Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Tuberculosis, HIV/AIDS and Malaria Health Services in sub-Saharan Africa – A Situation Analysis of the Disruptions and Impact of the COVID-19 Pandemic☆

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ABSTRACT

Background: The unprecedented and ongoing COVID-19 pandemic has exposed weaknesses in African countries' health systems. The impact of shifted focus on COVID-19 for the past 2 years on routine health services, especially those for the epidemics of Tuberculosis, HIV/AIDS and Malaria, have been dramatic in both quantity and quality.

Methods: In this article, we reflect on the COVID-19 related disruptions on the Tuberculosis, HIV/AIDS and Malaria routine health services across Africa.

Results: The COVID-19 pandemic resulted in disruptions of routine health services and diversion of already limited available resources in sub-Saharan Africa. As a result, disease programs like TB, malaria and HIV have recorded gaps in prevention and treatment with the prospects of reversing gains made towards

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meeting global targets. The extent of the disruption is yet to be fully quantified at country level as most data available is from modelling estimates before and during the pandemic.

Conclusions: Accurate country-level data is required to convince donors and governments to invest more into revamping these health services and help prepare for managing future pandemics without disruption of routine services. Increasing government expenditure on health is a critical part of Africa's economic policy. Strengthening health systems at various levels to overcome the negative impacts of COVID-19, and preparing for future epidemics will require strong visionary political leadership. Innovations in service delivery and technological adaptations are required as countries aim to limit disruptions to routine services.

Introduction

The ongoing unprecedented and devastating COVID-19 pandemic continues to claim lives, disrupt and divert resources from health systems and have a negative impact on the mental and physical health of peoples across the world. As of 7th February 2022, COVID-19 accounted for 396,254,535 cases and 5,759, 785 deaths globally, with Africa reporting 11,196,707 cases and 241,826 deaths (Worldometers, 2022). Since the beginning of the COVID-19 pandemic two years ago, African countries had to divert resources from other competing priorities to tackle this new WHO declared global public health emergency of international concern (WHO, 2020a; Ivers and Walton, 2020). The COVID-19 pandemic has also exposed weaknesses in health systems such as inadequate infrastructure, low numbers of health care workers, inadequate community engagement and gaps in health system leadership (Chapman and Veras-Estévez, 2021). Routine health services in Africa, especially those for other killer infectious diseases such as Tuberculosis (TB), HIV/AIDS and Malaria, were affected greatly, resulting in slowing progress in achieving control programs targets (Ivers and Walton, 2020). In this article, we reflect on some of the COVID-19 related disruptions on TB, HIV/AIDS and Malaria routine health services in Africa, and on gaps in health systems and lessons learnt.

Tuberculosis

The pandemic response measures such as lockdowns reduced access to key health services like TB diagnosis and treatment. Globally, COVID-19 led to a 29 % decline in the TB detection rates in 2020 (The Global Fund, 2021a). Reductions in sputum samples received for TB diagnosis were in part due to people shunning health facilities and health workers prioritised COVID-19 over other conditions (Afum et al, 2021; Alene et al, 2020). Country level declines for TB notifications ranged from 41% in South Africa to 25% in India, highlighting major disruptions in high TB burden countries (McQuaid et al, 2021). The African region has 17 countries, which have the highest burden of TB. New TB diagnosis notifications and screening programs declined in part due to a reduction in numbers of health workers, limited access to facilities, and data reporting lapses thus affecting treatment access. The World Health Organisation (WHO) states that in 2020, of the 10 million people who developed TB, only 5.8 million cases were detected globally, leaving 4.2 million undetected and a pool for further transmission in communities (WHO, 2021a). These cases of undetected TB will no doubt continue to rise in the near future. Furthermore, the number of people dying from TB increased both among HIV negative (from 1.2 Million in 2019 to 1.3 Million in 2020) and among HIV positive (from 209,000 in 2019 to 214,000 in 2020) individuals (WHO, 2021a). The underlying determinants of TB are poverty, undernutrition and stress and numbers of TB cases will rise further in Africa while untreated TB could kill more than half of those with disease (Tiemersma et al, 2011). Additionally, TB/COVID-19 coinfection appears to triple mortality compared with TB mono infection (Tamuzi et al, 2020; Kouapaei et al, 2021). The poor and malnourished are likely to have undiagnosed TB because of health services disruptions and stigma due to COVID-19, this has further led to an increase in TB incidence and mortality which is disproportionately higher among the low-income communities (Saunders and Evans, 2020). However, how many African countries have data on TB and COVID-19 infection? Larger cross-continental studies are required to define accurately the trends of undiagnosed and new TB cases, MDR-/XDR-TB and impact of TB/COVID-19 co-infections on management outcomes. Associated risk factors for mortality also need to be defined (Matos et al, 2021). The disruptions to pharmaceutical supply chains and national TB programs require urgent attention (Inzaule et al, 2021).

HIV/AIDS

According to Global Fund, the world recorded a 41% reduction in HIV testing, 37% decline in referrals for diagnosis and treatment in 2020 versus 2019 (The Global Fund, 2021a). Modelling estimates by Jewell and colleagues (2020) showed that disruptions in the supply of antiretroviral drugs (ART) would lead to negative impacts on HIV/AIDS trends. Disruptions in the supply of condoms among 50% of the population were projected to increase new infections by 1.19 times, general disruption to services would lead to a 1.06-fold increase in HIV deaths (Jewell, 2020). Information from simulation models also predicted an additional 0.002 -0.15 COVID-19 deaths per 10,000 clients if HIV services were maintained while averting 19-146 HIV deaths per 10,000 clients, showing that it was beneficial to continue HIV services (Stover et al, 2021). COVID-19 has resulted in disruptions of services both for those needing ART and for prevention activities (Holtzman et al, 2022). However, in South Africa, the impact of the 2020 national COVID-19 lockdown on HIV testing and treatment in KwaZulu-Natal, where 1•7 million people are living with HIV, showed that ART treatment provision was generally maintained during the lockdown, but HIV testing and ART initiations were heavily impacted (Dorward et al, 2021). The lessons learned from maintenance of ART provision which can be extended to other areas of service delivery include prioritising essential health services at all times, integrated health service delivery, multi-month prescriptions for chronic medications and ongoing sensitisation of patients and care givers. National HIV programs in collaboration with WHO and local non-governmental organization need to make pivotal health system changes to help maintain essential health services, including expanding testing and

treatment initiation during ongoing COVID 19 surges in low- and middle-income countries.

Malaria

The World Health Organisation (WHO) estimated that 241 million malaria cases and 627,000 malaria deaths occurred globally in 2020, an increase of 14 million cases and 69,000 deaths compared to 2019, with 47,000 deaths specifically due to COVID-19 related disruptions of malaria prevention, diagnosis, and treatment services (WHO, 2021b). In the African region, death increased by 12% between 2019 and 2020 (WHO, 2021b). Models project a grim picture for Africa, and anticipate that the 2021 situation may not be any better (WHO, 2021b; Weiss et al, 2021). While the scale up of Artemisinin-based combination therapy (ACTs) and Rapid Diagnostic Tests (RDTs) improved testing and treatment for malaria, the emergence of pyrethroid resistance stagnated malaria prevention efforts leading to WHO recommending use of nets containing the synergist piperonyl butoxide PBO nets (Churcher et al, 2016; Lindsay et al, 2021). Additionally, climate change factors and mobility are expected to re-introduce malaria to areas known to be malaria free (Cella et al, 2019). Late health seeking due to distance to health facilities impedes early access to appropriate treatment (Bannister-Tyrrell et al, 2017). Thus, the stagnation in malaria indicators requires further exploration (Lindsay et al 2021). The COVID-19 pandemic started while progress in malaria control and elimination had plateaued. COVID-19 exacerbated a trend that began about 2015, with improvements in other regions, but progress against malaria stalled in Africa where the malaria incidence is off track by 40% for cases and 42% for mortality rate (WHO, 2021b). The biggest increases in burden caused by disruptions due to COVID-19 occurred in the moderate and high malaria transmission countries in Africa.

Worst-case scenarios projected that the COVID-19-related disruptions to malaria control in Africa could double malaria deaths from 2020 and much more thereafter (Weiss et al, 2021). It has also been shown that even moderate service disruption to malaria services (diagnosis, treatment bed-nets distributions, chemo-prevention for pregnant women and children living in sahelian areas) may have dramatic consequences (WHO, 2021b). For countries in Africa, there are cross-country variations in the COVID-19 related impact. For example, Uganda reported a slight decline in patients tested for malaria because of disruptions in the global supply chain while the case load remained similar to pre-COVID times (Namuganga et al, 2021). In Zimbabwe, however, both malaria cases and deaths increased when comparing 2019 and 2020 using data from all public and private health facilities (Gavi et al, 2021). However, the data sources were different making it difficult for cross country comparisons. Countries need to take on the challenge of tailoring the response to infectious diseases using locally generated data to be on course to attain the 2030 global malaria targets (WHO, 2021b). The need for more resources is key as some of the reported reduction in funding levels was due to diversion of local and external resources to respond to the COVID-19 pandemic. Malaria service disruptions in the early days of the pandemic, though moderate, were anticipated to cause more deaths (WHO, 2020b).

Re-invigorating Health Systems Disruptions by COVID-19

COVID-19 has resulted in variable disruptions on health systems, social services, and economic activity (UNSDG, 2020) [Table 1]. Furthermore, global disruptions to the supply chains affected the availability of essential medicines and supplies amidst a limping global health system (Amimo et al, 2021). Disruptions in sub-Saharan Africa are expected to be disproportionately higher than other world regions due to relatively weak health service infrastructures, low clinician to population ratio, limited laboratory capacity, and a higher burden of other infectious diseases (El-Sadr and Justman, 2020). With the advent of COVID-19 however, even the available equipment and staff were repurposed as countries had to respond to the pandemic (Nyaruhirira et al. 2022, Ivers and Walton, 2020). As a result, outpatient consultations declined, childhood immunisations were disrupted, infectious disease programs limped, and the global burden and mortality estimates for both COVID-19 and other conditions have continued to soar (Shapira et al, 2021; Holtzman et al, 2022). Mathematical models predicted higher mortalities in high TB burden countries with major disruptions to provision of antiretroviral treatment (Hogan et al, 2020). Model projections showed that assuming a 75% disruption in malaria control interventions could lead to reduced testing rates and consequently declined numbers of those on treatment (Weiss et al, 2021). Weaknesses in the quality and scope of pediatric and critical care services in Africa have resulted in a high in-hospital mortality (8.3%) among African children with COVID-19, contrasting with about 1% in high-income countries (1%) (Nachega et al, 2022). The COVID-19 pandemic will continue to negatively affect the HIV, TB and Malaria Control Programs until such a time that the pandemic is contained (Holtzman et al 2022; Weiss et al 2021). The Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) has indicated that COVID-19 will likely reverse decades of progress made in mitigating the impact of TB, HIV and Malaria (The Global Fund, 2021b). Further research is required to establish the impact of COVID-19 preventive measures on infectious disease transmission patterns in Africa and beyond.

The COVID-19 pandemic associated economic recession has negatively affected each individual household through reduction of income and rise in unemployment rates (Gondwe, 2020). Underscoring the need for countries to strengthen social security systems as part of safeguarding the well-being of citizens. Unfortunately, at macroeconomic level, most African countries had to divert resources from essential services and acquired more debt in order respond to the COVID-19 fight, coupled with a shrinking fiscal space due to slowed economic activities, there are limited options to finance an ever growing health and social security need (Gondwe, 2020; Holtzman et al, 2022). Global solidarity is thus required to enable sustainable, rights-based approach to investments for the fight against TB, HIV and Malaria, amidst health security threats.

Given the foregoing COVID-19 pandemic, policy makers should align their plans in such a manner as to ensure that additional resource allocation and investment go into health system strengthening. Cross-country studies are required to generate granular country level surveillance data as well as on comorbidities, outcomes and costing to guide current and future COVID-19 related investments. National and international funding agencies should prioritise activities that will provide epidemiological, molecular diagnostics and surveillance programs to strengthen the countries early warning systems. Frontline health workers should utilise the point of care tests to guide their clinical management decision-making to optimise appropriate COVID-19 care. The inequities in COVID-19 vaccine rollout has taught the world that urgent investment in vaccine manufacturing hubs in Africa must be a priority and expanded to prepare for the current and future pandemics (Inzaule et al, 2021; Loembé and Nkengasong, 2021; Nachega et al 2021). When it appeared that the COVID-19 was somewhat contained, the 'leaving behind' of those needing routine services has regressed progress made and it is anticipated that countries will have to innovate and collaborate more to get back on track.

Therefore, innovations, collaborations, human rights, and science are critical now more than ever. Improvements in domestic and external investments are required to ensure uninterrupted

Table 1
Selected COVID-19 impacts, actual and projections.

Issue	COVID-19 related impact	Projections for 2021/2022
Tuberculosis -global (WHO, 2021a)	• >100,000 TB deaths among HIV negative (+100000) and HIV positive (+5000)	
Malaria - global (WHO, 2021b)	• 14 million more cases in 2020 compared to 2019 • 69,000 more deaths; 47 000/69,000 malaria were linked to disruptions in the provision of malaria prevention, diagnosis and treatment during the pandemic.	
HIV/AIDS – Model estimates (Jewell et al, 2020)	• Assuming disruption for 50% of the population over a 1 year period: ◦ 1•06 times increase in HIV-related deaths; ◦ 1•19 times increase in new HIV infections	
Financing/resources – Foreign and domestic	• Diverted and redirected to COVID-19 response	
Economic performance – Africa (Gondwe, 2020 https://unctad.org/system/files/official-document/aldcmisc2020d3_en.pdf)	• Overall 1.4% decline in GDP ◦ Smaller economies facing contraction of up to 7.8%	
Health services utilisation -Africa (Tessema et al, 2021)	• Reduced service utilisation • Repurposing of services and facilities	
Health service disruptions – Selected African countries (Shapira et al, 2021)	• >= 1 month, OPD 10-25% decline, • Variations in patterns of service disruptions across countries	

access to a wide range of services for all (WHO, 2020b). Innovations are also key in-service delivery including use of technological approaches to improve data or information flow, deliver essential medical supplies, e-learning, disease surveillance and supportive supervision (Maharana et al, 2021). As an example, the novel RTS,S which was found to save 1 life for every 200 children vaccinated, reduction of malaria cases by 40% and significant reduction in deadly severe malaria can be delivered through the existing platform for childhood vaccination that reaches more than 80% of children (WHO, 2021b). Practical recommendations to help maintain access to high quality HIV and TB health services in the COVID-19 era include embracing community-based differentiated service delivery models, less frequent visits to a health facility with less frequent medication pick-ups, expansion of mental health strategies, offering opportunities to build back better, and an improved focus on people centered care.

In HIV, innovative examples of home delivery models exist from Africa (Nigeria, Indonesia, Laos, Nepal, and) where ART was delivered using existing community networks or private courier to avoid interrupted service delivery during the pandemic (Hoke et al, 2021). Another good example of utilising the local context to ensure continued supply of essential medicines for PLHIV. The future pandemics should find a more just, prepared, and strong health system if the lives are to be saved by prioritizing the continuity of essential services amid the COVID-19 pandemic remains crucial (Gavi et al, 2021). The One Health approach provides valuable platform to effectively prepare and respond to zoonotic health threats through a multisectoral human-environmental-animal health approach (Ung et al, 2021; Zumla et al, 2016). It is important that other infectious diseases which also impact a high burden on health services in Africa are not sidelined by COVID-19 epidemic (Kapata et al, 2020).

Furthermore, innovations in financing are key to improve financing levels to support full implementation of prioritised activities. For example, The GFATM has used different innovations to raise up to US$50 billion as of June 2021 to support both programs and health system strengthening (The Global Fund, 2021b). The GFATM has also made available funding for both country and regional grants, increased the role of both domestic and private sources of financing while maintain transparency and accountability. The Fund continues to be responsive to emerging needs by providing 'above allocation' funding either to support country attainment of strategic targets or pandemic related responsive mechanism to avoid disruption to TB, HIV and malaria services (The Global Fund, 2021b).

In conclusion, the ongoing COVID-19 pandemic has disrupted health services generally and led to diversion of resources away from tuberculosis, HIV and malaria services at various levels. There is an urgent need to address this by strengthening health systems, providing needed financial resources, renewed political leadership and foster collaborations. Evidence-based cost-effective interventions need to be scaled-up and include community-based differentiated service delivery models, less frequent visits to a health facility with less frequent medication pick-ups, expansion of mental health strategies, offering opportunities to build back better, and an improved focus on people centered care. Finally, innovations in service delivery and technological adaptations remain critical as countries aim to limit disruptions to routine services.

Transparency declaration

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Conflict of Interest

All authors have no conflicts of interest to declare.

Author Contributions

PC-K, FN, NK and AZ conceptualised and drafted the manuscript. PSL, LAM, JC, JT, CH, RA, DA, SM, PN and PM contributed to discussions and provided further inputs in writing the manuscript.

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