# Challenges to paediatric tuberculosis care as perceived by health workers in Kano, North-western Nigeria

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## Abstract

Tuberculosis (TB) remains the world's deadliest infectious disease that affects a third of the world's population and newly infected an estimated 10 million people in 2018. The number of TB infected Nigerians ranks sixth in the world and first in Africa. Kano State has the highest Nigerian TB prevalence. I aimed to identify Paediatric TB care challenges as perceived by Kano Medical and DOT health care providers. The study design was prospective, descriptive and cross sectional involving structured questionnaire interviews of 43 healthcare providers, during TB supervision visits of 10 Health facilities in Kano. Generated data was entered, validated and analysed using the STATA 13 statistical software package. The sample size was convenient, since it is the number of all the health providers working in the facilities assigned to the author for supervision under a supervision contract with KNCV in 2017. Of the 43 respondents, there were 26 males, with a M: F ratio of 1.5: 1. Those health workers aged from 30 and 40 years constituted 58% of respondents. The staff cadre of respondents comprised of Community Health Extension Workers [CHEW] (40%), doctors (30%) and nurses (3%). Up to 51% of respondents had over 10 years health worker experience and greater than 36 months Child TB DOT care provision. The most commonly identified challenges to paediatric TB care included poor health knowledge (97.7%), poor health seeking behaviour (95.4%), poverty (95.4%), the inability of children to cough up sputum 95.4%, late presentation (90.7%), contact tracing logistics (90.7 %), patient and community factors of stigma and discrimination (86%) and poor health worker paediatric TB knowledge (70%). Perceived health worker challenges to effective Paediatric TB care were the adult orientation of the TB programme and its contact tracing logistic challenges, inadequate health worker Paediatric TB knowledge, children's inability to cough up sputum, poverty, poor patient TB health knowledge, community stigma and discrimination, poor health seeking behaviour and late presentation.

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## Introduction

Tuberculosis (TB) is a leading infectious cause of death in children globally and has infected a quarter of the world's population and with an estimated 10 million newly infected persons in 2020.[1,2] The global and Nigerian childhood TB burden is not well-known because childhood TB is commonly under-diagnosed, under-notified and under-reported.[3,4] Most of childhood TB morbidity and mortality was grossly under-estimated and has commonly been buried under categories of pneumonia, meningitis, sepsis, malnutrition or HIV.[4-7] The number of TB infections in Nigeria ranks sixth globally and is first in Africa while the TB prevalence in Kano State is the highest in Nigeria.[2,3] Childhood TB diagnosis is challenging for the majority of health practitioners because clinical and radiological signs of childhood TB are non-specific additional to the common occurrence of extrapulmonary TB presentations. This challenge is compounded by a difficulty in obtaining the appropriate biological samples for laboratory analysis and also the pauci-bacillary nature of childhood TB. [4-6,8] Furthermore, the poor

sensitivity of existing microbiological confirmatory tests leaves a large proportion of TB infected children undetected. The gold standard laboratory test method, TB culture (solid or liquid), is only positive in 7-40% of TB infected children.[4,9] The GeneXpert MTB/RIF molecular assay is reported to be positive for induced sputum in 60 - 66%, while the new Xpert MTB/RIF Ultra molecular assay had sensitivity and specificity on banked induced sputum of 75.3% and 96.9%, respectively.[7,8,9] None of these reports were conducted on gastric aspirate samples which have much lower yields of TB bacilli.

Until recently childhood TB has not received much attention in TB control programmes because children were considered non-infective, a perception that has changed with the realisation that TB contributes significantly to under-five mortality and also to the future reservoir of the epidemic.[4,8,9] Though TB is preventable and is curable, the diagnostic challenges in childhood TB are major barriers to initiating TB treatment, amongst numerous other barriers.[4-7] Other barriers include health worker ability to recognise childhood TB, the frequent transfer of trained personnel, the rigid adult orientation of TB control programmes, drugs and other consumable stock outs, stigma and discrimination, sub-optimal emphasis on contact tracing, poor community engagement and sub-optimal political funding and will.[10,11] In Kano, children with symptoms suggestive of TB are evaluated by medical officers or more often by nurses (only a few are evaluated by specialist Paediatricians) before referral to other nurses in the TB Directly Observed Treatment [DOT] Centres for treatment. This study aimed to identify Paediatric TB care challenges as perceived by medical and DOT health care providers in Kano.

## Materials and Methods

The study design was prospective, descriptive and cross sectional.

The study setting is in Kano State, the most populous state in Nigeria which also has the highest TB burden. Kano has 1145 Directly Observed TB Treatment (DOT) Centres, which are under the supervision of the TB Control Officer of the State TB, Leprosy and Buruli Ulcer Control Programme (STBLCP), commonly a Medical Officer with post-graduate training in Public Health.[12] The STBLCP is under the Public Health Department of the State Ministry of Health. All DOT centres are manned by at least one DOT officer (commonly 2-3 health workers) whose qualifications may be of a Registered Nurse, Community Health Officer or Community Health Extension Worker who is/are responsible to the medical officer in charge of the hospital where the DOT centre is domiciled. The DOT officers' TB responsibilities include identifying TB suspects, ensuring TB diagnosis through laboratory examination, classifying TB patients for treatment, administering and monitoring TB treatment, carrying out examinations of household contacts of patients, filling completely and accurately all forms, cards and registers used in patient management, and referring all smear negative patients and children suspected to be having TB to Medical Officers, trace and retrieve patients who interrupt treatment, carrying out patient education on TB and undertaking public enlightenment. [12]

The sample size was conveniently the number of medical officers and DOT Centre health officers working in the 10 facilities that the author was assigned to supervise by KNCV.

Interviews of 43 healthcare providers were conducted from eight major secondary and two private Health facilities, using structured questionnaires.

The structured questionnaire collected details from the respondents regarding their facility childhood TB service duration and the challenges related to the facility TB control programme, the health care process or structure, the health care providers, the community and challenges related to child immaturity and the nature of childhood TB disease. The interviews were conducted by the author or a study assistant, during supervisory visits by the author to childhood TB services at the selected health facilities. All procedures in the study were done in accordance with the ethical standards of the Health Services Management Board (HMB) of the Kano State Ministry of Health, the Aminu Kano Teaching Hospital Research Ethics Committee and with the Helsinki Declaration of 1975, as revised in 2000.

The data generated was entered, validated and analysed using the STATA 13 statistical software package.

## Results

Of the 43 respondents interviewed, more than half (58.1%) were aged between 30 and 40 years. Respondents were predominantly Community Health Extension Workers (39.5%) and doctors (30.2%). Most of the respondents had greater than 10 years health work experience (51.2%) and greater than 36 months child TB DOT care provision (39.5%, Table 1).

With regard to the TB control programme, the majority (90.7%) of health workers perceived contact tracing logistics as challenging in identifying childhood TB and about two thirds (69.8%) perceived poor paediatric TB knowledge as a challenge.

Majority of the health workers (90.7 – 97.7%) perceived specific patient and community factors as challenges to Paediatric TB care access and good TB care outcomes. The specific community factors included stigma and discrimination (86%), late presentation (90.7%), poverty (95.4%), poor health knowledge (97.7%) and poor health seeking behaviour (95.4%) while the specific

**Table 1. Socio-demographic characteristics of recruited DOT facility health workers.**

| Socio-demographic characteristics | Frequency (%) n=43 |
|---|---|
| Age category | |
| <30 | 6 (14.0) |
| 30 to 40 | 25 (58.1) |
| >40 | 12 (27.9) |
| Gender | |
| Male | 26 (60.5) |
| Female | 17 (39.5) |
| Cadre | |
| CHEW | 17 (39.5) |
| Doctors | 13 (30.2) |
| Community Health Officers | 4 (9.3) |
| Nurses | 3 (7.0) |
| Duration of Health Worker at DOTS Facility (Months) | |
| <12 | 14 (32.6) |
| 12 to 36 | 12 (27.9) |
| >36 | 17 (39.5) |
| Health worker years of paediatric TB experience | |
| <5 | 15 (34.9) |
| 5 to 10 | 6 (14.0) |
| 10 | 22 (51.2) |

patient factor was the inability of children to cough up sputum (95.4%; Table 2).

## Discussion

This study provides a description of challenges to the access and the optimal outcomes of the childhood TB control program as perceived by healthcare workers in Kano State. The predominant challenges identified, most of which were related to the community or to the patient, included, poor health knowledge (97.7%), poor health seeking behaviour (95.4%), poverty (95.4%), the inability of children to cough up sputum 95.4%, late presentation (90.7%), challenges with contact tracing (90.7 %) stigma and discrimination (86%).

A perceived barrier, from the TB program, to effective Paediatric TB care by the majority (90.7%) of health workers was contact tracing logistics. Contact tracing was also reported to be a challenge in developing countries by Laghari *et al.*[11] Ogbuabor and Onwujekwe reported inadequate staffing and dilapidated infrastructure which promoted ineffectiveness and inefficiency of the Nigerian TB control programme.[10] Adequate staffing and adequate funding are necessary for contact tracing and its logistics.

Additional programmatic, health worker perceived challenges (86.1%) were the adult orientation of the TB control services and the non-availability of recording tools and drugs (perceived by 53.5% of health workers). Sullivan *et al.* reported that the lack of access to TB diagnostic tools at peripheral health institutions, negatively impacted the TB control program performance.[6] It has been reported that rural facilities with improved TB diagnostic and treatment capacity could reduce diagnostic and treatment delays.[13,14] Nigeria's TB drug supply systems and health delivery infrastructure were observed to be sub-optimal and concluded to be challenges of the Nigerian national TB control program by Ogbuabor and Onwujekwe.[10]

The majority of health workers (90.7-97.7%) perceived specified patient and community factors as challenges to Paediatric TB care access and good care outcomes. These specified challenges included poverty, which was perceived by 95.4% of health workers as a barrier to early Paediatric TB care. It is also probable that poverty was a reason for the poor health seeking behaviour and late presentation perceived by 95.4% and 90.7% of health workers, respectively. Adamu *et al* observed in their study in Kano that transportation and diagnostic out-of-pocket expenses may negatively affect the outcome of TB treatment.[4] This observation was not contrary to reports that medical expenses and other indirect costs in poverty situations are barriers to TB treatment and TB treatment initiation for individuals of all ages in Sub-Saharan Africa (SSA) by Sullivan *et al.*,[16] Shimeles *et al.*[15] Asres *et al.*,[16] and Kirubi *et al.*[17] Sullivan *et al.* further reported, in their meta-analysis, that geography or distance to TB treatment centers (infrastructure barriers) contributed to delayed access and poor treatment outcomes.[6]

The inability of children to cough up sputum was perceived as a challenge to paediatric TB care by 95.4% of health workers interviewed. Tania Thomas reported that young children lack the oro-motor coordination and the force to deeply cough up sputum.[9] Sputum is often swallowed during cough in young children such that in LMIC, where induced sputum facilities are scarcely available, sputum assessments depend on microscopy smears and cultures of 2-3 early morning gastric aspirates.[9] Sputum microscopy is currently most useful for monitoring treatment after the diagnosis has been confirmed, especially in adults but has limited usefulness in pauci-bacillary childhood TB since at least 5000-10000 acid-fast bacilli (AFB) per µL are needed for positivity.[9] Not surprisingly, sputum and gastric aspirate smears are rarely positive, in less than 15% of children.[4,9] Childhood TB diagnosis is challenging for the majority of health practitioners because the clinical and radiological signs of childhood TB are non-specific, compounded by a difficulty in obtaining the appropriate biological samples for laboratory analysis.[4,6,9] Furthermore, microbiological confirmation is currently not feasible in a greater number of children with TB. Even the gold standard, TB culture (solid or liquid) is only positive in 7-40% of TB infected children.[4,9] The GeneXpert MTB/RIF molecular test is reported to be positive for induced sputum in 60 - 66% of TB infected children, while the new Xpert MTB/RIF Ultra assay had the sensitivity and specificity on banked induced sputum of 75.3% and 96.9% respectively.[9-11]

Since microbiological confirmation is often not feasible in Paediatric TB, the diagnosis is clinical in the majority of cases.

**Table 2. Perception of health workers on challenges of paediatric TB.**

| Paediatric TB challenges | Frequency n=43 | Percentage |
|---|---|---|
| Challenges related to the TB Control Program | | |
| Logistic challenges in contact tracing | 39 | 90.7 |
| Sub-optimal sensitisation and advocacy | 38 | 88.4 |
| Services are adult-oriented | 37 | 86.1 |
| Poor contact tracing by DOTS officers | 25 | 58.1 |
| Non-availability of recording tools and drugs | 23 | 53.5 |
| Challenges related to Health Workers | | |
| Poor knowledge regarding paediatric TB | 30 | 69.8 |
| Stigma and discrimination towards TB patients by HCP | 27 | 62.8 |
| Poor TB diagnostic skills | 23 | 53.5 |
| Uncaring attitude to TB patient high loss to follow-up | 23 | 53.5 |
| Challenges related to the community or TB patient | | |
| Poor patient health knowledge | 42 | 97.7 |
| Poor TB patient sputum expectoration | 41 | 95.4 |
| Poverty | 41 | 95.4 |
| Poor patient health seeking behaviour | 41 | 95.4 |
| Late patient presentation | 39 | 90.7 |
| Stigma and discrimination from the community | 37 | 86.0 |

Ogbudebe *et al.* in their assessment of childhood TB in Nigeria observed that the dependence on clinical diagnosis in under-five children with TB was associated with unsuccessful outcomes with an adjusted odds ratio of 5.6.[10]

In this study, the majority of health workers reported poor Paediatric TB knowledge as a challenge to effective Paediatric TB care. Ndakidemi *et al.* reported that Primary Health Care Workers expressed a need for continuous refresher training on standard TB care and data handling.[13] Adamu *et al.* in their retrospective study in Kano also suggested poor child TB diagnostic knowledge of low cadre health workers in addition to difficult child TB diagnosis and inaccessible diagnostic equipment could have contributed to their observation of unacceptably high child TB mortality in the intensive phase of treatment.[4] The capacity building requirement of health workers regarding childhood TB control efforts was only partially met in a benchmark assessment of the Nigerian National TB program.[14]

Additional findings that we observed in this study were the community factors of TB patients' poor health knowledge, perceived by 97.7% of health workers, community stigma and discrimination perceived by 86% of health workers as barriers to effective Paediatric TB care. Poor TB health knowledge has been observed to significantly promote delay in health seeking and non-adherence to TB treatment ultimately negatively impacting TB control in Ethiopia, South Africa and Nigeria, while on the other hand good TB health knowledge of patients promoted good health seeking behaviour also in Ethiopia.[18-21]

Perceived stigma by patients from health workers discourages health seeking, facilitating further spread of TB within communities as observed by Duko *et al.*, who reported a patient perceived stigma prevalence of 42.4% in Ethiopia.[18] The reported Ethiopian perceived stigma prevalence is similar to the reported stigma prevalence in southern Thailand (41.5%) and much lower than the stigma prevalence of Nepal (63.3%).[18] Our report on 86% prevalence of the perception of stigma and discrimination by health workers towards patients that prevents TB patients from seeking treatment may account for the higher prevalence than the actual perception by patients reported from Ethiopia, Thailand and Nepal.

Perceived health worker challenges to effective Paediatric TB care were Inadequate health worker Paediatric TB knowledge compounded by children's inability to cough up sputum with poverty, poor patient TB health knowledge, community stigma and discrimination which may have facilitated poor health seeking behaviour and late presentation. The TB programme's barriers to effective Paediatric TB care that were perceived by the majority of health workers were the adult orientation of the TB program and its contact tracing logistic challenges. These identified challenges, when addressed by the Nigerian and state TB programme, may improve the identification, notification and the childhood TB treatment outcome.

## Conclusions

Most health workers perceived contact tracing logistics and inadequate health worker Paediatric TB knowledge as challenges to Paediatric TB identification while patient and community factors challenge Paediatric TB care access.

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