



Interventions aimed at preventing, detecting, and treating Malaria, TB and HIV in Nigeria

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Question

What is the available evidence on the effectiveness of interventions aimed at preventing, detecting and treating malaria, TB and HIV in Nigeria?

- *Considering context, population gaps and capacity strengthening*
- *Focus on interventions that strengthen health systems in the longer term*

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The K4D helpdesk service provides brief summaries of current research, evidence, and lessons learned. Helpdesk reports are not rigorous or systematic reviews; they are intended to provide an introduction to the most important evidence related to a research question. They draw on a rapid desk-based review of published literature and consultation with subject specialists.

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1. Summary

There is an abundance of available evidence on the effectiveness of interventions aimed at preventing, detecting and treating malaria, TB and HIV in Nigeria. The evidence suggests that future interventions concerning these three diseases should focus on health systems strengthening, considering each of the 6 WHO building blocks. Therefore, this review is structured around the building blocks for each disease, presenting challenges, interventions applied or recommended and their impact (where available). A summary of the interventions is provided in the first paragraph of each section. The following is summary points taken from evidence across TB, Malaria and HIV/AIDS.

Governance and Financing

Evidence reflects key governance and financing constraints and indicates cross cutting mechanisms for improving the current situation. For example, the literature calls for increases in:

- domestic financing and ownership
- additional funding and focus at state and local levels of the health system
- better integration and organisation of services into general service provision
- leveraging of relevant legislation and human rights laws (specifically in relation to gender and disability)
- better coordination between primary, secondary and tertiary healthcare facilities, harmonization of health management information systems
- effective human resource management for quality and equitable service provision
- integration of strategies that accommodate public-private partnerships and Nigeria's social security scheme at state and national level.

Medicines and technology

Effective interventions related to medicines include, better regulation of drugs available at private pharmacists, integrated logistics management of key drugs and laboratories to minimise stock outs and expired medicines, revisions of drug order forms at the facility level alongside training and supervision for quantification and requisition of medicines, redistribution of surplus commodities from facilities, tools to counter the growing threat of drug and insecticide resistance and use of the malaria vaccine in targeted hotspots.

Opportunities presented in the evidence related to technology include employing spatio-temporal analysis to identify environmental hotspots for targeted malaria interventions, use of the geospatial epidemic model to ensure the most relevant interventions are delivered in the right context to prevent inefficiencies, additional use and sensitivity improvements of rapid diagnostic tests, improving housing materials to reduce malaria occurrence and using audio technology to improve knowledge of HIV in rural communities.

Information

The focus for refining surveillance was on the harmonisation and/or triangulation of national programme monitoring and evaluation systems, vertical donor funded systems, private sector data, and the Integrated Disease Surveillance and Response (IDSR) system for more accurate

data collection and analysis. In addition, strengthening facility level capacity for disease surveillance through on the job training and supportive supervision was recommended. The 2019 National HIV/AIDS Indicator and Impact Survey was presented as an opportunity to improve data for planning of HIV prevention and treatment programmes. An innovative mapping exercise identified 13,899 key population hotspots across 7 states to target services for key risk populations for HIV; female sex workers, men who have sex with men, and people who inject drugs.

Human Resources

Interventions proposed in the literature for human resources are consistent across the three diseases and comprise of; addressing disruptive variances in quality and quantity of health workers by facility; having structured, regular training and retraining that is tailored and has multifaceted, supervisory and group problem solving components; interventions to improve attitudinal, diagnostic and treatment skills, knowledge and practice for health workers; levelling of salaries and other remunerations; improving models for cascade training; performance based financing initiatives and reducing staff transfers to ensure those with relevant skills are placed where they are needed most.

Service provision

There are many interventions related to service provision for TB, malaria and HIV in Nigeria. Community-based interventions such as lay diagnosis and treatment by relatives, community members, mothers or drug shop attendants are common and have mixed results. Active community-based case finding for TB, especially for marginalised communities in Northwest Nigeria and other vulnerable groups had significant impact on TB notifications. Peer delivery models for prevention and treatment support delivered in-person or using social media/text messaging for HIV have shown promise but require strong training frameworks and support. Education based on the information–motivation–behavioural skills (IMB) model improved knowledge recognition and treatment of malaria. Economic incentives to improve HIV health outcomes was found to be cost effective with adolescents. Provider-initiated HIV/AIDS screening for all patients demonstrated an increased rate of HIV testing.

2. Health systems strengthening

A paper examining the impacts of the Global Fund’s interventions for HIV, TB and Malaria on Nigeria’s health system found that while the Global Fund has been successful in achieving its specific performance targets, its impacts on Nigeria’s health system has been minimal (Kalu, 2021). Reasons identified from 40 key informant interviews and analyses of archival records include Global Fund’s uncertain/parallel operational structures, little input from Nigeria actors in program design, excessive focus on fiduciary matters as opposed to public health interventions, emphasis on narrow short-term performance targets and preference for foreign consultants over building national capabilities and domestic NGOs. The paper recommends more involvement of domestic actors in designing the Global Fund’s projects, acknowledging the need for Nigeria to proactively articulate legitimate national needs and to develop the capacity to effectively put forward these needs to the donors. Therefore, this report is structured around the WHO health systems building blocks for each disease with the aim of presenting evidence that could contribute to overall health systems strengthening.

Another key cross cutting area for health systems strengthening for all 3 diseases is the integration of existing vertical programmes into the Nigeria Integrated Disease Surveillance and Response (IDSR) system. A study by Onwe, Okedo-Alex, Akamike, and Igwe-Okomiso (2021) found that across 12 states, vertical programs had different personnel, communication channels and supportive supervision processes from the IDSR system. Although there was evidence of a forum for data harmonization, this forum was ineffectively utilized in 83.3% of cases. Specific disease funding was higher than that of IDSR (92.9%) and only 42.9% reported funding for IDSR activities from development partners in the State. Poor data management, low priority on IDSR priority diseases, and donor-driven programming were major negative effects of vertical programs. Improved funding, political ownership, and integration were major recommendations preferred by state epidemiologists and Disease Notification Surveillance Officers (Onwe et al., 2021).

3. Preventing, detecting, and treating TB

The main interventions identified for preventing, detecting and treating TB included in this section are:

- improved TB governance and funding (Ogbuabor, 2020; Ogbuabor & Onwujekwe, 2019)
- more focus on institutional capacity at state and local levels of the health systems (Ogbuabor, 2020)
- improvements in data managements systems (Kusimo, Ugwu, Aduh, & Okoro, 2020),
- better infection prevention and control measures at facilities (Dokubo et al., 2016; Kuyinu et al., 2019)
- targeted active case funding especially for marginalised communities such as IDPs, migrant and transient communities, prisoners and pregnant women (Abdullahi et al., 2020; Oshi et al., 2017; USAID, 2018)
- engaging the private sector (Kusimo et al., 2020)
- economic support incentives for patients (Ukwaja, Alobu, Gidado, Onazi, & Oshi, 2017)
- community treatment supporters and case finding (Adejumo et al., 2016; Olukolade et al., 2017),
- integration of TB case finding into COVID-19 structures (Woolsey et al., 2021),
- using Gene Xpert testing machines (Akwapuo, Abah, & Oppong, 2020)
- mobile TB clinics and screening (Oshi et al., 2017),
- improved public communication around TB using mass awareness campaigns and behaviour change messages that also address stigma, advocacy with community leaders and gatekeepers(Oshi et al., 2017),
- training of providers (Kuyinu et al., 2019),
- patient tracking systems and supporting caregivers (Adamu, Osoba, White, & Abdullahi, 2018).

Examples of some of these interventions and their effectiveness are included under each WHO building block heading.

TB governance and financing

The role of governance in strengthening TB control has received little research attention. A scoping review of 38 journal articles and 11 documents published between 2000-2018 provided evidence of how institutional designs and organisational practices influence implementation of the National TB Control Programme (NTP) in Nigeria. The review found that improved governance for TB control programmes in Nigeria is required and the authors provide a useful table summarising constraints and enablers of the TB programme (Ogbuabor & Onwujekwe, 2019). The findings from the review and another conducted in Enugu State, South-eastern Nigeria involving 23 TB service providers to examine health system factors affecting implementation of the TB control programme (Ogbuabor, 2020) are included in each of the headings below.

In relation to governance and financing the studies identify the following:

- While costed TB plans and a policy coordination framework exists, however public spending is low and predictable domestic resource mobilisation through budgets and social health insurance is needed.
- Oversight from the NTP and the local health system needs strengthening.
- Capacity is limited, especially in the private sector and laboratories, calling for training and incentives to attract and retain TB service providers.
- Poor coordination, integration and organisation of TB services into general health services.
- Inadequately funded tracking systems for patients.
- Withdrawal of subsidies to community volunteers and patent medicine vendors.
- TB-specific legislation is absent. However in 2018 a TB legal environment assessment (LEA) was completed to examine the laws, policies and case law that constitute the legal and policy framework related to TB in Nigeria to identify those that support the fight against TB, those that hinder these efforts, and gaps in the framework where new law or policy is needed (USAID, 2018). The assessment includes concrete recommendations, including reforms to existing law and policy, enactment of new law and policy, and capacity-building for key stakeholders and decision-makers.

Medicines and technology -TB

TB drugs are available at private chemists and pharmacies throughout the country. WHO and a national programme officer expressed concern about the lack of quality assurance for drugs obtained from private chemists and asserted that over-the-counter sale of TB drugs contributes to inappropriate treatment and drug resistance. They therefore called for a prohibition on over-the-counter sale of drugs used to treat TB and restrictions on prescriptions and dispensing rights to ensure TB drugs are used appropriately (USAID, 2018). Ogbuabor (2020) also found evidence of ineffective drug supply and management. For example, TB preventive therapy (TPT) reduces 5-year mortality among people living with HIV by 37%, independent of antiretroviral therapy (ART). The most common form of TPT is isoniazid preventive therapy (IPT). However, procurement and logistics of IPT as part of the HIV programme in Nigeria has posed key bottlenecks to uptake since 2014. An intervention that integrated delivery of isoniazid (INH) with the antiretroviral (ARV) logistics management and information system (LMIS) was delivered

alongside revision of drug orders and requisition forms at the facility level to include INH, with training on appropriate quantification and requisition of INH with ARVs. This led to a 69% increase in TB preventive therapy (Odume et al., 2020). The authors recommend that the provider-to-client stage of TB preventive therapy implementation be driven by the HIV programme and that cross-communication between the two programmes be improved.

Information systems for TB

Despite adhering to standardized recording and reporting format, regular monitoring and evaluation, revision of reporting formats, and electronic data management system, TB surveillance systems were found to be weak (Ogbuabor & Onwujekwe, 2019). USAID implemented an intervention to improve TB surveillance in 12 states in Nigeria. The intervention focused on hospital based surveillance, community based surveillance, and health systems data strengthening (Kusimo et al., 2020). In response to a suspicion that “missing” TB cases could be in private hospitals a hospital-based surveillance was implemented mainly in private hospitals not previously linked to the NTP diagnostic, treatment, and M&E systems. TB data was harmonised and generated from both the Integrated Disease Surveillance and Response (IDSR) and the NTP M & E systems. As a result, engagement of umbrella bodies of general and private medical practitioners rapidly expanded the coverage of TB services in the private sector; technology enhanced the timeliness and usefulness of TB surveillance data and ensured prompt interventions for clients; health management information systems and human resource for health were better supported; state levels benefited from the monthly data collation and harmonization meetings; and timeliness and completeness of data improved across the 12 states. Capacities on TB surveillance were built at facility, Local Government Area (LGA) and state levels and the intervention gave rise to monthly data collection and review of TB data in a program which resulted in prompt resolution of issues affecting program implementation at all levels.

Engaging the private sector in TB is viewed as a priority by international stakeholders working in Nigeria including WHO, USAID and Global Fund. However studies in this area are limited and data from the private healthcare sector in Nigeria is particularly scarce and unreliable (World Health Organization, 2018). A report by WHO (2018) entitled ‘Engaging Private Health Care Providers in TB Care and Prevention: A Landscape Analysis’ highlighted that 66%-92% of initial care-seeking for respiratory conditions and fever is with private providers, especially drug shops known as Patent Medical Vendors (PMVs), of which there may be more than 60 000 in the country. However, the NTP reflects very low priority on engaging private providers.

Human resources for TB

Challenges to human resources for TB were reported including a lack of transparent deployment and transfer of staff to the NTP, health workers limited communication of service entitlements to users, inadequate human resources generally, and dilapidated service delivery infrastructure ((Kuyinu et al., 2019; Oga-Omenka et al., 2020; Ogbuabor, 2020). Additional challenges reported by nurses in the care of TB patients in Ekiti State, southwest Nigeria included inadequate availability of personal protective equipment (PPE), lack of isolation wards, delegating the care of TB patients to young inexperienced nurses, long processes in diagnosing patients with tuberculosis, lack of policies protecting the nurses from exposure to TB, and inadequate training. The major concern was the fear of contracting tuberculosis (Fadare, Akpor, Ifechukwude, Richard D, & Bello, 2020). The study suggested that there should be a provision of adequate

personal protective equipment, TB designated wards, provision of periodic training to update the nurses on care of TB patients, establishment and execution of hospital policies and practices along with support to facilitate a safe workplace (Fadare et al., 2020). An example is provided below of an intervention aiming to improve human resources capacity to manage TB infection prevention and control.

Tuberculosis infection prevention and control measures in DOTS centres in Lagos State (Kuyinu et al., 2019)

A study evaluating the TB infection prevention and control measures (TBIC) in 112 DOTS centres in Lagos State found the following gaps; in 46% of centres health workers were not specifically trained in TBIC or offered periodic screening for TB; 63.4% of health workers reported separating coughing patients with suspected TB; 79.2% with airflow exchange had inadequate ventilation; natural ventilation was found to be adequate in 83% of centres that attend to patients in rooms; 31% had designated areas for sputum collection; 29.5% of the centres were observed to provide face masks consistently (Kuyinu et al., 2019). Reasons given for these findings included structural inadequacies because most of the centres were not purpose-built for TB services. Other perceived barriers to the implementation of TBIC measures at the DOTS centres surveyed included, structural inadequacies, poor managerial and administrative controls, inadequate infrastructure and limited manpower. Stigmatisation of health workers involved in providing TB care was an additional barrier which can result in other health workers refusing to work in DOTS centres, leading to fewer human resources for TB. TBIC measures at DOTS centres in the secondary health facilities were better than those in primary facilities, possibly due to better funding and human resources. The authors conclude that compliance with TBIC measures in DOTS centres in Lagos needs to be increased through training and re-training of staff as well as institutional commitment to implementing TBIC. Mechanical ventilation in the form of fans should be put in place at DOTS centres to improve ventilation. Other measures should include supervision, improved funding, as well as TB screening and monitoring among health workers and increasing the number of staff available for TB care. The authors deduce that DOTS centres should be purpose-built in line with TBIC principles. Similar findings and recommendations were also found during a pilot intervention study in Ebonyi, Enugu, and Imo states. The intervention focused on training health care workers, identifying TB infection control gaps, and using continuous quality improvement measures to monitor strategies to strengthen and build infection control in health care facilities and was identified as effective in improving TB infection control (Dokubo et al., 2016).

TB service delivery

Despite the existence of supportive policies, integration of TB control into the community and general health services have been weak with limited patient awareness of TB symptoms and available services (Oga-Omenka et al., 2020). Significant gaps exist in accessing testing and diagnostic services (Abdullahi et al., 2020; Oga-Omenka et al., 2020). DOTS centers are often located too far from communities where people with TB live, especially at the Local Government Area (LGA) level. As a result, people with TB sometimes interrupt their treatment, rather than bear the cost and inconvenience of both transportation to the clinic and time away from their employment (USAID, 2018). Willingness to pay for TB services is high, however, transaction cost and stigma among patients limit equity (Oga-Omenka et al., 2020). Delay in TB diagnosis and initiation of care, poor staff attitude to patients, lack of privacy, poor management of drug

reactions and absence of infection control measures breach ethical standards for TB care (Oga-Omenka et al., 2020; Ogbuabor & Onwujekwe, 2019 p.1). The following examples of interventions relate to some of these challenges.

Active case finding

The evidence suggests that it is essential to increase the number of diagnosed and successfully treated, thus requiring not only a significant economic effort but also more community involvement and identification of marginalised and vulnerable groups which will address current inequities in service provision. This includes increasing the notification rate to the 80%-90% range, providing appropriate management of diagnosed patients, strengthening directly observed treatment and contact tracing (Ahmad et al., 2018).

TB and HIV outreach services to internally displaced populations in Northeast Nigeria (Abdullahi et al., 2020)

A decade of Boko Haram insurgency brought conflict, mass displacement, and the destruction of basic infrastructure to Northeast Nigeria. Infectious diseases like TB and HIV are especially difficult to address under such conditions, and IDPs are vulnerable to both. Although international investment supports some health interventions among IDPs, locally sourced solutions are lacking (Abdullahi et al., 2020).

An active case finding (ACF) intervention (2017- 2018) with participation of government, local authorities, community-based organizations, IDP camp leaders, and community volunteers, for TB and testing for HIV in 963 IDP communities was conducted (Abdullahi et al., 2020). The ACF was a component of a multistakeholder collaboration which also included mapping of IDP populations and health services, supporting existing health facilities, developing a sample transport network, and organizing community outreach to support ACF. The evaluation found that bacteriologically confirmed TB notifications increased by 847 (45.1%) during the intervention period, with IDPs accounting for 46% of these notifications. The analyses detected significant positive postintervention trend differences in TB notification rates between the intervention and control areas in all forms of TB. The TB prevalence (502 cases per 100,000 screening encounters) was 10 times the national notification rates and 2.3 times the estimated national incidence. Rates of HIV infection (1.8%) were higher than HIV prevalence estimates in the 3 states. The impact of the intervention showed that ACF can greatly increase TB case notifications. The study concluded that engaging IDP communities, local governments, and civil society organizations is essential to ensuring the success of interventions targeting TB and HIV, providing sustained solutions to these and other health crises among vulnerable populations.

Community-based approaches and systematic tuberculosis screening to improve TB case detection in Ebonyi State (Oshi et al., 2017)

Another more complex active case finding intervention was implemented in Ebonyi State targeted at reaching; women attending antenatal care (ANC) and maternal and child health clinics; people living with HIV (PLHIV) attending antiretroviral clinics; people attending general outpatient department (GOPDs); and active home screening of patients who were registered as smear positive. The intervention had the following components; capacity strengthening for all health workers within the NTP and laboratory staff; familiarization and awareness creation workshops

for political, community, and religious leaders and other stakeholders; the training of a community mobile health team; ad hoc screeners; one project supervisor per local government area to support and supervise field activities; and advocacy, communication, and social mobilization delivering messages about TB and the availability of the services during community meetings, campaigns, local radios and roadside shows. Community mobile health teams conducted TB screening outreaches and house-to-house visits in the intervention area to identify the individuals with chronic cough, inform symptomatic individuals how to produce sputum, and collect three (spot-morning-spot) sputum specimens for smear microscope. As a result 218,751 persons were screened, with 19.7% of them being presumptive TB cases, 23,729 (55.1%) submitted sputum samples for microscopy, and 764 (3.2%) had smear-positive TB, 683 individuals were diagnosed with other forms of TB using X-ray and clinical evaluation giving a total of 1447 all forms of TB cases. The authors concluded that ACT strategies achieved good returns though early loss to follow-up was high.

Co-infection of TB with HIV- Gene Xpert testing machines

The co-infection of TB with HIV places an immense burden on public health systems in LMICs. The National Tuberculosis and Leprosy Control Program (NTBLCP) tackles the TB epidemic in Nigeria and provides services for case management. At the end of 2014, a total of 5,728 DOTS centers and 1,765 microscopy sites were operational in Nigeria. These additional testing sites increased TB case detection by 92%, with 65% of patients referred for appropriate treatment (Akwafo et al., 2020). However, only 104,904 cases were detected in 2017, out of the estimated 407,000, indicating treatment coverage of only 25.8%. The fact that only 1 in 4 of estimated cases are diagnosed each year makes TB control nearly impossible. The Gene Xpert machine is a TB testing tool that helps to diagnose new TB cases in less than 2 hours of testing compared to 2-6 weeks duration when cases are tested in the laboratory and is documented to have reduced TB/HIV co-infection in 21 countries in 2015, from recorded cure rates of 48% to 68% including providing better treatment regimes for infected patients. In 2018 Nigeria had a total of 391 machines available across all states. Akwafo et al. (2020) attest that if government funding for TB and HIV programs are sustained and the Xpert machines are at optimal performance, TB case notifications by states should increase, thus reducing the challenge of undetected cases. However unequal distribution of machines in the South-western and North-western regions in Nigeria, rather than in the North-Central and North-Eastern regions of the country where TB is more prevalent has potentially reduced impact. Locations of more Gene-Xpert machines should be cited closer to the people, with linkages to health centers in the hinterland (Akwafo et al., 2020).

Integration of TB case finding into COVID-19 structures (WHO and partners) (WHO, 2021)

In Nigeria, during the second quarter of 2020 with WHO and partners, an intervention was rolled out integrating TB case finding into the COVID-19 structures in all outreach in 12 states (e.g., Anambra, Bauchi, Benue, Cross River, Delta, Imo, Kaduna, Kano, Lagos, Niger, Osun, and Rivers States). This resulted in a 15% increase in case notification. It included training TB case officers' /community informants on advocacy, house-to-house case search, contact tracing, and social mobilization for TB and COVID. Efforts to locate TB and Covid-19 cases included a screening programme, laboratory services, engagement with key community stakeholders in the 12 states, and intensified services in the health facilities, using Genexpert and 'WOW' Trucks. All

36 states and the Federal Capital Territory (FCT) have now included TB in the covid-19 response to ensure that new cases detected are placed on treatment (WHO, 2021).

Treatment for TB

Role of 'treatment supporters'

Additional patient support needs highlighted from the perspectives of TB patients include; (1) monitoring and supervision of daily drug in-take, (2) motivational support to take the drugs as expected, (3) provision of support for feeding (when there is no food or means of eating), and (4) support for provision of transportation cost to visit TB clinics (Olukolade et al., 2017). A study by Olukolade et al. (2017) suggested that TB patients may not be committed to taking their drugs and completing their treatment regimen if any of these supports is lacking. In Nigeria a patient-centred treatment intervention which allowed TB patients to determine whether treatment was supervised at the health facility by health care workers or at home by any treatment supporter of their choice such as a trained relation or volunteer close to the patient's home has been implemented (Adejumo et al., 2016). Olukolade et al. (2017) concluded that patients with treatment supporters, tended to complete their treatment regimen and were less likely to default (Akingbade, 2016; Olukolade et al., 2017). However, another study by Adejumo et al. (2016) found that patients supervised by treatment supporters had more treatment interruption compared with those supervised by health care workers suggesting a need to review the concept of treatment supervision by treatment supporters in Lagos state Nigeria.

Economic support intervention for TB treatment outcomes in rural Nigeria (Ukwaja et al., 2017)

An economic support intervention to investigate the feasibility of providing financial incentives to TB patients in a rural secondary care hospital, Ebonyi State, South-East Nigeria under routine conditions, and to determine their impact on TB treatment outcomes proved to be effective in improving treatment success and reducing loss to follow-up among poor TB patients in Nigeria (Ukwaja et al., 2017). Using a before and after study design, eligible patients in the intervention group (n=121) were offered a monthly financial incentive of 2500 Nigerian naira (US\$15) for 6 months and 171 patients were recruited for the control group. The treatment success rate was 104/121 (86.0%) during the intervention, and 123/173 (71.1%) during the control period.

Relationship between Caregiver's Quality of Life and Childhood Tuberculosis in Bauchi State, Northeastern Nigeria (Adamu et al., 2018)

Research studies integrating family and community-centered strategies have been recommended by stakeholders to address the paucity of current local prevention and management strategies for childhood TB (Adamu et al., 2018). A study in Bauchi State, Northeastern Nigeria highlighted that the quality of life of caregivers of childhood TB cases was significantly lower than caregivers of children without TB reflecting the importance of integrating quality of life interventions as part of TB control programs seeking to improve childhood TB reporting. The authors state that this will mitigate the disease burden in resource limited settings, thereby contributing to positive social change in society (Adamu et al., 2018).

Intervention Strategies of TB-HIV Co-Infection in West Africa (Akwafo et al., 2020)

Persons living with HIV (PLHIV) are about 30 times more likely to develop active TB, due to compromised immunity. A hybrid mathematical and agent-based model for determining optimal treatment strategy for Active TB and HIV co-infection indicates that HIV treatment could be more effective in eradicating TB (Akwafo et al., 2020). However, in resource-scarce settings, intervention programs should be geared towards detecting and treating HIV negative individuals infected with active TB disease, as a method of preventing co-infection as the TB-only treatment strategy averted more cases of mixed infections than the HIV-only strategy. However, the dual treatment strategy saves higher number of cases (of HIV, TB, and the mixed infection) in comparison to the other strategies. Thus, the study recommends where resources are limited, establishing centers, where the same resources (financial, personnel and structural) are used for treating both diseases as more beneficial in reducing new cases of the mixed infection (Akwafo et al., 2020).

4. Preventing, detecting, and treating Malaria

The main interventions identified for preventing, detecting and treating Malaria included in this section are;

- decentralisation of essential malaria interventions and better financial support for local level malaria units (Taleat & Olawoyin, 2021)
- improving referral mechanisms between primary, secondary and tertiary facilities for complicated malaria cases
- integration of public-private partnerships (Taleat & Olawoyin, 2021)
- use of the malaria vaccine (Hemingway et al., 2016b; Maduka, 2018)
- geo-temporal analysis for targeted interventions (Okunlola & Oyeyemi, 2019),
- geospatial epidemic models alongside costing data to identify the right interventions at the right place (Scott et al., 2017)
- improvements in the surveillance system's representativeness, data reporting rates and timeliness of reporting alongside supportive supervision for effective surveillance (Bajoga et al., 2019; Visa, Ajumobi, Bamgboye, Ajayi, & Nguku, 2020)
- long-lasting insecticide-treated nets (LLINs), indoor residual spraying (IRS), intermittent presumptive treatment during pregnancy (IPTp), seasonal mass chemoprevention in children (SMC), larval source management (LSM), mass drug administration (MDA), and behavioural change communication (BCC) (Maduka, 2018; Scott et al., 2017)
- improving housing material standards (Morakinyo, Balogun, & Fagbamigbe, 2018)
- tailored, multifaceted educational, supervisory and group problem solving for health workers with regular monitoring and feedback (Ojo et al., 2020; Rowe et al., 2018)
- cascade training models for health workers from national to state and LGA level (Jegade et al., 2020)
- malaria education using the information–motivation–behavioural skills (IMB) model (Balami, Said, Zulkefli, Bachok, & Audu, 2019)

- training caregivers for improved recognition and treatment of malaria (Elimian, Myles, Phalkey, Sadoh, & Pritchard, 2020)
- improvements in use and sensitivity of rapid diagnostic tests (Ajakaye & Ibukunoluwa, 2020; Mokuolu et al., 2018)
- training and support interventions for rural patent and proprietary medicine vendors (Oladepo et al., 2019).

Malaria governance and financing

A study examining the way inter-governmental collaboration could be improved to enhance the malaria elimination programme in Southwestern Nigeria found that funds from the health sector and local and international donors for Malaria strategies did not adequately reach State and local government levels (Taleat & Olawoyin, 2021). It has been reported that much of these funds get misappropriated, embezzled or wasted by corrupt officials and their collaborating partners which hinders the delivery of effective malaria control strategies (Hemingway et al., 2016a). The study found that if lower levels of government received the funds allocated to them, they could afford the interventions outlined in strategic plans. Taleat and Olawoyin (2021) state that the collaborative involvement by the federal, state and local government is essential, and that an integrated sustainable decision-making approach should be applied, where all the stakeholders are involved and actively participate. One mechanism to improve inter-governmental collaboration was suggested through improving referral systems on complicated malaria cases from primary to secondary, and to tertiary healthcare facilities. Seven key recommendations were made including the decentralisation of essential malaria intervention strategies like vector control, chemoprevention, diagnostic testing and treatment to cover all populations at risk, adequate financial aid for local level malaria elimination units, and the integration of strategies to accommodate public private partnership (Taleat & Olawoyin, 2021).

Medicines and technology- Malaria

Hemingway et al. (2016b) and others (Maduka, 2018) state that scaling up existing strategies for malaria treatment and prevention to address areas of high malaria transmission and interrupt parasite transmission is needed. They also discuss novel tools to counter the growing threat of drug and insecticide resistance and better surveillance mechanisms to target interventions more efficiently to populations and areas of high risk of malaria transmission. A key paper from Hemingway et al. (2016b) describe the medicines, technologies, tools and strategies that are used, as well as those on the near-term horizon, that have the potential to accelerate the decrease in malaria mortality and, thus, bend the curve. These are not covered in detail here but would be relevant for consideration in Nigeria. The following interventions highlight the use of new vaccines for Malaria, the use of geospatial technologies to identify malaria hotspots for targeted interventions and the main prevention mechanisms employed in Nigeria.

Malaria vaccine

WHO recommends that in the context of comprehensive malaria control the RTS,S/AS01 malaria vaccine be used for the prevention of *P. falciparum* malaria in children living in regions with moderate to high transmission as defined by WHO. RTS,S/AS01 malaria vaccine should be provided in a schedule of 4 doses in children from 5 months of age for the reduction of malaria

disease and burden. Maduka (2018) highlights the need to consider the vaccine for use in Nigeria.

Spatio-temporal analysis of association between incidence of malaria and environmental predictors of malaria transmission in Nigeria (Okunlola & Oyeyemi, 2019)

A study identifying hot spots in relation to environmental risk factors in Nigeria found that the rate of incidence of malaria increased significantly with increase in temperature, aridity, rainfall and proximity to water in the spatial error model whereas only temperature and proximity to water have significant positive effect on malaria incidence in the spatial lag model. The modelling of the ecological predictors of malaria transmission and spatial maps provided in the study could aid in developing a framework to mitigate malaria and identify its hotspots for urgent intervention in the endemic regions. Maduka (2018) reaffirms this finding and suggests that information and communication technologies for implementing web and mobile-based technologies for vector and parasite surveillance, geo-mapping and statistical modelling will also play a key role in Malaria control.

Maximizing the impact of malaria funding through allocative efficiency: using the right interventions in the right locations (Scott et al., 2017)

A geospatial epidemic model alongside costing data and an optimization algorithm was used to estimate the optimal allocation of budgeted and projected funds across all malaria intervention approaches. Interventions included long-lasting insecticide-treated nets (LLINs), indoor residual spraying (IRS), intermittent presumptive treatment during pregnancy (IPTp), seasonal mass chemoprevention in children (SMC), larval source management (LSM), mass drug administration (MDA), and behavioural change communication (BCC). The model was applied to six geopolitical regions of Nigeria in isolation and also the nation as a whole to minimize incidence and malaria-attributable mortality. The study found that allocative efficiency gains could avert approximately 84,000 deaths or 15.7 million cases of malaria in Nigeria over 5 years. With an additional US\$300 million available, approximately 134,000 deaths or 37.3 million cases of malaria could be prevented over 5 years. The authors state that priority funding should go to LLINs, IPTp and BCC programmes, and SMC should be expanded in seasonal areas. To minimize mortality, treatment expansion is critical and prioritized over some LLIN funding, while to minimize incidence, LLIN funding remained a priority. For areas with lower rainfall, LSM is prioritized over IRS but MDA is not recommended unless all other programmes are established. The authors conclude that substantial reductions in malaria morbidity and mortality can be made by optimal targeting of investments to the right malaria interventions in the right areas.

In addition to the above study by Scott et al. (2017), a review of strategies and future novelties for malaria elimination in Nigeria was published by Maduka (2018). It provided a situational analysis, challenges and recommendations of the above interventions from a different viewpoint which are summarised below alongside other studies in this area.

Long-lasting insecticide-treated nets (LLINs)

Maduka (2018) reports that in 2015 ownership of LLINs had increased to 69%, however net utilisation was low at 39%. Social mobilisation campaigns have not resulted in overcoming socioeconomic or sociocultural barriers to net use and there is only one indigenous producer of

nets in Nigeria causing sustainability concerns related to donor provision. The author recommends supporting indigenous LLIN manufacturers, forging sustainable partnerships with civil society groups and community-based organisations for low budget net distribution, hanging and monitoring campaigns, and partnering with mobile and web-based health tools to create demand for LLIN use. Another study identified women who lived in rural communities as more likely to utilize LLINs compared to their urban counterparts, whereas younger women (aged < 30 years) were less likely to utilize LLINs compared to the older women (OR 0.7; 95% CI 0.5–0.9) (Babalola et al., 2019) thus there is a need for strategies that will improve the utilization of LLIN among the young and urban. Technologies that help improve the uptake and use of LLINs through phone and social media reminder and support systems are being piloted and could be considered (Maduka, 2018). Another study found that exposure to malaria social and behavioural messages improved net use among under 5 children (Zalisk et al., 2019)

Indoor residual spraying (IRS)

In Nigeria, the 2015 Malaria Indicator Survey (MIS) reported that only 1% of households surveyed in the country had received IRS within the preceding 12 months (Maduka, 2018). Reasons suggested are related to the prohibitive cost of IRS campaigns, the absence of vector maps to guide implementation and the rising incidence of resistance to pyrethroids and other insecticides. Investment is suggested for vector mapping and insecticide resistance monitoring (Maduka, 2018).

Seasonal and intermittent chemoprevention (SMC)

Prevention among vulnerable populations involves providing Intermittent Preventive Treatment for pregnant women (IPTp) and infants (IPTi) and providing seasonal chemoprevention (SMC) for children less than five years of age. IPTp entails giving three or more doses of sulphadoxine-pyrimethamine (SP) as directly observed treatment (DOTS), one month apart from after the onset of quickening (Maduka, 2018). According to the 2015 Malaria Indicator Survey (MIS) uptake of the three-dose IPTp in Nigeria is low at 19% in 2015. However, uptake of two-dose IPTp was 37%. Both figures reflect poor implementation, knowledge and acceptance of IPTp. SMC is thus suggested as a viable option for prevention of transmission in the Sahel regions of the country especially as parasite prevalence rates continue to drop. The author states that SMC is one intervention that has large prospects for reaching zero deaths from malaria by 2020.

Housing type and risk of malaria among under-five children in Nigeria: evidence from the malaria indicator survey (Morakinyo et al., 2018)

Housing type is an essential risk factor for malaria occurrence among U5 children in Nigeria. A study assessing the relationship between housing type and malaria prevalence among U5s found that children living in 'improved housing' (cement, ceramic tiles, vinyl asphalt strips, parquet and polished wood) versus 'unimproved materials' (earth, sand, dung, rudimentary, wood planks, palm, bamboo, and others) were less likely to have malaria infection compared with those living in partially or un-improved housing. The findings support the idea that better protection from malaria can be achieved by building houses with modern materials in addition to the use of ITN and indoor spraying. Morakinyo et al. (2018) conclude that a combination of these strategies can create better means of preventing malaria with exponential effect among U5

children in Nigeria contributing to the reduction of infant and U5 morbidity and mortality in the country. Education on the role of improved housing on malaria protection and empowerment of the public to adopt improved housing is recommended.

Information systems for Malaria

Surveillance is an important tool in the progression from control to elimination of malaria in Nigeria. The findings of an evaluation of the Malaria surveillance system in Kano State revealed that the system was found to be useful, simple, flexible and acceptable but there is a need for improvement in the system's representativeness, data reporting rates and timeliness of reporting (Visa et al., 2020). The authors recommended improving reporting from private health facilities, strengthening human resource capacity for supportive supervision and ensuring adequate government funding to enhance the system's representativeness and improve data quality. Integrated supportive supervision and on-the-job training improved data quality which was observed from the monthly trend of reported cases. The finding is similar to that of a study in Kaduna State (Bajoga et al., 2019) where good supportive supervision was observed, emphasising the importance of adequate supervision as an integral part of an effective surveillance system.

Human Resources for Malaria

Challenges related to human resources for malaria are reported in relation to malaria diagnostics, stock-outs of treatment drugs, suboptimal health worker and medicine vendor practices and inappropriate management of under-fives malaria cases (Jegade et al., 2020; Ojo et al., 2020; Oladepo et al., 2019; Rowe et al., 2018). Variances in quality and quantity of health workers by facility was also reportedly hindering progress for malaria control which could be addressed through training and levelling of salaries and other remunerations (Maduka, 2018).

Health systems readiness and quality of inpatient malaria case-management in Kano State, Nigeria (Ojo et al., 2020)

Nigeria was among the first African countries to adopt and implement change of treatment policy for severe malaria from quinine to artesunate. Seven years after the policy change health systems readiness and quality of inpatient malaria case-management practices were evaluated in Kano State of Nigeria (Ojo et al., 2020). The study found that treatment for severe malaria was challenged by lack of malaria diagnostics, stock-outs of artesunate and suboptimal health workers' practices. For example, test positive non-severe patients, deserving treatment with oral ACT, are treated with injectable anti-malarials. Similarly, irrational use of anti-malarials was notable among test negative patients. Establishment of the effective supply chain and on-going supportive interventions for health workers accompanied with regular monitoring of the systems readiness and clinical practices are urgently needed. This could include tailored, multifaceted educational, supervisory and group problem solving components accompanied with regular monitoring and feedback to health workers (Rowe et al., 2018)

Capacity strengthening of health workers for treating under 5's in Niger State (Jegade et al., 2020)

A multicomponent capacity building intervention for malaria treatment of under 5's consisting of revised case management manuals; cascade training from national to state and then to LGA level, on the job capacity development through supportive supervision was implemented and evaluated in 28 health facilities in two rural LGAs of Niger State (1 intervention and 1 control) (Jegade et al., 2020). The intervention did not improve appropriate management of under-fives in intervention facilities above that seen for under-fives in comparison facilities. However, appropriate treatment of negative diagnosis for children, when defined as receipt of no ACT or any other anti-malarials, was better in comparison areas. Cascade training reached only half of health workers managing febrile under-fives in this setting. Implementation studies on models of cascade training are needed to define what works in what context (Jegade et al., 2020).

Malaria testing and treatment knowledge among selected rural patent and proprietary medicine vendors (PPMV) in Nigeria (Oladepo et al., 2019)

PPMVs, particularly within the rural communities are the first point of care for many Nigerians. A survey was conducted in Oyo and Bayelsa States to understand PPMV's knowledge of malaria testing and treatment of uncomplicated malaria as recommended in the 2011 National Malaria Control Programme policy. The authors found that while 82.5% of PPMV members were aware of the policy, and over 58% would recommend ACT combinations for a child or adult male with malaria, only 46.9% would recommend the correct adult male dosage, 33.1% the correct child dosage and 14% for a pregnant woman in her second trimester. In addition, just over half PPMVs knew the most common signs of severe malaria, and less than a quarter would recommend Sulfadoxine–pyrimethamine to prevent malaria in a pregnant woman and would recommend ACT to treat malaria in a pregnant woman in her second trimester. This is a major concern, given the high levels of malaria-related complications and mortality among these vulnerable groups. The authors recommend training and support interventions for PPMVs to safely and effectively use RDTs to diagnose malaria and provide appropriate treatment with ACT (Oladepo et al., 2019). Another study from 2014 found a similar situation and suggested that poorer individuals seeking care at PPMVs are more likely to receive inappropriate malaria treatment when compared to those who go to pharmacies (Isiguzo et al., 2014)

Another study assessing adherence to antimalarial drug policy among doctors in Delta State found that not only do they have confidence in but also adhered to the antimalarial drug policy (Obiebi, 2019). However, a few did not comply with the national treatment guidelines with adherence as low as 35.4% and as high as 78.5% respectively for complicated and uncomplicated malaria. The authors raises concerns over the impact this could have on the evolving resistance to antimalarial drugs as well as the control of malaria in the region (Obiebi, 2019).

Service Delivery for Malaria

Community based interventions

Lay diagnosis is widely practised as part of home-based management of Malaria in Nigeria (Balami, Said, Zulkefli, et al., 2019; Elimian et al., 2020). There are many examples of training lay

community members to diagnosis and treat Malaria. A study based in the Borno state capital of north-eastern Nigeria with women selected during their antenatal care visit involved a 4-h health education on malaria based on the information–motivation–behavioural skills (IMB) model (Balami, Said, Zulkefli, et al., 2019). The sessions covered malaria transmission; clinical features; complications of malaria during pregnancy, and preventive measures; lessons on how to use, and take care of their ITNs and how to take IPT, with regards to identifying the correct drug, timing, dosing, side-effects, and what to do in case they experienced one; motivation for malaria prevention during pregnancy and identifying and tackling deterrent factors to the use of ITN and IPT. The study found a significant increase of 12.75% ($p < 0.001$), 8.55% ($p < 0.001$), and 6.350% ($p < 0.001$) in higher total knowledge, motivation, and behavioural skills scores respectively, for the intervention group. The authors recommend the study module to be adopted and incorporated into routine ante-natal care programs. Also considering the relatively shorter duration of sustainability of the effects of the intervention on motivation and behavioural skills level, that an additional session be delivered 2–3 months after the first, to serve as a re-enforcement (Balami, Said, & Zulkefli, 2019).

Similarly, a study by (Elimian et al., 2020) training caregivers in the Integrated Management of Childhood Illness (IMCI) guidelines for improved recognition and treatment of malaria and pneumonia in Benin city was well received, however the impact on Malaria was not reported. The reliance on lay diagnosis by caregivers despite the perceived low diagnostic accuracy was a notable finding and congruent with the existing literature.

Rapid Diagnostic Tests (RDTs) for Malaria

While the National Malaria Eradication Program and international agencies are keen on scaling up the use of RDTs and ACTs, most community stakeholders do not have the skills, knowledge or awareness to implement the test, treat and track strategy. A community-based intervention to train mothers accessing antenatal care, drug shop attendants, and voluntary health workers selected from the three districts of Lagos, on the use of RDTs and ACTs found that this was an effective strategy to accelerate eradication of malaria, especially in villages and low socioeconomic settings (Ajibaye et al., 2019). Participants' field performance on the use of RDT was not associated with their training experience nor their level of education, however, other structural barriers are important including improved availability and subsidized costs of RDTs and good quality ACTs (Ajibaye et al., 2019).

Maduka (2018) highlights potentials for innovation to improve the ability to detect malaria such as the recent home/self urine malaria tests which were rolled out in Enugu state, however they only showed moderate level of sensitivity compared with blood smear microscopy (Oguonu et al., 2014). Likewise other studies have highlighted the inaccuracy of current RDTs (less than 70%) and call for improving the sensitivity and specificity through the use of automated readers such as the 'Deki-reader' (Ajakaye & Ibukunoluwa, 2020; Maduka, 2018). Hemingway et al. (2016b) also highlights that improved point-of-care diagnostics for other causes of fever, particularly multiplexed with malaria tests, will be increasingly important to address the burden of other acute febrile disease and, in so doing, maintain the viability and legitimacy of the continued intensive screening for malaria necessary to drive down residual transmission.

Another study confirmed that Health workers would use RDTs because of confidence in results (95.4%) and its reduction in irrational use of artemisinin-based combination therapy (ACT)

(87.2%). However, in Enugu state, RDT was not used by health workers because of the belief that RDT results were inaccurate (Mokuolu et al., 2018). Furthermore, the compliance rate (administering ACT to positive patients and withholding ACT from negative patients) from patient exit interviews was 90.2%. Thus the study concluded that there were positive perceptions to RDT use by health workers and among community members (Mokuolu et al., 2018).

5. Preventing, detecting, and treating HIV/AIDS

The main interventions identified for preventing, detecting and treating HIV/AIDS included in this section are;

- address gender-based factors that increase female vulnerability to HIV
- promote integration of services and evidence-based HIV programmes that are gender sensitive and responsive (Awofala & Ogundele, 2018)
- support disability inclusion in HIV/AIDS programming (Adesina, Adigwe, Olufadewa, & Oladele, 2021)
- improve laboratory logistics management information systems (Omo-Emmanuel, Chinedum, Michael, & Negedu-momoh, 2017)
- use of audio technology for improved HIV knowledge (Ofotokun et al., 2010)
- identify the estimated 800k people with HIV and start them on treatment (Adeyinka, Olakunde, Oladimeji, & Ezeanolue, 2019)
- triangulate the NAHIS data with key population estimates at the state level, use hotspot maps to reach high risk populations (Lo et al., 2021)
- performance based financing (Suthar et al., 2017)
- reduced staff transfer between facilities (Itiola & Agu, 2018)
- peer-led interventions and education services (Chizoba, Chineke, Adogu, Nwafia, & Chizoba, 2021; Mark et al., 2017; Ochonye et al., 2019)
- youth cocreation of HIV self-testing services (Tahlil et al., 2021)
- conditional economic incentives and motivational interviewing (Ekwunife et al., 2021)
- provider-initiated HIV screening (Ogbo et al., 2017)
- corporate social responsibility of oil companies (Uduji, Okolo-Obasi, & Asongu, 2019).

HIV/AIDS Governance and financing

A review of policy documents and research papers with a focus on achievements and challenges in the elimination of mother-to-child transmission of HIV in Nigeria highlighted a number of cross-cutting health systems strengths and challenges. For example, Nigeria has increased the number of prevention of mother-to-child transmission of HIV (PMTCT) sites, decentralized and integrated PMTCT care for expanded service delivery, adopted task-shifting to address the shortage of skilled healthcare providers, explored alternative sources of domestic funding to bridge the funding gap and harmonized the health management information system to improve data quality

(Olakunde et al., 2019). However, challenges were identified including difficulty in identifying HIV-infected pregnant women because of low uptake of antenatal care; interrupted supplies of medical commodities; knowledge gaps among healthcare workers; and lack of a national unique identifying system to enhance data quality. The authors concluded that gaps still exist in the different blocks of the health system such as a need for stronger leadership and political will for domestic financing and evidence based service delivery approaches to enhance uptake and reduce loss to follow-up, effective human resource management for quality service provision, well-developed procurement and supply chain systems to reduce medical products being out of stock, and a health information management system for improved patient monitoring and quality data to inform planning (Olakunde et al., 2019).

Many of these findings were echoed in Itiola and Agu (2018) who interviewed twelve key informants involved in HIV/AIDS supply chain management, the authors in this study present a useful table of key findings broken down by the WHO health system building blocks, some of which are discussed in more detail throughout this section. However, in summary, sustainability achievements included development of national strategic plans and policy documents, establishment of coordinating structures, allocation of funds for some logistics activities at the state level and payment of salaries of government staff, institution of pre-service training, use of logistics data for decision making and the unification of parallel HIV/AIDS supply chains. Challenges included inadequate domestic funding, bureaucratic blockages, and inadequate manpower at the health facility level. Recommendations suggested by respondents were more political commitment and increased government funding, exploration of alternative sources of funding, improved accountability, effective healthcare workforce planning, and local manufacture of HIV commodities. Existing structures and programmes that the country can leverage on included: Nigeria Supply Chain Integration Project, National Health Insurance Scheme and the private sector (Itiola & Agu, 2018).

In the current context of COVID-19 Oladele et al (2020) make 6 recommendations to ensure sustainability of the HIV response; integrate HIV into Nigeria's social security scheme at state and national level, develop a Covid-19 plan to accommodate the shocks to essential services, intensify advocacy efforts and encourage private sector support, advocacy with leaders to ensure HIV remains on the national agenda, commit to building a robust health system with an expanded health workforce and ask donors to lock in commitments (Oladele, Olakunde, Oladele, Ogbuoji, and Yamey (2020).

Governance for gender and HIV inequities

The patriarchal society in Nigeria dictates that women's rights are often weaker than that of men. Male partners play decision-maker, financial provider, and support roles for women in their utilization of maternal-child health services where HIV services are targeted. These roles, and whether they are ultimately supportive of women or not, are synergistically influenced by multiple factors, including traditional and religious norms, male partners' age, level of education, socioeconomic status, and rural or urban residence (Al-Mujtaba, Sam-Agudu, Torbunde, Aliyu, & Cornelius, 2020). Gender mainstreaming with community stakeholder engagement that includes women can reduce harmful gender norms and advance gender equity in women's healthcare access, ultimately improving HIV outcomes. Women who would otherwise access care may be unable to do so if their male partner is in disagreement, and men who desire to actively participate in maternal-child healthcare may be derided and stigmatized as non-masculine (Al-

Mujtaba et al., 2020). Financial constraints, male-unfriendly clinics and poor healthcare worker attitudes have been identified as major barriers to women's access and male partner involvement (Al-Mujtaba et al., 2020). Each of the above factors has been reported to increase a woman's vulnerability to HIV (Milazzo, 2014). Thus, Awofala and Ogundele (2018) recommend that the Nigerian HIV prevention plan should address these gender factors that increase female vulnerability to HIV, promote integration of services and evidence-based HIV programmes and should be gender sensitive and responsive, with gender related barriers reduced to a minimum.

Furthermore, a study assessing the caregiving role to people living with HIV/AIDS (PLWHA) in Nigeria found that the burden of care lay with women and girls from 10 years old and above, often worsening their economic status and subjecting them to imminent poverty (Asuquo, Etowa, & Akpan, 2017). Health systems in countries such as Nigeria do not have the capacity to provide long-term care and support to PLWHA, and patients are often discharged without contact with family caregivers. The need for the healthcare system and government to endorse policies that will support female caregivers and also enhance quality of care to PLWHA in Nigeria has been highlighted as a key priority. The study found that these caregivers had minimal social support which increased the burden they experienced and called for policy that recognizes and supports female caregivers ("silent cornerstone") to reduce burden and ensure high quality care of people living with HIV/AIDS (PLWHA) in Nigeria (Asuquo et al., 2017).

Governance for disability inclusive HIV programmes

There are legislation and policies that support disability inclusiveness in HIV/AIDS programming related to their sexual and reproductive health rights including HIV/AIDS (Anti-Discrimination) Act 2014 and the Discrimination Against Persons with Disabilities (Prohibition) Act 2014. However, Adesina et al. (2021) state that this policy is largely unimplemented in Nigeria as it has poor political and financial backing. The authors make 6 recommendations to support disability inclusion in HIV/AIDS programming including; championing of programmes by people with disabilities that focus on HIV/AIDS related to their sexual and reproductive health and rights while strengthening organisations that work with disabilities; obtain accurate data in relation to persons with disabilities in HIV/AIDS programmes including strengthening the capacity of governments to collect such data; identify additional funding dedicated to ensuring inclusivity of people with disabilities and ensuring that disabled persons in hard-to-reach, vulnerable, historically marginalized communities and humanitarian settings should not be neglected.

Medicines and technology

Evaluation of Laboratory Logistics Management Information System in HIV/AIDS Comprehensive Health Facilities in Bayelsa State, Nigeria (Omo-Emmanuel et al., 2017)

An evaluation of Laboratory Logistics Management Information System in HIV/AIDS Comprehensive Health Facilities was conducted in Bayelsa State. The study found limitations of LMIS implementation for HIV/AIDS commodities including a lack of standard operating procedure to guide implementation of LMIS, deterioration of commodities due to poor power supply, lack of computers and internet for electronic LMIS implementation, lack of training for some laboratory personnel involved in LMIS, inadequate supply chain management during resupply cycle, long lead time and inadequate space for laboratory store (Omo-Emmanuel et al., 2017). There were also high amounts of expired laboratory commodities in the facilities while some key HIV/AIDS

monitoring laboratory commodities were stock out at some facilities. Based on findings, the supply of standard operating procedure on LMIS to all health facilities is recommended alongside effective and efficient mechanisms for redistribution of surplus commodities from facilities that have large quantities to those with low stock to prevent large expiries.

Culturally-adapted and audio-technology assisted HIV/AIDS awareness and education program in rural Nigeria: a cohort study (Ofotokun et al., 2010)

A 14-week cohort study was designed to compare short-term changes in HIV knowledge between seminar-based education program (a one-time open house seminar with pamphlets) and a novel program, which capitalized on the rural culture of small-group oral learning and was delivered by portable digital-audio technology (similar to an MP3-player). The seminars and pamphlet distribution resulted in some amount of improved HIV awareness, however the audio-device assisted intervention was associated with a more robust gain in knowledge. The authors deduce that the reasons behind this are related to the content being formulated into culturally familiar oral modules and delivered in a small group setting in the local language, by an easy-to-use audio platform. The use of an mp3-like device ensured that information was consistent and participants could refresh their knowledge by listening multiple times. The study concluded that the audio HIV program offers a feasible and cost-effective alternative to improving HIV knowledge in such settings (Ofotokun et al., 2010).

Information- HIV/AIDS

A recent article in the Lancet (Adeyinka et al., 2019) has highlighted that the planning of HIV prevention and treatment programmes could have been flawed due to ambiguities around the number of people with HIV in Nigeria. For example, the use of sentinel prevalence data from pregnant women attending antenatal care clinics to estimate HIV rates in the population had inherent limitations, such as non-representative samples arising from selection bias and small sample sizes. However, on March 14, 2019, the Government of Nigeria released the preliminary findings of the National HIV/AIDS Indicator and Impact Survey (NAIIS) which is described as the largest population based, cross-sectional survey ever done. However, in settings with low HIV prevalence, population-based surveys, such as this, can underestimate the prevalence of HIV in some subpopulations missing those who are at a high risk of HIV, such as men who have sex with men, female sex workers, and injection drug users, especially if such groups are not adequately represented in the survey. The government has recognised this limitation and is planning to triangulate the NAIIS data with key population estimates at the state level. Based on current HIV treatment coverage (1.1 million) and the new prevalence estimate, 800 000 people with HIV will need to be identified and started on treatment in Nigeria. Although prevalence is estimated to have decreased, many people will still need to be tested to identify those with HIV. The authors conclude that the 2018 NAIIS report provides a clearer understanding of the current HIV epidemic, and an opportunity for data-driven planning for improved HIV service delivery in Nigeria.

In agreement with the above survey, populations identified by a descriptive analysis of the HIV epidemiology in Nigeria based on the sentinel surveillance system are people practicing low-risk sex described as the driving force of the HIV epidemic in Nigeria while the high risk groups of female sex workers (FSWs), men who have sex with men (MSM) and people who inject drugs (PWID) contribute substantially to new infections (Awofala & Ogundele, 2018). HIV prevalence

among adults in Nigeria was found to be relatively low (3.2%), however the large population in Nigeria means that HIV infection remains an issue that demands a systematic and highly tailored intervention (Awofala & Ogundele, 2018).

In recognition of key risk populations, a study was conducted to map and develop a profile for the hotspots of female sex workers, men who have sex with men, and people who inject drugs in 7 states of Nigeria to inform HIV prevention and service programs and in preparation for population size estimation (Lo et al., 2021). A total of 13,899 key population hotspots were identified and mapped in the 7 states. The most common hotspots were those frequented by female sex workers (9593/13,899, 69.0%), followed by people who inject drugs (2729/13,899, 19.6%) and men who have sex with men (1577/13,899, 11.3%). Although hotspots were identified in all local government areas visited, more hotspots were found in metropolitan local government areas and state capitals. Close collaboration with key population-led community-based organizations facilitated identification of many new and previously undocumented hotspots. Overall, hotspots of men who have sex with men and people who inject drugs were more difficult to locate due to social stigma compared to female sex worker hotspots which were more visible. The authors contend that the findings can be used by HIV service providers to identify strategic areas for placement of services and allocation of limited resources for targeted interventions.

Human Resources – HIV/AIDS

A study that conducted interviews with key informants involved in the HIV/AIDS supply chain management (SCM) highlighted the following human resource challenges. Attrition/transfer of trained staff, remuneration differentials contributing to attrition rates and inequitable distribution of healthcare professionals in some instances, capacity gaps at the national and state levels especially for programme management and quantification of HIV/AIDS products, poor work attitude and placement of personal gains above public good at the national level (Itiola & Agu, 2018). The interviewees recommend; advocacy to reduce transfer of trained staff to sites where their skills may not be needed, recruitment, training and motivation of workers through regular payment of salaries, prioritizing certain professionals for some SCM roles such as pharmacists, professional recognition of logisticians and better remuneration package for those performing SCM functions, task shifting, better planning and regular training and mentorship for government officials, institutionalizing and enforcing performance benchmarks to address attitudinal challenges, attracting the private sector to improve public sector performance and institutionalizing health SCM as a professional postgraduate programme (Itiola & Agu, 2018).

In addition, the need for training and retraining of health workers using more practical methods of training such as role plays, for different levels of the health systems to improve the delivery of HIV/AIDS services was highlighted by several studies (Ashipa, Ofili, Onakewhor, & Adejumo, 2017; Itiola & Agu, 2018; Suthar et al., 2017). For example a study assessing health workers' knowledge of the national guidelines on preventing mother-to-child transmission of HIV in Benin City, Edo State found that less than two-thirds of the health workers had good knowledge of the national guidelines on PMTCT (Ashipa et al., 2017). The factors significantly associated with good knowledge of the guidelines among the health workers were occupation, previous training on PMTCT and having a copy of the guidelines. The authors in the study highlight key areas for training.

To address some performance related factors a systematic review of four performance-based financing (PBF) interventions for improving HIV/AIDS service delivery found that PBF did not improve individual testing coverage, however it did improve couples testing coverage and pregnant women testing coverage PBF improved coverage of antiretrovirals in pregnant women, infants, and adults. PBF reduced attrition and treatment failure (Suthar et al., 2017) .

Service delivery for HIV/AIDS

Public health versus peer-led or community-based interventions

Key populations including PWID, FSW and MSM reported that they are more satisfied attending a peer-led HIV prevention service in Nigeria compared to public health services across Enugu, Nassarawa, Benue, and Akwa-Ibom states (Ochonye et al., 2019). Significantly more respondents were satisfied with the quality of services with respect to service providers listening to respondent's problems and concerns, privacy and confidentiality and in respect of rights of service recipients. Respondents using peer-led organisations identified no barriers to service access whereas those using public health facilities identified cost of services, confidentiality, waiting time and staff attitude as barriers to service access due mainly to stigma and the effects of the same-sex prohibition law (Ochonye et al., 2019).

However another study investigating the effects of peer and provider-based education interventions on HIV/AIDS knowledge and behaviour-risk among in-school adolescents in Ebonyi State found greater increase in knowledge among the health provider based intervention groups (Chizoba et al., 2021). The authors suggest that this could be because health providers have better experience and skill for delivering education intervention and recommend that adolescents receive adequate tutelage from health providers to develop required skills to give HIV education to their peers in school settings.

Studies have highlighted that youth (15–24 years of age) in Nigeria have not benefited from ART as much as adults (Mark et al., 2017). A combination intervention, comprising daily 2-way text message medication reminders plus peer navigation led to a 6-fold increase in the odds of viral suppression from baseline to 48 weeks. The combination intervention was feasible and acceptable with high satisfaction and retention in HIV care documented. The authors concluded that the 48-week pilot study demonstrated that the intervention is promising for improving ART outcomes among YWH aged 15–24 years in Nigeria (Taiwo et al., 2021).

A designathon to co-create community-driven HIV self-testing services for Nigerian youth: findings from a participatory event (Tahlil et al., 2021)

This study engaged 42 young Nigerians to develop ideas on how to promote HIV self-testing services among youth. This is part of the “Innovative Tools to Expand HIV Self-Testing” (ITEST) project, locally known as “4 Youth By Youth”. Ideas presented include social media (WhatsApp, Facebook, Instagram, and Twitter) to conduct online marketing campaigns for their kits, a social media application where youth could report their test results and find post-test HIV services, and a peer referral system to enhance HIV self-testing uptake. The authors conclude that Youth-led development of HIV self-testing strategies offer promising solutions to expand HIV self-testing among young people in Nigeria (Tahlil et al., 2021).

Cost-effectiveness and Feasibility of Conditional Economic Incentives and Motivational Interviewing to Improve HIV Health Outcomes of Adolescents Living with HIV in Anambra State, Nigeria (Ekwunife et al., 2021)

A conditional economic incentives and motivational interviewing intervention was assessed for impact on the health outcomes of adolescents living with HIV in Nigeria. The intervention group received US\$5.6 when the viral load is < 20 copies/ml for the first three months, received US\$2.8 if the viral load remained suppressed for the next three months and the next 6 months, and then received US\$5.6 if the viral load remained for the next one year. This cash reward was linked to attaining undetected viral load and also attending motivational interview sessions on each clinic visit. The study found that the intervention was cost effective and that patients acceptance was very high. However, health workers stated that the intervention would not be sustainable without government buy-in and healthcare provider diligence addressed. The authors suggest that the Incentive Scheme be incorporated as one of the social welfare schemes that are operational in Nigeria such as the school feeding programme and Tradermoni (a Federal Government Empowerment Scheme) and should be targeted to assist adolescents who cannot afford transportation fares for hospital appointments.

Assessment of provider-initiated HIV screening in Nigeria with sub-Saharan African comparison (Ogbo et al., 2017)

To increase the number of people who test for HIV, the Joint United Nations Programme on HIV/AIDS/WHO recommends a provider-initiated testing and counselling (PITC) strategy for all patients aged ≥ 13 years. PITC refers to a routine offer of HIV testing and counselling for all patients who visit a health facility by a health professional (particularly in HIV endemic communities), regardless of the presenting symptoms, and without a separate written consent (World Health Organization, 2007). This intervention was implemented with all patients (aged ≥ 13 years) who visited the out-patient department and antenatal care unit of General Hospital Idekpa, Benue state. PITC for HIV was highly acceptable and logistically feasible and resulted in an increased rate of HIV testing among patients including a 5% increase compared to voluntary counselling and testing. Among the 212 patients offered PITC for HIV, 199 (94%) accepted HIV testing, 10 patients (4.7%) opted out and 3 patients (1.4%) were undecided. Of the 199 participants who were tested for HIV, 9% were HIV seropositive (Ogbo et al., 2017). The authors conclude that a PITC strategy, that facilitates early detection of HIV and referral for early treatment should be encouraged for broader HIV control and prevention in Nigerian communities (Ogbo et al., 2017).

Multinational Oil Companies in Nigeria and Corporate Social Responsibility in the HIV/AIDS Response in Host Communities (Uduji et al., 2019)

A study assessing the impact of corporate social responsibility (CSR) of multinational oil companies (MOCs) on HIV/AIDS prevalence in Nigeria's oil producing communities was undertaken with 1200 households in the Niger Delta region. The study found that interventions of MOCs in the rural Niger Delta communities was insignificant. The authors deduce that this is likely to lead to; greater absenteeism and staff turnover of oil workers; higher recruitment and training costs in medical care or insurance coverage, retirement funds or funeral fees; declining morale and productivity among oil workers and contractors. This is likely to take toll on workers savings, the resources of their families, and their efficiency as they start spending more time

taking care of the sick. The findings suggest that corporate social responsibility offers an opportunity for MOCs to help address HIV/AIDS prevalence through a business case for stakeholders' health in the Niger Delta region, which could be achieved through interventions in local communities. The findings call for MOCs to improve health interventions in Nigeria, especially in combating the spread of HIV/AIDS through appropriate sensitization campaigns (routine community conversations about HIV/AIDS in the village squares, traditional market places, on the way to farmlands), funding testing and counselling centers, subsidized anti-retroviral drugs (ARD), prevention of mother-to-child transmission (PMTCT), rehabilitation of orphaned and vulnerable children and other carers for people living with AIDS in the oil-host communities (Uduji et al., 2019).

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