Developing a communicable and infectious diseases research agenda in South Sudan: A multi-stakeholder prioritisation approach

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ABSTRACT

Introduction: South Sudan faces a considerable health burden, including high rates of communicable, non-communicable, and maternal and child health concerns within a constrained health system and challenging humanitarian context. Our aim was to engage stakeholders to identify major health research gaps, apply the Africa Centres for Disease Control & Prevention (CDC) prioritization tool to rank disease programme areas and the health system based on context-specific criteria, and produce a ranked agenda to inform implementation plans.

Method: A multi-stakeholder, criteria-driven approach was used, adapting the Africa CDC research prioritisation tool. This involved a situational analysis, the identification of potential research questions, the scoring of topics against established criteria such as burden, equity, feasibility, impact, and cost-effectiveness, and a consensus-building workshop. The disease themes and health system components were on high, medium, and low set-scores.

Results: Several high-priority research themes and questions were identified. South Sudan remains heavily burdened by infectious diseases, with malaria a leading cause of morbidity and mortality. The highest probability conditions in this category were Human papillomavirus (HPV), respiratory syncytial virus, and staphylococcal infections. Health System Strengthening emerged as a cross-cutting challenge due to workforce shortages, weak infrastructure, and disease surveillance gaps.

Conclusion: Initiating the health research agenda with a national research plan that identifies lead institutions, potential funding sources, and timelines was considered essential. Investing in health research capacity strengthening and leveraging on stakeholders such as the Africa CDC is a call to action. Institutionalising and harmonising priority-setting mechanisms through a national health research prioritisation technical committee to ensure ongoing responsiveness to health threats and shocks was also realised as important.

Keywords: communicable, research agenda, Africa CDC prioritisation tool, South Sudan

Introduction

An effective health research agenda is fundamental for aligning research investments with national health priorities, particularly in developing and fragile contexts such as South Sudan. Research prioritisation informs the allocation of resources to health needs, supports the generation of appropriate evidence, and facilitates strategic coordination among stakeholders.[1] South Sudan faces acute and chronic burdens of communicable and non-communicable diseases. This report documents the process, prioritised health research themes and questions, and indicates the next priority steps in South Sudan, adapting, applying, and contextualising the Africa CDC research prioritisation tool.[2]

South Sudan faces numerous health system challenges: high maternal and newborn mortality, a scarcity of skilled health workers, disease outbreaks - for instance, cholera, Hepatitis E, and Mpox. There are only 7.6 skilled health workers per 10,000 population, when the minimum for universal health coverage (UHC) is 44 per 10,000 persons.[3] Priorities to achieve UHC include strengthening health security, improving population well-being, and reinforcing health information systems.[4]

These essential pillars necessitate targeted research to inform decision-making and interventions. Priority-setting processes are heavily influenced by external donor-driven agendas. Power asymmetries between donors and national health governance exist, affecting how priorities were set within the Health Pooled Fund (HPF models 1, 2, & 3) service-delivery contract framework, as well as the Health Sector Transformation Project (HSTP), a multi-donor funded project.[5]

Health financing and implementation gaps persist due to weak priority-setting mechanisms and governance.[6] A structured activity to prioritise health research in South Sudan is critical to ensure alignment of research with national priorities. The principal objectives were to engage key stakeholders to identify major health research priorities and apply and contextualise the Africa CDC prioritisation tool to rank research topics according to context-specific criteria, produce a ranked health research agenda that inform national research funding, partnerships, and implementation plans.

Method

The stakeholders from the Ministry of Health (MoH), academia, partners' agencies, national research institutions, civil society organisations and researchers, and health service delivery partners were brought together for a consultative workshop held 1-5 September 2025 in Juba, with 35 invited, 53 attended. Multidisciplinary experts from biomedical, public health, laboratory, epidemiology, biostatisticians, monitoring and evaluation, ethics and clinical fields to (a) review health systems and research needs in South Sudan; (b) apply clear and agreed criteria to prioritise research themes and questions; (c) agree on a ranked list of priority research topics; and (d) propose mechanisms for follow-up, including funding coordination, capacity-building, and knowledge translation. This aligns with the Africa CDC's emphasis on inclusive, multi-stakeholder consultative approaches.[7]

The Africa CDC Research prioritisation tool was adapted, with a framework developed from a discrete choice experiment, a conditional utility model, and weighted criteria to guide our research agenda. The tool was used to conduct a situational analysis of the research landscape and burden of disease; identify candidate research questions; apply layout criteria and a weighted scoring and ranking scheme for themes; and validate and build consensus.[7] Stakeholders were consulted, and invitations extended to MoH technical staff, implementing partners, academia, and researchers. A desk analysis was made of strategic documents and previous research to identify gaps and weaknesses. The participants agreed on prioritisation criteria and contextualized the Africa CDC research prioritisation tool.

Each proposed research topic was scored and ranked against the criteria. Topics were ranked by aggregate probability scores, then discussed to reach consensus. During the workshop, participants reviewed existing national health indicators, national databased (DHIS2), recent studies, and stakeholder inputs to develop a long list of potential research questions within thematic domains such as communicable diseases, eye defects, fungal infections, injuries, maternal and child health, mental health, neglected tropical, non-communicable, and zoonotic diseases. The list was then scored according to agreed-upon weighting and criteria, using disease thematic groups to score them, and a plenary session was convened to build consensus. Finally, the results were consolidated into a priority ranking.

A plenary session reviewed the ranked list, presented by each thematic area team lead, and proposed mechanisms for monitoring and translating research outputs into policy and practice. The invited health sector stakeholders endorsed the plan for coordinating research

implementation, capacity building for local researchers, and mechanisms for dissemination and uptake. An agreement was reached to consolidate the research priority framework, aligning short-term (1-2 years) and medium-term (3-5 years) research initiatives with the national health strategic plan. The Africa CDC prioritisation tool is not publicly available; its details can be found on their websites and in recent communications.

Results

Prioritised research themes and questions

Infectious diseases and outbreak preparedness are important pillars for global health security. Repeated outbreaks expose the vulnerability of public health systems and the need for investment in disease surveillance, prevention, and rapid-response mechanisms. Integrating infectious disease management within the broader health-security framework emphasizes not only biomedical interventions but also governance, coordination, partnerships, and resilience-building. Hence, epidemic preparedness is a key component of international health policy and regulation, demonstrating that the control and threats of infectious conditions are a scientific and strategic imperative for safeguarding population health.

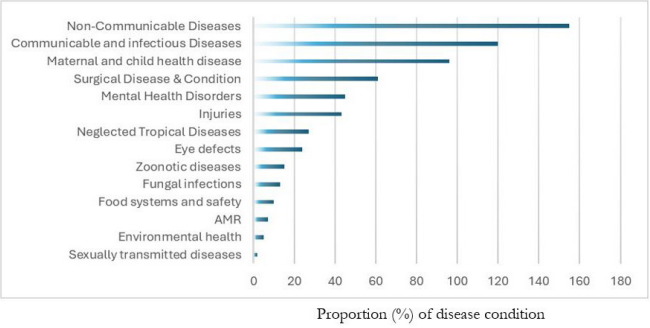

Figure 1. Situational context in Continental Africa: Diseases by thematic area

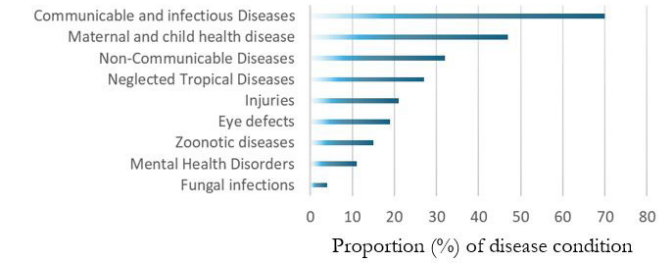

Figure 2. Situational context in South Sudan: Diseases by thematic area

Context in Continental Africa

Figure 1 shows Communicable and Infectious Diseases (CID) 120 and emphasises that, in Africa, infectious disease outbreaks remain substantial. For example, from July 2021 to June 2022, 112 of 130 acute infectious disease conditions reported in Africa were infectious disease outbreaks. The non-communicable disease (NCD) burden is rising, and so a "double burden" of infectious and non-infectious conditions demands attention.

Context in South Sudan

Health research in South Sudan is limited by low capacity and the translation of evidence into policy and practice. Many member states still under-invest in research.

The disease burden is complex, reflecting longstanding communicable and maternal/child health challenges, emerging non-communicable, zoonotic, injury, ocular, and mental-health conditions. Figure 2 provides the thematic breakdown of disease burden by proportion, starting from communicable and infectious diseases (70%), maternal and child health (47%), non-communicable (32%), neglected tropical diseases (27%), injuries (21%), eye defects (19%), zoonotic diseases (15%), mental health disorders (11%), and fungal infections (4).

Infectious diseases are a heavy burden in South Sudan. Malaria is a leading cause of morbidity and mortality. In 2021, it was estimated at ~3 million cases (incidence ~280 per 1,000) with ~7,344 deaths. In addition, there is a high incidence of HIV/AIDS, lower respiratory infections and diarrhoeal diseases. Thus, the figure "70" in Figure 2 shows the dominance of infectious-diseases. The latter is exacerbated by humanitarian crises, displacement, weak infrastructure, and outbreak risk.

The maternal, neonatal, and child health theme is an area of concern. The link between infections, poor immunisation coverage, malnutrition and maternal/child outcomes is clear in South Sudan. Poor vaccination coverage and disruption of services are major public health issues. The figure "47" in the Figure 2 reflects these matters.

NCDs are increasingly recognised in South Sudan, accounting for 28% of deaths in 2019. The probability of premature death from NCDs for ages 30-70 years was ~20% in 2020, higher than the sub-Saharan African average of ~13.7%. The figure "32" in Figure 2 signals the growing relevance of NCDs. There is limited surveillance of NCDs with low diagnostic capacity, shortages of essential medicines, and health information systems that focus on acute infections and maternal and child conditions. Thus,

while the number ("32") appears lower than infectious burdens, the impact of NCDs is under-estimated.

South Sudan has a challenging problem of neglected tropical diseases (NTDs). "It is endemic for all five NTDs amenable to preventive chemotherapy through mass drug administration (MDA) in 2021, reached 91% of the 6.6 million people targeted for treatment."[8] Number "27" in Figure 2 highlights the impact of NTDs.

In a country with decades of conflict and instability, injuries are a notable burden ("21" in Figure 2). Data on national injuries are sparse and represent a key area for public-health programming.

Ocular disorders receive poor attention in national health statistics but are considerable for disability-adjusted life years (DALYs). In South Sudan, eye defects are recognised as a substantial thematic area (see "19" in Figure 2). The broader disease burden, including sensory impairments and congenital anomalies, is important for integrated primary care and rehabilitative service planning.

Zoonotic diseases are an under-resourced area, given the livestock-based livelihoods, displacement, and outbreak risk. Figure "15" (Figure 2) indicates that zoonotic diseases require serious attention.

Although the number "11" (Figure 2) is relatively low, and probably an underestimation, mental health disorders are serious in the context of chronic and acute conflict, trauma, and limited-service availability. Specialised mental-health clinics are rare, aggravating the unmet need.

Fungal infections are frequently overlooked, particularly in settings like South Sudan. Figure "4" in Figure 2 is likely another underestimate, bearing in mind immunosuppression, malnutrition, and poor hygiene that predispose to fungal infections.

The coexistence of major communicable disease burden ("70") with an increasing NCD burden ("32") reflects the "double burden" of disease in low-income, fragile settings. The health system must adapt to address these changing circumstances.

Many thematic categories are under-reported. Health-information systems focus on infectious, maternal, and reproductive health, with chronic conditions under-recognised and underestimated and lack integration in healthcare provision.

The "neglected" categories (NTDs "27", eye defects "19", zoonoses"15", fungal infections "4") need a cross-cutting approach such as "One-Health" (a multi-professional body addressing zoonotic diseases). In this context improvement in cost-effective laboratory capacity is crucial.

In the South Sudan context, preventable infectious and

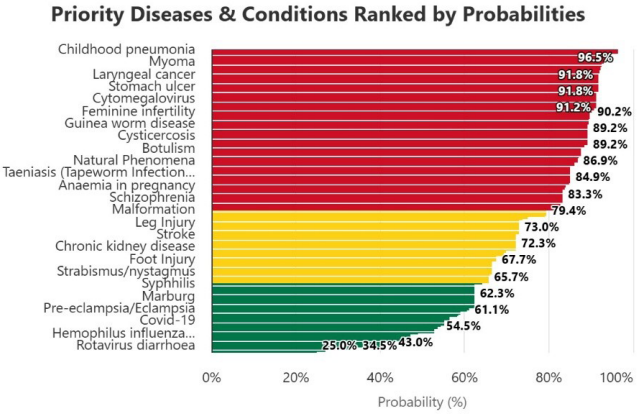

Figure 3. Diseases and health conditions in South Sudan context

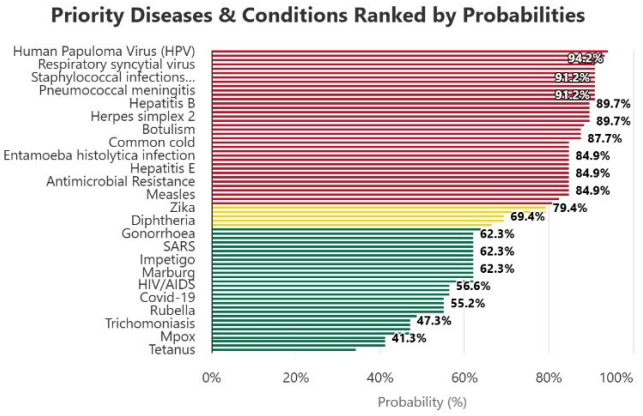

Figure 4. Priority communicable and infectious diseases

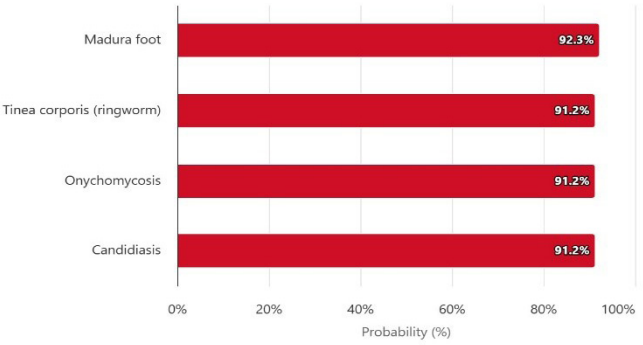

Figure 5. Priority fungal infectious diseases & conditions

maternal–child conditions, particularly pneumonia, diarrhoeal disease, vaccine-preventable bacterial infections, and the combination of malnutrition and maternal complications, represent the highest health threats in 2020-2025(EWARS/DHIS2 report). These threats are compounded by NTDs and episodic viral haemorrhagic disease risks, all amplified by conflict, displacement, food insecurity and weak health systems.

Pneumonia causes more under-5-year-old deaths than any other disease. High malnutrition and low vaccine coverage are serious issues in South Sudan. In addition, there is a high maternal mortality and low service coverage. Hypertensive disorders in pregnancy contribute substantially to maternal deaths. Addressing maternal health and nutrition is central to reducing maternal and child mortality.

Conditions such as cysticercosis and occasional human cases of dracunculiasis place NTD control on the priority list. A small number of human guinea-worm cases were documented in the early 2020s. The emergence of viral haemorrhagic fevers highlights ongoing outbreak risk and the need for cross-border preparedness.

Priority research questions

Communicable and infectious diseases (CID)

The bar chart presents a comparative analysis of various diseases and conditions according to their associated probabilities, expressed as percentages (Figure 4). The probabilities range from 41.3% to 94.2%, with the diseases grouped by colour to indicate relative priority or likelihood.

At the highest probability level (red), Human papillomavirus (HPV) ranks first with 94.2%, followed by Respiratory syncytial virus and Staphylococcal infections, both at 91.2%. Other diseases include pneumococcal meningitis, Hepatitis B, Herpes simplex 2, and botulism, all exceeding 84%.

The intermediate probability group (yellow) includes measles (79.4%), Zika (69.4%), and diphtheria, reflecting moderate probability/priority. The lower probability group (green), e includes diseases such as gonorrhoea, SARS, and impetigo (each at 62.3%), as well as Marburg (56.6%), HIV/AIDS (55.2%), rubella (47.3%), trichomoniasis (41.3%), Mpox, and tetanus.

Figure 5 presents four distinct medical conditions with similar probability percentages: Madura foot, *Tinea corporis* (ringworm), onychomycosis, and candidiasis.

Discussion

Broad and specific strategic research questions for CIDs

What is known about the distribution and determinants of communicable and infectious diseases in South Sudan?

The detailed, specific strategic research questions for different thematic areas are found in the health/diseases research prioritization agenda for 2025-2030. These research questions are categorized as short-, medium-, and long-term. The short-term questions include, but are not limited to, the following: (1) What are the structural and systemic factors influencing South Sudan's emergency preparedness and response capacity at national and subnational levels? (2) How do governance, financing, and coordination mechanisms influence the effectiveness of South Sudan's emergency health preparedness system? (3) What lessons can be drawn from South Sudan's responses to past public health emergencies (e.g., cholera, Ebola alerts, yellow fever, Mpox, Hepatitis-E virus, COVID-19) to strengthen resilience against future outbreaks? (4) How do humanitarian crises, displacement, and conflict dynamics shape emergency preparedness planning and implementation in South Sudan? For medium and long-term strategic research questions, four are selected, with two questions from each category. For example: (5) What are the cost-effectiveness outcomes of universal Hepatitis B vaccination programmes in South Sudan? (6) How does climate change influence the seasonal distribution of typhoid outbreaks? (7) What are the barriers to effective implementation of oral cholera vaccines in high-risk populations? (8) What is the role of antimicrobial resistance in the management of cholera cases?

Reflections on the prioritisation process

Through engaging stakeholders, broad participation ensured that multiple perspectives and opinions informed the agenda. However, some sub-national groups were under-represented. Feasibility and sustainability were prominent concerns. Participants emphasised that research should be adaptable to changing circumstances. It is acknowledged that donor funding and technical capacity drive research priorities.[5] The process uses explicit criteria and ranking as well as resources from Africa CDC, but the country's sustainability and ownership remained a challenge.

Aligning research priorities with national health policy and the health sector strategic plan ensures relevance.[4]

A recurrent theme was investment in national research capacity, data systems, and institutional infrastructure. The exercise confirms the applicability of the Africa CDC prioritisation approach in a developing context. The multi-stakeholder and criteria-driven process lends transparency to the setting of research priorities. Translating prioritized research into policy and practice requires institutional linkages, which should be deliberately constructed. A similar approach used in developing newborn and child health guidelines in African countries highlighted the importance of context-specific stakeholder engagement and consensus processes.[9]

Conclusion

The prioritisation activity represents a meaningful step toward systematically aligning health research with national health priorities in South Sudan. Hence, engaging diverse stakeholders, applying transparent criteria, and producing a ranked research agenda linked to policy documents, the groundwork has been laid for more strategic research investment. Nonetheless, the success of the agenda depends on sustained governance, capacity investment, funding alignment and translation of research into actionable health policies and programmes.

Recommendations

Operationalise the prioritized health research agenda by developing a national research plan identifying lead institutions, funding sources, timelines and responsible parties for each high-priority topic.

Invest in research capacity strengthened by leveraging relevant stakeholders, such as the Africa CDC's capacity-mapping initiatives, to build infrastructure, train researchers, strengthen ethical/regulatory frameworks, and embed research within service delivery.

Institutionalise priority-setting mechanisms by establishing a standing national research prioritisation committee that uses the Africa CDC tool to review and update across cycles, ensuring responsiveness to emerging health threats.

Strengthen translation of research into policy by creating pathways for uptake of research findings by the MoH and partner agencies, including policy briefs, knowledge-translation workshops, and institutional linkages.

Monitor and evaluate the impact of prioritised research by developing indicators to track funding flows, research outputs, policy uptake, and health outcomes tied to each priority topic.

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