

Effect of COVID-19 on paediatric TB service delivery and patients' comfort receiving TB services in Cameroon and Kenya during COVID: a qualitative assessment

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ABSTRACT

Background The outbreak of COVID-19 has caused a setback to the gains achieved in tuberculosis (TB) control by impairing TB diagnosis, delaying treatment initiation and aggravating TB deaths. This study explored the effect of COVID-19 on paediatric TB services provided through the Catalysing Paediatric TB Innovations (CaP-TB) project among caregivers of children receiving TB services and healthcare workers (HCWs) providing TB services in Cameroon and Kenya.

Methods From March to September 2021, in-depth interviews (44) were conducted with caregivers whose children under 5 years had gone through TB services and programme managers (10) overseeing the CaP-TB project. Focus group discussions were conducted with HCWs (07) and community health workers (04) supporting TB care services. Transcripts were coded and analysed by using MAXQDA V.12.

Results The COVID-19 pandemic has caused fear and anxiety among HCWs and caregivers. This fear was motivated by stigma related to COVID-19 and affected the ability to screen patients for TB due to the similarity of symptoms with COVID-19. The health-seeking behaviour of patients was affected, as many caregivers avoided hospitals and those accessing the facilities concealed their sickness due to fear of testing positive or being vaccinated. In addition, COVID-19 mitigation strategies implemented by both government and health facilities to curb the spread of the virus limited patient access to paediatric healthcare services. These included temporary closure of health facilities due to COVID-19 infections among staff, transfer of services to other spaces, spacing out patient appointments and reduced time spent with patients.

Conclusions The outbreak of COVID-19 has induced fear and stigma that affected patients' health-seeking behaviour and provider attitudes towards paediatric TB service delivery. In addition, facility and governmental measures put in place to mitigate COVID-19 impact negatively affected paediatric service delivery. Training

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ The COVID-19 outbreak has had a detrimental impact on the health system, including tuberculosis (TB) services. The strain on healthcare resources, disruption in healthcare services and diversion of attention have weakened the health system's ability to effectively address TB. This has resulted in challenges in TB diagnosis, delays in treatment initiation and an increase in TB-related deaths.
- ⇒ The COVID-19 pandemic has presented significant challenges in accessing TB services during the outbreak. These challenges include a lack of means of transport to healthcare facilities, changes in TB services and fear of COVID-19 infection within the facility.

WHAT THIS STUDY ADDS

- ⇒ The fear instilled by COVID-19 in the community has made many community members wary of healthcare workers, especially when they visit their homes. They perceive healthcare workers as potential carriers of the virus and fear that they could infect their family member.
- ⇒ The mitigation strategies implemented to curb the spread of COVID-19 have had a negative impact on access to paediatric TB services. The measures taken, such as lockdowns and restrictions on movement, have disrupted the delivery of paediatric TB services. This has resulted in challenges in accessing timely diagnosis, treatment and care for children with TB.
- ⇒ The modification of services to reduce the risk of infection and overcrowding, such as reducing the time for paediatric TB screening and spacing outpatient appointments, has had a negative impact on the quality of service.



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**HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY**

- ⇒ Policy-makers at the global and local levels can use these data to enhance their preparedness for pandemic outbreaks. By understanding the challenges faced in accessing healthcare services during such outbreaks, including paediatric TB service delivery, they can develop and propose mitigation strategies that minimise the impact on essential healthcare services.
- ⇒ At the local level, healthcare facilities can use these data to implement and adopt measures that prevent the spread of infections, including COVID-19, without compromising the quality of services provided to paediatric TB patients.

for health personnel, timely provision of personal protective equipments and appropriate communication strategies could help mitigate COVID-19 impact on paediatric TB service delivery.

INTRODUCTION

Tuberculosis (TB) is a leading cause of morbidity and mortality among infectious diseases. Children below 15 years old represent about 12% of new cases of TB but an estimated 1.4 million (16%) of TB-related deaths.¹ A significant proportion of children with TB infection go undetected due to challenges in paediatric TB diagnosis such as the paucibacillary nature of the infection, difficulty in obtaining an appropriate sample, clinical signs and symptoms of TB that overlap with those of other common childhood diseases and difficult interpretation of chest X-ray in children.^{2,3}

The outbreak of novel COVID-19 has caused a setback to the gains achieved in TB control by impairing TB diagnosis, delaying treatment initiation and aggravating TB deaths, which in turn will adversely impact the TB elimination targets of 2030.⁴ When health systems are overwhelmed by the pandemic outbreak, patients may not receive the services they need. This can result in an increased number of outbreak-related and non-outbreak-related deaths.^{5,6} Surveys conducted with TB patients reported significant challenges in accessing TB services during the COVID-19 pandemic, including lack of means of transport to the facility, changes in TB services and fear of COVID-19 infection in the facility.⁷ The outbreak of the COVID-19 pandemic has weakened the health system of many countries including Cameroon and Kenya. There is limited literature on the effect of this pandemic on paediatric TB service delivery.

The Catalysing Paediatric TB innovation (CaP-TB) project aimed to reduce paediatric TB morbidity and mortality by developing, implementing and documenting innovative models of care and catalysing their wide-scale uptake to improve case detection and treatment in nine countries from Sub-Saharan Africa. The INPUT study was designed to evaluate the effectiveness of the CaP-TB project in Cameroon and Kenya. This study was implemented in 18 facilities in Cameroon (6 hubs and 12 spokes) and 14 facilities in Kenya (5 hubs

and 9 spokes). The INPUT study included a qualitative evaluation to assess the acceptability and feasibility of integrated TB services into routine paediatric services as provided through the CaP-TB project among caregivers and healthcare workers (HCWs).⁸ As COVID-19 emerged, the qualitative component also captured information on the perceived impact of COVID-19 on TB service delivery and patients' comfort with receiving TB services during COVID-19 among caregivers of children with presumptive TB and HCWs providing TB care in selected CaP-TB project sites in Cameroon and Kenya.

METHODS**Study design**

A qualitative study using focus group discussions (FGDs) and in-depth interviews (IDIs) was conducted in Kenya and Cameroon as part of the INPUT study.⁸

The CaP-TB intervention package

The CaP-TB intervention package used a hub-and-spoke model. Hubs are hospitals that offer full TB services from screening, sample collection, diagnosis confirmation, treatment initiation and follow-up. Spokes are primary healthcare centres located in the health district (hub) catchment area, with mainly nurses or nurse assistant, trained to screen children for TB, perform sample collection and send to hubs for TB diagnosis. Interventions are tailored according to the different levels of care. The first pillar is the integration of TB screening into all healthcare services, including units such as maternal, newborn and child health, paediatric inpatient and outpatient facilities, nutrition and HIV care. The project included the introduction of a specific case detection tool and an updated presumptive TB register. Trained cough monitors/linkage agents were placed on the sites to serve as lay HCWs who screened patients in waiting rooms and accompanied children with presumptive TB to healthcare providers for second screening and sample collection according to manufacturer protocols and national guidelines. A sample transport system was designed, and sites without a GeneXpert platform were connected to GeneXpert sites following the hub-and-spoke model. Samples (including expectorated sputum, gastric aspirates, induced sputum and nasopharyngeal aspirates) from primary healthcare centres were collected, transported and tested at GeneXpert platform sites. Depending on the setting, HCWs or bikers were responsible for transporting the samples to the GeneXpert platform sites and returning the results to the requesting sites. Furthermore, another pillar of CaP-TB is the improvement of clinical, radiological and bacteriological TB diagnosis capacities. HCWs were trained in clinical diagnosis of TB and advanced specimen collection (eg, gastric aspirates, induced sputum, lymph node aspiration). The use of GeneXpert and chest X-ray was strengthened on-site or through a referral system that was supported by the project, such as providing transport

vouchers for patients. Finally, children diagnosed with TB initiated treatment at the point of diagnosis.

Study sites

The qualitative study was conducted in two regions in Cameroon (centre and west) and one county in Kenya (Homa Bay). The west and centre regions of Cameroon were chosen for this study due to their distinct cultural disparities and varying HIV prevalence rates. The centre region exhibits one of the highest HIV prevalence rates at 5.8%, surpassing the national prevalence of 3.7%, thereby contributing to elevated TB/HIV-related mortality risks.⁹ Conversely, the west region demonstrates one of the lowest HIV prevalence rates at 2.7%.⁹ Culturally, the west region represents three cultural zones in Cameroon (west, littoral, northwest and southwest) while the centre region represents three other cultural zones in Cameroon (centre, east and south regions). Homa Bay County is situated in western Kenya, on the shores of Lake Victoria. The county has a high HIV prevalence in adults of 19.6% compared with the national prevalence of 3.7% and grapples with a dual challenge of TB-HIV coinfection, leading to an elevated risk of TB-related fatalities.¹⁰ Homa Bay county also carries a substantial schistosomiasis and malaria burden with malaria being the top cause of mortality in the region after pneumonia. The population is largely uncircumcised and has early sexual debut with high rates of teenage pregnancies. In Cameroon, six INPUT study sites (four hubs and two spokes) implementing integrated paediatric TB services were purposefully selected: two in the centre region and four in the west region. In Kenya, nine INPUT study sites (three hubs and six spokes) implementing the CaP-TB project were also purposefully selected in Homa Bay County.

Study population

The study population included four groups: caregivers, HCWs, community workers (CWs) and programme managers (PMs). Eligible caregivers were parents or legal guardians of a child with presumptive TB. Caregivers were 21 years and above in Cameroon and 18 years and above in Kenya, except in the case of emancipated minors

who are married, pregnant, a mother or a household head. The caregiver's child had to be aged <5 years and screened positive for TB within the integrated services model. Eligible HCWs were those involved in the provision of integrated paediatric TB services at the selected site. CWs supporting the selected site for a minimum of 6 months in the last 12 months following the CaP-TB project implementation. Due to the lack of involvement of CWs in Cameroon's paediatric TB programme, data were only collected with this population in Kenya. PMs who were involved in the oversight of the integrated paediatric TB services were equally included to provide high-level perspectives.

Sampling and recruitment

During the recruitment, we aimed to reach saturation for each group of participants. Previous studies have indicated that saturation can be reached at 10–12 for IDIs and 3–6 for FGDs in a homogeneous group within the data set.^{11 12} The participant groups' sizes are presented in [table 1](#).

Participant recruitment

The recruitment of caregivers started with a random selection of children enrolled in the INPUT study.⁸ The highest volume sites for paediatric TB were purposefully selected to participate in this study. At each site, eligible children were arranged in random order and the first five children were selected and their caregivers contacted to participate in the study. In sites where we had less than five eligible children, all were included. Additional children were selected from the closest CaP-TB site using the list of children arranged in random order until the sample size for the country was reached. A link log was used to identify caregivers and their contacts. Caregivers were contacted, screened for eligibility, informed of the study and invited for an interview at the facility.

A list of eligible HCWs was produced by the TB nurse in the facility. If a site had more than 12 eligible HCWs, the names of all eligible HCWs were put in a bag and 12 eligible HCWs were randomly selected. Selected HCWs were contacted by the TB nurse and invited to participate in the FGD in the facility on a specific day and time. If

Table 1 Size of participant groups in the qualitative evaluation of the CaP-TB project in Cameroon and Kenya

Study population group	Cameroon*	Kenya†	Total
Caregivers	24 IDIs	20 IDIs	44 IDIs
HCWs	4 FGDs (36 participants)	3 FGDs (23 participants)	7 FGDs (79 participants)
Community workers	0	4 FGDs (38 participants)	4 FGDs (38 participants)
Programme managers	6 IDIs	4 IDIs	10 IDIs

*Cameroon sites: Akonolinga District Hospital, Soa District Hospital, Fouban District Hospital, Palais des Rois Bamouns Private Hospital, Dschang District Hospital, Lepi Health Centre.

†Kenya sites: Homa Bay County referral hospital, Makongeni Sub-County hospital, Marindi Health Centre, Ndhiwa Sub-County hospital, Magina health centre, Kiasa Dispensary, Kendu Bay Sub-County Hospital, Wagwe Health Centre and Kandiege Sub-County Hospital. CaP-TB, Catalysing Paediatric tuberculosis Innovations; FGD, focus group discussion; HCW, healthcare worker; IDI, in-depth interview.



there was an insufficient number of HCWs to participate in the FGD, additional HCWs were invited from neighbouring CaP-TB sites to participate in the FGDs. FGDs were authorised to take place when there was a minimum of five participants.

In Kenya, the TB nurse produced a list of all the eligible CWs supporting the health facility. For sites with more than 12 CWs, the names of all eligible CWs were written and put in a bag and 12 participants were randomly selected. The INPUT study team contacted the selected CWs, informed them of the study and invited those interested to participate in the FGD in the facility. Additional CWs were from neighbouring CaP-TB sites if the minimum number of FGD participants was not met.

The PMs selected were involved in the oversight of the paediatric unit in which CaP-TB interventions were being implemented. In Cameroon, the selection of the PMs was done by either the facility director or district medical officer. In Kenya, the selection was done with the support of the CaP-TB project staff. PMs were either facility directors, District medical officers, TB unit coordinators or held other supervisory positions.

Data collection

Eligibility criteria were confirmed for all study participants before enrolment into IDI or FGD. Written informed consent was obtained from all study participants before data collection. IDIs lasted for a minimum of 45 min and 60 min for FGDs. IDIs were conducted with caregivers and PMs while FGDs were conducted with HCWs and CWs by research assistants (RAs) who were trained on the study protocol, protection of human subjects in research and qualitative data collection skills.

IDIs were selected as the data collection method to gather information from caregivers about the individual's experience receiving TB care during the COVID-19 pandemic. IDIs with PMs captured a high-level perspective on the impact of the COVID-19 pandemic on paediatric service delivery within the facility. FGDs with HCWs gathered information on the impact of the COVID-19 pandemic on paediatric TB service delivery. FGDs with CWs explored community perceptions of COVID-19, the relationship between COVID-19 and TB, and the impact of the COVID-19 pandemic on caregivers' health-seeking behaviours.

FGDs and IDIs were conducted in Cameroon and Kenya from May to September 2021. IDIs were conducted one-on-one by RA. FGDs were composed of 5–12 participants, one moderator and one notetaker. Both the IDIs and FGDs employed a semistructured guide. Field notes were made immediately after the IDIs session and after the daily briefing between the moderator of FGD and the note taker. IDIs and FGDs in Cameroon were conducted in either English or French based on participants' preferences. In Kenya, FGDs and IDIs were conducted in English. IDIs and FGDs were audio recorded and then

transcribed and translated into English simultaneously into Microsoft Word documents.

Confidentiality

The study recruited graduates in social sciences and related fields and trained them in: ethics in human subject research, obtaining informed consent, conducting IDIs and FGDs, maintaining patient confidentiality and storing study materials. Interviews and FGDs took place in secured places, and the audio recordings and transcripts were stored in password-protected files on the server (only accessible to the study team). All members of the study team signed a confidentiality agreement.

Data analysis

Transcripts were reviewed by the study team to generate the initial code list, using both inductive and deductive approaches. Three transcripts were independently coded by three RAs using MAXQDA V.12 and the final coding results were reviewed by the study team for consensus on coding and definitions. After this, the remaining transcripts were shared among the three RAs for coding. The code list was modified as emergent themes arose during the coding process. Once the coding was complete, code reports were generated by country and by study population (HCWs, caregivers, PMs and CWs). Data reduction and summary tables were generated to aid in the identification of overall themes and key findings.

Participants and public involvement

Participants and the public were involved in the design, conduct and dissemination of the results of this study. The results were shared at the facility level and participants in this qualitative component provide feedback before sharing the results during a public dissemination event under the leadership of the Ministry of Public Health.

RESULTS

Demographic characteristics of participants

Table 2 presents the demographic characteristics of the caregivers, HCWs, CWs and PMs who participated in the study. The majority of caregivers were female. In Cameroon, the majority of caregivers had secondary education or above, while in Kenya, the majority of caregivers had primary education or below. In Kenya, almost all caregivers were married. Among PMs, the mean duration of service in Kenya was twice that in Cameroon (80.0 months and 40.0 months, respectively). The mean duration of service among HCWs was also longer in Kenya as compared with Cameroon (19.2 months and 14.5 months, respectively). The majority of HCWs in Kenya were clinical officers as opposed to nurses in Cameroon. The mean duration of service among CWs was 23.9 months with close to half (46%) being community health volunteers.

Table 2 Demographic information of the different groups of participants enrolled on the IDIs and FGDs

	Caregivers		Programme manager		HCW		CHW
	Kenya	Cameroon	Kenya	Cameroon	Kenya	Cameroon	Kenya
	(N=20)	(N=24)	(N=4)	(N=6)	(N=23)	(N=36)	(N=38)
Age (years)	N=20	N=24	N=4	N=6	N=23	N=36	N=37*
Mean (SD)	30.3 (11.2)	36.3 (12.1)	38.3 (3.9)	40.7 (9.0)	32.9 (3.6)	37.1 (9.2)	39.1 (10.2)
Duration of Service (months)			N=3	N=6	N=23	N=36	N=37*
Mean (SD)	–	–	80.0 (30.2)	40.0 (32.1)	19.2 (5.6)	14.5 (10.0)	23.9 (11.8)
Gender	n=20	n=24			n=23	n=36	n=38
Female	19 (95%)	17 (70.8%)	–	–	10 (43.5%)	22 (61.1%)	26 (68.4%)
Male	1 (5%)	7 (29.2%)			13 (56.5%)	14 (38.9%)	12 (31.6%)
Marital status	n=20	n=24					
Single	1 (5%)	11 (45.8%)	–	–	–	–	–
Married	19 (95%)	13 (54.2%)					
Education	n=20	n=24					
Below primary	7 (35%)	0 (0%)					
Primary	7 (35%)	7 (29.2%)	–	–	–	–	–
Secondary	5 (25%)	15 (62.5%)					
University	1 (5%)	2 (8.3%)					
Age of child (months)	n=20	n=24					
Mean (SD)	24.7 (17.0)	27.6 (15.2)	–	–	–	–	–
Duration of anti-TB treatment (weeks)	N=15†	N=17†	–	–	–	–	–
Mean (SD)	12.4 (5.8)	4.2 (1.8)					
Min max	Min: 4 weeks/Max: 24 weeks	Min: 0 weeks/Max: 6 weeks					
Cadre					n=23	n=36	
Clinician (physician and non-physician)	N/A	N/A	N/A	N/A	16 (69.6%)	7 (19.4%)	N/A
Laboratory position					3 (13.0%)	7 (19.4%)	
Nursing position					4 (17.4%)	22 (61.1%)	

*One participant did not respond to this question.
 †Five TB presumptive children in Kenya and seven in Cameroon were not diagnosed with TB, which makes 15 and 17 on TB treatment, respectively.
 CHWs, community health workers; FGDs, focus group discussions; HCWs, healthcare workers; IDIs, in-depth interviews; N/A, not available; TB, tuberculosis.

Fear and stigma experienced during the COVID-19 pandemic

According to participants' response, the outbreak of COVID-19 created significant fear and anxiety among the general population, which likely resulted in many patients avoiding the health facility. Many factors contributed to the modification of patients' and providers' behaviours towards paediatric TB healthcare service delivery, described below.

Fear and anxiety due to COVID-19

Fear of COVID-19 was a prominent emotion among HCWs and within the facility and was exacerbated by infection among healthcare staff. A few HCWs described feeling fear regarding potential COVID-19 exposures in the facility. Patients reported health facilities being associated with COVID-19 and viewed as a place of refuge for those with the disease. Participants reported that the community avoided health facilities for fear of being

Table 3 Fear and anxiety due to COVID-19

Observed theme	Quote
Many in the community feared testing positive and being isolated.	<i>Then they also tend to think that any cough is COVID-19. So, they do not go to the facility for fear of being taken to isolation centres. (Kenyan clinical officer, M, 31 y/o)</i>
SARS-COV-2 infection was seen as a death sentence.	<i>Yes, that's a scary thing! COVID is scary! It's more than AIDS ten times over, because when we talk about COVID, humm! That's death. When they tell you that someone has it, it's a total field [fear], everyone has to run away! (Cameroonian caregiver, M, 40 y/o, child taking medicine for 5 weeks)</i>

exposed to the virus and/or fear of testing positive for COVID-19. Few patients reported that COVID-19 is more feared than AIDS within the facility. One PM suggested that the community also feared being forced to take the COVID-19 vaccine if they were to visit the facility. In addition to avoiding the facility, fear also contributed to persons hiding symptoms during the TB screening process. Similarly, the community feared being quarantined as a consequence of COVID-19 diagnosis. However, some respondents noted that with time this avoidance of facilities diminished due to less fear of COVID-19 and increased sensitisation. These findings were similar across Cameroon and Kenya (table 3).

Stigma and community perception towards COVID-19

The CWs reported that there was a stigma against any person perceived as being infected, often because of coughing. Stigma primarily appeared in community settings, as most caregivers did not report experiencing stigma with HCWs. Examples include people being asked to leave public transport or others running away from the suspected individual. Fear and stigma related to COVID-19 also affected the work of CWs in Kenya. Many CWs in Kenya reported that community members were wary of them or would not allow them to enter their homes to conduct their work. Although this fear and facility avoidance was common, not all caregivers reported similar feelings. In Cameroon, community members felt pity for HCWs who were exposed to the deadly virus. One

HCW in Cameroon stated that COVID-19 did not impact patients' attendance very much because patients knew how to manage COVID-19 cases from the start. Many HCWs from Cameroon did speak of mandatory face mask wearing by all (HCWs and patients) and social distancing on visiting the facility during COVID-19 (table 4).

Many study participants reported that the COVID-19 outbreak had negatively impacted paediatric TB service delivery. There were several changes in healthcare delivery that had a negative effect on the quality of healthcare delivery and limited access to essential paediatric TB services.

Impact of COVID-19 on health services delivery

Changes in service delivery included patients reportedly receiving services faster and reduced screening time for TB. This was done to decrease opportunities for transmission and crowding of facilities. However, some community members were upset by the decreased time spent by HCWs because they felt they were not being adequately cared for. In an effort to reduce the crowding of facilities and transmission opportunities, the spacing between appointments was lengthened in both Cameroon and Kenya. However, some staff reported that this decision occasionally led to defaulters and loss of patients because some patients questioned the quality of care they were receiving. There was some confusion between the signs and symptoms of TB and those of COVID-19. Given their similarities, it was often difficult for staff to distinguish

Table 4 Fear, stigma and community perception to the COVID-19

Observed theme	Quote
Coughs in the community were associated with SARS-COV-2 infection and result in stigma.	<i>... In church if someone is coughing, I think psychologically you are not at ease... I think it is natural that when everyone understands that there is COVID, it kills, we are in a pandemic period and that someone presents signs that could make think of this disease, that he is afraid and that he runs away from the one who presents these signs. (Cameroonian PM, 48 y/o, 5 years of experience)</i>
Facilities were considered a refuge for SARS-COV-2.	<i>In its early days, COVID emptied the health centres at one point. So people were afraid because they were afraid that the hospitals were considered to be places of refuge (of the SARS-COV-2)... So people preferred to go and give birth elsewhere, they were afraid. But with time, well I think it all faded away. (Cameroonian caregiver, M, 42 y/o, child taking medicine for 6 weeks)</i>
Perceived effect of COVID-19 on paediatric TB service delivery. TB, tuberculosis.	

Table 5 Perception of the impact of COVID-19 on healthcare service delivery

Observed theme	Quote
Patients received faster care and screening time was reduced	<i>Corona (COVID-19) is different from TB in that when you go to the hospital, you are attended to very fast because they do not want people to be crowded at the facility. (Kenyan caregiver, F, 30 y/o, child tested negative)</i>
Reduced time spent with patients during the home visit	<i>And so, when we go to these households, we are required to take the shortest time possible and so some will start questioning why you are not giving them enough attention. And so, they might start losing interest in you and start questioning if the services they are getting as inappropriate (Kenyan cough monitor, M, 31 y/o)</i>
Spacing out patients' appointment	<i>In fact, at one point they gave a policy... There's a policy document that was talking about prolonging the duration of a patient and minimizing the frequency of patients coming to the hospital. Remember, to be a TB client you are either given one week or two weeks, but at one point now we had to give a drug after one month. So that we minimize the exposure of that client to the hospital. (Kenyan PM, M, 40 y/o, 9 years of service)</i>
Confusion between TB and COVID-19 signs and symptoms	<i>Already COVID-19, when you look at the signs, the signs of COVID-19, it's...it really threatens [frightful], it's similar to those of tuberculosis. So, since it's a disease that really frightened us, among us, we were afraid of COVID. So, when we coughed, when we had a fever, when we lost weight, if it was COVID, we could easily confuse it. Someone could have...could be in the process of having his TB like that, we confuse it with the signs of COVID or then someone is in the process of having his, his COVID, we confuse it with TB. (Cameroonian nursing assistant, F, 28 y/o)</i>

TB, tuberculosis.

the diseases before TB testing. This inability to differentiate the two contributed to the fear experienced by HCWs during the TB screening process (table 5).

TB service disruption due to COVID-19

In addition to the service delivery changes, the COVID-19 pandemic led to significant service disruption, including temporary facility closures and service suspensions that were reported to have occurred due to SARS-COV-2 infection among staff and subsequent staff shortages. However, service suspension was not the only method of dealing with staff shortages. Other PMs reported relying on staff from other services or operating with fewer staff. They stressed the importance that services remain open during this period.

Aside from temporary closures, some health facilities were converted to COVID-19 clinics, and therefore, could no longer continue the provision of TB services. In such cases, services were transferred to other facilities. These transfers led to a loss to follow-up among some patients. Certain services were also suspended to reduce potential transmission. For example, paediatric support group meetings were halted to comply with social distancing. In Kenya, many CWs mentioned that their services were also restricted by COVID-19 mitigation efforts. Most notably, curfews restricted the number of houses that CWs were able to visit because they were unable to reach all beneficiaries and return home prior to the curfew start time. Further, patients who were primarily available in the evening became more difficult to reach because of the curfew. Subsequently, CWs reported that some patients were lost as a result of this restriction (table 6).

DISCUSSION

This study found that the COVID-19 pandemic significantly impacted paediatric TB service delivery. TB service disruptions were mostly due to fear of COVID-19 infection and associated mitigation measures. COVID-19 has affected the dynamics of health services delivery and utilisation by changing the behaviours of HCWs, installing fears in the community and government measures.

The outbreak of a novel COVID-19 pandemic has induced a considerable degree of fear and worry among the general population.¹³ Previous studies explained that these fears are motivated by social stigma and discriminatory acts faced by people infected with the SARS-COV-2 virus in the community, lack of adequate information about the disease and a rapid increase in cases.^{14 15} Patients suffering from both COVID-19 and TB experienced increased stigma since the symptoms of both diseases are similar.¹⁶ Many participants in this study expressed fear and distress towards COVID-19 and some perceived COVID-19 to be more fatal than AIDS. Our study found that fear of COVID-19 infection and being quarantined impacted caregivers' and patients' health-seeking behaviours. Many patients avoided health facilities, which were seen as a refuge for COVID-19 virus, and patients who managed to visit health facilities concealed their condition to avoid being stigmatised and discriminated. A few PMs mentioned that some patients avoided the facility because they feared being vaccinated with the COVID-19 vaccine. This finding concurred with findings from a previous study where participants mentioned that people in the community were afraid of health facilities and HCWs as they were considered a refuge for COVID-19

**Table 6** Tuberculosis service disruption due to the COVID-19 pandemic

Observed theme	Quote
Temporary service closure	<i>COVID came when there was a shortage of personnel. The few that were available...who are qualified through training...or let me say, 'Capacitated' by training programs were infected, and at the end of the day... those who were alone in service, in the distribution of drugs is sick [drug dispensation] and the service is shutdown. In this case, we had no option but to entrust the service to someone who does not have a good mastery of that service. (Cameroonian PM, 41 y/o, 1 year and 6 months of experience)</i>
Services changing location	<i>Kandiege became an isolation centre for COVID-19. So as such, all other services were to be transferred to a nearby facility so that we only had that facility meant for, COVID cases... So, when it was closed, and our patients were scattered, they are neither here nor there... but you know patients decide where they can go. You can tell them to go there, but then they may decide. ...We had patients who went and we are not able to, to see them. (Kenyan PM, M, 40 y/o, 9 years of service)</i>
Suspension of certain activities	<i>The painful part of it, it forced me and the facility to stop the support group for pediatrics, to avoid the gathering of children. (Kenyan cough monitor, F, 29 y/o)</i>
Movement restriction	<i>It is a challenge because when somebody comes from far, for example, am working here but coming from Asumbi or Rongo... it will force me to work not the way I was working before; I will leave some duties pending so that I do them a day after because I cannot go past some given time... because if I go past that given time, the curfew will get me before I get home. (Kenyan cough monitor, F, 32 y/o)</i>

infection.¹⁷ Furthermore, home care and community activities were affected; many patients in the community prevented CWs from entering their homes because they believed that COVID-19 is found in the hospitals and that CWs coming from hospitals could infect them with COVID-19. This finding goes in line with previous studies that show HCWs were being discriminated against and were restricted access to homes and public places because they care for those affected by COVID-19.^{16–18} Avoidance of health facilities could lead to many missed diagnoses as patients who present TB signs and symptoms, which are similar to those of COVID-19, tend to hide them and stay at home. In the same way, given the fact that COVID-19 signs and symptoms are similar to those of TB, concealment of symptoms will lead to many missed opportunities for early diagnosis. Also, the restriction of CWs from entering homes will negatively affect paediatric TB patients' follow-up and screening of contacts during home visits. These disruptions in paediatric TB services encompass various factors such as limited access to healthcare facilities and challenges in delivering comprehensive care to children affected by TB. However, this is not limited to paediatric TB service delivery, as findings from other studies in different sub-Saharan countries and other services show similar challenges in services such as HIV, malaria, and mother and child clinics. This indicates that the challenges are not unique to paediatric TB services, suggesting a systemic issue that affects multiple areas of healthcare delivery.^{19–21} Prompt and widespread dissemination of adequate information about the COVID-19 virus can help reduce fear and anxiety and provide better control over the disease and its consequences in the community.

HCWs are at the front line of defence against the COVID-19 pandemic. Fear is very common during the

COVID-19 pandemic and HCWs are not immune to anxiety and fear. A recent study found that more than half of HCWs working in COVID-19-designated hospitals had fear and anxiety symptoms.^{17 22} A previous study shows that fear and anxiety among HCWs were mostly due to inadequate knowledge of preventive measures, lack of personal protective equipment (PPE) and stigma associated with COVID-19 in the general population.^{13 23} In this study, HCWs were concerned about getting infected with COVID-19. Consequently, HCWs were reluctant to screen patients for TB because COVID-19 signs and symptoms are similar and they find it difficult to differentiate symptoms of COVID-19 from those of TB. There is a critical need to develop strategies to address fear in a pandemic situation such as COVID-19, including training of health personnel, timely provision of PPE and putting in place a mental health support system for health personnel who develop fear and anxiety.

During the COVID-19 pandemic, countries continued to make important decisions to respond to the pandemic that may have negatively affected access to healthcare.²⁴ However, these mitigation strategies continue to adversely affect TB services in many countries.²⁵ Findings from our study revealed that in addition to governmental measures, health facilities have adopted other measures to limit infection within their buildings. These measures include limiting time spent with patients during screening, spacing outpatient appointments and keeping social distancing while talking with patients. All these strategies have the potential to limit nosocomial infection of COVID-19 but also negatively affect the provider-patient relationship. For example, limiting time spent with patients will not permit the clinician to adequately screen patients for signs and symptoms of TB and consequently impact the early detection of TB cases. Also,

spacing out patients' appointments can lead to many patients defaulting on care and being lost to follow-up.

The African region is suffering from a severe health workforce shortage.²⁶ A pulse survey conducted by the WHO highlighted the redeployment of staff to newly created COVID-19 clinics and the temporary closure of health facilities as a result of the COVID-19 pandemic.²⁴ In this study, temporary service closure was found to be one of the major hindrances to accessing healthcare services by patients with TB. This closure was mainly due to COVID-19 infection among staff, which forced services to temporarily shut down. Given the shortage in human resources for health, available staff should be capacitated to adequately deliver TB care in the absence of TB staff to permit service continuity. Additionally, health facilities should simultaneously look for ways to increase the health workforce.

Curfew or restriction of movement to limit the spread of COVID-19 has pervasive impacts on healthcare delivery, including disruptions in routine and essential healthcare.^{27,28} Several previous studies have highlighted that lockdown and movement restrictions greatly impact the ability of patients to seek medical services for non-COVID-19 illnesses.²⁹ Participants in this study reported that follow-up of patients who were only available in the evening was difficult, resulting in many patients becoming lost to follow-up. In addition, HCWs mentioned that they were obliged to leave work early to comply with curfews. Paediatric TB patients require consistent access to healthcare even during a time of widespread health crises. Implications of curfews on healthcare delivery for patients with chronic diseases should be considered when putting in place measures to control COVID-19 globally.

In response to the COVID-19 pandemic, many countries converted existing services—largely their TB programmes—to manage COVID-19 cases in their facility.³⁰ In our study, according to HCWs and PMs, most TB services were converted to COVID-19 services and hence TB services were redirected to other care facilities. This finding is in line with a survey conducted by WHO which found that many countries, in response to the COVID-19 pandemic, redirected patients to other care facilities.²⁴ These transfers of mainly TB services resulted in many TB patients' being lost to follow-up due to their transfer to other care facilities. Previous studies have shown that TB patients adhere most to treatment when they establish a good relationship with their service provider.^{31,32} Also, a qualitative study conducted in Ethiopia found that many patients prefer to be followed up by the same healthcare provider throughout their treatment.³³ Patients with stigmatising diseases usually take time to develop trust in a new healthcare provider. In the future, the movement of staff to other care facilities should be well coordinated and patients should be adequately prepared ahead of time.

Much literature has documented the impact of the COVID-19 pandemic on overall TB services. However, nothing is known about the specific impact of COVID-19

on paediatric TB service delivery. While this study provides important insight into the impact of the COVID-19 pandemic on paediatric healthcare delivery, it also presents some limitations. First, limitation is that the study included only caregivers whose children were screened presumptive for TB at the facility, and caregivers who refused to screen or those who were screened in the community may have a different perspective. Another limitation is this study was conducted during the early phase of COVID-19 pandemic when health needs were high and knowledge of COVID-19 was still very low. Furthermore, the study was conducted in only two French-speaking regions in Cameroon and one region in Kenya, making the study area limited. As a result, the findings from this study may not accurately reflect the realities in other regions within these countries. The perception of providers and caregivers towards healthcare service delivery may have shifted over time due to increased sensitisation and reduction of cases. The results of our study can be used for future policy and programme planning to deliver effective health services during public health emergencies in sub-Saharan Africa.

CONCLUSION

The outbreak of COVID-19 has induced considerable fear and related stigma which affected patients' health-seeking behaviour and provider attitudes towards paediatric TB services delivery. In addition, facility recommendations and governmental measures put in place to mitigate COVID-19 impact negatively affected paediatric TB service delivery. Training and mental support of health personnel, timely provision of PPE and appropriate communication strategies could help mitigate COVID-19 impact on paediatric TB service delivery.

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Ethics approval This study involves human participants and the study protocol was approved by the National Ethics Committee for Research in Human Health (number 2018/12/ 1131/CE/CNERSH/SP dated 14 December 2018) in Cameroon and the Kenyatta National Hospital University of Nairobi Ethical Review Committee (number KNH-ERC/A/44 dated 7 February 2019) in Kenya, the Advarra Institutional Review Board in the US (Pro00029181 dated 6 September 2018), a service contracted by EGPAF. This research was conducted in accordance with the Declaration of Helsinki. Participants gave informed consent to participate in the study before taking part.

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