TUBERCULOSIS PATIENT PATHWAY ANALYSIS:
A PRAGMATIC EVALUATION ACROSS SELECTED STATES IN NIGERIA

A FINAL REPORT

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LIST OF ACRONYMS

CDC	Centers for Disease Control and Prevention
DOTS	Directly Observed Treatment Short Course
DS-TB	Drug Sensitive TB
DRTB	Drug Resistant TB
FCT	Federal Capital Territory
HBCs	High TB Burden Countries
HIV	Human Immune Deficiency Virus
LGA	Local Government Area
MDR-TB	Multi drug resistant TB
NHC	National Health Council
NPS	National TB prevalence survey
NTBLCP	National Tuberculosis and Leprosy Control Programme
NTP	National Tuberculosis Programme
PCC	Patient Care Cascade
PPA	Patient Pathway Analysis
PPM	Public-Public/Public-Private Mix
PPMV	Patent and Proprietary Medicine Vendor
RR-TB	Rifampicin resistant TB
SPOs	State Programme Officers
TB	Tuberculosis
WHO	World Health Organization

EXECUTIVE SUMMARY

Background information

Nigeria is among the fourteen countries with the highest TB, MDR-TB and TB/HIV burden, included in the eight countries contributing two-thirds of the global total TB cases and has an Robust health systems are a prerequisite to improve health outcomes and to accelerate progress towards achieving the national target of elimination of TB. Besides, knowing the challenge of locating the missing patients with tuberculosis and challenges TB patients face in accessing TB care and services, patient-pathway analysis (PPA) PPA is imperative. The intent of the PPA is to help national tuberculosis programs more accurately identify some of the health system alignment gaps that can be addressed through targeted program interventions. This will enable them plan prevention and care services that addresses patient care-seeking preferences and options. The study objectives are:

1. To examine the alignment of care seeking with service availability.
2. To reveal where TB patients experience delay during care seeking or treatment initiation.
3. To accurately identify some of the health systems alignment gaps that can be addressed through targeted program interventions.

Methodology

The study was a cross sectional study under programme implementation in 14 states of Nigeria (8 in northern regions and 6 in the southern regions), in a total of 92 facilities (53 in north and 39 in south regions). It involved all levels of health care (primary, secondary, and tertiary) in both public and private sectors. It included the review of data and documents from routinely collected programmatic data and national survey data in 14 states. Proforma and questionnaire were used in data collection from June 2020 to December 2021 by trained research assistants (health workers at facilities, ad hoc staff, and volunteer workers of KNCV). Data collected included Health Care seeking data, TB service availability and Health facility sectors and levels. It covered both Drug sensitive and drug resistant TB (DSTB and DRTB). Data was collected on paper forms, collated, and cleaned using Microsoft Excel. The preliminary analysis was done in Tableau for

easy visualization and interpretation. The PPA wizard was used in the final analysis and visualization. All data is presented in numbers and percentages. The visualization shows: distribution of diagnostics, TB and DR-TB treatment disaggregated by level of care of the health system; availability of diagnostics in public and private sectors; place where patients with TB symptoms first seek care first, diagnostic availability at first facility of seeking care for public and private sectors as well as availability of TB and DR-TB treatment at health facility of seeking care. Delay in patients' care was assessed based on respondents who first sought care in facilities but were referred to another facility due to unavailability of diagnostics and/or TB services (e.g., DR-TB treatment) at the facility. Ethical clearance was obtained from National Research and Ethics Committee. Written informed consent, confidentiality, voluntary participation, and permission from appropriate authorities were observed where and when necessary.

Results:

There are a total of 17,463 facilities in these 14 states studied. Out of these, there are 6,078 DOTS facilities in these states. However, PPA study was in 1,743 (29% of DOTS Sites). A total of 9,584 respondents were interviewed across the 14 states. With the highest number (28%) of respondents from Katsina state and the lowest number (0.7%) from Benue state. Over half (58%) of the respondents were male and 41% of all respondents had completed secondary education.

Overall, in the public facilities GeneXpert and smear microscopy are mostly available at the tertiary facilities. Of the fourteen states, nine (64%) of these have smear microscopy available in all their tertiary and eight states (57%) have GeneXpert in all their tertiary facilities. In the secondary facilities, smear microscopy availability is high where 10 states (71%) have availability in over 70% of the facilities, while GeneXpert availability is very low where only two states have over 50% of its facilities with availability. In the primary facilities, diagnostic availability is very low where only one state (7%) has 61% of its facilities with smear availability, and five states with less than 2% of its facilities with GeneXpert available. Availability of TB lamp is scanty with only Rivers having availability in all its tertiary facilities and sparse number of states (36%) at the tertiary and secondary levels – howbeit with very low coverage of 20% or less., - and no availability in the primary facilities

Also in the private facilities, the availability of diagnostics at the different levels is much lower when compared to the facilities in the public sector. Also like the public sector, smear microscopy has the highest proportion of availability in facilities compared to other types of diagnostics. 79% of the states have availability at both the primary and secondary facilities, and only two states (14%) have this available in their tertiary facilities. Availability of GeneXpert is similarly poor at all levels, with the lowest numbers in the tertiary facilities- only one state (7%) has availability in all its tertiary facilities, two states (14%) have availability in all their secondary facilities and lowest availability at the primary facilities – four states (7%) all with only 1% of their facilities with GeneXpert machines. There is no TB lamp available in any tertiary facilities and scanty availability in the other two levels – only one state (7%) has availability in secondary facilities (with a facility of coverage of 1%), and two states (14%) have availability in primary facilities, both with less than 4% facility coverage

The highest proportion of respondents - between 57% and 88% - in all 14 states first sought care for TB symptoms in the public facilities. Less than 3.5% of respondents in all states did not seek care in the health system but may have sought other forms of care not captured by the study. 50% of the states (Anambra, Akwa Ibom, Benue, Cross River, Delta, Imo, and Rivers) had the highest percentage (>20%) of respondents who first sought care in the private informal sectors.

Overall, there is a poor alignment of diagnostics and appreciable good alignment on DR-TB treatment services in the health system and patient care seeking behavior. For public sector, very few facilities at the secondary (4, 29%) and tertiary (2, 14%) levels have TB lamp available. Eleven (80%) states have either GeneXpert and/or microscopy smear available in all secondary and tertiary facilities. Here, patients more often sought care in the secondary and primary facilities, however there are more diagnostics available at the tertiary facilities than the other two levels. In the public sector, there is a misalignment of DR-TB treatment overall, as most states do not have treatment in facilities (0% in the visual) where patient first sought care (higher end of the x-axis). In the primary facilities there are very limited DR-TB treatment available in facilities across all fourteen states. For private sector, very few facilities offer DR-TB treatment at the primary and secondary levels, and no tertiary facilities offer this option. Only 6 (43%) states have proportions of facilities with DR-TB treatment availability – these are very low between 2% and 7%, with only Plateau state having up to 39%. More respondents reported to have first sought care in the private

sector. However, overall, there is a lower availability of diagnostic in the private sector compared to the public sector, with very poor alignment of microscopy smear in the secondary and primary facilities where over 50% of respondents in all states first sought care (combined).

Delay in patients' care showed that for public sector; higher proportion of patients experienced delays in access to TB services mostly in the primary and secondary facilities Patients who first sought care in the tertiary facilities experienced the least delays across all states except in Delta and Anambra states. This finding is similar for private sector.

Conclusions and key recommendations

Identified differences in patient pathways to care and poor alignment call for differentiated approaches to patient-centered care. It will require closing the diagnostic and treatment gap by engaging as well as strengthening the capacity for both diagnosis and treatment in both public and private sector. This calls for innovative TB program, reduction in barriers to TB services and improvement on referral system.

1.0 INTRODUCTION

Tuberculosis (TB) continues to be a global public health problem across the world. In 2020, approximately 10.0 million people fell ill with TB and an estimated 1.3 million died among HIV-negative people as well as 214 000 among HIV- positive people globally (1). Although global commitments have been made which provide actionable targets to end the TB epidemic by 2030, the pace of progress in most regions and countries is insufficient (1,2). The End TB strategy is in line with the Sustainable Development Goals Target 3.3 and sets the 2030 target of reducing TB mortality by 90% and TB incidence by 80% using 2015 levels as the reference. This strategy also endeavors that no TB patient and their households face catastrophic costs as a result of TB disease by 2020 (2). A recent analysis of three years of the End TB Strategy found that despite global declines in TB incidence and deaths, the rate of decline needs to be accelerated in order to reach global targets (3). In 2016, it was estimated that 74% of new cases of TB among HIV-positive people were in the African region (4).

Nigeria is among the fourteen countries with the highest TB, MDR-TB and TB HIV burden, and is included in the eight countries contributing two-thirds of the global total TB cases (5). There is an estimated 219 cases of TB per 100 000 population making it one of the 30 High TB Burden Countries (HBCs) in the world, contributing to 8% of the worldwide gap in case detection (3). Nigeria along with 7 other HBCs (India, China, Indonesia Philippines, Pakistan Bangladesh and South Africa) alone account for two thirds of all new cases worldwide (1). Nigeria has an estimated 323,000 missing TB cases equivalent to 12% of the total global TB cases not notified (6). It is estimated that 452,000 (295, 000-641,000) persons fell ill with TB in 2020, yet only about 138,591 (all cases) were notified (1). This, therefore, means that about 70 percent of estimated TB cases were not diagnosed, treated and or notified annually. Regarding drug resistant TB (DRTB), it is estimated that in Nigeria 1,940 cases were detected and notified over the same period (1).

Despite incremental progress in the quality of TB treatment and care over the years as evidenced by 88% treatment success rate (new and relapse cases registered in 2019), the overall TB treatment coverage remained low at 30% in 2020 in Nigeria (1), out of which 71% of these patients face total catastrophic (6). The WHO-estimated TB mortality (excluding HIV-related TB) rate for Nigeria improved below 100 per 100,000 in 2020 (1). The World Health Organization (WHO) 2021 report for Nigeria showed ninety one percent (91%) of bacteriological confirmed TB cases tested for rifampicin resistance -previously treated TB cases (MDR/RR-TB), while 67% of new TB cases are drug-resistant forms. Overall in 2020, only 2,061 were bacteriologically confirmed MDR/RR-TB cases (77% started on treatment); 97 were bacteriologically confirmed pre-XDR-TB or XDR-TB (77% started on treatment), Furthermore, 1,940 MDR/RR-TB cases tested for resistance to any fluoroquinolone (1). WHO also estimates a high TB mortality of 125,000 Nigerians annually equivalent to 340 deaths per day and 14 deaths per hour (6). The burden of TB in Nigeria also comes at a great economic cost with an estimated loss of $45 billion between 2000 and 2015 due solely to TB (7). Nigeria has a TB/HIV co-infection incidence rate of 27 per 100 000 population which also places it in the list of 30 high TB/HIV burden countries (7).

In Nigeria, the public health service is organized into primary, secondary, and tertiary levels as well as public and private facilities. National Health Bill 2014 lays out the roles and responsibilities as well as strengthened the linkages between the three levels of the health system. The National Tuberculosis and Leprosy Control Programme (NTBLCP) operations are in line with the three

levels of governance in the country: national, state, and local government area (LGA). The LGA is the basic management unit of the NTBLCP. A declaration at the 2017 National Health Council (NHC) made TB reporting mandatory for all health professionals including private practitioners (8). The private and public non-NTBLCP sectors are playing an increasingly important role in TB control. Private sector engagement is extremely important in Nigeria, as an estimated 60% of all health care is delivered by the private sector, however, their role in TB control is highly limited (7). The NTBLCP has stepped up its engagement through a public-public/public-private mix (PPM) approach, implemented in all 36 States and FCT providing a range of TB services (referral, diagnosis and/or treatment) (7). However, low TB service coverage among all health facilities exists at <11%, while even lower in private facilities at 5%; combined with poor utilization of existing TB services and weak referrals systems (9). These challenges and gaps are due to among many others, a combination of limited knowledge about TB symptoms and service delivery points among the general population (24%) (10), underreporting of TB cases, under diagnosis i.e., people with TB not accessing health care or not diagnosed when they do. The National TB prevalence survey (NPS) conducted in 2012, showed 75% of the smear-positive cases detected had symptoms that met national screening criteria but had not been previously diagnosed, demonstrating a need to strengthen access to TB services (11).

Varying actions and approaches have been employed to understand programmatic gaps in TB management and control including TB prevalence surveys, routine surveillance, qualitative program reviews, and other special studies. Still, TB poses a major public health problem globally. The goal of the Patient Pathway Analysis (PPA) is to help TB programs identify where TB patients may be missed by looking at the steps a patient takes on their pathway to care and how the TB system meets them along the way. The PPA findings will complement data from other approaches to shape TB programs and plan. Based on these, the Patient Pathway Analysis (PPA) approach was established to appreciate better the alignment between patient care seeking and TB service availability. This approach targets to define and unravel the barriers experienced by TB patients at each stage from the initial point of seeking care to the point of being cured and discharged. The PPA describes steps TB patients take from the initial point of seeking care to the end of treatment. It reviews the availability of TB screening, diagnosis, and treatment at various levels of the health system (12). (Figure 1) Proper evaluation of alignment of health care seeking

behavior with service availability at these health systems will help inform programmatic priority setting and planning for more patient-centered availability of services.

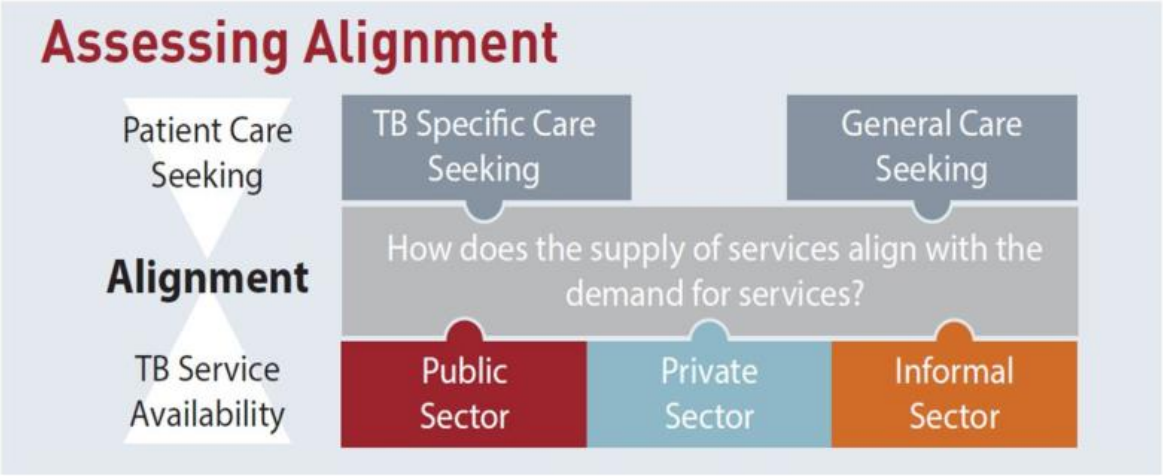

Figure 1: Hypothetical framework: Aligning Care Seeking and Service Availability (adapted from PPA how-to guide)

The person-centered care is key in the WHO End TB Strategy as it looks at where services should be positioned to serve the patients better rather than looking for where services are provided without the recipients considered. It allows bottom to top method and meet patients need based on where they are. The PPA is designed to help- actualize this.

In addition, review of where TB patients experience delay during care seeking or treatment initiation is very necessary for maximal benefit to these patients. The patient care cascade (PCC) was presented as an "Onion Model" and developed as a framework for assessing the fraction of missing TB patients provides a comprehensive understanding of where persons with TB are missing, with the different steps in health-seeking and various levels of the health system represented by different 'layers' of the onion (13). If the goal of ending TB is to be achieved, finding these 'missing' TB patients is essential. These 'missing' TB patients can be grouped into three categories: (Figure 2)

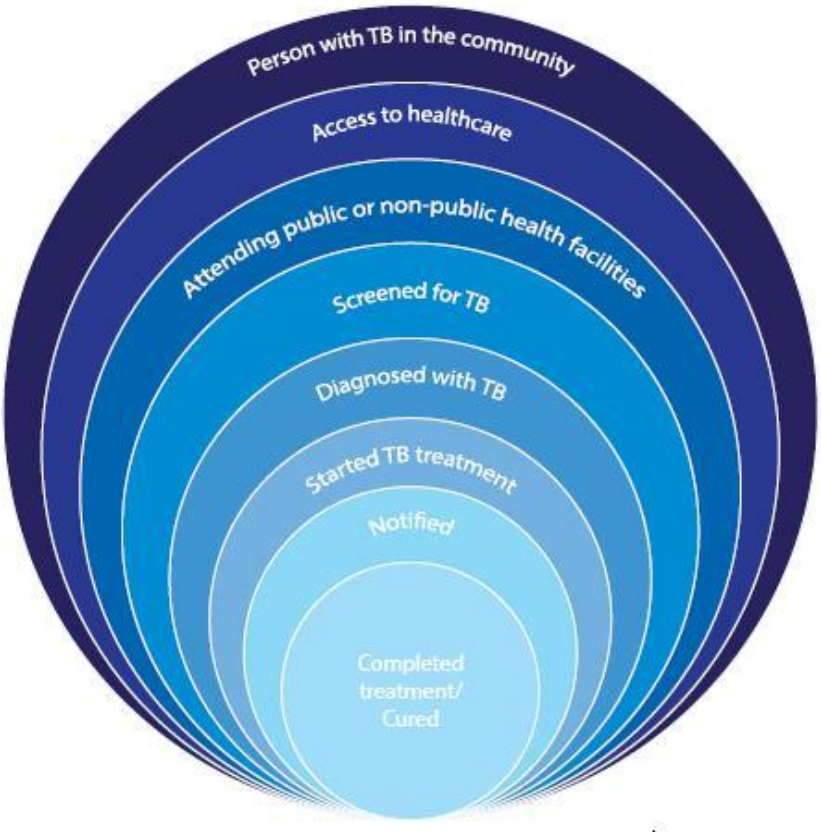

Figure 2: Onion Model with key steps along the patient care cascade (adapted from FMTP Operational Guideline)

a) Patients who did not access care due to financial, geographic, or other barriers to accessing care.

b) Patients who sought care in the private (or non-state) sector and were diagnosed and treated there, but not notified to the NTP.

c) Patients who were diagnosed and treated in the public sector facilities but not notified to the NTBLCP or TB Patients who had contact with the public sector facilities but were not diagnosed.

2.0 GOALS & OBJECTIVES

The goal of this study is to provide technical assistance to the NTBLCP to better understand varied patient care cascade and patient health-seeking behavior across different service points. The study objectives are:

1. To examine the alignment of care seeking with service availability.
2. To reveal where TB patients experience delay during care seeking or treatment initiation.
3. To accurately identify some of the health systems alignment gaps that can be addressed through targeted program interventions.

Figure 3: Patient care seeking behavior along the care cascade

3.0 METHODS

3.1 Study area

Nigeria is a country in West Africa, and is the most populous country in Africa, with an estimated population of 206 million in 2020 according to World Bank projection. There are three levels of government: Federal, State and Local Government Area (LGAs). There are 36 states and a Federal Capital Territory (FCT), which are organized into six geopolitical zones (North-West, North-East, North-Central, South-West, South-East and South-South). There are widely varied regional health indices with the southern regions generally having better indices than the northern regions. The number of LGAs in each state is variable, ranging from 8 to 44, with a total of 774 LGAs in the country. The official language of Nigeria is English, although there are more than 250 ethnic groups with diverse languages and religious faiths. Nigeria's economy is heavily dependent on oil exports. An estimated 43.9 percent of the population is under the age of 15years and 19.3 percent between the ages of 15 and 24years. The life expectancy for both sexes is 55.8 years. The public health service is organized into primary, secondary, and tertiary levels with responsibilities for primary health care ascribed to local governments, secondary care to states and tertiary care to the federal level. As at 2019, there are 5,389 DOTS centres providing TB treatment services in Nigeria and 398 GeneXpert MTB-Rif machines were in use, supported by numerous partners and placed in all 36 states plus FCT (14). All LGAs have at least one DOTS treatment facility. The study was carried out in 14 states (8 in northern regions and 6 in the southern regions), in a total of 92 facilities (53 in north and 39 in south regions). The facilities included both public and private sectors across the three levels of care (primary, secondary, and tertiary). These are states where are KNCV operates.

3.2Study Design

The study is a cross sectional study under programme implementation and was conducted from June 2020 to December 2021. It included the review of data and documents from routinely collected programmatic data and national survey data in 14 states. Total Health Facilities in States studied were 17,463 and total DOTS Facilities in States 6,078. Also, PPA Study Sites were 1,743 (29% of DOTS Sites).

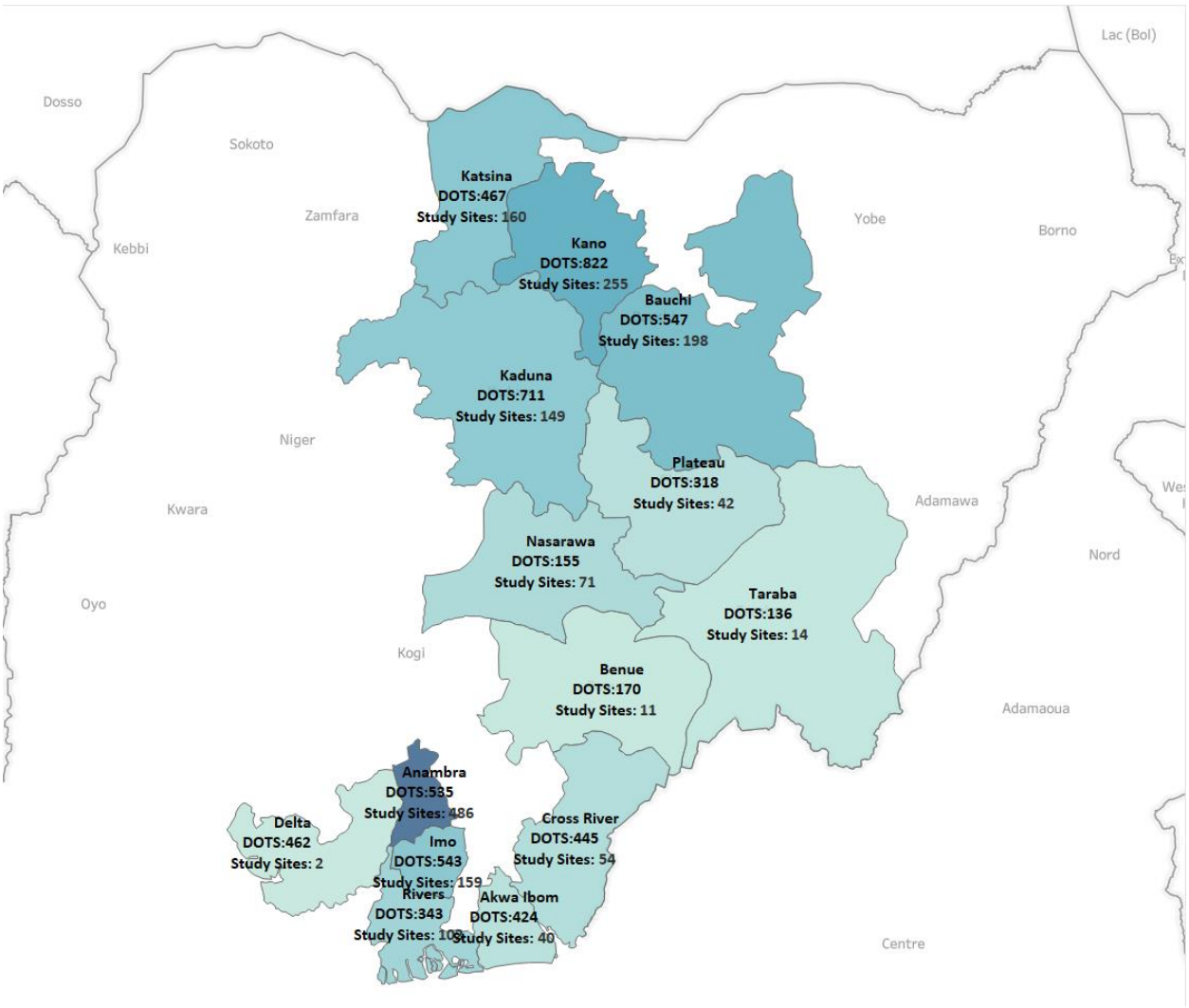

Figure 4: Geographical location on study states and sites

3.3 Data Types

The 3 data types collected include:

- Health Care seeking data: This is data regarding patients' health-seeking behavior, especially those with TB symptoms presenting at a first instance in the 14 states. This data was collected using the patient questionnaire (Annex B).
- TB service availability: This is data on the availability of different TB services (diagnostics, TB and DR-TB treatment) in the health facilities. Data was collated using

proforma and questionnaire with additional information collected from the NTBLP and KNCV Nigeria databases for the 14 states studied. (Annex A).

- Health facility sectors and levels: This is data about the disaggregation of the facilities per sector (public and private) and levels (primary, secondary, and tertiary). Data was collated using proforma and questionnaire with additional information collated from the National and respective states' health facility registries (Annex A).

3.4 Data Collection and Tools

Data collection was conducted by trained and proficient personnel to ensure good quality data. The health workers were trained by Principal Investigator or Consultant and State Programme Officers (SPOs). This training was further cascaded to research assistants who conducted the data collection from the facilities and respondents. The research assistants were made up of health workers at facilities, ad hoc staff and volunteer workers of KNCV.

- **Data collection tool 1: Proforma**

  Data was extracted from registers at facilities using a proforma template. The data collected include - facility name, sector (public or private), level of care (primary, secondary, or tertiary), applicable diagnostic tool(s) separate for DS-TB and DR-TB (AFB microscopy, Gene Xpert, Chest X-ray, TB Lamp, Culture) as well as available TB treatment services (for both DS and DR-TB).

- **Data collection tool 2: Questionnaire**

  The questionnaire was administered by trained data collectors. Data collected include – patient demographics and socio-economic status, health complaints (symptoms) the client sought care for, and place the client first sought care for the complaints, if referred, the reason for referral and the health facility referred to.

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3.5 Data Cleaning, Analysis and Visualization

Data was collected on paper forms, collated, and cleaned using Microsoft Excel. The preliminary analysis was done in Tableau[15] for easy visualization and interpretation. The PPA wizard was used in the final analysis and visualization in Q1 2022. The data visualizations show:

- Distribution of diagnostics, TB and DR-TB treatment disaggregated by level of care of the health system.
- Availability of diagnostics in public and private sectors.
- Place where patients with TB symptoms first seek care first, diagnostic availability at first facility of seeking care for public and private sectors as well as availability of TB and DR-TB treatment at health facility of seeking care.

For this study, Community Pharmacists, Patent Medicine Vendors (PMVs) and private hospitals were grouped as private formal facilities, while all traditional and home treatments were grouped as private informal, both categories make up the private sector. All data is presented in numbers and percentages.

3.6 Ethical consideration

Ethical clearance was obtained from National Research and Ethics Committee. Written informed consent, confidentiality, voluntary participation, and permission from appropriate authorities were observed where and when necessary.

4 RESULTS

4.2Respondents Demographics and Socio-Economic Factors

A total of 9,584 respondents were interviewed across the 14 states. With the highest number (28%) of respondents from Katsina state and the lowest number (0.7%) from Benue state. Over half (58%) of the respondents were male and 41% of all respondents had completed secondary education.

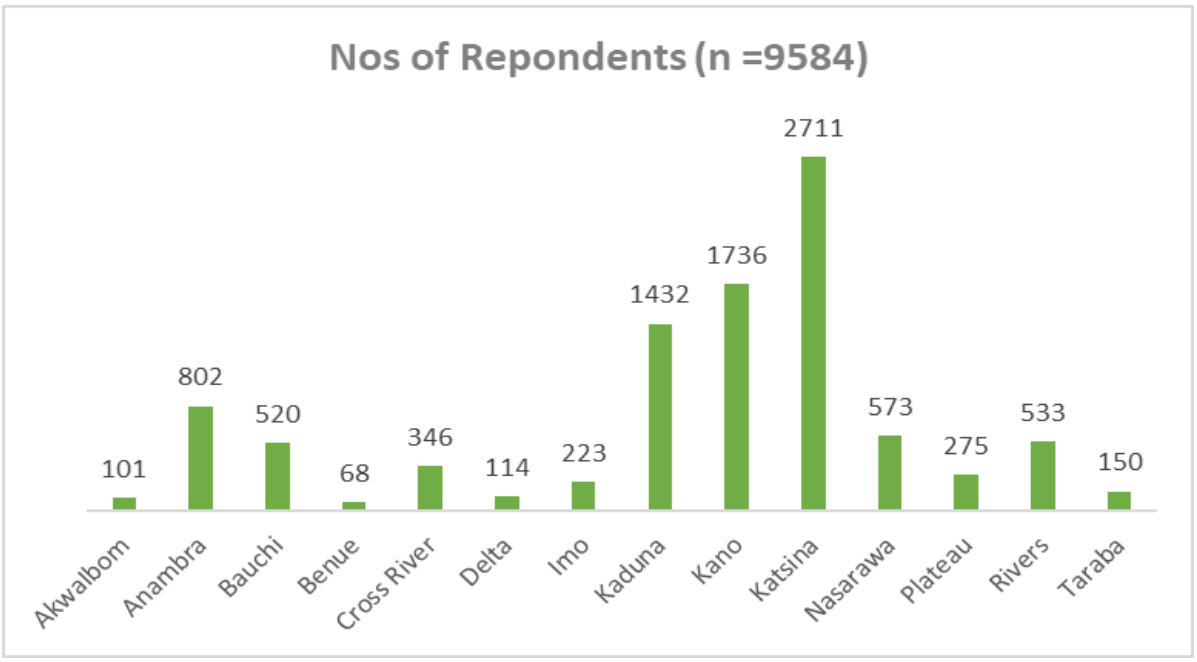

Figure 5: Respondents per State

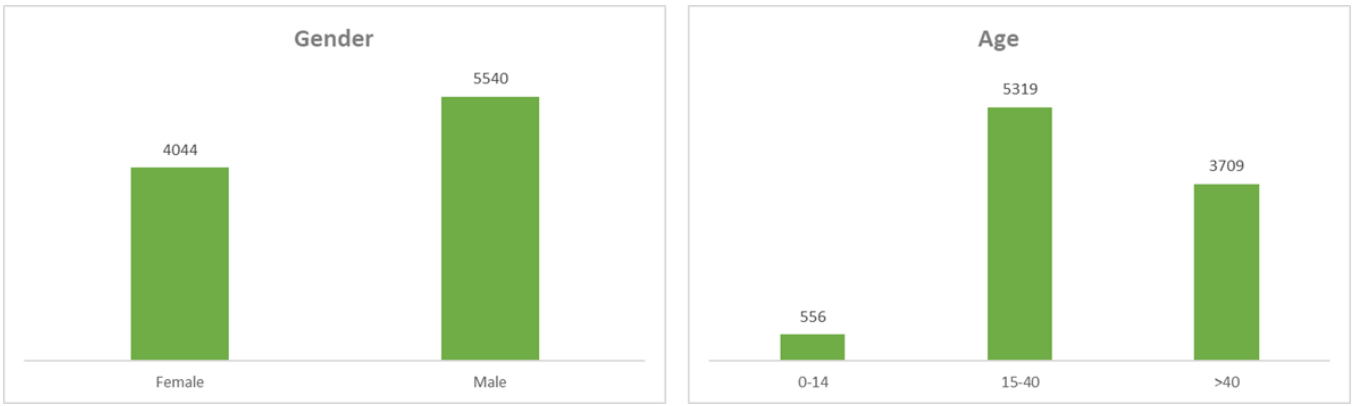

Figure 6: Respondent Demographics

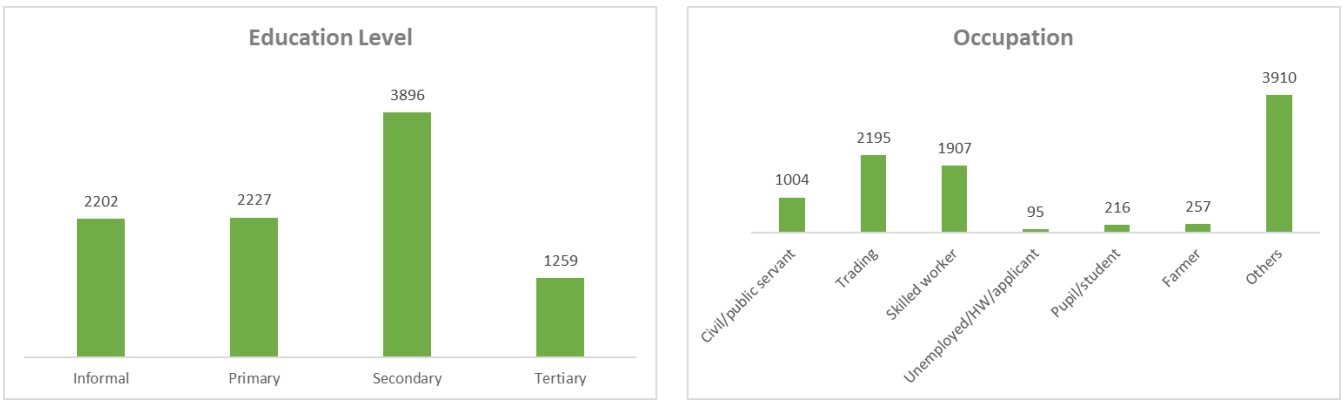

Figure 7: Respondent socio economic status

4.3Service Availability

This analysis is based on the proportion of facilities that have TB diagnostics available per state in the different sectors and health system levels, with a deep dive into the specific diagnostic types.

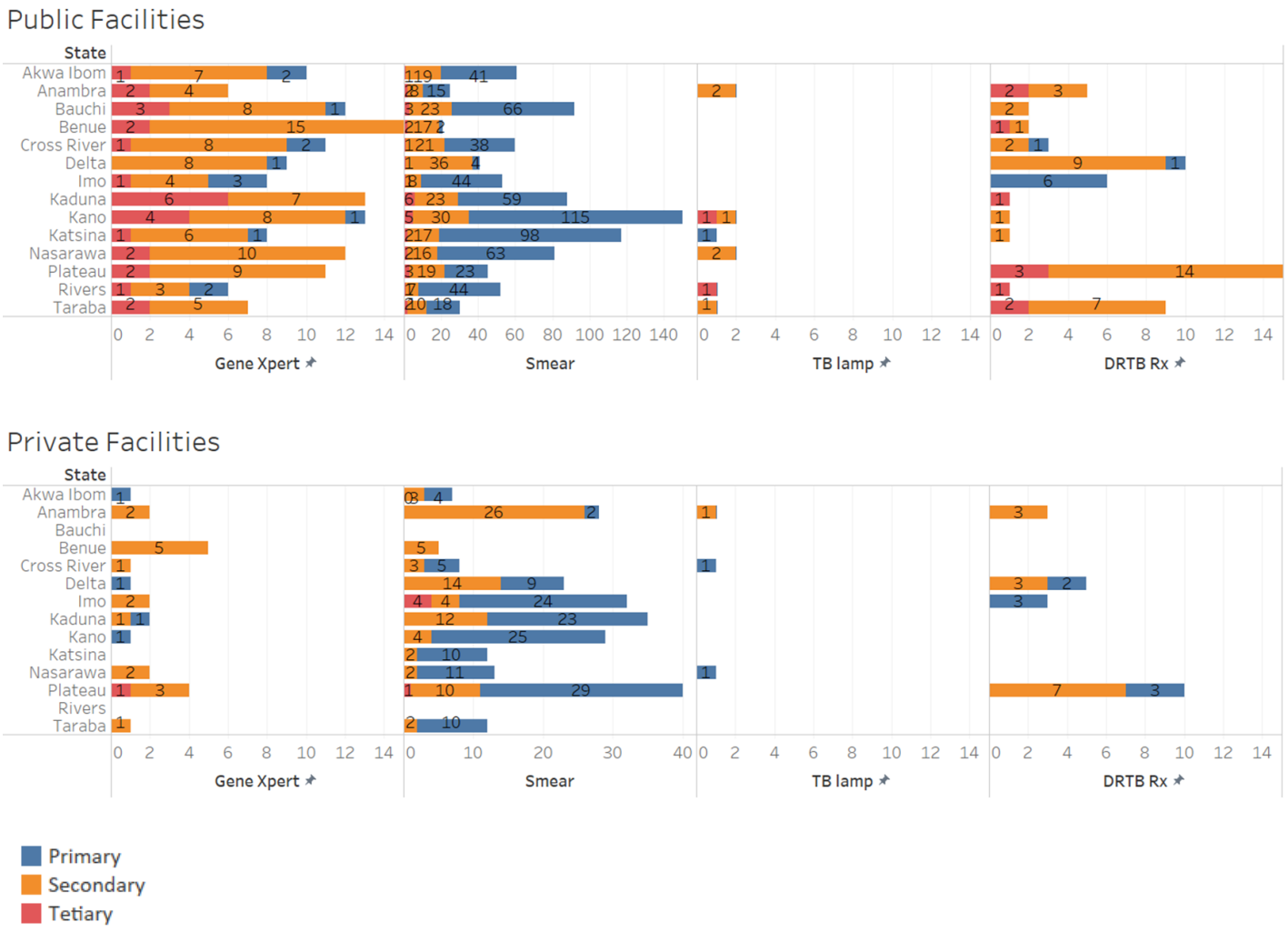

Figure 8: Distribution of service availability in the public and private sectors

Availability in the Public Sector

Overall, in the public facilities GeneXpert and smear microscopy are mostly available at the tertiary facilities. Of the fourteen states, nine (64%) of these have smear microscopy available in all their tertiary and eight states (57%) have GeneXpert in all their tertiary facilities. In the

secondary facilities, smear microscopy availability is high where 10 states (71%) have availability in over 70% of the facilities, while GeneXpert availability is very low where only two states have over 50% of its facilities with availability. In the primary facilities, diagnostic availability is very low where only one state (7%) has 61% of its facilities with smear availability, and five states with less than 2% of its facilities with GeneXpert available.

Availability of TB lamp is low. Sparse number of states (36%) have TB lamp at the tertiary and secondary levels – howbeit with very low coverage of 20% or less., - and no availability in the primary facilities.

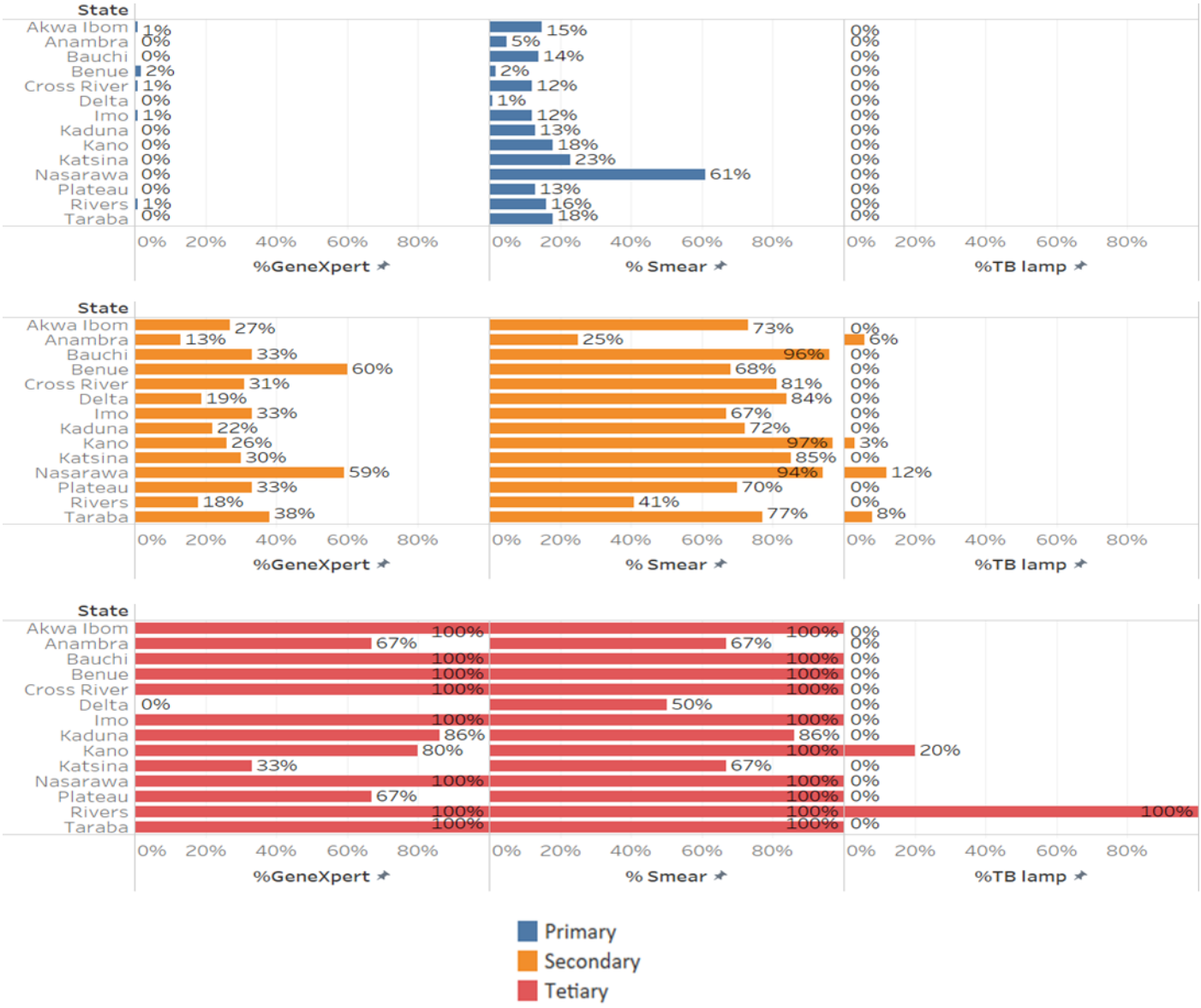

Figure 9: Proportion of diagnostics availability in the public sector per health system level

Availability in the Private Sector

Overall, in the private facilities, the availability of diagnostics at the different levels is much lower. when compared to the facilities in the public sector. Also like the public sector, smear microscopy has the highest proportion of availability in facilities compared to other types of diagnostics. 79% of the states have availability of smear microscopy at both the primary and secondary facilities, and only two states (14%) have this available in their private tertiary facilities. Availability of GeneXpert is similarly poor at all levels, with the lowest numbers in the tertiary facilities- only

one state (7%) has availability in all its tertiary facilities, two states (14%) have availability in all their secondary facilities and lowest availability at the primary facilities – four states (7%) all with only 1% of their facilities with GeneXpert machines. There is no TB lamp available in any tertiary facilities and limited availability in the other two levels – only one state (7%) has availability in secondary facilities (with a facility of coverage of 1%), and two states (14%) have availability in primary facilities, both with less than 4% overall facility coverage.

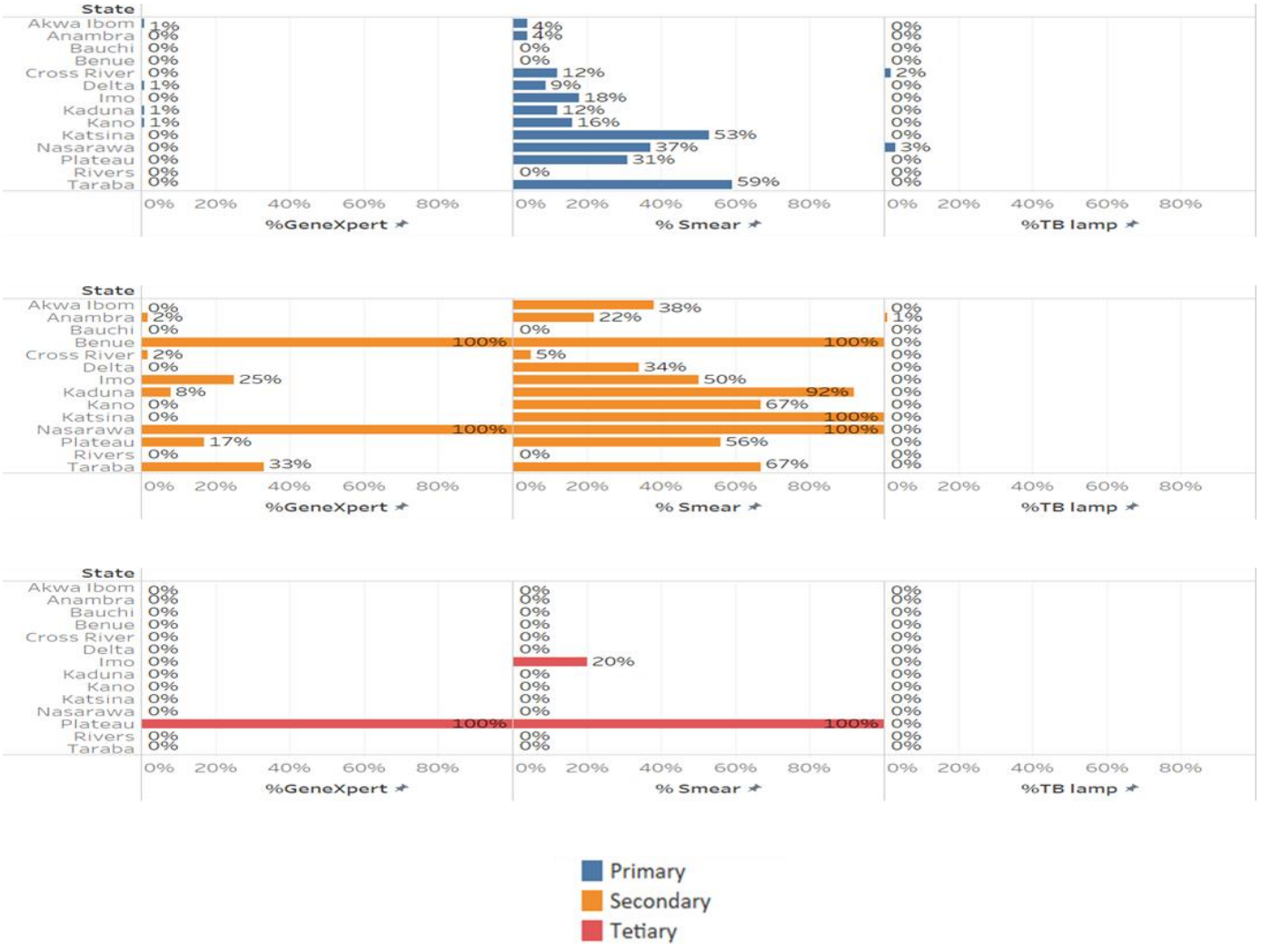

Figure 10: Distribution of diagnostics availability in the private sector per health system level

4.4 Patient Health Seeking Behavior

Analysis is based on where respondents first sought care when they experienced TB symptoms such as fever, coughing, weight loss, night sweats, and other health complaints.

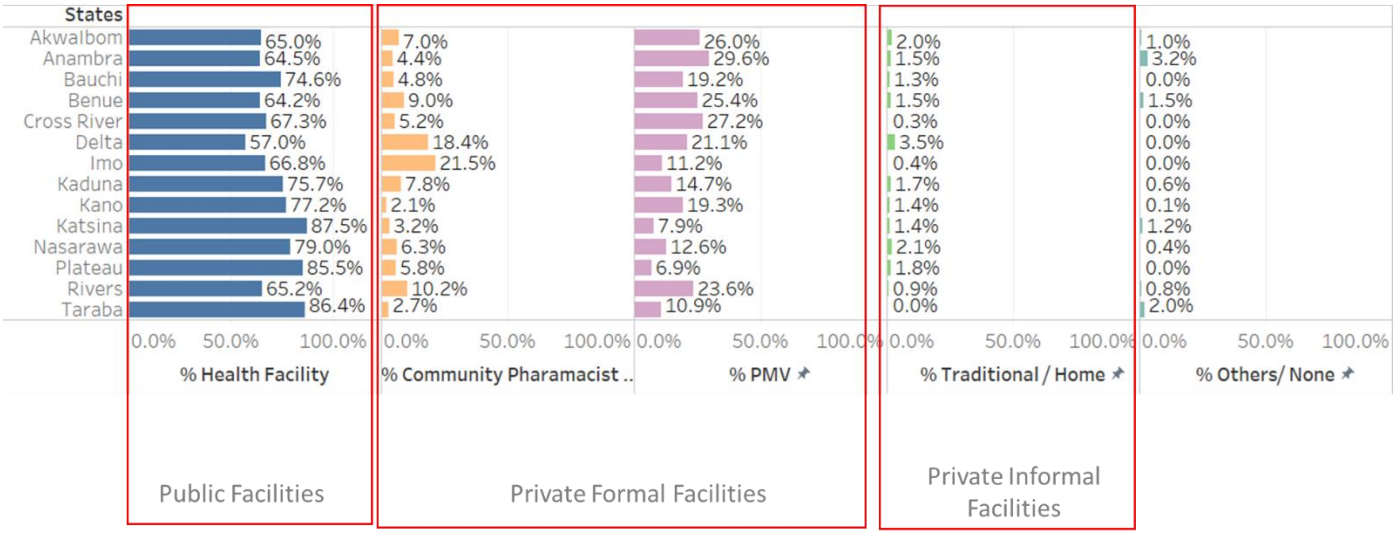

Figure 11: Where patients with TB symptoms first sought care

The highest proportion of respondents - between 57% and 88% - in all 14 states first sought care for TB symptoms in the public facilities. Less than 3.5% of respondents in all states did not seek care in the health system but may have sought other forms of care not captured by the study. 50% of the states (Anambra, Akwa Ibom, Benue, Cross River, Delta, Imo, and Rivers) had the highest percentage (>20%) of respondents who first sought care in the private informal sectors.

4.5 Alignment of care seeking behavior with diagnostic availability

Overall, there is a poor alignment of diagnostics services in the health system and patient care seeking behavior.

Diagnostic Alignment in the Public Sector

Overall, there is a poor alignment of diagnostics in the public sector and patient care seeking behavior. For instance, very few facilities at the secondary (4, 29%) and tertiary (2, 14%) levels

have TB lamp available. Also eleven (80%) states have either GeneXpert and/or microscopy smear available in all secondary and tertiary facilities. Here, patients more often sought care in the secondary and primary facilities, however there are more diagnostics available at the tertiary facilities than the other two levels.

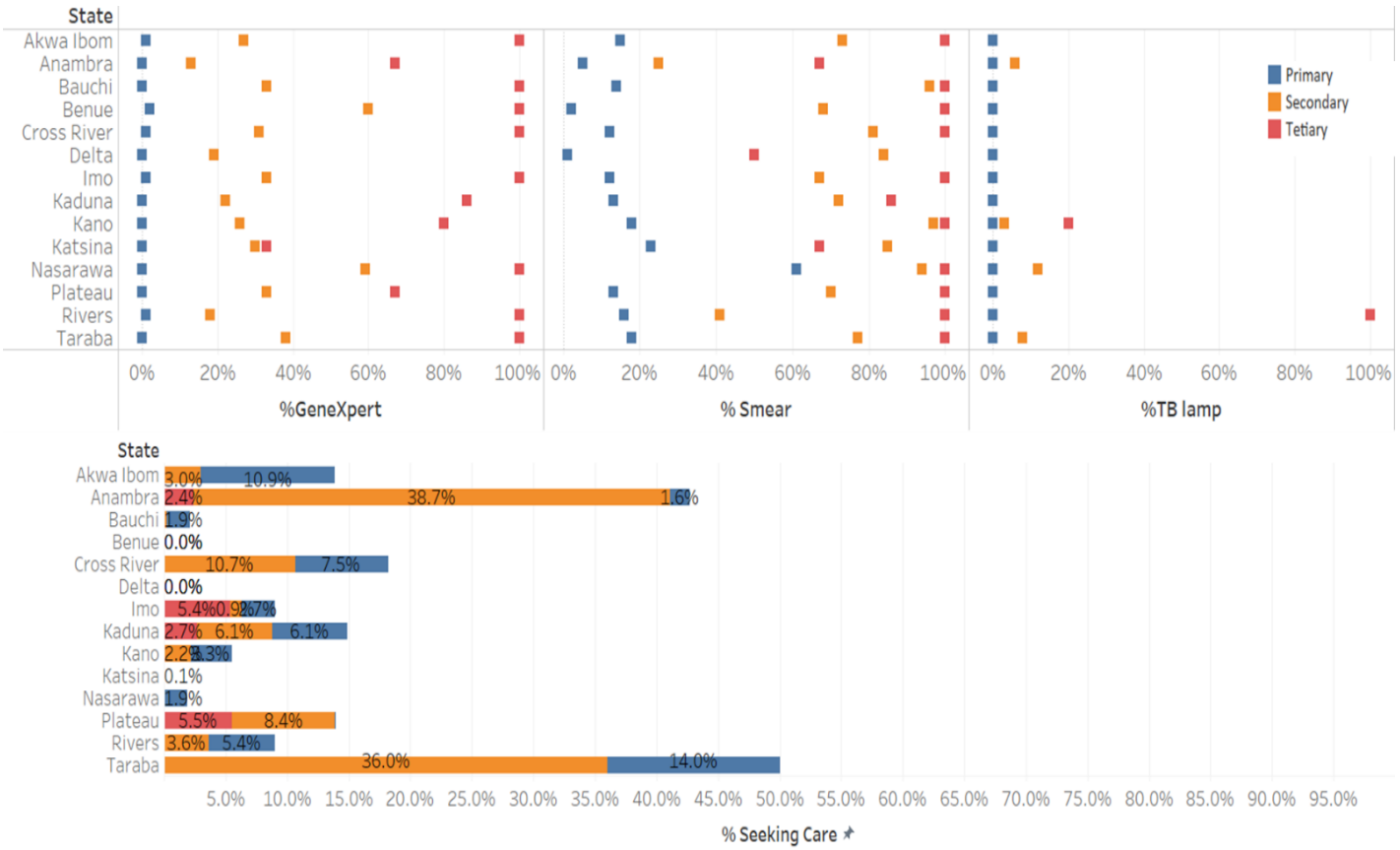

Figure 12: Alignment of diagnostics and where patients first seek care in the public sector

Generally fewer respondents first sought care in the public sector – less than 50% of the respondents first sought care at this level. No respondents first sought care in the public sector in two states - Benue and Delta states - and less than 2% of respondents in three states – Bauchi, Katsina and Nasarawa. Only two states – Anambra and Taraba – had up to 30% (36% and 39% respectively) of respondents who sought care in secondary facilities, while in primary facilities the highest proportion respondents who first sought care at this level is in Taraba state (14%), with the other 10 states ranging from 1.6% to 11%.

Respondents reported to have more often first seek care in the secondary and primary facilities - of the 12 states (86%) (where respondents first sought care in public facilities), only 4 (29%) of these states had tertiary facilities included, however there are more diagnostics available at the tertiary facilities than the other two (primary and secondary) levels. The proportion of tertiary facilities with diagnostics available include –GeneXpert in 100% of the tertiary facilities in 8 (67%) states, 4 states (33%) ranging from 62% to 82% of facilities with availability, 10 states (83%) with smear available in 100% of their tertiary facilities, and finally 3 (25%) states with proportion of smear availability in facilities ranging from 50% to 82%, and 2 (17%) states have TB lamp available (20% and 100% respectively).

Eight of the 12 states (67%) had GeneXpert at the tertiary levels as compared to availability in only ~2% of primary facilities-, and even the availability of smear is quite low at this level– less than 16%. Comparing this to where patients first sought care, there is some alignment at the primary level as very low proportions of patients first sought care here- the highest proportion respondents who first sought care at the primary level is in Taraba state (14%), with the other 12 states ranging from 1.6% to 11%.

Diagnostic Alignment in the Private Sector

More respondents reported to have first sought care in the private sector. However, overall, there is a lower availability of diagnostic in the private sector compared to the public sector, with very poor alignment of microscopy smear in the secondary and primary facilities where over 50% of respondents in all states first sought care (combined).

More patients (over 50% of patients in 5 states) sought care from the secondary facilities in the private sector, and most of the available diagnostics (GeneXpert and smear microscopy) are placed at the secondary facilities – howbeit that these are very few. A closer look into the specific levels and diagnostic types, shows the level of misalignment in the availability of GeneXpert machines at the primary health facilities were over 40% of patients in six (43%) states first sought care. Here only 4 (29%) states had GeneXpert in 1% of their primary facilities. More specifically,

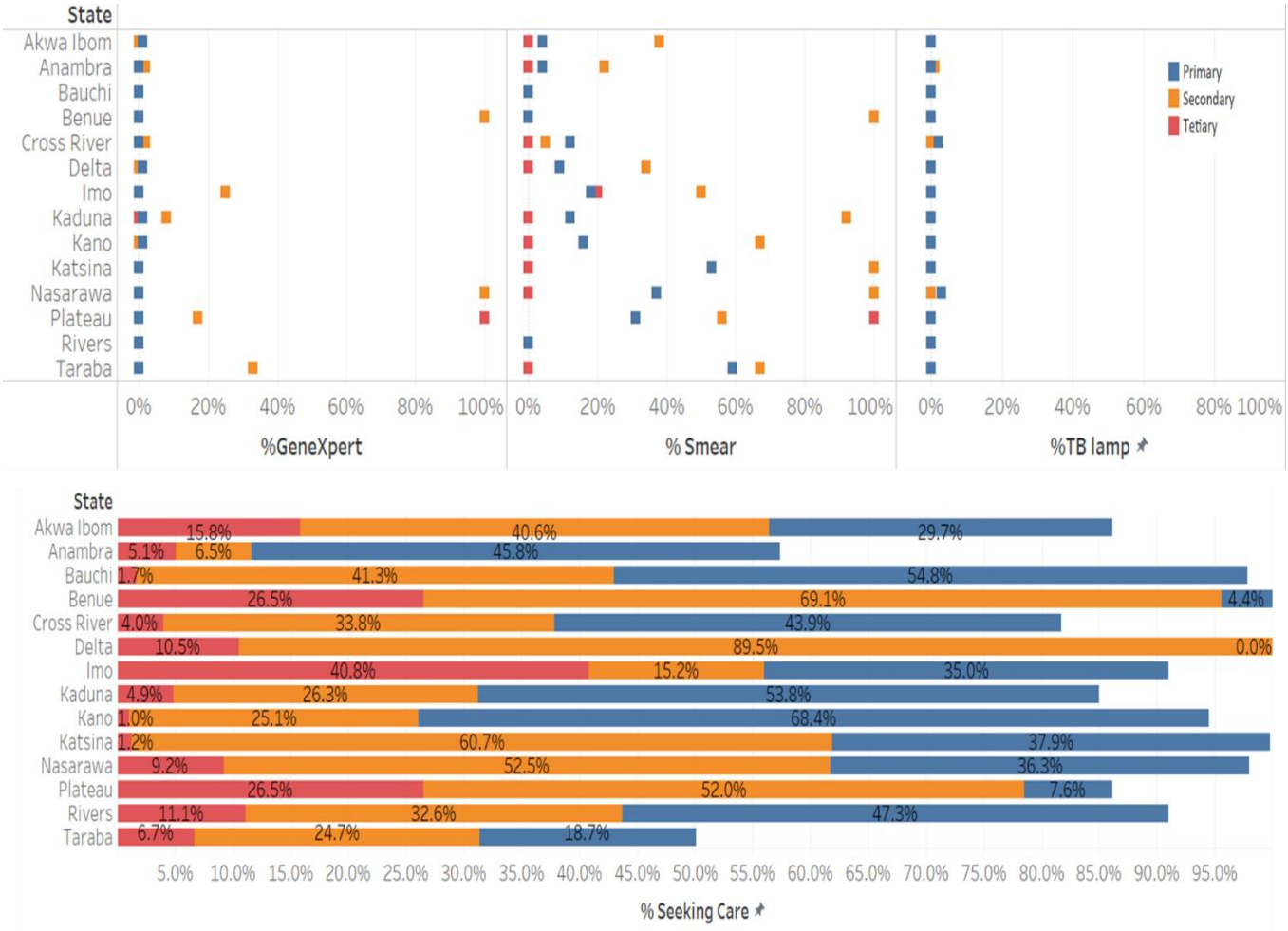

Figure 13: Alignment of diagnostics and where patients first seek care in the private sector

- In Anambra, 46% of patients first sought care in the primary facilities, however there are no GeneXpert at this level and only 4% of facilities in the states have smear microscopy
- In Bauchi and Rivers, 55% and 48% of patients first sought care in the primary facilities respectively, however there are no diagnostics at facilities in these states at the 3 levels
- In Cross River, 44% of patients first sought care in the primary facilities, here only 2% of facilities have GeneXpert available and 5% have smear available
- In Kano, 54% of patients first sought care in the primary facilities, however there are no GeneXpert but a high availability of smear in 67% of facilities
- On the other hand, in Benue, Plateau and Nasarawa only 4%, 7.6% and 37% of patients first sought care in the primary facilities respectively, however all facilities (100%) at this level have GeneXpert and/or smear available in Benue and Nasarawa, and Plateau has up to 56% of its facilities with smear available at this level

4.6 Alignment of care seeking behavior with TB and DR-TB Treatment Service Availability

DR-TB Treatment Service Alignment in the Public Sector

In the public sector, there is a misalignment of DR-TB treatment overall, as most states do not have treatment in facilities (0% in the visual) where patient first sought care (higher end of the x-axis).

The darker the color's in the visual the higher the percentage of DR-TB treatment facilities available in the state.

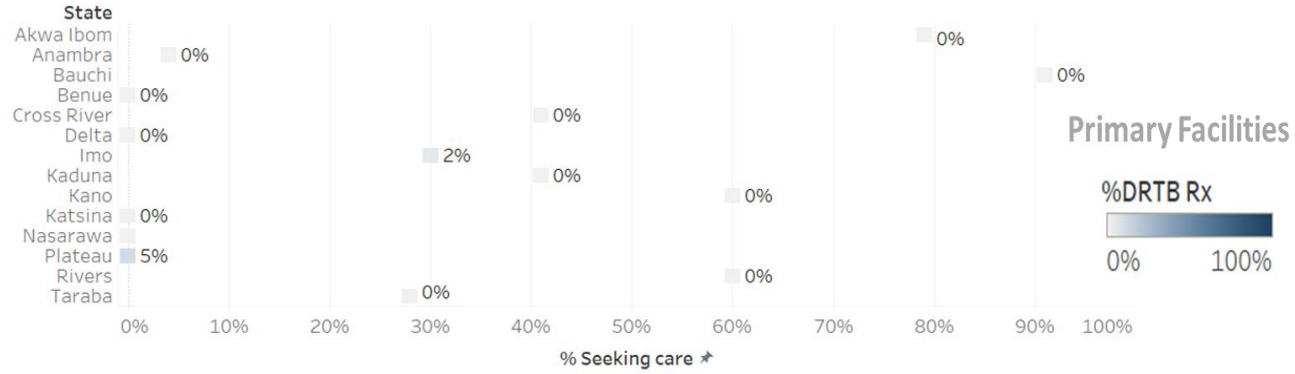

Figure 14: Alignment of DR-TB Treatment and where patients first seek care in the primary public facilities

In the primary facilities there are very limited DR-TB treatment available in facilities across all fourteen states. At this level, only two (14%) states (Imo and Plateau) have DR-TB treatment available in facilities at this level and the proportion of facilities are below 6%. Additionally, Imo state which has the highest availability of 5% does not have patients who first sought care at this level, so there is a complete misalignment at the primary level.

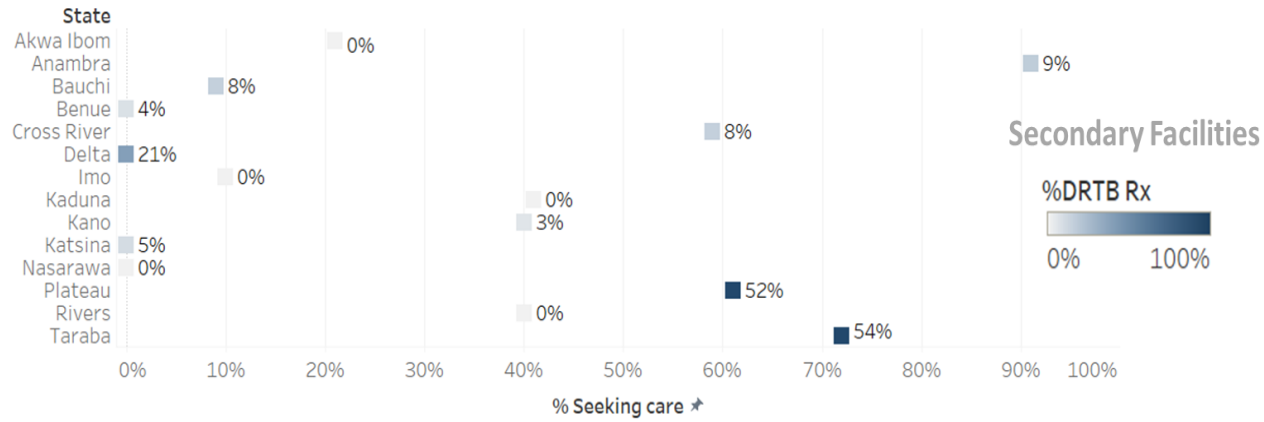

Figure 15: Alignment of DR-TB Treatment and where patients first seek care in the secondary public facilities

In the secondary facilities, only two (14%) states (Plateau and Taraba) have above 50% of their facilities at this level have DR-TB treatment available, this aligns with where patients are seeking care in these states, (60% and 72% respectively). However, there are 4 (29%) states (Delta 21%, Bauchi 8%, and Katsina 5%, Benue 4%) with up to 21% DR-TB treatment available and no patients first sought care at this level.

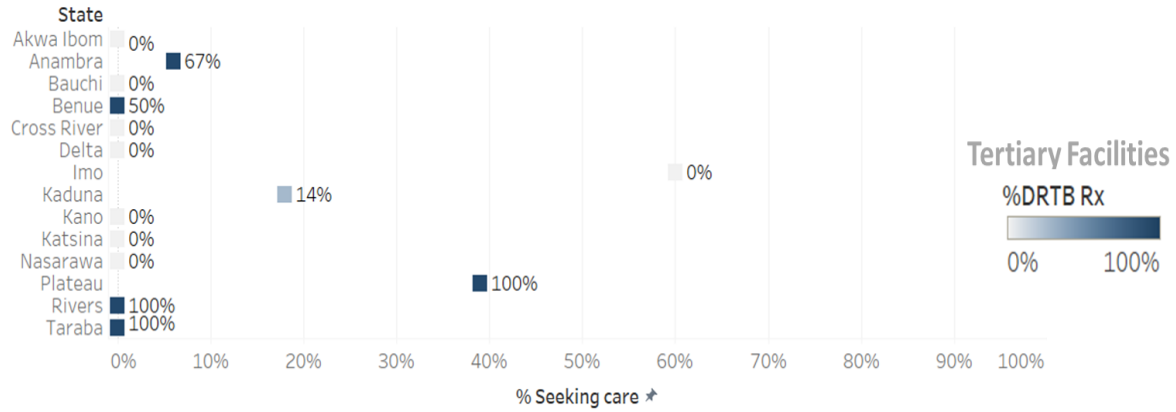

Figure 16: Alignment of DR-TB Treatment and where patients first seek care in the tertiary public facilities

In the tertiary facilities, like the other levels, there is little or no alignment in avaibility of treatment with where patients are seeking care. Patients do not first seek care at this level in 4 states (Rivers, Taraba -100%, Anambra-67%, and Benue-50%) that have highest proportion of facilities with DR-TB treatment. There is minimal alignment in 2 states, Kaduna, and Plateau with 14% and 100% of

facilities having DR-TB treatment available, respectively and 20% and 100% of patients first seeking care at this level respectively.

DR-TB Treatment Service Alignment in the Private Sector

In the private sector, overall, very few facilities offer DR-TB treatment at the primary and secondary levels, and no tertiary facilities offer this option. Only 6 (43%) states have proportions of facilities with DR-TB treatment availability – these are very low between 2% and 7%, with only Plateau state having up to 39%.

With such low numbers of facilities offering this treatment, it is expected that there is a misalignment of availability with facilities where patients first sought care.

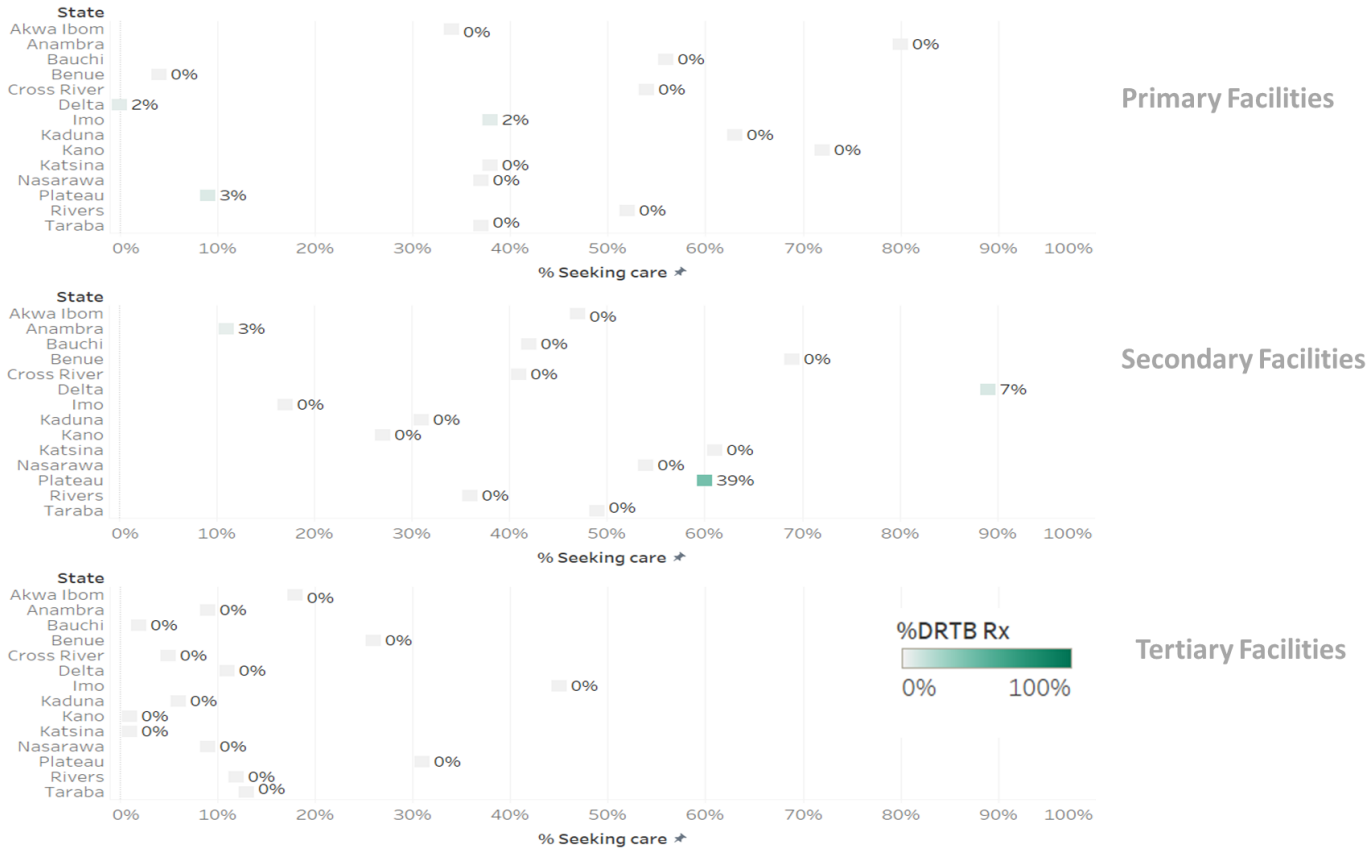

Figure 17: Alignment of DR-TB Treatment and where patients first seek care in the private facilities

4.7 Patient Delays in Accessing TB Services

Delay in patients' care was assessed based on respondents who first sought care in facilities but were referred to another facility due to unavailability of diagnostics and/or TB services (e.g., DR-TB treatment) at the facility. This data is disaggregated by health sector, health system levels and gender. However, the data does not show the specific reason for the referrals - unavailability of diagnostics or TB services.

Patient delays in the Public Sector

Overall, higher proportion of patients experienced delays in access to TB services mostly in the primary and secondary facilities Patients who first sought care in the tertiary facilities experienced the least delays across all states except in Delta and Anambra states. Availability of diagnostics was much higher in the secondary facilities in this sector (higher proportion of facilities – 8 states with 100% of their facilities have GeneXpert and 10 states with 100% of their facilities with Smear Microscopy).

The primary facilities showed the highest proportion of referrals, and a higher proportion of male respondents were referred. 6 (50%) states had over 50% of respondents referred – Bauchi (55%), Imo (59%), Kaduna (68%), Kano (73%), Katsina (58%) and Rivers (64%). Respondents experienced little or no delays for TB care in 1 state –Delta, with no referrals made at this level. Secondary facilities also had a higher proportion of referrals for male respondents, and respondents experienced some level of delay in all states with the least proportion in Anambra state (4%). 4 (33%) states had over 45% of respondents referred – Benue (59%), Delta (96%), Nasarawa (49%), and Plateau (47%).

Respondents may have experienced the least amount of delay at the tertiary facilities, with the lowest proportion of referrals in all states. The highest proportions in Plateau (34%) and Benue (32%), and no referrals were made in Katsina state.

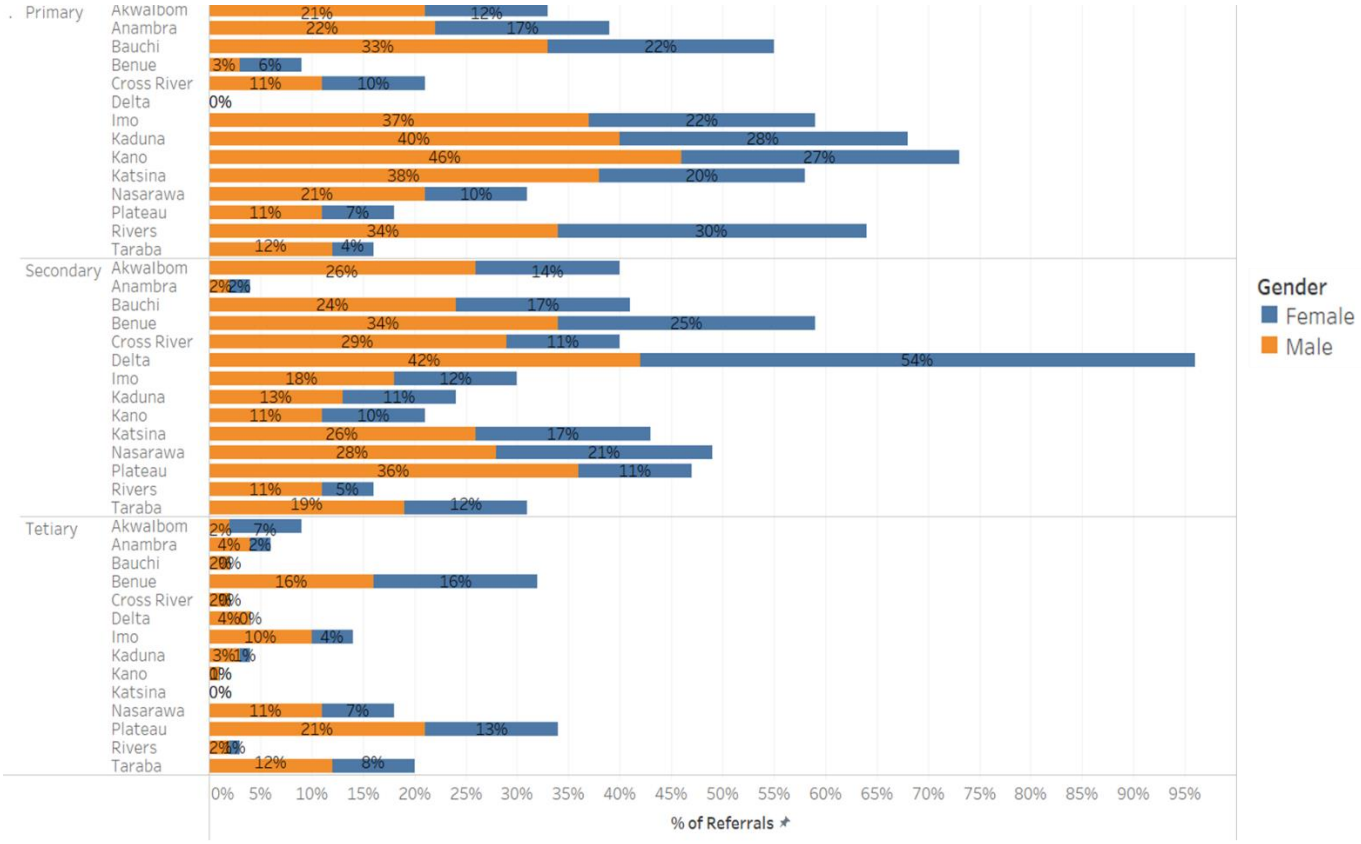

Figure 18: Proportion of patients that experienced delays in care in public facilities

Patient delays in the Public Private Sector

Overall, higher proportion of patients experienced delays in access to TB services mostly at the primary facilities. Patients who first sought care in the tertiary facilities experienced minimal or no delays across all 14 states. There is some level of alignment with the availability of diagnostics which was much higher in the secondary facilities in this sector (higher proportion of facilities in states have GeneXpert and Smear Microscopy available at the secondary facilities), however there is misalignment at the tertiary facilities where only 2 states – Plateau and Imo – had any diagnostic type available. However, for DR-TB services there were no facilities offering the DR-TB treatment service and no referrals at this level.

Like the public sector, the primary facilities showed the highest proportion of referrals and slightly higher proportion of female respondents were referred. Cross Rivers had the highest proportion of referrals (19%), followed by Taraba (12%), Rivers and Akwa Ibom (11% respectively). Respondents experienced little or no delays for TB care in 3 states – Benue, Delta, Katsina and Plateau, with no referrals made at this level. Secondary facilities had a higher proportion of referrals for male respondents. Respondents were seen to experience little or no delays for TB care in more states (5) – Bauchi, Benue, Delta, Katsina, Nasarawa – 3

of these states also had not referrals made at the primary level. Anambra had the highest proportion of referrals (45%), followed by Taraba (23%), and Cross Rivers (19%) It is noteworthy that Taraba also had a high proportion of referrals in the primary facilities. The tertiary facilities had the least number of states with referrals - only in Anambra state.

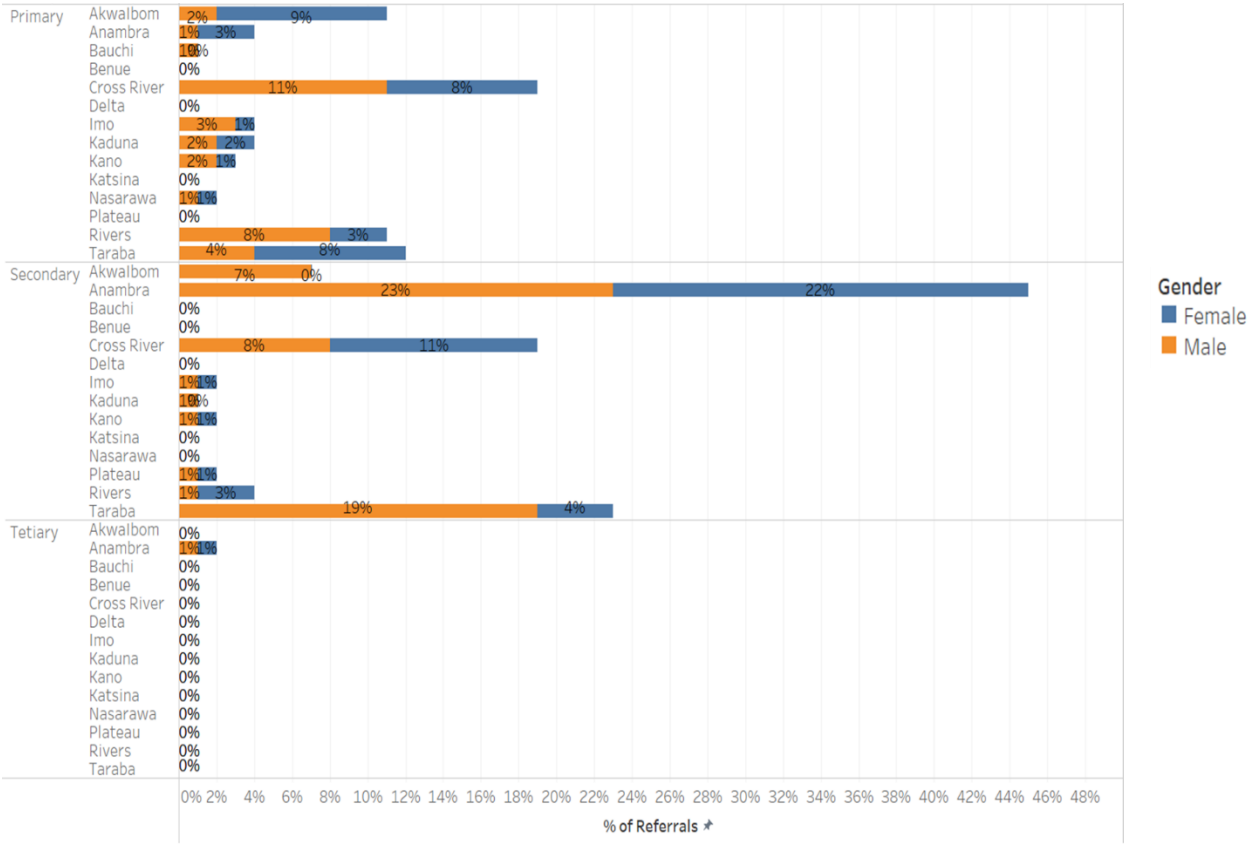

Figure 19: Proportion of patients that experienced delays in care in private facilities

5.0 DISCUSSION

Strong health systems are a prerequisite to improve health outcomes and to accelerate progress towards achieving the national target of elimination of TB. Moreover, knowing the challenge of locating the missing patients with tuberculosis and challenges TB patients face in countries with a high tuberculosis burden like Nigeria, patient-pathway analysis (PPA) was employed to unravel these. The intent of the PPA is to help national tuberculosis programs more accurately identify some of the health system alignment gaps that can be addressed through targeted program interventions.[15] This is because when armed with data from a PPA, national tuberculosis programs can plan prevention and care services that addresses patient care-seeking preferences and options.

Finding from this study show that in the primary facilities, diagnostic availability is very low with only one state having 61% of its primary facilities with smear availability. Like the public sector, facilities in the private sector also have highest coverage of smear availability even though most states have availability in the primary and secondary facilities and only 2 states have this available in their tertiary facilities. Concisely, the availability of diagnostics at the different levels is much lower at private facilities when compared to the facilities in the public sector not minding those 3 states have availability of diagnostic services in all their secondary facilities. This is not good for TB elimination programme and for various targets set by different partners in TB control.

The healthcare system in Nigeria is provided by the public healthcare system and poorly regulated private sector.[17,18] The primary health facilities were established to serve as the first point of contact with healthcare for individuals and communities, but have been basically abandoned, both by the local governments, individuals and the communities they were supposed to serve.[19,20] A study reported that time to reach the facility of a TB patient's first consultation was significantly associated with delays in diagnosis. It went further to state that improvements in the availability and accessibility of health care services are imperative to reduce delays and expedite TB diagnosis and treatment.[21] This becomes imperative bearing in mind that undetected cases pose a great threat to the society at large as they serve as a reservoir for the continued transmission of TB in the country. In a single year, people who are living with TB disease can infect up to 10 to 15 close contacts.[22]

Evidence has shown that the major problem with TB in Nigeria is the low diagnosis of people with TB and poor knowledge about TB.[24] The same study also reported that out of the estimated 407,000 TB patients expected in year 2017, only 104,904 patients were detected leaving a gap of 302,096 patients who were either undetected or detected.[23] Similarly, in year 2020, only 30% of estimated number of individuals infected with TB were detected.[14] Centers for Disease Control and Prevention (CDC) acknowledged that finding missing cases and breaking the cycle of transmission need a strong health care system, a public health workforce that can reach those who need care, the laboratory capacity to quickly and effectively diagnose the disease, innovative approaches to meet people where they receive care, and expand access to TB diagnostic and treatment services.[22] In Nigeria, this can only be possible by adequately engaging the private health providers. Though heterogeneous and poorly regulated, private providers are an important entity in the Nigerian health system. They constitute a large part of the Nigerian health system, accounting for over 60 percent of care provision in Nigeria. Commonly when sick, individuals often visit a patent and proprietary medicine vendor (PPMV) or community pharmacy for over-the-counter medications. Some of these individuals will go to labs for diagnostic tests, and others will seek care at a private clinical facility in their neighborhood.[24,25]

This study also documented that while highest proportion of respondents first sought care for TB symptoms in the public health facilities (>70% overall) and that about 50% of the states have the > 20% of respondents who first sought care in the private informal sectors. This sounds good, however these facilities do not have diagnostic nor DOTS services. For instance, very few facilities at the secondary (4) and tertiary (2) levels have TB Lamp available. Report has shown that less than a third (31%) of health facilities in Nigeria are providing TB services as at 2019.[14] The report went on to state that this low coverage of TB services is a key factor in the under diagnosis of TB in Nigeria.[14] Consequent on this, there is need to improve DOTS coverage in health facilities in the country.[14,26] National TB Prevalence survey similarly documented that despite the implementation of DOTS for many years in Nigeria, DOTS services have not been able to penetrate the community hence recommended that NTBLCP should consider decentralizing TB care and control services into the community.[11]

Findings from assessment of the Contributions of Private Provider Engagement in Tuberculosis Case Finding and Notification in South West Nigeria documented that with an increase in private

provider engagement, there was a progressive increase in the number of presumptive TB cases and number of notified cases of tuberculosis. It also asserted that the PPMVs tend to contribute more to the overall number of presumptive TB cases than any other cadre of private providers and recommended that there are still opportunities for a scale up in the private provider engagement in states studied.[25] Similarly in India private providers were found to make substantial contribution to detection and appropriate treatment of patients with TB and DR-TB when provided with access to rapid diagnostics, support for notification and patient treatment through interface agencies, and free, quality anti-TB drugs.[27] In contrast to this, a study in Ebonyi State, Nigeria reported that practices toward presumptive TB clients among PPMVs were poor as shown in their inadequate referral of clients with persistent cough to DOTS facilities, prolonged treatment of clients with persistent cough with antibiotics which have anti-TB activity and untimely referral of clients for diagnosis and treatment.[28] This can be explained by knowledge gaps about tuberculosis signs, symptoms, free-treatment policy and mode of operation of care service among Patent Medicine Dealers. Even when Patent Medicine Dealers and Tuberculosis Control Programme Managers are supposed to collaborate in tuberculosis control effort, continual demand for incentives by Patent Medicine Dealers and inability of National Tuberculosis Control Programme to keep up with such demands continues to pose as constraints.[29]

One of the strategies of the NTBLCP aimed at finding more people with TB was the involvement of private health facilities in TB control activities. This has led to an increase in number of health facilities offering TB services even though majority of the facilities (72%) involved in the exercise are public health facilities. The number of health facilities providing TB services in Nigeria increased from 9,625 in 2018 to 12,606 in 2019, revealing a 31% increase.[14] Nonetheless, caution should be exercised in incorporating the growing private and informal health sectors in many countries in TB services. These sectors are unregulated, often do not have access to or utilize quality-assured diagnostics or the anti-TB drugs needed to appropriately diagnose and cure patients, which can lead to under-diagnosis or inappropriate treatment and ultimately contributing to drug resistance.[22]

Making the decision to refer to TB specialists accounted for most of the healthcare delay for all cases. Different risk factors were associated with presentation delay compared to healthcare delay,[30] One explanation for the longer delays would be a low index of clinical suspicion by health

workers or paramedics for cases whom they perceive as being at low risk of TB. This could result in delayed investigation and/or referral to specialist services. Also, differential access to first-line investigations and specialist advice at first point of seeking health care, as well as potentially a lower index of suspicion to consider onward referral to TB specialists are likely to contribute to longer delays and further compounded ordeal of people with TB disease.[31]

This current study documented that 50% of the states (Anambra, Akwa Ibom, Benue, Cross River, Delta, Imo, and Rivers) had the highest percentage (>20%) of respondents who first sought care in the private informal sectors. This is expected due to health system preferences in Nigeria. The states listed are all in the southern part of the country. Regional and urban-rural disparities exist regarding the utilization of private sector services. On average, private health facilities are concentrated in southern Nigeria, while public health facilities dominate service provision in the north.[32]

Generally, according to present study there is a poor alignment of diagnostics and patient care seeking behavior. In the public sector, patients more often were seen to seek care in the secondary and primary facilities, however there are more diagnostics available at the tertiary facilities than the other 2 levels. There is even worse availability of diagnostic in the private sector compared to the public sector. However, there is minimally better alignment of the smear in the secondary and primary facilities where over 80% of patients in all states first sought care (combined). There is equally a slight misalignment in the availability of GeneXpert machines at the primary health facilities where over 50% of patients in 6 states first sought care. Here only 4 states had GeneXpert in 1% of their primary facilities. The PPA highlights a key gap in the country's public and private sector engagement. This is like findings from other previous studies.

In Pakistan, almost 90% of patients-initiated care in the private sector, which accounts for only 15% of facilities with the capacity for tuberculosis diagnosis and treatment. Across the country, nearly 50% of tuberculosis microscopy laboratories were in public-sector–basic health units and regional health centers. However, very few patients-initiated care in these facilities.[33] For Kenya, more than half of patients initiate care in the public sector where just under half of patients encountered tuberculosis diagnostic and treatment capacity where they initiated care. The PPA

results emphasized the need for a differentiated approach to tuberculosis care, by county, and the distinct need for better referral systems.[34] Similarly, in Cameroun pathway analysis showed that only about 9% of people attended a health facility providing TB services at initial care-seeking, with access varying from <3% to 16% across the ten regions of the country. Also, though 72% of government and 56% of private hospitals (Level 2 facilities) provide TB services, most Cameroonians (87%) initially chose primary care (Level 1) or informal private sector sites (Level 0) without TB services.[35]

The results of PPA in Indonesia revealed that only 20% of patients encountered diagnostic capacity at the location where they first sought care. Most initial care seeking occurred in the private sector and case notification lagged diagnostic confirmation in the public sector. It further emphasized the role that the private sector plays in TB patient care seeking and suggested a need for differentiated approaches by provinces to respond to variances in care-seeking patterns and the capacities of public and private providers.[36] In Philippines approximately 36% of patients initiated care in the private sector, where there is limited coverage of appropriate diagnostic technologies. Remarkable differences in the alignment between care seeking patterns and diagnostic and treatment availability were found between regions. The authors identified opportunities for strengthening access to care for all forms of tuberculosis and for accelerating the time to diagnosis by aligning services to where patients initiate care following this PPA.[37]

The current study found an appreciable good alignment on DR-TB treatment services and patient care seeking behavior. More patients seek care at a facility where there is DR-TB treatment available in that level of healthcare in the state. This can partly be explained by limited facilities with DR-Tb services. Worthy of note is that DR-TB services in Nigeria are not always equitable, and patients face significant barriers to care.[7] In the context of Nigeria's low case-finding and treatment coverage adversely affected their access to DR-TB care. Most of the available DR-TB care are in the public secondary and tertiary hospitals.[3]

6.0 CONCLUSION

The PPA can be a valuable planning and programming tool to ensure that diagnostic and treatment services are available to patients where they seek care. Patient-centered care will require closing the diagnostic gap and engaging the private sector. Subnational differences in patient pathways to care call for differentiated approaches to patient-centered care. There is need to strengthen the capacity for both diagnosis and treatment in both public and private sector. Efforts should be geared to innovate TB program and reduce these barriers as well as adapting to the needs of the patients, including improving referral system with the private sector and reducing the mal alignment identified.

7.0 LIMITATION

- Limited scope of data collection – The data on health seeking behavior was collected from patients met on days of data collection as well as facilities studied. This would be better if all the facilities in states were studied though effort was made to ensure that no patients was missed out throughout this period.
- Subnational study instead of a national study – To ensure quality of data, the study has to be limited to 14 states out of 36 states and Federal Capital Territory of the country. These states were where KNCV sites are located. National study would have been better to increase generalization of findings.

8.0 RECOMMENDATIONS

Based on findings from this study, there is need to:

1. Scale up PPA to cover the country (36 states and FCT) – This is necessary as though the study covered the northern and southern part of Nigeria, it may not capture some areas especially tribes or groups of people located in states not studied. There may be characteristics or cultures that may influence findings from this study.\

2. Inclusion of TB variables in NDHS as obtainable in other countries - This is done will provide a wider, comprehensive and validated national data. Comparison of finding with other studies done in other clines with be easier and more acceptable. Generalization will also be more valid.

3. National study on health seeking behavior – This is necessary for TB as a disease and will be a proxy foe studies on other diseases. It is a major denominator for many studies.

4. National TB prevalence survey – This is imperative as the only and referenced prevalence study done in the country was in 2012. Since then a lot must have changed in TB indices that need to be updated.

5. Equitable and need driven distribution of TB services – This if done will address poor alignment in TB services identified in this study. Also it will be in line with current patient centered approach in TB care

REFERENCES

1. Global tuberculosis report 2021. Available at: https://www.who.int/publications/i/item/9789240037021. Accessed 20/11/2021
.
2. Floyd K, Glaziou P, Houben R, Sumner T, White RG, Raviglione M. Global tuberculosis targets and milestones set for 2016-2035: definition and rationale. Int J Tuberc Lung Dis. 2018;22(7):723–30

3. World Health Organization. Global tuberculosis control. 2015.

4. World Health Organization Global Task Force on TB Impact Measurement. Third meeting of the TB estimates subgroup: methods to use for WHO's definitive assessment of whether 2015 global TB targets are met. Geneva: World Health Organization; 2015 Available at https://www.who.int/tb/advisory_bodies. Accessed 2/2/2020

5. WHO, "Global Tuberculosis Report," WHO, Geneva, 2019.

6. NTBLCP, "National Tuberculosis Patient Cost Survey," FMoH, Abuja, Nigeria, 2017.

7. National Tuberculosis Leprosy Control Programme (NTBLCP). Nigeria Annual Report 2017.

8. Federal Ministry of Health, Abuja, Nigeria, 2017

9. Federal Ministry of Health "National Strategic Plan for Tuberculosis 2015 - 2020,", Nigeria, 2014.

10. National Tuberculosis Leprosy Control Programme, ARFH, "National Tuberculosis Knowledge, Attitude and Practice Survey," FMoH, Abuja, Nigeria, 2017.

11. Federal Republic of Nigeria, Report: First National TB Prevalence Survey. 2012. Abuja, Nigeria. 2012.

12. PPA Tool, "Patient Pathway Analysis. How-to Guide: Assessing the Alignment of TB Patient," None.

13. KNCV TB Foundation, "Operational Guide. Find and Treat All Missing Persons with Tuberculosis -," KNCV, Hague, 2018.

14. National Tuberculosis and Leprosy Control Programme. 2019 Annual TB Report (DRAFT) Abuja. Nigeria

15. Hanson, C.L.; Osberg, M.; Brown, J.; Durham, G.; Chin, D.P. Conducting Patient-Pathway Analysis to Inform Programming of Tuberculosis Services: Methods. J. Infect. Dis. 2017, 216, 679–685. [CrossRef] [PubMed]

16. World Health Organization. Engaging private health care providers in TB care and prevention: A landscape analysis. Geneva 2018.

17. Alubo O. The promise and limits of private medicine: health policy dilemmas in Nigeria. Health Policy and Planning. 2001;16(3):313-21.

18. Koce F, Randhawa G, Ochieng B. Understanding healthcare self-referral in Nigeria from the service users' perspective: a qualitative study of Niger state. BMC health services research. 2019;19(1):209.

19. Asuzu MC. Commentary: The necessity for a health systems reform in Nigeria. Journal of community medicine and primary health care. 2004;16(1):1-3.

20. Yanga Q, Tongb Y, Yina X, Qiua L, Suna N, Zhaoa Y et al. Delays in care seeking, diagnosis and treatment of patients with pulmonary tuberculosis in Hubei, China. International Health 2020; 12: 101–106 doi:10.1093/inthealth/ihz036

21. Center for Disease Control Division of TB & HIV. Finding The Missing Cases: The Role Of Enhanced Diagnostics And Case-Finding In Reaching All People With TB. Available at: https://www.cdc.gov/globalhivtb Accessed December 20221

22. KNCV. Nigeria is among the 14 high burden countries for TB. Available at http://kncvnigeria.org>nigeria-is-among-the-14-high- Accessed December 2021

23. World Bank. Nigeria: Healthcare. Available at - World Bank - allAfrica.com. assessed December 2021

24. Fadeyi MO, Ahmed B, Akindele A, Bakare A, Ariyo M, Onitiju O et al. Assessment of the Contributions of Private Provider Engagement in Tuberculosis Case Finding and Notification in South West Nigeria. Journal of Tuberculosis Research. 2021; 9:160-171. doi: 10.4236/jtr.2021.93015

25. Gidado M. Assessment of tuberculosis underreporting by level of reporting system in Lagos, Nigeria. Dissertation submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy, Public Health, Walden University. November, 2019

26. Ananthakrishnan R, Richardson MD, van den Hof S, Rangaswamy R, Thiagesan R, Auguesteen S et al. Successfully engaging private providers to improve diagnosis, notification, and treatment of TB and drug-resistant TB: the EQUIP public-private model in Chennai, India. Glob Health Sci Pract. 2019;7(1):41-53. https:// doi.org/10.9745/GHSP-D-18-00318

27. Onah CK, Azuogu BN, Ossai EN, Agu AP, Ogbonnaya LU, Onwasigwe C. Practices toward presumptive tuberculosis clients among patent medicine vendors in Ebonyi State Nigeria. Int J Mycobacteriol 2021;10:71-8.

28. Onah CK, Azuogu BN, Ossai EN, Agu AP, Alobu I, Ogah EO. Addressing constraints to informal providers' involvement in tuberculosis control: a qualitative study of patent medicine dealers and tuberculosis programme managers. Global Health Research and Policy. 2021;6:43

29. Paynter S, Hayward A, Wilkinson P, et al. Patient and health service delays in initiating treatment for patients with pulmonary tuberculosis: retrospective cohort study. Int J Tuberc Lung Dis 2004; 8: 180–185.

30. Roberts DJ, Mannes T, Verlander NQ. Factors associated with delay in treatment initiation for pulmonary tuberculosis. ERJ Open Res 2019; 6: 00161-2019 [https://doi.org/10.1183/23120541.00161-2019]

31. Dutta, A., E. Kariisa, J. Osika, G. Kombe, A. Onoja, M. Lecky, and A. Oyemakinde. 2009. The Private Health Sector in Nigeria – An Assessment of Its Workforce and Service Provision. Bethesda, MD: Health Systems 20/20 project, Abt Associates Inc.

32. Razia F, Mahboob UH, Aashifa Y, Nasir M, Ahmad KL, Osberg M et al. Delivering Patient-Centered Care in a Fragile State: Using Patient-Pathway Analysis to Understand Tuberculosis Related Care Seeking in Pakistan • The Journal of Infectious Diseases 2017:216 (Suppl 7) • S733

33. Masini E, Hanson C, Ogoro J, Brown J, Ngari F, Mingkwan P et al. Using Patient-Pathway Analysis to Inform a Differentiated Program Response to Tuberculosis: The Case of Kenya. The Journal of Infectious Diseases. 2017:216 (Suppl 7) • S715

34. Titahong CN, Ayongwa GN, Waindim Y, Nguafack D, Kuate AK, Wandji IAG et al. Patient-Pathway Analysis of Tuberculosis Services in Cameroon. Trop. Med. Infect. Dis. 2021, 6, 171. https://doi.org/10.3390/ tropicalmed6040171

35. Surya A, Setyaningsih B, Nasution HS, Parwati CG, Yuzwar YE, Osberg M et al. Quality Tuberculosis Care in Indonesia: Using Patient Pathway Analysis to Optimize Public–Private Collaboration. 2017:216 (Suppl 7) • S725

36. Garfin C, Mantala M, Yadav R, Hanson CL, Osberg M, Hymoff A et al. Using Patient Pathway Analysis to Design Patient-centered Referral Networks for Diagnosis and Treatment of Tuberculosis: The Case of the Philippines. The Journal of Infectious Diseases 2017:216 (Suppl 7) • S741

37. Federal Ministry of Health. 2015 Annual Report National Tuberculosis and Leprosy Control Programme., Health. DoP; 2015 August 2014

Annex A: Informed Consent Form

STUDY ON TUBERCULOSIS PATIENT PATHWAY ANALYSIS; A PRAGMATIC EVALUATION ACROSS SELECTED LGAS IN NIGERIA

You are invited to take part in a research study that is led by the KNCV a not-for-profit organization based in Nigeria funded by USAID, Global fund. Before you choose if you want to take part, we need to explain this study so you understand why it is being done and what you would do. Please take the time to read or to listen as I read the following information. You may talk to others about the study if you wish. Please ask me if there is anything that is not clear, or if you would like more information. When all your questions have been answered and you feel that you understand this study, we will ask you if you want to take part. If you do, then you will sign this Informed Consent form. We will also give you a signed copy to keep.

Purpose of the Study and Study Requirements

What is the study? The purpose of the study is to assess TB patient's health seeking attitude and availability of facilities to cater for them

Why you have been invited to take part? You have been invited to take part because you fall into category of persons we need.

What will happen you take part? If you agree to participate in the study, we will ask you to sign this form. You will be enrolled and followed till end of TB care.

How long will the survey last? The study will last till you are discharged from treatment.

Risks

What are the risks of the study? We do not anticipate any risks for being in this study. We will not include your name or any other information that could identify you in reports about this study. Furthermore, nobody will know how you answer the questions, so please feel comfortable answering the questions honestly.

Benefits

What are the benefits of participating? There are no benefits to your participating in the study. However, you may indirectly benefit from the opportunity to ask questions and discuss your feelings and concerns. However, your participation in this study will help us obtain reliable data that can be used to improve TB services in Nigeria.

Confidentiality

Will my participation in the study be kept confidential? The information that is collected during the study will be kept private. The study team will make every effort to protect your privacy and maintain the confidentiality of all the information that you provide. We will not record your name. No specific information about you will be printed in any reports from this study. The information you give us will be stored in a computer dedicated to this study that only the study team can access. All data will only be stored securely on the dedicated computer for two years and will be destroyed thereafter.

Voluntariness

What are my rights as a research participant/subject? Your participation in this study is entirely voluntary. Your decision not to answer certain questions or not to participate in this study at all will not affect any of the services that you receive from this health facility.

Additional Information

What will I receive for participating? You will not receive any money for taking part in the study.

What will happen to the results of the research study? The results of the study will be discussed with the Ministry of Health and funders of TB programs in Nigeria and will be presented at other meetings and conferences. The results may be published in scientific reports.

Who has reviewed the study for ethical issues? This study has been reviewed by the National Health Research Ethics Committee, Nigeria.

What if I need more information? If you have any concern about any aspect of the study, you should ask to speak to the researchers who will do their best to answer your questions. You can also contact a member of the study Dr Elias Aniwada of @ 08038722291

Any complaint about the way you have been treated during the study or any possible harm you might suffer will be addressed. Please contact the IRB Secretariat at National Health Research Ethics Committee, Nigeria (NHREC).; phone number: 08063190328.

Subject Statement: I have read the Informed Consent for this study. I have received an explanation of the planned research, procedures, risks and benefits and privacy of my personal information. I agree to take part in this study.

Your name: _____

Your signature: _____Date: _____

Investigator or person who conducted Informed Consent discussion: I confirm that I have personally explained the nature and extent of the planned research, study procedures, potential risks and benefits, and confidentiality of personal information.

Name of person obtaining consent: _____

Signature of person obtaining consent: _____Date: _____ _____

Annex B: Study Proforma

PATIENT PATHWAY ANALYSIS PROFORMA FOR EXTRACTION OF DATA FROM FACILITY TB REGISTERS (RECORDS)

Name of facility _____

Name of LGA _____

State _____

Sector □ Public □ Private

Level of care □ Primary □ Secondary □ Tertiary

Please answer the questions by ticking the applicable box:

Checklist for the interviewer

- ☐ Great the client and introduce yourself
- ☐ Explain your mission and activities to the clients
- ☐ Ask if she/he understands your explanation
- ☐ Seek the consent to proceed with study/questions
- ☐ Proceed with the questions

If you have any questions or complaints regarding this questionnaire, please contact the project Consultant:

Dr. Elias Aniwada; EMAIL: eaniwada@gmail.com

Questions: Tuberculosis diagnostic services in the facility

1. **Please indicate (by checking the box) which diagnostic services for drug susceptible tuberculosis (DS-TB) and drug resistant tuberculosis (DR-TB) were operated by your health facility in each of the years:**

AFB microscopy	□ 2018	□ 2019	□ 2020
GeneXpert	□ 2018	□ 2019	□ 2020
Chest X-ray	□ 2018	□ 2019	□ 2020
TB Lamp	□ 2018	□ 2019	□ 2020
Culture	□ 2018	□ 2019	□ 2020

Questions: Tuberculosis treatment services in the facility

2. **Please indicate (by checking the box) which of the below tuberculosis treatment services your health facility has offered in each of the years:**

TB DOTS clinic:	□ 2018	□ 2019	□ 2020
DR-TB OPD clinic:	□ 2018	□ 2019	□ 2020
DR-TB Treatment center:	□ 2018	□ 2019	□ 2020

Questions: Tuberculosis notification data

3. **Please fill in the data (numbers) for your health facility for the three different years in the below table**

Drug susceptible TB (DS-TB)												
A. Diagnosis of TB patients	**2018**				**2019**				**2020**			
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15
Number of persons with Presumptive TB												
Number of TB Patients diagnosed (clinically)												
Number of TB Patients diagnosed (bacteriological)												
-Number diagnosed using AFB microscopy												
-Number diagnosed using Gene Xpert												
-Number diagnosed using Chest Xray												
-Number diagnosed using TB lamp												
-Number diagnosed using Culture												
B. lTuberculosis treatment data	**2018**				**2019**				**2020**			
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15
Number of TB patients who started TB treatment												

Number of TB patients who **discontinued** TB treatment												
Number of TB patients who **were lost to follow-up** during TB treatment												
Number of TB patients who were **transferred out** during TB treatment												
Number of TB patients who **died** during TB treatment												
Number of TB patients who **completed** TB treatment												
Drug resistant tuberculosis (DR-TB)												
C. Diagnosis of DR-TB patients	**2018**				**2019**				**2020**			
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15
Number of persons with Presumptive DR-TB												
-Number diagnosed using Gene Xpert												
-Number diagnosed using Culture												
D. Tuberculosis treatment data	**2018**				**2019**				**2020**			
	Male		**Female**		**Male**		**Female**		**Male**		**Female**	
	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15	<15	≥15
Number of TB patients who **started** DR-TB treatment												

Number of DR-TB patients who **discontinued** DR-TB treatment												
Number of DR-TB patients who were **lost to follow-up** during DR-TB treatment												
Number of DR-TB patients who were **transferred out** during DR-TB treatment												
Number of DR-TB patients who **died** during DR-TB treatment												
Number of DR-TB patients who **completed** DR-TB treatment												

Thank you for participating in this project and for your time to answer the questions on this questionnaire. We very much appreciate it.

Completed by

Name: _____

Phone number: _____

Date: _____

Annex C: Patient Questionnaire

PATIENT PATHWAY ANALYSIS QUESTIONNAIRE FOR CLIENTS ACCESSING TUBERCULOSIS SERVICES AT FACILITIES

Name of facility _____
Name of LGA _____
State _____
Sector □ Public □ Private
Level of care □ Primary □ Secondary □ Tertiary

Please answer the questions by ticking the applicable box:

Checklist for the interviewer

- ☐ Great the client and introduce yourself
- ☐ Explain your mission and activities to the clients
- ☐ Ask if she/he understands your explanation
- ☐ Seek the consent to proceed with study/questions
- ☐ Proceed with the questions

If you have any questions or complaints regarding this questionnaire, please contact the project Consultant:

Dr. Elias Aniwada, email: eaniwada@gmail.com

Questions: Client characteristics

1. **What is your [client] sex?** □ Female □ Male

2. **What is your [client] age?** _____

3. **What is your [client] highest completed level of education?**
   □ Primary □ Secondary □ Tertiary □ Informal

4. **What is your [client] current occupation?**
   □ Trading □Skilled worker □ Civil / Public servant □ Other

5. **What is your [client] estimated family income in one year?** _____

Questions: Access to tuberculosis services at facilities

1. **For which health complaints did you [the client] seek care?** *(multiple answers may be applicable)*
   □ Cough □ Fever □ Weight loss / Loss of appetite □ Night sweats
   □ Other:_____

2. **Where did you [the client] first sought care for your health complaints?**
   □ Health facility □ Patient Medicine Vendor
   □ Community pharmacist □ Traditional Birth Attendant / Non-Orthodox personnel
   □ Other: _____
   _____

If health facility, go to question number 3.
If not health facility, go to question number 5.

3. **Did the health facility cover TB services?**
   □ No □ Yes

   If yes,
   Under which sector is the health facility classified? □ Public □ Private
   Under which level is the health facility classified? □ Primary □ Secondary □ Tertiary

   What was the name and place of the health facility?
   Name: _____

   Place: _____

4. **Did you [the client] receive any diagnostics for tuberculosis for your health complaints at the first place where you [the client] sought care?** *(multiple answers may be applicable)*
   □ No □ Yes, □ AFB / smear microscopy □ Chest X-ray
   □ Gene Xpert □ TB LAMP
   □ Other: _____

5. **From the place where you [the client] first sought care, have you been referred to a (second) health facility for your health complaints?**
   □ No □ Yes

   If yes, what was the reason for your referral:
   □ To receive diagnostics □ To receive treatment for TB
   □ Other: _____

   What was the name of the health facility to which you were referred to?

   _____

Thank you for participating in this project and for your time to answer the questions on this questionnaire. We very much appreciate it. Is there anything you would like to add or comment on this questionnaire?

Completed by

Name: _____

Phone number: _____

Date: _____

Notes from the interviewer: