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Integrating TB screening into house-to-house polio vaccination campaigns

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SETTING: In July 2019, the Anambra State (south-east Nigeria) TB Control Programme implemented the integration of TB case-finding with the polio vaccination campaign with the support of the WHO.

OBJECTIVE: To improve TB case-finding from communities leveraging already existing polio structures.

DESIGN: Vaccination teams were trained to ask for symptoms of TB in each household and to document details of people presumed to have TB. Community TB workers subsequently tracked those identified for subsequent sample collection. We report the numbers detected, and the proportion of wards that reported people with TB. Regression analyses were used to estimate the relationship between ward characteristics and reporting. Odds ratios (ORs) with associated 95% confidence intervals (CIs) are also reported.

RESULTS: Of 281 people with presumptive TB, 32 were diagnosed with TB; 21% (70/330) of wards identified at least one presumptive, while 5% (18/330) of the people were identified with TB. Peri-urban slums were most likely to identify presumptives (adjusted OR [aOR] 11.52, 95% CI 1.62–81.79), while Riverine areas were most likely to identify a person with TB (aOR 3.59, 95% CI 1.16–11.01).

CONCLUSION: Integrating community TB case-finding into house-to-house vaccination campaigns can boost case detection. This approach proved effective in areas perennially underserved by routine healthcare services.

Over the past 5 years, traditional health system surveillance structures have continued to detect about a third of all newly occurring TB cases in Nigeria.[1–5] This makes Nigeria a major contributor to the global pool of 'missed people with TB (7.8%).[1] The 2012 TB prevalence survey found a huge prevalence-notification ratio.[6]

Historically, TB case-finding in Nigeria has largely depended on facility-based passive TB surveillance. This approach relies heavily on symptomatic individuals making contact with formal health facilities and the health system surveillance being sensitive enough to identify such symptomatic individuals upon presentation and diagnose them correctly.[7] A number of challenges are associated with this approach: most symptomatic people do not end up in hospitals, and surveillance at the hospitals is suboptimal, leading to many missed opportunities.[8] The large number of missed people with TB serves to sustain TB transmission within households and communities, causing significant setbacks for the country towards achieving the 2035 elimination target.[9]

In recent years, however, the Nigerian National Tuberculosis and Leprosy Control Programme (NTBLCP) made a strategic shift to prioritise active TB surveillance. This approach is emphasised as a key objective in the current National Strategic Plan with the aim of increasing access to services for people missed.[10] Different models of active TB surveillance broadly implemented in non-routine care settings or embedded within communities have been carried out so far.[11] Significant improvements in case-finding have accrued from these activities, as well as costs. There have also been efforts to integrate TB screening into other existing public health programmes, especially those that involve the active participation of communities.[12]

The supplementary immunisation activities (SIAs) are a key strategy of Nigeria's National Primary Healthcare Development Agency (NPHCDA) for disease control. They are aimed at covering the gaps in health facility-based routine immunisation within communities and ensuring that children and other vulnerable persons who may have fallen through the cracks are protected from vaccine-preventable diseases.[13] Under the guidance of the NPHCDA, States' Primary Healthcare Development Agencies (SPHCDAs) implement the immunisation campaigns using nationally established protocols and guidelines. Being a key strategy of the polio eradication initiative, SIAs receive significant support from the WHO, the United Nations Childrens' Fund and other development partners.

Anambra State in southeast Nigeria is a high TB burden state. Despite recent improvements in the case notification, recent evidence suggests that multiples of the number of people notified might have missed out on care.[14] Due to the prevailing health-seeking behaviour, as well as persistent stigma and community myths around cough,[15] appropriate interventions to promptly detect and treat TB are highly needed to interrupt community transmission. The state participates in SIAs and has a track record of achieving high coverage rates and has been recognised nationally for this.[16] The 4-day Polio SIA of the Anambra SPHCDA implemented in July of 2019 targeted 1,367,878 under-five children across the state. The WHO provided technical support and oversight for the campaign and deemed it a veritable platform for the integration of community TB screening and surveillance activities. The key objective of this intervention was to enhance

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KEY WORDS
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identification of people presumed to have TB from the various wards in the state.

METHODS

Setting

Anambra State in southeast Nigeria comprises 21 local government areas (LGAs), each having 10–20 wards, the smallest political unit. There are wards 330 in total, with no fewer than 3,040 settlements, each containing enumerated households.[17] In terms of land area, Anambra is the smallest state in Nigeria but for Lagos, with a land area of 4,844 km^2, despite being the 10th most populous state, with a 2019 population projection of 5,988,221. There are four main hard-to-reach LGAs: Ogbaru, Anambra West, Anambra East and Awka North. Anambra West is completely riverine and inaccessible during the rainy season, except by boat through river Niger, while Anambra East has three riverine wards. Three wards in Awka North are hardly reached by most health interventions.

Ethical approval for this surveillance intervention was obtained from the Directorate of Research Ethics, Department of Planning Research and Statistics, Anambra State, Ministry of Health Awka. All participants provided oral consent.

Methodology of implementation

Mass polio immunisation campaigns, known as National Immunisation Days (NIDs) or SIAs, are one of the four pillars of polio eradication strategies that aim to administer additional two drops of potent oral poliovirus vaccine to each child aged <5 years, irrespective of previous immunisation status.[18] Active community-based TB surveillance was embedded into the implementation processes of the Polio SIA. It included multi-level trainings, preparation of diagnostic logistics, campaign implementation, monitoring and supervision, and data collection and reporting.

Training

The training courses were conducted at three levels: state, LGA and Ward. State-level training was anchored by the state's Director of Immunisation, Immunisation Officer, Health Educator, Cold Chain Officer, TB Programme Officer, as well as WHO Technical Officers. The training participants at this level included the state technical facilitators and LGA team members such as heads of departments of health, local immunisation officers, social mobilisation officers, and cold chain officers. The content of this training included the basic signs and symptoms of TB in adults, children and people living with HIV, as well as the method of integrating community TB surveillance in the SIA. This training was to enable them supervise and monitor the implementation at their various LGAs.

LGA-level trainings were conducted in all LGAs in the state anchored by the (already-trained) state technical facilitators and LGA team members. The participants for this level included ward focal persons and vaccination team supervisors. Training courses were supervised by WHO officers, including the TB Surveillance Officer. The training content focused on the participants' role in supervising the ad-hoc field staff. As these participants were responsible for training or supervising the house-to-house teams, the content of their training focused on understanding the process of implementing the integration.

Similarly, ward-level trainings were conducted in all the wards for house-to-house vaccinators, community leaders, recorders and town announcers. Facilitated by ward focal persons and supervisors, the training focused on the signs and symptoms of TB disease which the vaccinators were to ask in each household during the campaign. It also covered documentation of the details of all the presumptive TB cases so identified and the submission of those reports at the daily ward-level evening review meeting. TB diagnostic logistics were prepared before the campaign.

Campaign implementation

Each house-to-house vaccination team comprised a vaccinator, community leader and recorder who doubled as a supervisor and household visits were made using the Daily Implementation Plan (DIP) to ensure assigned settlement(s) are covered on a daily basis. After vaccinating eligible children in each household, the team (usually the recorder) asked if any member of the household had a cough of >2 weeks, lost weight or had fever or night sweats, or whether there were children not gaining weight or growing as expected (failure to thrive). Name, age, traceable address and household number of anyone with a positive symptom score were recorded on the reverse-side of the team's tally sheet (used to tally the number of vaccine doses used).

At the daily ward-level review meeting each team submits their tally sheets (including the list of presumptives) to the ward focal person, who, in turn, submits it at the LGA-level evening review meeting. The LGA Tuberculosis and Leprosy Supervisor (LG-TBLS), who attends the meeting then obtains the details of all the identified presumptives from each ward focal person. The TBLS distributes the list of people identified with TB symptoms to the community TB workers or volunteers for tracing, sample collection and shipment to the nearest testing laboratory. Symptomatic children who were unable to expectorate were sent for chest X-ray in approved radiological centres and subsequent clinician's review. A summary framework is shown in the Figure.

Data collection, reporting, and analysis

Data were later transferred onto the service registers at the local health facilities. At the end of the campaign, ward level data were reported by each LG-TBLS. Data on the presumptives and people diagnosed with TB were reported with age and sex disaggregation using a simple MS Excel template (MicroSoft, Redmond, WA, USA). A hard copy of the report was retained by the LG-TBLS. Method of diagnosis was categorised as either bacteriological or clinical per standard NTBLCP definitions. To ensure quality and consistency of the reports, data were validated twice by the WHO TB Surveillance Officer and the State TB Programme Manager. Ward characteristics, such as population density, level of urbanisation, and whether the ward was hard-to-reach or riverine, were obtained from the WHO master list of mapped settlements in the state.

Proportion of wards that reported at least one person with presumptive TB was calculated. Univariable logistic regression was used to estimate the relationship between individual ward-level characteristics and the report of a presumptive or a confirmed case of TB. Odds ratios (ORs) and associated 95% confidence intervals (CIs) are presented below. Multivariable logistic regression was then done. All statistical analyses were carried out using MS Excel v2013 (MicroSoft) and IBM SPSS v20 (IBM Corp, Armonk, NY, USA).

RESULTS

Following 4 days of implementation of the campaign, a total of 1,529,827 under-five children were vaccinated, representing 111.8% achievement of the targeted population; 281 presumptive cases of TB were reported by vaccination teams from 21%

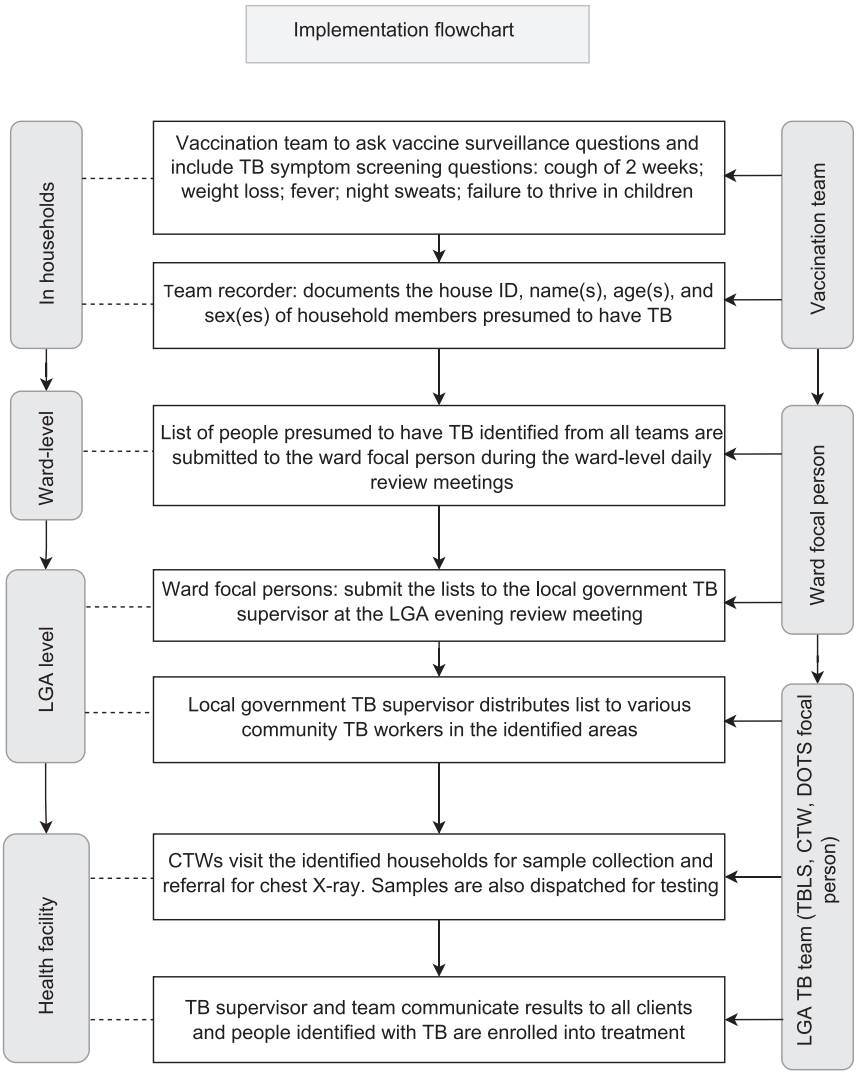

Figure Implementation flowchart for the integrated TB screening in polio vaccination campaign. LGA = local government area; CTW = community TB worker; TBLS = TB and Leprosy Supervisor.

(70/330) of wards in the state. In total, 32 people with TB were diagnosed and notified to the NTBLCP Monitoring & Evaluation systems, constituting 13% of all TB cases notified in the month of July in the state: 84.4% (27/32) of the cases were diagnosed bacteriologically (using Xpert® MTB/RIF; Cepheid, Sunnyvale, CA, USA) and 15.6% (5/32) using radiological means. As shown in Table 1, the positivity rates were respectively 16% (21/129) and 7.2% (11/152) for males and females. The child proportion was 18.7% (6/32)

Findings from the multivariable logistic regression analysis are given in Table 2. Urban and peri-urban settlements seemed to have higher crude ORs of finding both presumptive and confirmed TB cases than rural settlements. However, after adjusting for population density, access to services and proximity to rivers, only the peri-urban slum settlements retained a statistically significantly higher OR of yielding presumptive TB cases. Similarly, densely populated settlements showed statistically significant crude ORs for yielding both presumptive and confirmed cases of TB from the intervention. The adjusted OR for yielding a confirmed TB case did not achieve statistical significance. Hard-to-reach settlements seemed to show over two-fold higher adjusted OR (aOR) of yielding a presumptive case of TB; however, the association was not statistically significant. Riverine areas showed over 3.5-fold aOR of diagnosing persons with TB from this intervention compared to non-riverine areas.

DISCUSSION

The level of participation by the wards in this intervention was measured by the ability of the ward teams to identify and report at least a person with positive symptom score. This is based on the assumption that if well done, house-to-house TB screening

TABLE 1 Summary of case-finding from polio campaign-integrated TB screening by sex and age group, Anambra State, Nigeria, July 2019

	0–14 years	⩾15 years	Total
Presumptives			
Male	26	103	129
Female	17	135	152
TB cases			
Males	5	16	21
Females	1	10	11

TABLE 2 Association of ward characteristics to TB presumptive and case reporting during polio-campaign-integrated TB screening in Anambra State, Nigeria, July 2019

		Reported presumptive TB cases				Reported TB cases			
	n	OR	95% CI	aOR	95% CI	OR	95% CI	aOR	95% CI
Type of settlement									
Rural	252	1.0	—	1.0	—	1.0	—	1.0	—
Urban	69	1.85	0.99–3.44	1.43	0.49–4.12	2.09	0.74–5.86	—	—
Peri-urban slum	9	17.01	3.42–84.71	11.52	1.62–81.79	2.74	0.31–23.8	—	—
Population density									
Not densely populated	277	1.0	—	1.0	—	1.0		1.0	
Densely populated	53	2.82	1.49–5.32	1.89	0.60–5.98	2.82	1.01–7.88	2.46	0.86–7.05
Accessibility									
Not hard to reach	288	1.0	—	1.0	—	1.0	—	1.0	—
Hard to reach	42	1.86	0.92–3.80	2.48	0.94–6.57	2.06	0.65–6.58	—	—
Proximity to river									
Not riverine	298	1.0	—	1.0	—	1.0	—	1.0	—
Riverine	32	2.96	1.38–6.34	0.99	0.32–3.08	4.06	1.35–12.2	3.59	1.16–11.01

OR = odds ratio; CI = confidence interval; aOR = adjusted OR.

should at least yield one presumptive across all households located in each ward. This is a reasonable assumption as the number needed to screen to detect a person with TB hovers between 90 and 120 for general populations in Anambra State. A participation level of 21% may seem low but unsurprising, given that this intervention is new, and some ad-hoc workers may require more repeated instructions to fully grasp it. This may have also been affected by the manner in which screening questions were asked in each household. A household TB screening intervention in India reported that only eight presumptives were identified from 3,940 households after the initial question about cough of 2 weeks was asked.[19] However, further probing by the volunteers yielded an additional 374 persons exhibiting TB symptoms.[19] Thus, the ability of vaccination teams to elicit data on TB symptoms could affect the detection of presumptive TB cases from households. In reality, it did seem, however, that most vaccination teams forgot to ask questions and were more preoccupied with meeting their daily targeted number of households and children to be vaccinated. It is important to note that no new tool was added to the vaccination teams' paper work and what was required of them was a fairly straightforward task, and this may have contributed to its acceptability.

The majority of people with TB (86%) notified through this intervention were bacteriologically diagnosed and were all drug-susceptible. The five clinical diagnoses occurred exclusively in children, who were diagnosed radiologically by paediatricians. It is noteworthy that these community members may never have presented to any health facility during the course of their illness.[6] Active surveillance interventions are thus critical to interrupting community transmission of TB, especially in high-burden settings.[20] Although similar interventions using the house-to-house model have been shown to contribute significantly to case-finding in our setting, they tend to be quite capital-intensive.[11] Our work leverages the well-established polio eradication infrastructure, and thus had minimal cost implications and arguably, enjoyed more community acceptance. These are important advantages, given the grossly insufficient domestic budgetary allocations, as well as the non-release of allocated funds for TB control in many low-resource settings.[21] Over two decades ago, the WHO supported the successful integration of vitamin A supplementation into polio vaccination campaigns in countries where vitamin A deficiency was recognised as a public health problem.[22] Forty countries conducted the activity, and over 60 million children were reached with vitamin A supplementation.[22]

The pattern of case-finding from this intervention suggests that areas typically underserved by routine health services seemed to benefit more. Peri-urban slums, riverine areas, and densely populated and had-to-reach areas all showed comparably higher chances of finding people with presumptive and confirmed TB. However, after adjustments, only peri-urban slums and riverine areas were found to be significantly associated with finding people with presumptive and confirmed TB, respectively. TB surveillance benefited from the extensive reach of the polio programme to these challenged settings hardly reached by certain interventions.[23] This has implications for universal health coverage, particularly in settings like ours, where resource constraint limits the reach of disease control activities. Cross-programmatic integration will portend better effectiveness in reaching all desired beneficiaries, leaving no one behind.

Key challenges and prospects

As countries emerge from the disruptions occasioned by the COVID pandemic and re-start progress towards achieving End TB targets, scalable innovations for finding the missing people with TB are needed. Our intervention was quite novel in our setting, and could have benefited from more robust advocacy to health system and community stakeholders.[24] There was insufficient time and resources for social mobilisation, and focused monitoring and supervisory support to the vaccination teams, most of whom were lay health workers.

Integrating TB surveillance into immunisation campaigns holds potential to deepen the reach of the TB programme activities into the communities. The teams could be made to distribute educational materials to improve local knowledge of TB, which currently stands at 27% in Nigeria.[15] To yield these benefits, policy backing is crucial, as it would enable a more embedded approach. Reporting can become integrated as the vitamin A supplementation intervention was successfully integrated.[22] A policy in this direction will contribute to the polio eradication legacy, creating sustained usefulness of the systems and resources developed in fighting the disease.

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CONTEXTE : En juillet 2019, le programme de lutte contre la TB de l'État d'Anambra (sud-est du Nigeria) a mis en œuvre l'intégration de la recherche de cas de TB à la campagne de vaccination contre la polio avec le soutien de l'OMS.
OBJECTIF : Améliorer la recherche de cas de TB auprès des communautés en s'appuyant sur les structures déjà existantes de la polio.
METHODES : Les équipes de vaccination ont été formées à rechercher les symptômes de la TB dans chaque foyer et à consigner les coordonnées des personnes présumées tuberculeuses. Les agents communautaires de lutte contre la TB ont ensuite suivi les personnes identifiées pour la collecte ultérieure d'échantillons. Nous rapportons le nombre de personnes détectées et la proportion de quartiers qui ont signalé des personnes atteintes de TB. Des analyses de régression ont été utilisées pour estimer la relation entre les caractéristiques des municipalités et la déclaration. Les odds ratio (OR) et les intervalles de confiance (IC) à 95 % associés sont également rapportés.
RÉSULTATS : Sur 281 personnes présumées tuberculeuses, 32 ont été diagnostiquées tuberculeuses ; 21 % (70/330) des quartiers ont identifié au moins une personne présumée tuberculeuse, tandis que 5% (18/330) des personnes ont été identifiées tuberculeuses. Les bidonvilles périurbains étaient les plus susceptibles d'identifier des présomptifs (OR ajusté [aOR] 11,52 ; IC 95 % 1,62–81,79), tandis que les zones riveraines étaient les plus susceptibles d'identifier une personne tuberculeuse (aOR 3,59 ; IC 95 % 1,16–11,01).
CONCLUSION : L'intégration de la recherche communautaire de cas de TB dans les campagnes de vaccination de porte à porte peut améliorer la détection des cas. Cette approche s'est avérée efficace dans des zones toujours mal desservies par les services de santé de routine.

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