic environments. Increasing life expectancy and high population growth across the region are likely to have a major impact on the burden of multimorbidity in coming decades.

In addition, **outcomes** for people with multimorbidity are generally worse in sub-Saharan Africa than in HICs, reflecting deficiencies in timely diagnosis, access to treatment and management of conditions.

The general public typically has low awareness of multimorbidity, and may erroneously consider chronic conditions to be inevitable consequences of ageing. Conceptions of mental health and mental illness may also be different from those in HICs.

An understanding of multimorbidity in sub-Saharan Africa is hampered by **a lack of or limited data** as well as variability in the types of populations and combinations of conditions studied. Importantly, due to genetic, physiologic or other factors, markers of health conditions may not translate directly from HICs to sub-Saharan African settings.

All these factors illustrate the importance of generating **sub-Saharan Africa-specific evidence** – including data on regional patterns and trends in multimorbidity, drivers of multimorbidity, and effective prevention and treatment interventions and models of integrated health service delivery.

As well as low levels of **research capacity** in multimorbidity in sub-Saharan Africa, research is held back by **organisational silos** in clinical practice, research and also in funding, with some agencies restricting their support to specific individual diseases. These challenges are exacerbated by **insufficient prioritisation** of multimorbidity in sub-Saharan Africa and a lack of health system preparation, due to low political awareness of its importance and a lack of political commitment to address it.

During the meeting, participants identified a draft high-level sub-Saharan Africa-specific **research agenda** (see Box 1), within the framework of the global research priorities developed earlier in the Academy of Medical Sciences' programme of work in multimorbidity. This agenda could provide a strategic framework to guide future research in the region.

Participants also identified cross-cutting factors that could act as **research and translational enablers**, accelerating multimorbidity research and its translation into practice more generally. These included:

- **Research capacity:** Developing the knowledge, skills and infrastructure for multimorbidity research in the region.
- **Partnerships:** Building 'South–South' and 'South–North' networks, including cross-disciplinary and cross-sectoral collaborations.
- **Adding value:** Supplementing existing studies (e.g. cohorts, trials) to address multimorbidity-specific questions.

- **Standardisation:** Adopting a standard definition of multimorbidity and establishing sub-Saharan Africa-specific diagnostic cut-offs and standardised multimorbidity data sets.
- **Political engagement:** Promoting early dialogue with ministries of health to encourage prioritisation of multimorbidity and involvement in projects.
- **Community engagement:** Developing stronger links with communities to promote multimorbidity health literacy, to understand attitudes and behaviours, and to engage communities in co-creation of interventions.

The outputs from this workshop will be taken forward by the participating academies in order to engage with policymakers in this area. This will help to address some of the priority areas highlighted during the workshop.

Box 1: Sub-Saharan Africa multimorbidity research priorities

Research priority 1: Trends and patterns

- Explore opportunities offered by existing cohorts/data sources to generate a clearer picture of local patterns of multimorbidity.
- Delineate multimorbidity patterns in different age groups (e.g. youth, older people).
- Collate information on existing potential sources of multimorbidity data in a standardised form.
- Scope new multimorbidity-specific cohorts/data sources.

Research priority 2: Clusters and burden

- Use simulations/modelling to estimate current and future burdens of multimorbidity.
- Develop novel approaches to determine the full societal/socioeconomic burden of multimorbidity.

Research priority 3: Determinants

- Characterise local/regional variation in established risk factors.
- Identify novel/locally important risk factors.
- Carry out region-specific causality assessments.
- Undertake root cause analyses/behavioural studies.
- Improve understanding of interactions between non-communicable and infectious diseases.
- Explore the impact of under- and over-nutrition and the life-course approach to multimorbidity.
- Analyse the role of the social/policy environment (e.g. food and drink regulation).
- Explore syndemic perspectives on multimorbidity.

Research priority 4: Prevention

- Adapt and evaluate proven preventive interventions.
- Develop and evaluate novel context-specific interventions (including behaviour change communication interventions).
- Explore opportunities for 'secondary' prevention (e.g. after HIV diagnosis).
- Investigate multimorbidity health literacy and social attitudes to multimorbidity and its prevention.
- Develop and evaluate initiatives to promote good 'brain health'.
- Inform the development of and evaluate 'healthy cities' initiatives.
- Promote multidisciplinary approaches, including collaborations with behavioural scientists and health economists.

Research priority 5: Treatment

- Develop and evaluate context-specific treatment interventions (including task-shifting interventions).
- Investigate the impact of polypharmacy, drug-drug interactions, adverse drug reactions.
- Adapt essential research tools from high-income countries (e.g. mental health assessments).
- Promote the use of pragmatic trials and greater use of real-world evidence.

Research priority 6: Healthcare systems

- Promote implementation of evidence-based interventions.
- Carry out cost-effectiveness studies to inform decision-making.
- Evaluate models of integrated health and social care.
- Explore potential for greater engagement with traditional healers and other community-based providers.
- Carry out equity analyses and evaluate innovative approaches for reaching vulnerable and neglected populations.
- Identify effective approaches for policymaker engagement and dissemination of research findings.
- Promote greater use of implementation research.

Introduction

As life expectancy increases, multimorbidity – the simultaneous presence of two or more chronic health conditions – is becoming increasingly common globally. The relationship between the conditions may be by chance, there may be particular risk factors that increase the risk of multiple diseases, or one condition (or its treatment) may predispose a person to another condition. Multimorbidity spans both physical and mental health conditions, this is important because a damaging reciprocal relationship can exist – chronic physical conditions can increase the risk of mental health conditions such as depression and mental health disorders can worsen physical symptoms or promote behaviours that harm physical health.

Notably, economic and social development has led to the widespread adoption of westernised lifestyles and a burgeoning of non-communicable diseases (NCDs) in sub-Saharan Africa – the NCD burden in the region increased by 67% between 1990 and 2017.[1] Moreover, with a high infectious disease burden, greater life expectancy, and a population boom, multimorbidity threatens to be a huge issue for the region in the future.

Multimorbidity represents a challenge to health systems and to research, both of which are typically oriented around individual conditions. Patients may end up seeking care from a range of specialists, and care is not necessarily coordinated or delivered in a patient-centred way.

In 2016, the Academy of Medical Sciences established a working group, led by Professor Stephen MacMahon FMedSci, to develop a clearer global picture of multimorbidity and a research agenda to address it. The working group published a highly influential report in 2018,[2] which included six strategic research priorities (Box 2).

The Academy of Medical Sciences' programme of work in multimorbidity has included further workshops exploring more detailed questions, including multimorbidity in BRICS countries (Brazil, Russia, India, China and South Africa). A workshop held in September 2019, jointly organised by the Academy of Medical Sciences and the Academy of Science of South Africa, provided an opportunity to discuss the specific multimorbidity issues facing sub-Saharan Africa.

The main objectives of the workshop were to review the evidence on the prevention and management of multimorbidity in sub-Saharan Africa, to identify key gaps in knowledge and how they might be filled, and to discuss research initiatives successfully addressing prevention and management.

In breakout groups and plenary sessions, participants discussed key features of multimorbidity in sub-Saharan Africa and identified a range of multimorbidity research priorities for the region, as well as enablers that could advance multimorbidity research more generally.

1. Gouda HN, Charlson F, Sorsdahl K, Ahmadzada S, Ferrari AJ, Erskine H, Leung J, Santamauro D, Lund C, Aminde LN, Mayosi BM, Kengne AP, Harris M, Achoki T, Wiysonge CS, Stein DJ, Whiteford H (2019). *Burden of non-communicable diseases in sub-Saharan Africa, 1990-2017: results from the Global Burden of Disease Study 2017.* Lancet Glob Health **7(10)**:e1375-e1387.
2. Academy of Medical Sciences (2018). *Multimorbidity: A priority for global health research.* https://acmedsci.ac.uk/policy/policyprojects/multimorbidity

Box 2: Global multimorbidity research priorities[1]

Research priority 1:

What are the trends and patterns in multimorbidity?

Research priority 2:

Which multimorbidity clusters cause the greatest burden?

Research priority 3:

What are the determinants of the most common clusters of conditions?

Research priority 4:

What strategies are best able to facilitate the simultaneous or stepwise prevention of chronic conditions that contribute to the most common multimorbidity clusters?

Research priority 5:

What strategies are best able to maximise the benefits and limit the risks of treatment among patients with multimorbidity?

Research priority 6:

How can healthcare systems be better organised to maximise the benefits and limit the risks for patients with multimorbidity?

Multimorbidity in sub-Saharan Africa

Patterns of morbidity in sub-Saharan Africa show several distinct features, which influence the nature of multimorbidity in the region. For example, chronic infections, including HIV, tuberculosis (TB) and hepatitis, are common, and multimorbidity therefore tends to affect proportionately more younger people than in HICs (even after allowing for the younger age structure). Chronic infections can increase the risk or severity of other health conditions, while long-term treatment can also adversely affect aspects of health.

In addition, life expectancy is on the rise in sub-Saharan Africa. Growing numbers of older people, urbanisation, as well as the widespread adoption of westernised lifestyles are significantly increasing the burden of non-communicable diseases (NCDs) in the region. Sub-Saharan Africa now faces the dual, somewhat paradoxical challenges of widespread food insecurity and malnutrition – which can have major long-term consequences for the development and health of children[3] – as well as growing rates of obesity[4] linked to economic development. Demographic changes, particularly high rates of population growth,[5] raise the prospect of substantial increases in the multimorbidity burden in coming decades.

However, the full impact of NCDs and multimorbidity in the region is hard to judge. High-quality data are available from a limited number of cohorts in the region, but may not be generalisable. Data from national demographic and health surveys are not yet widely used to provide information on local patterns or trends in multimorbidity. As a result, much of the data on NCDs and multimorbidity come from a relatively limited number of countries, particularly South Africa.

Nevertheless, available data suggest that multimorbidity is a major issue. Data from the Agincourt cohort in South Africa, for example, reveal that 69.4% of people aged 40 years and above have at least two health conditions.[6] A cross-sectional study of hospital attendees aged 18 and above in Ethiopia found that 18% had more than one chronic health condition,[7] while a community-based cross-sectional study in Burkina Faso found multimorbidity rates of 65% in people aged 60 and above.[8]

Furthermore, patients with multimorbidity typically experience significantly worse **outcomes** in sub-Saharan Africa than in HICs. This reflects a combination of factors, including late diagnosis, limited access to treatment, and poor long-term management of conditions.

These studies also highlight one of the challenges of multimorbidity research – the use of multiple different methods of characterising multimorbidity. Furthermore, there is not necessarily an agreement on the most appropriate diagnostic criteria for certain conditions. In particular, for genetics related reasons, the cut-offs used in HICs to define a disorder or condition may not be appropriate for sub-Saharan African populations. For example, waist circumference predictive of insulin resistance is different for people of European and African heritage.[9]

3. Lelijveld N, Seal A, Wells JC, Kirkby J, Opondo C, Chimwezi E, Bunn J, Bandsma R, Heyderman RS, Nyirenda MJ, Kerac M (2016). *Chronic disease outcomes after severe acute malnutrition in Malawian children (ChroSAM): a cohort study.* Lancet Glob Health **4(9)**:e654–62.
4. World Health Organization (WHO) (2016). *Obesity and overweight.* Geneva: WHO.
5. United Nations. Population. New York: United Nations. Available at www.un.org/en/sections/issues-depth/population/index.html.
6. Chang AY, Gómez-Olivé FX, Payne C, Rohr JK, Manne-Goehler J, Wade AN, Wagner RG, Montana L, Tollman S, Salomon JA (2019). *Chronic multimorbidity among older adults in rural South Africa.* BMJ Glob Health **4(4)**:e001386.
7. Woldesemayat EM, Kassa A, Gari T, Dangisso MH (2018). *Chronic diseases multi-morbidity among adult patients at Hawassa University Comprehensive Specialized Hospital.* BMC Public Health **18(1)**:352.
8. Hien H, Berthé A, Drabo MK, Meda N, Konaté B, Tou F, Badini-Kinda F, Macq J (2014). *Prevalence and patterns of multimorbidity among the elderly in Burkina Faso: cross-sectional study.* Trop Med Int Health **19(11)**:1328–33.
9. Kabakambira JD, Baker RL Jr, Briker SM, Courville AB, Mabundo LS, DuBose CW, Chung ST, Eckel RH, Sumner AE (2018). *Do current guidelines for waist circumference apply to black Africans? Prediction of insulin resistance by waist circumference among Africans living in America.* BMJ Glob Health **3(5)**:e001057.

In general, **healthcare systems** in sub-Saharan Africa are poorly prepared to manage multimorbidity. Many countries have limited health system infrastructure and face chronic shortages of trained healthcare personnel. New healthcare delivery mechanisms have been developed, particularly for HIV, but these often focus only on single conditions and may not be fully integrated into wider health systems. Mental health has also been a relatively neglected aspect of health, although there are signs that this may be beginning to change and its importance to multimorbidity is being recognised.[10]

In addition, **community awareness** of multimorbidity is generally low and chronic conditions such as hypertension and high blood glucose are poorly controlled. Prevention may be being held back by fatalistic attitudes and the perception that health conditions and loss of function are a natural consequence of ageing, rather than deficits that can be delayed or avoided altogether. Perceptions of mental health disorders such as depression also vary according to local culture, and detection of mental health conditions is challenging without culturally sensitive instruments.

These factors emphasise the fundamental importance of **sub-Saharan Africa-specific evidence**. A deeper understanding of local causes and drivers of multimorbidity could be used to underpin the design of tailored preventive strategies. A clearer picture of local patterns and trends in multimorbidity would support prioritisation of efforts. Region-specific evidence is also required for locally applicable approaches to prevention, treatment and health system organisation.

However, **silo working** creates important organisational barriers. Specialist clinical practice is still mostly discipline-specific, with few examples of integrated patient-centric care. Departmental divisions in research are obstacles to the multidisciplinary approaches that multimorbidity demands. Funding agencies may also specify narrowly focused research, or bring their own research agendas that do not necessarily align with national priorities.

These challenges are exacerbated by **insufficient prioritisation** of multimorbidity in sub-Saharan Africa. This spans generally poor health system preparedness for multimorbidity, as well as low political awareness of the importance of multimorbidity and insufficient political commitment to address it.

10. Stein DJ, Benjet C, Gureje O, Lund C, Scott KM, Poznyak V, van Ommeren M (2019). *Integrating mental health with other non-communicable diseases*. BMJ **364**:l295.

Meeting the multimorbidity challenge in sub-Saharan Africa: Research priorities

Research priority 1: Trends and patterns

Explore opportunities offered by existing cohorts/data sources to generate a clearer picture of local patterns of multimorbidity.
Some cohorts have been established for research purposes across sub-Saharan Africa. Although they are unlikely to be fully representative of populations, they provide an opportunity to gather high-quality data on multimorbidity in African settings. However, they are restricted to a limited number of countries and may not necessarily be large enough to provide a detailed picture of multimorbidity.

National health and demographic surveys may also hold valuable data on multimorbidity and allow trends over time to be determined. Electronic health records represent another potential source of information, but these are not yet widely used in the region. Individual countries may also have sources of data, such as enrollees in health insurance schemes, which could shed light on aspects of multimorbidity, although such sources are again not likely to be representative of general populations. In contrast to HICs, there are no national or even regional routine health data capture systems and there is no alternative but to establish cohorts for the research.

Delineate multimorbidity patterns in different age groups (e.g. youth, older people).
The nature of multimorbidity is likely to differ significantly between different age groups. Existing data sources could provide opportunities to shed light on disease burdens at different ages, for example established research cohorts.

Collate information on existing potential sources of multimorbidity data in a standardised form.
Research efforts would benefit from a regional directory describing potential sources of multimorbidity data. A template should be developed to ensure coordinated and systematised descriptions of data sources. These efforts should also draw on existing data-source directories.

Scope new multimorbidity-specific cohorts/data sources.
Cohorts set up specifically to document the full spectrum of morbidities, and potential risk factors, would provide the most relevant data on multimorbidity and its evolution over time. By revealing more about the order in which morbidities develop, longitudinal studies could also shed light on chains of causality. However, creating new cohorts is costly and long-term sustainability is a major challenge. Initial research efforts could focus on the feasibility of establishing new cohorts, or of using routinely collected data, and identifying the key research questions that they would answer.

Research priority 2: Clusters and burden

Use simulations/modelling to estimate current and future burdens of multimorbidity.
In the absence of extensive data, simulations and modelling could be used to provide estimates of the impact of multimorbidity, and how this is likely to change in the future given demographic, developmental and disease trends. Such analyses could inform national decision-making on allocation of resources and organisation of health services.

Develop novel approaches to determine the full societal/socioeconomic burden of multimorbidity.
The impact of multimorbidity on individuals, households and socioeconomic development is poorly understood. More work is needed to identify the critical functional impacts of multimorbidity, and how these translate into social and economic impacts at the household and wider levels. Such data would provide a more accurate picture of the burden of multimorbidity and the benefits of prevention.

Research priority 3: Determinants

Characterise local/regional variation in established risk factors.
Many lifestyle and other risk factors for chronic conditions are well-established. However, it is less clear whether any of them increase the risk of multimorbidity, above and beyond their impact on individual conditions. Data on the prevalence of risk factors in local populations, and their relative importance to multimorbidity, could be used to inform and prioritise preventive interventions.

Identify novel/locally important risk factors.
Populations in sub-Saharan Africa may be exposed to environmental or other risk factors that are rare or absent in HICs (such as smoke from cook stoves, civil conflict, and rheumatic heart disease). Exploratory research could be used to identify these risk factors and their potential contribution to local disease burden.

Carry out region-specific causality assessments.
More extensive longitudinal data on local patterns of disease could support analyses of the order in which conditions develop and the impacts they have on each other, which may not necessarily mirror that seen in HICs. Such analyses could reveal common risk factors and underpin more targeted preventive interventions.

Undertake root cause analyses/behavioural studies.
Social and behavioural studies could explore the pathways through which distal risk factors (such as socioeconomic status) influence proximal social and behavioural risk factors and ultimately health. Such studies could shed light on the attitudes and beliefs that drive lifestyle behaviours which increase the risk of multimorbidity, to underpin targeted behavioural or other interventions.

Improve understanding of interactions between non-communicable and infectious diseases.
Despite much progress having been made, infectious diseases remain prevalent in sub-Saharan Africa. As well as major killers such as HIV/AIDS, TB and malaria, neglected infectious diseases account for a huge burden of disease. There is a need to develop a better understanding of the two-way interactions between infectious and non-infectious causes of disease – how infections increase the risk of NCDs or exacerbate their impact and vice versa. Such understanding could help to improve patient care to reduce the risk of further morbidities or their impact.

Explore the impact of under- and over-nutrition and the life-course approach to multimorbidity.
Sub-Saharan Africa faces the dual challenge of persistent food insecurity and rising levels of being overweight and obesity – often, with a rapid transition between the two. Research is needed on the contributions of each to multimorbidity, and in particular on the long-term consequences of early-life nutritional adversity and maternal under-nutrition.

The life-course perspective could also shed light on the long-term consequences of exposure to risk factors during key stages of life such as adolescence and early adulthood.

Analyse the role of the social/policy environment (e.g. food and drink regulation).
A specific strand of research could focus on the impact of social policies in either increasing or reducing risk exposures and behaviours, and generate evidence to inform policymaking. Research could explore the extent to which permissive policies may create environments that promote unhealthy behaviours. Conversely, countries and local governments have introduced policies that aim to reduce consumption of tobacco, alcohol and unhealthy foodstuffs, and promote healthy lifestyle choices. Evidence of the impact of such initiatives, at national or local levels, could support their wider introduction.

Explore syndemic perspectives on multimorbidity.
The syndemic approach[11,12] emphasises the importance of considering holistically the biological, social and environmental factors that contribute to multiple overlapping epidemics or clusters of disease and disease inequities. Framing of multimorbidity in this context could help to identify common interests across sectors and galvanise action across multiple domains, with wide-ranging benefits on health and wellbeing.

11. Willen SS, Knipper M, Abadía-Barrero CE, Davidovitch N (2017). *Syndemic vulnerability and the right to health.* Lancet **389(10072)**:964–977.

12. Mendenhall E, Kohrt BA, Norris SA, Ndetei D, Prabhakaran D (2017). *Non-communicable disease syndemics: poverty, depression, and diabetes among low-income populations.* Lancet **389(10072)**:951–963.

WoW! WesternCape on Wellness

The WoW! programme is designed to enable people to make healthy lifestyle choices across the life course.

Developed by Western Cape Government and partners, including academic groups, WoW! is an evidence-based, cross-sectoral, comprehensive community-based programme addressing key risk factors for multimorbidity, including diet, inactivity, social isolation and risk behaviours, and spans both individual and social determinants of wellness. It incorporates a continuous improvement framework so that lessons learned can be applied for immediate corrective actions.

An evaluation of the WoW! Phase-1 pilot programme in 2015–17 found that at baseline, more than 80% of participants were overweight or obese, more than 50% had high blood pressure, and less than 25% were meeting physical activity recommendations. Barriers to lifestyle change included a lack of knowledge and resources, lack of time, and an inability to prioritise lifestyle change.

The programme achieved marked improvements in blood pressure at 3 months, and improvements in self-reported healthy eating, physical activity, quality of life and general health status, and significant reductions in waist circumference and in sedentary time at 6 months.

www.westerncape.gov.za/westerncape-on-wellness/

Research priority 4: Prevention

Adapt and evaluate proven preventive interventions.
Multiple preventive interventions have been shown to be effective in reducing the risk of NCDs. However, these may not necessarily be appropriate for particular social contexts, or may not fulfill cost-effectiveness criteria. Research is required to adapt evidence-based interventions and to confirm the efficacy of locally tailored versions that could be scaled within local systems.

Develop and evaluate novel context-specific interventions (including behaviour change communication interventions).
Research into local determinants of multimorbidity could underpin the development and evaluation of novel interventions targeted at locally important risk factors. These could include behaviour change communication/communication for development (C4D) interventions created locally but rooted in a strong theoretical framework.

Explore opportunities for 'secondary' prevention (e.g. after HIV diagnosis).
The diagnosis of a health condition provides an initial contact point with a health system, while the management of chronic conditions is likely to trigger multiple further contacts. These provide opportunities to integrate additional assessments and preventive interventions, focused on the most common co-morbidities.

Investigate multimorbidity health literacy and social attitudes to multimorbidity and its prevention.
Public understanding of multimorbidity and associated risk factors is generally low, and fatalistic attitudes may be an obstacle to the adoption of healthier lifestyles. The design of effective preventive interventions will require a deeper understanding of individual attitudes and social norms, as well as of key enablers of (and barriers to) healthier behaviours.

Develop and evaluate initiatives to promote good 'brain health'.
The importance of good mental health is increasingly recognised; building resilience to adversity and because of its protective effect on physical health. In addition, protection against cognitive decline with age will become more important as life expectancy continues to increase. More research is needed on the key attributes of a 'healthy brain', and on how good brain health can be promoted in sub-Saharan African contexts.

Inform the development of and evaluate 'healthy cities' initiatives.

The world is rapidly urbanising – 68% of the world's population is likely to be living in cities by 2050, with the urban population of Africa projected to almost triple.[13] Rapid urbanisation presents major challenges, driving behavioural changes that increase the risk of NCDs and adding further strain on under-developed health systems. Additional research is needed on how cities can prepare for population growth while promoting good health and wellbeing.

Promote multidisciplinary approaches, including collaborations with behavioural scientists and health economists.
Effective prevention of multimorbidity calls for a multifaceted approach to understand the full range of biological, social, behavioural, environmental and structural drivers of ill-health. The design and evaluation of preventive interventions requires a similarly pluralistic approach. Evaluations should also include health economic analyses in order to inform policymaking and ensure cost-effective use of limited resources.

Research priority 5: Treatment

Develop and evaluate context-specific treatment interventions (including task-shifting interventions).
Multiple proven interventions are available to treat both individual infectious diseases and NCDs. A major challenge is to adapt those most appropriate for low-resource settings, and to design interventions to address multimorbidity which fit local healthcare and cultural contexts. Given healthcare worker shortages, there is great potential to develop and evaluate task-shifting interventions to improve access to care.

Investigate the impact of polypharmacy, drug-drug interactions, adverse drug reactions.
Multimorbidity, including widespread co-existence of infectious diseases and NCDs, leads to frequent use of multiple drug treatments (polypharmacy). Some medications are known to interfere with each other's actions, but there are few data on how they interact, particularly in sub-Saharan African populations.

In addition, while the long-term survival of people living with HIV who are taking antiretroviral drugs (ARVs) has been a positive outcome, the extended periods on ARVs are creating new challenges, due to the long-term effects of both HIV infection and HIV medication.

Promote the use of pragmatic trials and greater use of real-world evidence.

Clinical trials typically focus on single conditions, and their clinical settings may not be typical of routinely used health facilities. Given the diversity of multimorbidity, it is challenging to gather evidence through such approaches. Pragmatic trials, run in situations as close as possible to routine care, have the potential to generate evidence more directly relevant to the treatment of multimorbidity. In addition, data captured in routine care, for example in electronic health records, could also hold important information on the effectiveness of treatments and the risks of adverse events.

13. United Nations Department of Economic and Social Affairs (2019). World Urbanisation Prospects 2018. New York: United Nations. Available at: https://www.un.org/en/development/desa/population/theme/urbanization/index.asp.

Research priority 6: Healthcare systems

Promote implementation of evidence-based interventions.
Evidence has been accumulating on effective interventions for NCDs, including mental health, albeit not necessarily in the context of multimorbidity. However, their implementation in practice is emerging as a key translational bottleneck. The reasons may be manifold, from lack of a policy framework promoting uptake through to practical challenges in the uptake of new ways of working.

Carry out cost-effectiveness studies to inform decision-making.
Financial resources for healthcare are inevitably limited. Health economic analyses can provide quantitative data on the financial impacts of implementing new interventions and ways of working to inform decision-making. Ideally, cost-effectiveness studies should also incorporate the wider social and economic benefits of more effective prevention and the management of multimorbidity, as well as the costs of inaction.

Carry out equity analyses and evaluate innovative approaches for reaching vulnerable and neglected populations.
Health economic analyses provide a rigorous and rational approach for determining the most cost-effective use of health resources. However, in a world of limited resources, utilitarian calculations can disadvantage hard-to-reach or vulnerable populations – who may be at high risk but require targeted strategies. An equity lens can ensure that the needs of such populations are considered in health policymaking.

Evaluate models of integrated health and social care.
The distinction between health and social care is often artificial, and both domains are likely to be critical to effective prevention and management of multimorbidity. In particular, communities will have a vital role to play in supporting individuals and promoting pro-health social norms. Research is needed to develop and evaluate integrated models of health and social care that fit local contexts.

Explore potential for greater engagement with traditional healers and other community-based providers.
In many countries, traditional healers or other informal practitioners are often the first to be consulted by people with health problems. Given their respected status in certain communities, some efforts have been made to engage with the informal health sector, to promote more evidence-based practices and improve linkage to formal healthcare systems. More evidence is needed on how best to build relationships and the effectiveness of such approaches in improving the prevention and management of multimorbidity.

Identify effective approaches for policymaker engagement and dissemination of research findings.
The principal route for the dissemination of research findings is through academic papers. However, policymakers generally do not have sufficient time or expertise to assimilate the research literature, and researchers may not be skilled in presenting findings in ways that are useful to policymakers. More work is needed to identify the most effective approaches for strengthening the relationship between evidence-providers and evidence-users.

Promote greater use of implementation research.
Implementation science[14] is a relatively new area of research focusing on factors impeding or facilitating the introduction of evidence-based innovations into health systems. A body of evidence is building on the most effective ways to plan implementation and to evaluate implementation activities to ensure more successful rollout of new interventions and working practices. A greater focus on implementation research will ensure that proven interventions are delivered effectively to patients and that they improve the performance of health systems.

Research and translational enablers.
Participants also identified a range of factors that could function as **research and translational enablers**, accelerating multimorbidity research and its uptake into practice.

14. Bauer MS, Damschroder L, Hagedorn H, Smith J, Kilbourne AM (2015). *An introduction to implementation science for the non-specialist.* BMC Psychol **3**:32.

Cross-cutting themes

Research capacity.
Sub-Saharan Africa currently has limited capacity to carry out multimorbidity research, including not having sufficient appropriately trained researchers. In part, this reflects more general underdeveloped research capacity in the region, but a tendency towards specialisation in research is also a significant barrier. Efforts are needed to strengthen capacity for multimorbidity research – including the development of people as well as health systems able to host research studies – as part of wider efforts to build research capacity in the region.

Partnerships.
There is potential to build multimorbidity-focused 'communities of practice', through greater 'South-South' and 'South-North' networking. Such partnerships could provide a framework for sharing of information and experience, and underpin international multicentre research collaborations. Ideally, such partnerships need to be broad in scope, including cross-disciplinary and cross-sectoral collaborations. Platforms such as that managed by the Global Health Network (https://tghn.org) could support greater sharing of knowledge and capacity development.

PACK: The Practical Approach to Care Kit

The PACK guide provides primary care health workers with practical guidance on detection and management of multiple long-term conditions.

Primary healthcare facilities in low-resource settings are typically understaffed, have a high workload and rely on workers with minimal levels of training. Increasingly, staff are caring for patients with multiple conditions, yet their training and clinical guidelines are typically oriented around individual conditions.

Developed by the University of Cape Town Knowledge Translation Unit, the PACK guide is an integrated and practical tool for primary healthcare workers to refer to during consultations. It draws evidence from multiple sources for multiple conditions, filtered according to the needs and constraints of low-income settings.

PACK has been evaluated in four pragmatic randomised controlled trials collectively spanning 33,000 patients and 124 clinics. It has been shown to improve clinical outcomes, enhance utilisation of healthcare resources, and boost care worker morale. PACK has been introduced into primary care facilities across South Africa, and it has been adapted for use in Botswana, Nigeria, Ethiopia and Brazil. Its use in other countries is being explored.[15]

https://pack.bmj.com

15. Simelane ML, Georgeu-Pepper D, Ras CJ, Anderson L, Pascoe M, Faris G, Fairall L, Cornick R (2018). *The Practical Approach to Care Kit (PACK) training programme: scaling up and sustaining support for health workers to improve primary care.* BMJ Glob Health **3(Suppl 5)**:e001124.

Adding value.

Creating new infrastructure to manage multimorbidity or to carry out multimorbidity research is highly challenging. A more practical approach is to consider how additional services can be integrated into existing systems. Examples include initiatives focusing on the mental health of people receiving treatment for HIV or diabetes. The Practical Approach to Care Kit (PACK) goes a step further, supporting integrated primary healthcare for multiple chronic conditions (see PACK project box).

Similarly, for research, building on existing research infrastructure could be a cost-effective way to generate new knowledge. Data collection relevant to multimorbidity could be integrated into existing cohort programmes. In addition, multimorbidity-related questions could be addressed by extending or following up participants in existing clinical trials.

Standardisation.

To a degree, multimorbidity research is held back by the lack of an agreed definition of multimorbidity and common tools for assessing it. Adopting a single definition of multimorbidity, such as that proposed by the Academy of Medical Sciences working group,[1] could provide a firm foundation for future research.

Disease definitions and diagnoses are often based on data from populations of European heritage, which are not necessarily directly transferable to sub-Saharan Africa. There is a need to establish sub-Saharan Africa-specific cut-offs to support more regionally appropriate diagnoses for key conditions such as hypertension and insulin resistance/diabetes. Context-sensitive mental health screening tools are also required. As well as translation into local languages, terminology used to describe mental distress or other key aspects of mental health may need to be adapted to suit local contexts. Research is needed to ensure that adapted tools retain their validity and enable meaningful comparisons to be made across populations.

Project MIND

Project MIND is an experimental study comparing two possible ways of integrating mental healthcare into treatment programmes for chronic NCDs.

People with chronic NCDs are at an increased risk of mental health disorders. In addition, there is a reciprocally harmful relationship between the two – mental health issues exacerbate the severity of chronic NCDs and vice versa.

Project MIND is a collaborative research study between the South African Medical Research Council, the University of Cape Town, the University of Oxford, and the Western Cape Department of Health. It is being run as a three-arm randomised controlled trial comparing usual treatment and two forms of counselling – a 'dedicated' model where counselling is provided in groups by outside specialists and a 'designated' model in which a participant is trained to deliver the intervention.

As well as the impacts on NCDs and mental health outcomes, the project will also assess the cost-effectiveness of the two models and explore implications for wider implementation.

Political engagement.

Multimorbidity research is also partially being held back by limited political awareness of its importance and a lack of political commitment. Greater advocacy for multimorbidity may be required, with multimorbidity researchers potentially acting as national and regional 'multimorbidity champions'. More evidence of the current and likely future impact of multimorbidity, including the cost of inaction, could also help to build political commitment.

The development of national plans for universal health coverage could provide an opportunity to strengthen both political commitment and health system preparedness for multimorbidity. Stressing its relevance to the attainment of Sustainable Development Goals[16] could also focus political attention on multimorbidity.

Research into practice.

Engagement with policymakers is essential if evidence is to inform practice. Conventional academic publication routes are not an ideal way to disseminate information to policymakers, who may have limited experience of fields of medicine and little time for in-depth analysis. Equally, researchers may not have the skills to prepare materials in ways that meet policymakers' needs, and often receive no credit for engaging with policymakers or influencing practice. Specialist mediators can play an important role in translating academic outputs into formats that are suitable for policymakers

In most countries in the region, further work is needed to develop policymakers' capacity to use research evidence and researchers' capacity to generate policy-relevant outputs. Research is also needed on the most effective processes and systems to underpin evidence-based policymaking.

In practical terms, it may be helpful to engage with policymakers early in the development of research projects (see the PRIME project box) to ensure that research meets their needs and to encourage wider ownership of a project and its findings.

PRIME: Programme for Improving Mental Health Care

The PRIME programme is an international partnership that is developing, implementing, evaluating and scaling up district-level mental healthcare plans in five low- and middle-income countries (LMICs) – Ethiopia, India, Nepal, South Africa and Uganda.

There is an urgent need to integrate better mental healthcare into primary care to address huge treatment gaps in LMICs. The PRIME programme[17] has been generating evidence on how best to do this, by developing integrated mental healthcare plans, evaluating them in five district sites, and using this learning to inform wider scaling up to 94 facilities.

The programme achieved a significant impact on the detection of mental health conditions, access to treatment, and clinical outcomes, although impacts varied markedly between countries. It demonstrated that mental healthcare plans can be integrated into primary care in low-resource settings, although substantial investment in training, supervision and health system strengthening is required.

www.mhinnovation.net/innovations/prime-programme-improving-mental-health-care

16. Hurst JR, Dickhaus J, Maulik PK, Miranda JJ, Pastakia SD, Soriano JB, Siddharthan T, Vedanthan R; GACD Multi-Morbidity Working Group (2018) *Global Alliance for Chronic Disease researchers' statement on multimorbidity.* Lancet Glob Health **6(12)**:e1270-e1271.
17. Lund C, et al. (2012) *PRIME: A programme to reduce the treatment gap for mental disorders in five low- and middle-income countries.* PLoS Med **9**: e1001359.

Community engagement.
Some communities may have limited understanding of multimorbidity and may adopt a fatalistic approach to long-term conditions, for example believing them to be an inevitable consequence of ageing. Such misconceptions can be obstacles to the adoption of healthier lifestyles and to adherence to medication – conditions such as hypertension, for example, are often poorly controlled in LMICs.

More attention could be given to multimorbidity health literacy – most information materials typically focus on single conditions. More social and behavioural research is needed to understand attitudes and behavioural motivations, to inform the design of preventive interventions. There is also the potential to involve communities in the co-creation of contextually tailored interventions for prevention or treatment, to ensure interventions are locally appropriate and to encourage community ownership.

African-PREDICT

The African-PREDICT programme is a newly launched cohort study characterising the development of hypertension in young black Africans.

Although hypertension is on the decline globally, it is increasing in Africa, with African countries having the world's highest mean blood pressure levels. In South Africa, nearly four in five adults have hypertension.

Black South Africans are at an increased risk of hypertension, potentially for several reasons – lower socioeconomic status, worse access to healthcare and/or pathophysiological factors. However, the relative contribution of these factors, and in particular the impact of pathophysiological factors, is poorly understood.

The African-PREDICT study[18] is collecting a wide range of demographic and behavioural data, as well as biological samples, from around 1,200 people (black and white, men and women) aged 20–30 years. They will undergo fiveyear follow-up assessments to monitor the emergence of hypertension. The study should reveal more about the pathophysiology of early cardiovascular disease and how it differs between people of African and European ancestry. It will also identify key factors associated with the risk of its development, pointing the way to targeted preventive interventions.

http://health-sciences.nwu.ac.za/hart/current-projects

18. Schutte AE, Gona PN, Delles C, Uys AS, Burger A, Mels CM, Kruger R, Smith W, Fourie CM, Botha S, Lammertyn L, van Rooyen JM, Gafane-Matemane LF, Mokwatsi GG, Breet Y, Kruger HS, Zyl TV, Pieters M, Zandberg L, Louw R, Moss SJ, Khumalo IP, Huisman HW (2019) *The African Prospective study on the Early Detection and Identification of Cardiovascular disease and Hypertension (African-PREDICT): Design, recruitment and initial examination.* Eur J Prev Cardiol **26(5)**:458-470.

Conclusion

Sub-Saharan Africa is making significant progress in improving the health of its people. Great strides have been made in combatting infectious disease, enhancing access to antiretrovirals, and in improving maternal and child health. As a result, life expectancy has been improving markedly.

However, the growing adoption of westernised lifestyles is driving a new NCD epidemic. With its high infectious disease burden, people living longer, and a growing population, the region will face a huge challenge from multimorbidity in the near future.

Nevertheless, this may be an opportune moment to highlight the current and future challenges presented by multimorbidity. A global focus on primary healthcare and universal health coverage is encouraging national governments to consider the health needs of their populations and how health systems can be efficiently organised in patient-centric ways. Multimorbidity considerations should therefore be at the heart of initiatives to strengthen health systems.

Multimorbidity research has a crucial role to play not just in providing a clearer picture of regional multimorbidity challenges, but also in identifying the most effective ways to prevent and manage it. The outline research priorities presented here could provide the first step towards defining a regional research agenda to address these emerging challenges.

Annex 1: Steering committee

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- Professor Karen Hofman FAAP, University of the Witwatersrand, South Africa

Members

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- Professor Benson B A Estambale, Jaramogi Oginga Odinga University of Science and Technology, Kenya
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