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National population-based tuberculosis prevalence survey in Ghana, 2013

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SUMMARY

BACKGROUND: The prevalence of tuberculosis (TB) disease is one of the three main indicators used to assess the epidemiological burden of TB and the impact change of TB control; the other two are incidence and mortality.

OBJECTIVE: To estimate the prevalence of TB disease among adults in Ghana.

METHODS: A nationally representative cross-sectional survey was conducted. Participants were screened for TB using interview and chest X-ray (CXR). For those participants with cough ≥2 weeks and/or abnormal CXR, spot and morning sputum specimens were collected and examined by smear microscopy and culture.

RESULTS: The study revealed that the prevalence of smear-positive TB among adults (age ≥15 years) was 111 (95%CI 76–145) and that of bacteriologically confirmed TB was 356 (95%CI 288–425) per 100 000 population. Males and older people had a higher prevalence than their counterparts. The majority of TB cases were smear-negative and had an abnormal CXR without reported chronic cough.

CONCLUSION: The survey revealed much higher TB disease burden than previously estimated. This implies that the programme needs more effort and resources to find undiagnosed and unreported cases. The higher proportion of smear-negative and asymptomatic TB cases suggests the need to revise the existing screening and diagnostic algorithms.

KEY WORDS: TB prevalence; smear-positive TB; bacteriologically confirmed TB; population-based survey; Ghana

TUBERCULOSIS (TB) POSES A major public health threat in Ghana and worldwide. Before this survey in 2012, the Ghana National TB Programme (NTP) notified 15 207 (all forms) of TB patients.[1] There have been some attempts to estimate the burden of TB in Ghana. In 1957, a WHO-sponsored study reported a point prevalence of 0.2% to 0.9% in the general population and 0.4% to 3% in the gold mining areas.[2] Tuberculin surveys conducted in the late 1970s in some urban areas estimated the prevalence of infection between 1% and 2%.[3] In the most recent nationwide tuberculin surveys conducted between 2004 and 2006, using a cut-off of 15 mm, the prevalence of TB infection ranged from 0.0% to 5.4%, and the annual risk of TB infection ranged from 0.0% to 0.6%. The risk of TB infection was lowest in the districts sampled from the northern savannah, and highest in districts sampled from the southern coastal zone.[4]

A TB prevalence survey provides useful information in areas where surveillance data are incomplete or of unproven accuracy, especially in areas with an estimated TB prevalence of more than 100 per 100 000 population.[5] In order to estimate the burden of TB in Ghana, assess risk factors and explore why some patients are diagnosed and treated for TB while others are not, a nationally representative cross-sectional survey was conducted.

SURVEY DESIGN AND METHOD

A nationwide cross-sectional population-based survey was conducted among adults (age ≥15 years) from March to December 2013. Sample size was determined based on a previous estimate for the national prevalence of bacteriologically confirmed TB of 270/100 000 adult population.[6] Using a relative precision estimate of 20%, design effect of 1.44 (k = 0.5) and assumed participation rate of 80%, the total sample size for a single population mean was

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estimated to be 63 905 individuals. Based on previous notification data, TB prevalence in Ghana varied by urban and rural areas (henceforth referred to as strata). Of the 98 clusters, 53 clusters were selected from urban and 45 from rural localities. Within each stratum, the required set of clusters were selected using a multi-stage process (district and enumeration area), whereby at each stage sampling units were selected using a probability proportional to size (PPS) method. All inhabitants in each selected household were enumerated by residents before the survey. After the enumeration list, the survey team selected eligible participants from each household and provided invitation cards to participate in the survey. The inclusion criteria for the study were all inhabitants aged ≥15 years, permanent residents who have lived in the household for at least 1 day in the last 2 weeks before the census and visitors who have lived in the household for at least 7 days in the last 2 weeks preceding the survey census.

All eligible participants who consented were interviewed about symptoms suggestive of TB. Those who had cough ≥2 weeks (chronic cough), current or previous history of TB were asked additional questions related to exposure to risk factors and their health care-seeking behaviour. All participants who had chronic cough were considered eligible for sputum examination. After the interview, a full-size postero-anterior chest X-ray (CXR) was taken from all those who consented to CXR. Female participants with known or possible pregnancy were exempted from CXR examination. All CXR images taken were interpreted at the field level by a trained medical doctor using the following categories: 'Normal'; 'Abnormal, eligible for sputum examination'; and 'Other abnormalities'. A participant with abnormalities in the lung, pleura and/or mediastinum on CXR was considered as eligible for sputum examination. Individuals with chronic cough and/or abnormal CXR, or CXR exempted for any reason were asked to provide spot and morning sputum sample. Audited reading and detailed interpretation were performed at the central level by two independent radiologists, and a third radiologist in case of discrepancy between the two radiologists.

Laboratory testing

Sputum specimens from the field were collected in the open air and stored in cool boxes with frozen ice packs until transport to reference laboratories in Accra, Ghana, where they were kept at 4°C in a refrigerator. Specimens from the field were transported to the reference laboratory within 2 days of collection. Sputum smear microscopy, culture examination and Xpert® MTB/RIF testing (Cepheid, Sunnyvale, CA, USA) were performed at the Noguchi Memorial Institute for Medical Research (Accra, Ghana) and the Chest Clinic Laboratory of the Korle-Bu Teaching Hospital (Accra, Ghana). After reception, a sodium hydroxide-sodium Citrate solution with *N*-acetyl L-cysteine (NALC) kit known as Mycoprep™ (BD Diagnostic System, Sparks, MD, USA) was used to digest and decontaminate the sputum specimen according to the manufacturer's instructions. After decontamination, the sediment was reconstituted with about 2 ml of phosphate-buffered saline (PBS) solution (pH 6.8) to make the inoculum for smear testing and culture. Suspensions of reference TB strains ($H_{37}Rv$) and freshly prepared PBS solution were used as positive and negative controls, respectively.

Smear preparation and microscopy

Each inoculum was used to prepare two smears for Ziehl-Neelsen (ZN) staining and microscopy. The ZN-stained smears were examined using Olympus™ light microscope (Olympus Corporation, Shinjuku, Tokyo, Japan) with oil immersion at 1000x. All smear-positive specimens, contaminated culture (where sediments were available) and some specimens culture not done were run on Xpert to confirm *Mycobacterium tuberculosis* and detect rifampicin resistance.

Culture and identification

About 0.5 ml of decontaminated sputum specimen was inoculated onto two tubes each of commercially available MGIT™ (Mycobacteria Growth Indicator Tube; BD Diagnostic System) medium. The inoculated tubes were incubated at 37°C for a maximum of 6 weeks. Growth in the MGIT was indicated by increasing fluorescence. Once a tube flagged positive, smear was prepared, stained using ZN and examined for presence or absence of acid-fast bacilli (AFB).

Xpert testing was performed instead of culture on a proportion of specimen when a biosafety cabinet at one of the laboratories broke down unexpectedly. The BD MGIT™ TBc Identification Test (kit) (BD Diagnostic System) was used to broadly identify all pure mycobacterial isolates obtained from MGIT culture as *Mycobacterium tuberculosis* complex (MTBC) and non-tuberculosis mycobacterium (NTM) per the manufacturer's instructions.

Case definitions

Case definition was based on the standard WHO case definitions for prevalence surveys.[7]

Laboratory case definitions

A smear-positive sample was one with at least one AFB in 100 immersion fields. A culture-positive sample was one that was MGIT-positive by 6 weeks, positive on confirmatory ZN-stained microscopy and identification using the TBc Identification Test. Samples with detected *Mycobacterium tuberculosis*

on Xpert (regardless of grade and rifampicin resistance pattern) was considered Xpert-positive.

Survey TB case definitions

Smear-positive tuberculosis case

Patients with at least one smear-positive result and at least with one of following conditions were considered smear-positive TB cases: 1) culture *M. tuberculosis*-positive (definite); 2) Xpert-positive and CXR finding consistent with TB as judged by a central panel (definite); and 3) Xpert-positive and CXR not available due to exemption (probable).

Smear-negative bacteriologically positive TB cases

Smear-negative bacteriologically positive TB cases were patients without any smear-positive results and with at least one of following conditions: 1) both specimens (spot and morning) were culture *M. tuberculosis*- and/or Xpert-positive (definite); 2) one specimen culture- and/or Xpert-positive with CXR findings consistent with TB as judged by central panel (definite); and 3) one specimen culture *M. tuberculosis* and/or Xpert-positive without a CXR image (probable).

Bacteriologically confirmed TB case

Patients with a biological specimen that is positive on smear microscopy, culture or Xpert were considered to have bacteriologically confirmed TB.[7,8]

Medical panel review

The medical panel was made up of radiologists, a microbiologist, an epidemiologist or statistician and a core survey team comprising the principal investigator and survey coordinators. The role of the panel was to evaluate all participants with any positive specimen to identify TB cases based on the survey case definition. The panel re-examined CXR images of all participants with at least one positive specimen.

Data entry and analysis

Onsite electronic data collection was used throughout to enable real-time data entry. This is therefore one of the first surveys to implement fully electronic data collection. A local area network was created in the field for data entry. Field data and digital CXR images were transmitted electronically to a central server. Laboratory results from the two laboratories were transmitted electronically to the central server. Data were analysed using Stata release v12 (StataCorp, College Station, TX, USA; 2011) and SPSS v20 (IBM Corporation, Armonk, NY, USA). National and subpopulation prevalence (such as by age group and sex) were estimated using a logistic regression model with standard robust errors accounting for sampling design effects and sampling probabilities. Multiple imputation of missing data and inverse probability weighting to represent all eligible individuals, including those who did not participate, according to previously published methods were used.[9] Missing values were imputated in the subset of survey participants who were eligible for sputum examination but for whom smear and/or culture results were missing. Weights were calculated by dividing the number of eligible individuals by the number of total participants. This was done for each pairwise category of age group (15–24, 25–34, 35–44, 45–54, 55–64, ≥65 years) and sex (male/female) for each cluster. If there were no participants in any of these categories, then the weight was truncated. The *ICE* module in Stata[10] generated 15 imputed data sets based on 15 cycles using the following variables: age group (15–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, ≥65 years), sex (male, female), strata (urban, rural), cough for ≥2 weeks (yes, no), past history of TB treatment (yes, no), abnormal central CXR (yes, no), CXR exemption (yes, no).

Ethical consideration

The study applied and obtained ethical approval from the Scientific and Technical Committee and Institutional Review Board of the Noguchi Memorial Institute for Medical Research, Accra, Ghana (NMIMR-IRB CPN: 031/10-11, amended 2012). Each potential survey participant had been adequately informed of the aims and methods of the survey and the anticipated benefits and potential risks of the study. The participants had been informed of the right to abstain from participation in the survey or to withdraw consent to participate at any time without reprisal. All participants who had been diagnosed with TB and other conditions were referred to the nearby public health facility for treatment and further medical follow up.

RESULTS

A total of 101 772 individuals were enumerated, of whom 67 757 (66.6%) were eligible and invited to participate in the study (Figure 1). Of those eligible 61 726 (91.1%) participated in at least one of the TB screening methods. The participation rate was higher in females than in males (37 038; 93.6% vs. 24,688; 87.6%). Participation rate increased with age (Table 1).

All 61 726 (100%) participants were interviewed using a TB symptom screening questionnaire and 59 718 (96.7%) had CXR (Table 1). Of 61 726 interviewed, 1,969 (3.2%) reported chronic cough (Table 2). Of 59 718 CXR images taken, 5158 (9%) had an abnormal CXR eligible for sputum examination (Table 2, Figure 1).

Of 61 726 participants, a total of 8298 (13.4%) were eligible for sputum examination. At least one sputum sample was submitted by 8126 (97.9%) participants eligible for sputum examination. At least

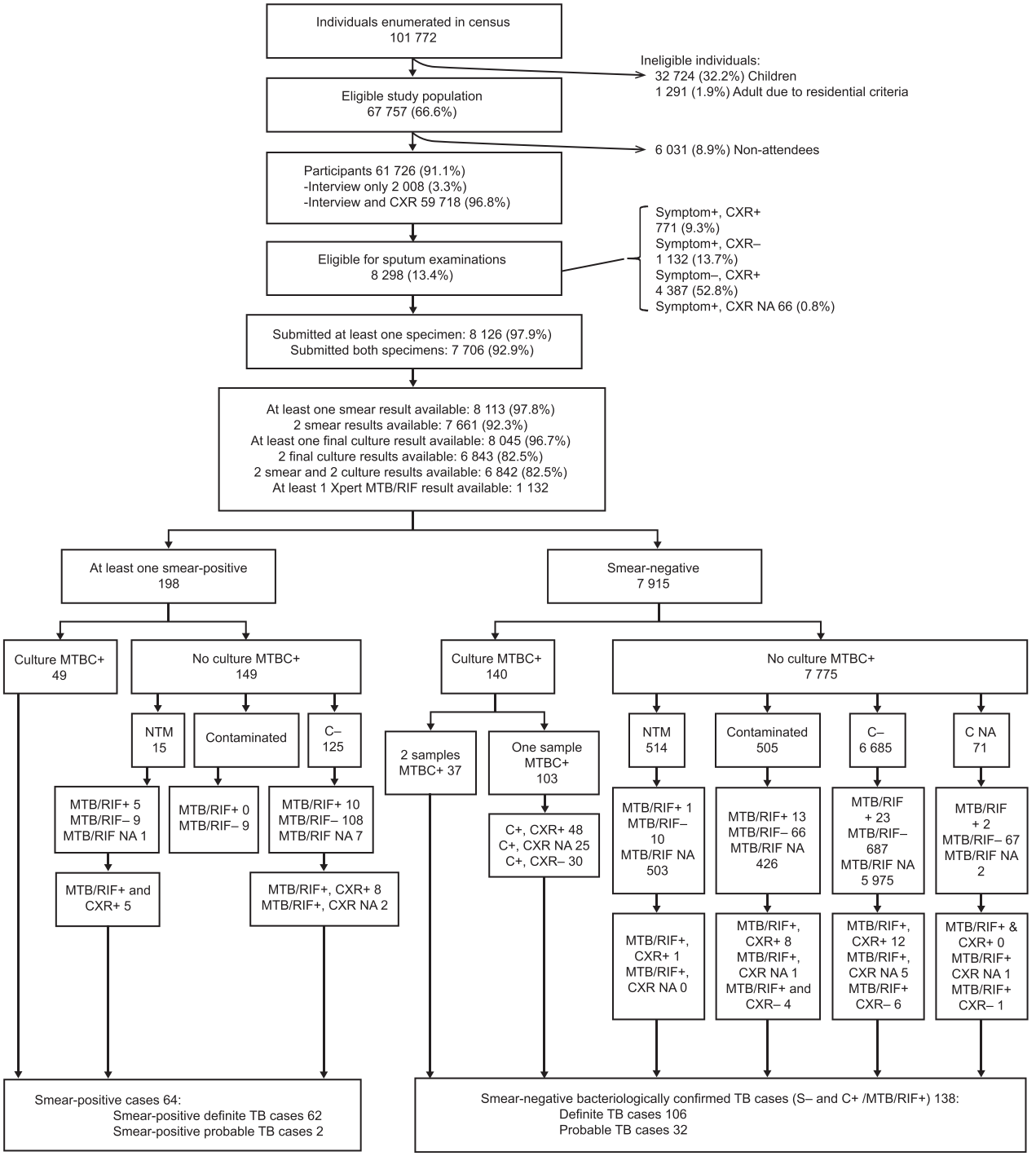

Figure 1 Consort diagram of Ghana National TB Prevalence Survey, 2013. C = culture; CXR = chest X-ray; + = positive; – = negative; NA = not available; MTBC = *M. tuberculosis* complex; TB = tuberculosis.

one smear result was available for 8113 (97.8%) and two smear results were available for 7661(92.3%) of participants eligible for sputum examination (Figure 1). Of the 8113 participants who had at least one smear result, at least one smear-positive result was obtained for 198, whereas 7915 had a smear-negative result. Of those who were smear-positive, 49 were culture-positive, and an additional 15 were Xpert-positive. Of those who were smear-negative, 140 were culture-positive, and an additional 39 were Xpert-positive. In total, at least one positive laboratory test result was obtained from 377 participants (198 smear-positive; 140 smear-negative, culture positive [37 with two MTBC-positive samples and 103 with one MTBC-positive sample]; and 39 smear-negative, Xpert-positive); a medical panel reviewed their CXR images, symptoms and laboratory results. Based on the survey case definition, the medical panel classified a total of 202 as TB cases (64 [31.7%] smear-positive and 138 [68.3%] smear-negative

Table 1 Sociodemographic characteristics of participants and non-participants, Ghana National TB Prevalence Survey, 2013

	Total eligible	Participated in at least one screening method				Participants screened using			
		Yes		No		Interview		Chest X-ray	
	n	*n*	%	*n*	%	*n*	%	*n*	%
Total	67 757	61 726	91.1	6 031	8.9	61 726	100	59 718	96.7
Sex									
Male	28 185	24 688	87.6	3 497	12.4	24 688	100	24 592	99.6
Female	39 572	37 038	93.6	2 534	6.4	37 038	100	35 126	94.8
Age group, years									
15–24	19 107	17 089	89.4	2 018	10.6	17 089	100	16 458	96.3
25–34	15 186	13 584	89.5	1 602	10.5	13 584	100	12 742	93.8
35–44	12 119	11 057	91.2	1 062	8.8	11 057	100	10 742	97.2
45–54	9 330	8 689	93.1	641	6.9	8 689	100	8 647	99.5
55–64	5 805	5 442	93.7	363	6.3	5 442	100	5 411	99.4
≥65	6 210	5 865	94.4	345	5.6	5 865	100	5 718	97.5
Strata									
Urban	36 379	33 122	91.0	3 257	9.0	33 122	100	32 197	97.2
Rural	31 378	28 604	91.2	2 774	8.8	28 604	100	27 521	96.2

TB = tuberculosis.

bacteriologically confirmed). A total of 134 smear-positive patients with no confirmation on culture or Xpert and 41 smear-negative patients with only one culture-positive result and panel CXR reading not suggestive of TB were removed from the TB case list (Figure 1).

The weighted prevalence of smear-positive TB among adults (age ≥15 years) was estimated at 111/100 000 (95% confidence interval [CI] 76–145). Smear-positive TB prevalence was higher in males than in females (198/100 000; 95%CI 133–264 vs. 49/100 000; 95%CI 21–76). Smear-positive TB prevalence was higher in urban than in rural areas (142/100 000; 95%CI 89–195 vs. 75/100 000; 95%CI 39–111) (Table 3). Prevalence of bacteriologically confirmed TB (smear-positive and/or culture-positive or Xpert-detected) among adults was 356/100 000 (95%CI 288–425). Prevalence of bacteriologically confirmed TB was also higher in males than in females (431/100 000; 95%CI 133–264 vs. 303/100 000; 95%CI 223–382). Unlike smear-positive TB, prevalence of bacteriologically confirmed TB was higher in rural than in urban areas (429/100 000; 95%CI 315–542 vs. 293/100 000; 95%CI 216–372). Prevalence of bacteriologically confirmed TB increased with age (Table 3) and ranged from 185/100 000 (95%CI 104–265) in the 15–24 years age group to 908/100 000 (95%CI 597–1219) in the ≥65 years age group.

Of the 202 TB cases, 40.6% reported cough of ≥2 weeks and 8.9% had cough of <2 weeks. If cough ≥2 weeks was used as the sole screening method, 120

Table 2 Symptom and CXR results, Ghana National TB Prevalence Survey, 2013

	Total participants	Symptom screening		CXR screening				Total eligible for sputum testing by any of the screening criteria	
		Cough ≥2 weeks		Abnormal, eligible for sputum test		X-ray not done			
	n	*n*	%	*n*	%	*n*	%	*n*	%
Total	61 726	1 969	3.2	5 158	8.4	2 008*	3.3	8 298	13.4
Sex									
Male	24 688	868	3.5	2 380	9.6	96	0.4	2 956	12.0
Female	37 038	1 101	3.0	2 778	7.5	1 912	5.2	5 342	14.4
Age group, years									
15–24	17 089	427	2.5	550	3.2	631	3.7	1 488	8.7
25–34	13 584	306	2.3	579	4.3	842	6.2	1 616	11.9
35–44	11 057	330	3.0	786	7.1	315	2.8	1 301	11.8
45–54	8 689	304	3.5	986	11.3	42	0.5	1 199	13.8
55–64	5 442	231	4.2	872	16.0	31	0.6	1 014	18.6
≥65	5 865	371	6.3	1 385	23.6	147	2.5	1 680	28.6
Strata									
Urban	33 122	995	3.0	2 685	8.1	925	2.8	4 140	12.5
Rural	28 604	974	3.4	2 473	8.6	1 083	3.8	4 158	14.5

* No CXR images (38 refused, 1 747 exempted due to pregnancy, 223 exempted due to other medical conditions).
CXR = chest X-ray; TB = tuberculosis.

Table 3 Prevalence of smear-positive and bacteriologically confirmed tuberculosis in the adult population, Ghana, 2013*

	Smear-positive			Bacteriologically confirmed		
	Point estimate	Lower limit	Upper limit	Point estimate	Lower limit	Upper limit
Overall	111	76	145	356	288	425
Sex						
Male	198	133	264	431	327	536
Female	49	21	76	303	223	382
Age group, years						
15–24	49	14	84	185	104	265
25–34	35	1	69	228	130	326
35–44	101	38	164	295	174	416
45–54	223	129	317	470	294	645
55–64	245	63	426	607	362	854
≥65	212	77	347	908	597	1219
Post-strata						
Urban	142	89	195	293	216	372
Rural	75	39	111	429	315	542

* Analysis method used: robust standard errors with multiple imputation and inverse probability weighting.

(59.4%) survey cases would have been missed. Of all the survey TB cases, 152 (75.2%) were detected and 13 (6.4%) missed using CXR (Table 4).

Of all the 202 survey TB cases, 43 (21%) cases sought care at public or private facilities before the survey, 23 (11%) of whom had reported that they had been tested for TB by the time they sought care. Only nine (5%) survey cases were diagnosed as TB before the survey and were on treatment during the time of the survey.

DISCUSSION

The survey was successfully implemented with high participation rate and high sputum collection rate. The use of a digital data collection system in this survey significantly reduced human errors and time required for data entry and cleaning. The use of Xpert testing as backup for culture in case of contamination or unavailable culture results led to the identification of additional cases that would have been missed had Xpert not been used.

This survey revealed a much higher prevalence estimate (356/100 000) than anticipated during the survey design stage (270/100 000). Using the prevalence survey data and extrapolating for the prevalence of extrapulmonary TB and TB in children, the WHO re-estimated the national overall TB prevalence for 2013 at 290/100 000 (95%CI 196–384),[11] which is four times higher than the WHO estimate for the same year (71/100 000) calculated before the survey result became available.[12] All forms of TB were estimated among all ages based on the average proportion of children and the proportion of extrapulmonary TB cases among the total number of cases notified to the routine programme surveillance data from 2008 to 2012. The possible explanation for underestimation of the prevalence in the previous estimate was likely the lack of reliable surveillance data. Compared to other African countries that carried out similar surveys after 2010, the estimated prevalence of bacteriologically confirmed TB among adults in Ghana (356/100 000) is greater than that of the 2010–2011 Ethiopia survey (277/100 000),[13] but much less than the estimates for the 2012 Nigeria survey (524/100 000).[14] This study showed higher prevalence of bacteriologically confirmed TB in males and older age groups, and a higher prevalence of bacteriologically confirmed TB in rural than in urban areas. Possible explanations for this difference may include higher poverty levels, lower access to health services and other predisposing factors likely to be more prevalent in rural than in urban areas. However, the observation of a lower proportion of smear-negative, bacteriologically confirmed TB cases in urban areas compared to rural areas needs further study.

Our survey revealed that only 40.6% of TB cases had chronic cough; this implies that if only symptom screening had been used, nearly 60% of survey TB cases would have been missed. This suggests the need to revise the screening criteria for the programme to improve TB case detection. If cough of any duration could be used as a screening criterion, the sensitivity of the symptom screening protocol would have increased to 51%, but the number of diagnostic sputum tests required would increase by three-fold. CXR screening helped identify most of the survey TB cases (75%) and only a small proportion of TB cases

Table 4 Prevalence survey of TB cases by screening method used, Ghana National TB Prevalence Survey, 2013

	Cough duration			
Abnormal CXR, eligible for sputum examination	Cough ≥2 weeks *n* (%)	Cough <2 weeks *n* (%)	No cough *n* (%)	Total *n* (%)
Yes	67 (33.2)	18 (8.9)	67 (33.2)	152 (75.2)
No	13 (6.4)	0	0	13 (6.4)
CXR not done	2 (1)	3 (1.5)	32 (15.8)	37 (18.3)
Total	82 (40.6)	21 (10.4)	99 (49.0)	202 (100)

TB = tuberculosis; CXR = chest X-ray.

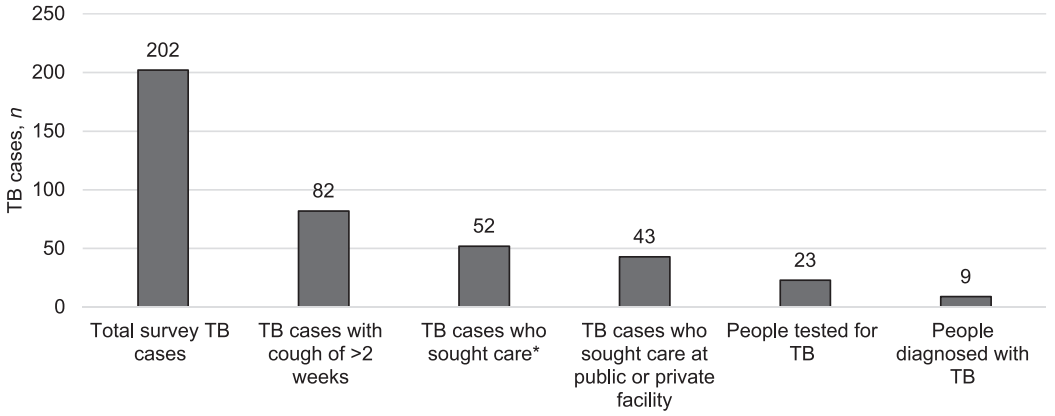

Figure 2 Proportion of survey TB cases who sought care and were diagnosed with TB by the programme before the survey. * Of the total number of 52 cases, 7 sought care at a pharmacy and 2 with a traditional healer with no TB diagnostic testing. TB = tuberculosis.

(6.4%) were missed. This suggests that CXR can be an important screening tool for the early detection of cases before the patient develops full-blown TB symptoms.

The low sensitivity of smear microscopy (68% of survey cases missed using smear), as well as the low specificity due to NTM (134/198 patients with at least one sample smear-positive were Xpert-negative and culture-negative/NTM) required the scaling up of TB tests from smear microscopy to Xpert; this can help to increase the number of genuine cases notified and reduce the risk of unnecessary treatment of false smear-positive cases. In addition to high sensitivity and specificity, Xpert testing can help detect rifampicin-resistant TB.

Among all TB cases identified, only 4.5% were diagnosed as TB and enrolled on treatment before the start of the survey (Figure 2). Although 43 patients reported that they had sought care at public and private facilities, only nine were diagnosed with TB. Possible explanations for the misdiagnosis of TB patients include lower index of suspicion by health care providers, sensitivity of laboratory tests and availability of diagnostics in facilities where TB patients seek care. Data from patient pathway analysis done during the epidemiological review of TB data in Ghana in 2017 showed only 23% of all patients who seek care have access to TB diagnostic service at their first visit.[15]

This survey had the following major limitation: children aged <15 years were excluded from the study due to technical and logistic difficulties. The survey also lacks information on extrapulmonary TB. Due to concerns about low participation and the risk of affecting the primary survey objective, human immunodeficiency virus testing was not included in the study.

CONCLUSION

Survey findings suggest much a higher TB prevalence than anticipated, including a large proportion of undetected new TB cases, in the community. The survey also revealed that a large number of TB cases had visited public health facilities but had not been diagnosed with TB. The following recommendations were suggested: revision of the national TB screening and diagnostic algorithms to increase sensitivity of screening and diagnosis to improve case detection in facilities; scale-up of rapid molecular testing and use of Xpert as first-line diagnostic test; CXR use as a screening tool in high-risk populations; community interventions to improve health-seeking behaviour; sensitisation of health workers to increase index of suspicion to TB and initiation of active TB screening among hospital attendants, conducting targeted TB screening among old men; engaging pharmacies (licensed to sell all classes of drugs, including Class A and B drugs) and chemical shops (licensed to sell drugs other than Class A and B drugs) in screening and referring presumptive TB patients; and sputum transportation and referral linkage to increase diagnostic coverage.

Implementation status of the survey recommendations and lessons learnt from post-survey interventions

This prevalence survey informs the NTP of the actual gap in case detection and the results were used for the upward revision of previous estimates. The case detection rate (proportion of new cases diagnosed and notified from the total annual estimated new cases) dropped from 81% (95%CI 71–92]) in 2012[17] to 34% (95%CI 20–70]) in 2013.[16] Based on the survey findings, the national TB strategic plan 2015–2020 has been developed, with special focus on identifying missing cases. In 2015, the NTP introduced intensified TB case finding: TB screening of all health facility attendants in 113 district hospitals reporting high incidence. The criterion for presumed cases has been changed from 2 weeks' cough to cough of any duration with any additional TB symptom (fever, night sweet, weight loss or chest pain) or

abnormal CXR, regardless of the presence of TB symptoms. The programme deployed 48 digital X-ray machines with automated computer-added detection for TB (CAD4TB) system in 48 selected hospitals. In addition, the programme deployed 126 Xpert machines and upgraded 126 smear microscopic diagnostic facilities at Xpert testing sites; since mid-2017, Xpert has been used as first-line TB test for all presumed TB cases.

Although the NTP implemented some of the recommendation of the survey, implementation was limited to existing facilities who were providing diagnostic and treatment services before the survey. As a result, the impact of the intervention was not significant, except that an increasing trend in the detection of rifampicin- or multidrug-resistant TB was observed, which increased from 72 in 2015 to 231 in 2018[18] due to Xpert use. The case detection rate remains low and unchanged since 2015 (range 32–33%). Based on the 2017 Ghana patient pathway analysis, 77% of outpatient attendants first seek care at facilities with no TB diagnostic capacity. Due to the case detection rate that has remained unchanged and evidence of low TB diagnostic coverage, a roadmap has been developed for sample transportation from 1000 periphery health facilities with no onsite access to diagnostic testing to 126 Xpert-equipped sites (NTP Global Fund grant reprogramming proposal 2019). This intervention is planned to be introduced in September 2019. This sample transport arrangement is intended to provide onsite access to Xpert testing to 91% of outpatient department attendees who visit facilities with no onsite TB diagnostic test services.

Based on observation from post survey activities and findings from the survey itself, we recommended the NTP to continue its effort in addressing case finding gap by scaling up the coverage of the diagnostic services using sputum sample transport, combined with improved diagnostic capacity at existing diagnostic sites.

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Conflicts of interest: none declared.

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RÉSUMÉ

CADRE : La prévalence de la tuberculose (TB) maladie est l'un des trois principaux indicateurs utilisés pour évaluer le poids épidémiologique de la TB et l'impact de la lutte contre la TB ; les deux autres sont l'incidence et la mortalité.

OBJECTIF : Estimer la prévalence de la TB maladie parmi les adultes au Ghana.

MÉTHODE : Une enquête nationale transversale représentative a été réalisée. Les participants ont été dépistés par entretien et radiographie pulmonaire (CXR). Chez ceux qui avaient une toux depuis plus de 2 semaines et/ou une CXR anormale, des échantillons de crachats spot et matinaux ont été recueillis et examinés par microscopie de frottis et culture.

RÉSULTATS : L'étude a révélé que la prévalence de TB à frottis positif parmi les adultes (âge ≥15 ans) était de 111 (IC95% 76–145) et celle de la TB confirmée par bactériologie a été de 356 (IC95% 288–425) par 100 000 habitants. La prévalence a été plus élevée chez les hommes et les personnes âgées. La majorité des cas de TB ont été à frottis négatif et avaient une CXR anormale sans rapporter de toux chronique.

CONCLUSION : L'enquête a mis en évidence un poids de la TB bien plus élevé qu'il avait été estimé auparavant. Ceci implique que le programme doit faire davantage d'efforts et avoir plus de ressources afin d'identifier les cas non diagnostiqués et non déclarés. La proportion plus élevée de cas de TB à frottis négatif et asymptomatiques suggère qu'il est nécessaire de revoir les algorithmes existants de dépistage et de diagnostic.

RESUMEN

MARCO DE REFERENCIA: La prevalencia de enfermedad tuberculosa es uno de los tres principales indicadores utilizados con el fin de evaluar la carga epidemiológica de la tuberculosis (TB) y su modificación como resultado del control de la enfermedad; los otros dos indicadores son la incidencia y la mortalidad.

OBJETIVO: Estimar la prevalencia de enfermedad tuberculosa en los adultos en Ghana.

MÉTODOS: Se realizó un estudio transversal representativo a escala nacional. El tamizaje de la TB en los participantes se llevó a cabo mediante una entrevista y la radiografía de tórax (CXR). En los participantes con tos de ≥2 semanas de duración o con CXR anormales se recogieron muestras de esputo inmediatas y matinales para baciloscopia y cultivo.

RESULTADOS: En el estudio, la prevalencia de adultos (a partir de los 15 años de edad) con TB y baciloscopia positiva del esputo fue 111 por 100 00 habitantes (IC95% 76–145) y la prevalencia de TB con confirmación bacteriológica fue 356/100 000 (IC95% 288–425). Se observó una prevalencia más alta en el sexo masculino y los ancianos, que en sus contrapartes. En la mayoría de los casos de TB la baciloscopia fue negativa y la CXR anormal y los pacientes no referían tos crónica.

CONCLUSIÓN: El estudio reveló una carga de morbilidad por TB mucho más alta que las estimaciones anteriores. Esto indica que el programa necesita más esfuerzos y recursos con el fin de detectar los casos que se pasan por alto y los casos sin notificación. La proporción más alta de casos con baciloscopia negativa y asintomáticos insinúa la necesidad de revisar los algoritmos actuales de detección sistemática y diagnóstico.