

Research Article

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Impact of community based tuberculosis care interventions on TB Case detection in Nigeria – What works and what does not?

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Abstract

We studied the role of community resource persons including community pharmacists (CPs), patent medicine vendors (PMVs) and a small mix of community volunteers (CVs) as a bridge between the health system and the community in the prevention, care and control of TB in Nigeria through the Community TB Care Program supported by FHI 360 in Badagry Local Government Area (LGA) of Lagos State, Nigeria. The aim of the study was to determine the effect of Community TB Care (CTBC) Program on the knowledge, attitude and practice (KAP) of Community Pharmacists, Patent Medicine Vendors (PMVs) and Community Volunteers (CVs) regarding the identification and referral of presumptive TB cases for diagnosis and treatment, and the overall effect on TB case detection in Badagry LGA of Lagos State. The intervention spanned from June 2013 to September 2014, a period of 15 months. At the end of December 2013, after only six months of intervention, the TB Case Finding in the LGA increased from 300 in 2012 to 632 in 2013, representing an increase of 111%, and by the end of the first phase of the intervention in September 2014, the TB Case Finding for 2014 was already 633, although it was still three months to the end of the year. Our study showed that CPs and PMVs are a huge community resource for the promotion of TB messages through their abundant clientele. Pre intervention baseline data revealed that the CPs and PMVs in Badagry LGA see an average of 18 clients per day, with each CP/PMV coming across an average of 6 clients with symptoms they believed were suggestive of tuberculosis per month, pre-intervention. Although majority (62.1%) of the CORPs reported referring such clients to health facilities, the actual number of suspected TB cases ever referred by them pre intervention was negligible (<1 per month). The poor referral practice among the CPs and PMVs before they were engaged for the CTBC program was probably due to their low level of awareness of the DOTs Program as reflected by the low proportion of the CORPs (15.4%) that knew that there is a standard treatment regimen for TB despite about half of them (43.6%) claiming awareness of the TB treatment guidelines by the National TB Program. Only 12.8% of the CORPs had had any training on tuberculosis prior to our intervention. After our interventions, 89.7% of the CORPs have good knowledge of TB and the National TB guidelines and all of them (100.00%) have referred presumptive TB cases throughout the period of intervention with each PMV referring an average of 2.8 clients per month (range 1-5). Compared with the number of presumptive TB cases ever referred by the PMVs pre-intervention, this difference was statistically significant ($p < 0.05$). Community based interventions with engagement of Community Pharmacists, Patent Medicine Vendors and Community Volunteers when properly situated with efficient referral systems and other community mobilization efforts and TB information dissemination activities can contribute substantially to improve TB case detection and notification. This intervention provides a model that can be applied to similar areas in Nigeria especially in the light of the result of the recent prevalence survey that put case notification at a paltry 17% and efforts to bridge this yawning gap.

Keywords

community pharmacists,
PMVs,
TB Care Program,
DOTs.

Introduction

Despite the many gains of the World Health Organization (WHO) Directly Observed Treatment (DOT) short course with anti-TB medications that has saved some 37 million people, tuberculosis (TB) remains a global public health challenge.¹ Globally, 9 million people became ill with TB in 2013 out of which 1.5 million died from the disease, including 360,000 deaths among HIV-positive people (WHO,2014). While prevalence is decreasing by about 2 percent each year, nearly 3 million TB cases went undiagnosed or unreported in 2012 (WHO,2013). Missed cases present a major challenge in fighting TB (WHO,2013).

About one-third of the world's population, including the inhabitants of Sub-Saharan Africa are latently infected with *Mycobacterium tuberculosis* (WHO,2015). The situation of TB in Sub-Saharan Africa is made worse by TB/HIV co-infection (WHO,2015). In 2013, there were an estimated 1.1 million new cases of TB among people who were HIV-positive, 78% of whom were living in Africa (WHO,2015).

Tuberculosis remains a serious public health threat to people of all sexes and ages in Nigeria (FMOH,2014). The country ranks 3rd among the 22 high burden TB countries in the world (FMOH,2014), with an incidence rate of 338/100,000 and a prevalence rate of 322/100,000 (FMOH,2013) and a projected 610,688 incident cases of TB in 2014 (FMOH,2014). The rate of TB case detection in Nigeria is one of the lowest in the world currently standing at approximately 16%.⁵ Lagos, Nigeria is a densely populated city with the highest TB burden in the country (United States Embassy in Nigeria, 2012).

Community involvement in TB prevention, treatment and control is one of the STOP TB strategies (WHO/STOP TB Partnership,2006), using casual and volunteer health work force as a bridge between the health system and the community, improves and strengthens community mobilization and TB campaigns, sensitizations, contact tracing and treatment support. This was found effective in Kenya and many African countries (Harries *et al.*,2001). However, a high attrition rate among community volunteers (CVs) and casual health workers in CTBC is a globally known problem (Colvin *et al.*,2014).

Patent medicine vendors (PMVs) are independent medicine sales persons that form the 1st line of health care provision for most communities in Nigeria. Their business premises which are largely fixed locations with a huge clientele vary from place to place, and provides a means for the screening and referral of presumptive TB cases to a TB diagnostic and treatment facility.

Using USAID funds, FHI 360 implemented Community TB Care (CTBC) in 27 LGAs in Nigeria between 2012 and 2014. Five of these LGAs are in Lagos State. Traditionally, the CTBC model involves the engagement of community

volunteers to identify and refer presumptive TB cases in the community. However, in Badagry LGA of Lagos State, FHI 360 piloted the engagement of a mix of community pharmacists, patent medicine vendors and community volunteers working with the hypothesis that a mix of these community resource persons will produce more results than engaging only the traditional volunteers.

We studied the impact of FHI 360's community TB Care Program on TB case detection using Patent Medicine Vendors (PMVs), Community Pharmacists, and other community resource persons (CVs) as part of a referral network in Badagry LGA of Lagos state; what works and what doesn't?

Materials and Methods

STUDY SETTING

Lagos State

Lagos State is one of the 36 states in Nigeria. It is located in the South-West geo-political zone and is the commercial, industrial and financial nerve center of Nigeria. It is the most populous state of the federation with a projected population of 22,583,305 for 2014, and a population density is 6,312.98 persons/km² (Lagos Bureau of Statistics,2011).

Lagos State has a large number of health facilities including two teaching hospitals, 24 general hospitals and numerous primary health centres. There are also numerous privately owned health facilities. However, as with the rest of the country, there is a rural-urban variation in the distribution of the health facilities with most of the facilities being in the urban Local Government Areas.

Lagos State is made up of 20 Local Government Areas (LGAs). Each LGA is further divided into Local Council Development Areas (LCDAs) depending on the size of the LGA. Sixteen (16) of these LGAs are urban while 4 are rural. The rural LGAs include Badagry, Epe, Ibeju-Lekki and Ikorodu LGAs. This study was carried out in Badagry LGA.

Badagry LGA

Badagry (Traditionally called Gbagle) is a coastal town and a Local Government Area in Lagos State, Nigeria. It is situated between metropolitan Lagos town and the border with Benin Republic. According to the preliminary 2006 census results, the municipality had a population of 380,420. Badagry LGA is further divided into three Local Council Development Areas namely, Badagry Central, Badagry West and Olorunda LCDAs. Altogether, there are 20 wards in Badagry LGA with over 380 communities. There are 17 health facilities out of which one is a secondary health facility (General Hospital Badagry), 12 are primary health centres (PHCs) running 24-hour services,

while 4 are health posts running day clinics only. As at March 2013, General Hospital Badagry and 5 PHCs were providing DOTs services. They were subsequently selected as the CTBC facilities.

STUDY DESIGN

This is a quasi-experimental (intervention) study designed to determine the impact of Community TB Care (CTBC) Program on TB case detection in Badagry LGA of Lagos State and on the knowledge, attitude and practice (KAP) of Community Pharmacists, Patent Medicine Vendors (PMVs) and Community Volunteers (CVs) regarding the identification and referral of presumptive TB cases for diagnosis and treatment.

STUDY POPULATION

The population for this study were community resource persons (CORPs) consisting of Community Pharmacists (CPs), Patent Medicine Vendors (PMVs) and Community Volunteers (CVs) in Badagry LGA of Lagos state.

The inclusion criteria for selecting the CORPs included close proximity of the PMV and CP outlet to a functional DOTs Centre; viability of the PMV/CP outlet in terms of accessibility/location of the outlet, size of outlet and the total numbers of clients seen per week. The CVs were selected based on their residence in hard-to-reach areas without a health facility.

STUDY SAMPLE AND SAMPLING TECHNIQUES

A list of all the DOTs facilities and the catchment of the communities they serve in Badagry LGA was obtained from the Local Government Tuberculosis and Leprosy Supervisor (LGTBLS) A total of 39 CORPs were purposively selected to participate, including 22 of the registered PMVs, 4 of the 6 CPs and 13CVs who were providing for other health related community initiatives like immunization, malaria and HCT The selection of the PMV and CPs was based on their location within the identified catchment and the patronage of their facility.

DATA COLLECTION TOOLS AND TECHNIQUES

Data Collection Tools (DCTs)

Customized referral forms, Community Volunteer (CV) Registers and Community Outreach Registers were deployed to record the activities of the CORPs. The TB Suspect Register and TB Treatment Register were placed at the DOTs facilities in the LGA to record the impact of the activities of the CORPs in the TB treatment and diagnostic facilities.

The data on the KAP of the CPs/PMVs/CVs was collected by means of interviewer-administered, semi-structured questionnaires (before and after intervention). TB Case Detection Data (before and after intervention) was obtained

from the Badagry LGA and Lagos State TB Program. Community TB Care programmatic data (before and after intervention) was obtained from the FHI 360 supported DHIS.

Training of Interviewers;

The interviewers were trained project staff on CTBC and the use of the DCTs.

Community Entry;

Prior to implementation, FHI 360 staff carried out advocacy visits to the State TBL Control Officer and Local Government officials including the Special Adviser on Health, the Medical Officer of Health and the LG TBL Supervisor in March 2013 to sensitize them on the Community TB Care Program. The various community leaders and other stakeholders in each community reached were also visited and sensitized appropriately. Subsequently an LGA Management committee was set up in April 2013 drawing members from the Health Department at the LGA level and other stakeholders at the community level.

PHASES OF THE STUDY

The study was carried out in three phases as follows;

PHASE 1: PRE INTERVENTION PHASE

A baseline assessment of the health facilities in Badagry LGA was carried out in March 2013 prior to the commencement of intervention. Of the 12 health facilities successfully mapped and assessed for suitability for CTBC services from 27th-28th March 2013, General Hospital Badagry and 5 PHCs were found to have DOT services. They were subsequently selected as the CTBC facilities.

The selected CP and PMV premises/outlets in the LGA were visited and mapped with the use of GIS coordinates on 17th and 18th April 2013. Baseline assessment was then conducted for the CPs and PMVs with the use of an already prepared questionnaire. Each PMV and CP was assessed on their level of knowledge of TB, their attitude to the referral of presumptive TB cases and their referral practices. The same questionnaires were administered to the selected CVs in order to assess their KAP regarding TB and the referral of presumptive TB cases in the community. The LGA TB Case Detection Rate for 2012 as reported by the State TBL Program was also noted at baseline.

Altogether, 22 Patent Medicine Vendors, 4 Community Pharmacists and 13 Community Volunteers were mapped, assessed and selected for training on community TB care.

PHASE 2: INTERVENTION PHASE

Following the baseline assessments, the community based interventions geared at improving the knowledge, attitude and practice of the CPs/PMVs/CVs regarding the referral of

presumptive TB cases and increasing TB case detection in the LGA began.

First the general health workers and DOTs Providers were trained on epidemiology of TB, diagnosis of TB, treatment of TB and the CTBC referral process on 3rd and 4th June 2013. Next the 39 selected CPs, PMVs and CVs were trained on different aspects of Community TB Care including recognition of the signs and symptoms of TB, referral of presumptive TB cases to facilities for diagnosis and treatment, treatment support (TS) and TB infection control (IC) on 18th and 19th June 2013. Customized CTBC Recording and Reporting (R&R) tools were then deployed to the DOTs facilities and the CP/PMV/CV outlets for data collection.

After the trainings, the CPs, PMVs and CVs were linked to the DOTS facilities in closest proximity to them and TB referral activities were commenced from July 2013. This corresponds to the beginning of the third quarter of 2013.

In order to further ensure prompt diagnosis of presumptive TB cases following referral, two Acid and Alcohol Fast Bacilli (AAFB) Microscopy Laboratories were established in two DOTs facilities in the LGA and two laboratory scientists were trained on AFB microscopy and Good Clinical Laboratory Practice (GCLP) with USAID resources in February 2014.

Monthly data review meetings were held by the FHI 360 staff with the DOTs Providers and community resource persons during which programmatic data generated by the CPs/PMVs/CVs were collated and triangulated with the facility data and summarized for entry into the DHIS. The meeting also served as an avenue to identify challenges and collectively address them.

Monthly advocacy, communication and social mobilization activities were done during which influential community leaders are visited and community mobilization and sensitization exercises carried out for TB awareness creation and service demand generation.

The LGA management committee on community TB care established at the community entry stage meet every quarter in order to review the performance of the CTBC program with community and LGA stakeholders and address challenges for continuous improvement.

All these community TB care activities are closely monitored through supportive supervision and mentoring of the DOTs Providers and the CORPs by the LGTBLS on a daily basis and by the FHI 360 team monthly.

PHASE 3: POST INTERVENTION

After 15 months of implementation, a post intervention assessment was carried out by the FHI 360 team in Badagry LGA from 27th to 30th October 2014. The knowledge, attitude and practice of the CPs/PMVs/CVs were reassessed by administering the same questionnaire used at baseline in

order to determine if there has been any change. The TB case detection rates of the LGA for each quarter after the intervention began were obtained from the Lagos State TB Program and compared with the pre-intervention rates. Also CTBC programmatic data for each month was extracted from the FHI 360-supported District Health Information System in order to determine the contribution of the CTBC program to the TB Case Detection figures obtained from the State TB Program.

DATA ANALYSIS

Data was analysed with the use of SPSS version 16 statistical software package. The results were presented using frequency tables and cross tabulations. The findings before and after intervention were compared using the appropriate statistical tests to test for statistical significance at $P < 0.05$.

The various data sets analysed included:

- Analysis of KAP questionnaire/data (Before and After Intervention)
- Analysis of routine Case Detection Data (Before and After Intervention)
- Analysis of Programmatic Data (Before and After Intervention- to determine the contribution of the community TB program to TB case detection after intervention).

Scoring Method

The respondents' level of knowledge was assessed by assigning scores to correct answers given for selected knowledge questions (one mark for each correct answer and zero mark for incorrect answers and "I don't know" responses). The sum of the scores for the questions was expressed in percentage and then divided into three parts for grading. A score of 0-39% was graded as poor, 40-69% as fair, and 70-100% as good.

OUTCOME INDICATORS

A set of indicators was used to measure the outcome pre and post intervention in the study. They include:

- Proportion of PMVs, CPs and CVs who have a good knowledge of TB, National TB treatment guidelines and CTBC referral processes
- Proportion of PMVs, CPs and CVs who have good practices of referring presumptive TB cases to diagnostic facilities
- Number of presumptive TB cases referred for diagnosis by PMVs, CPs and CVs
- Number of TB cases supported on treatment by trained PMVs, CPs and CVs
- Number of TB cases detected in the LGA before and after intervention

ETHICAL CONSIDERATIONS

Oral and written consents were made by the subjects.

Results

interviewed in the LGA during the pre- and post-intervention phases.

A total number of 39 community pharmacists, patent medicine vendors and community volunteers were

Table 1: Respondents' Socio-demographic Characteristics

Variable	Pre Intervention	Post Intervention	statistics	P value
Age group				
<30	5(12.8)	8(22.2)	5.39	0.15
30-40	10(25.6)	15(41.7)		
40-50	16(41.0)	7(19.4)		
>50	8(20.5)	6(16.7)		
Mean Age (SD)	41.3±10.4			
Marital Status				
Married	36(92.3)	34(87.2)	2.34	0.31
Singles	2(5.1)	5(12.8)		
Others	1(2.6)	0(0.0)		
Religion				
Christianity	31(79.5)	30(76.9)	0.075	0.50
Islam	8(20.5)	9(23.1)		
others				
Job Category				
PMV	22(56.4)	22(56.4)		
CV	13(33.3)	13(33.3)	0.00	1.0
CP	4(10.3)	4(10.3)		
Years of Practice				
Mean (SD)	13.8±7.7	11.9±9.1	0.41	0.29

There were no statistically significant differences in the age distribution, marital status, religion, job category and years

of practice of the community resource persons pre- and post- intervention (P>0.05)

Table 2: Effect of Engagement on Respondents' Knowledge of TB

Knowledge	Pre Intervention	Post Intervention	statistics	P value
Cause of TB				
Correct	31(79.5)	39(100.0)		
Wrong			8.91	0.012
Don't Know	8(20.5)	0(0.00)		
Signs & Symptoms of TB				
Cough	28(71.8)	39(100.0)	12.8	0.0002
Weight loss	15(38.5)	33(84.6)	17.6	0.00001
Chest pain	3(7.7)	34(87.2)	49.4	0.00
Night Sweat	1(2.3)	34(87.2)	56.4	0.00
Fever	1(2.6)	32(82.1)	50.5	0.00
Don't Know	4(10.3)	0(0.00)	4.44	0.06
TB-HIV				
Yes	22(56.4)	36(92.3)	14.1	0.003
No	10(25.6)	3(7.7)		
Don't Know	7(17.9)	0(0.0)		

All the respondents (100.00%) knew that germs cause TB post intervention, compared to the 79.5% that knew the cause of TB pre intervention ($P<0.05$) and significantly higher proportions of the respondents knew each of the major symptoms of TB post intervention ($P<0.05$).

Likewise, 92.3% of the respondents knew that there is a relationship between TB and HIV post intervention, compared to the 56.4% that had this information pre-intervention ($P<0.05$).

Table 3: Effect of Engagement on Respondents’ knowledge of National TB Guidelines

Knowledge	Pre Intervention	Post Intervention	statistics	P value
Aware of National TB Program				
Yes	17(43.6)	39(100.0)	30.6	0.000
No	22(56.4)	0(0.00)		
Diagnosis of TB				
Correct	2(5.1)	36 (92.3)	2.00	0.000
Wrong	18(46.2)	0(0.00)		
Don’t Know	19 (48.8)	3(7.6) 0.00)		
Knowledge of Duration of Treatment				
Correct	21(53.9)	39(100.0)	23.4	0.000
Wrong	16(40.9)	0(0.00)		
Don’t Know	2(5.1)	0(0.00)		
Knowledge of Treatment Regimen				
Correct	6(15.4)	35(89.8)		
Wrong	1(2.6)	4(10.3)	49.5	0.000
Don’t Know	32(82.1)	0(0.0)		
Knowledge of TB patient Monitoring				
Correct	20(51.3)	39(100.0)	25.1	0.000
Wrong	1(2.0)	0(0.00)		
Don’t Know	19(48.7)	0(0.00)		

Post intervention, all the respondents (100.0%) were aware of the National TBL Control Program compared to the 43.6% that were aware pre intervention. This difference was statistically significant ($P<0.05$). Likewise, significantly higher proportions of respondents knew the National TB

Treatment Guidelines regarding the diagnosis of TB, duration of TB treatment, treatment regimen for tuberculosis and modalities for patient monitoring post intervention compared to pre-intervention ($P<0.05$)

Table 4: Effect of Engagement on Respondents’ Level of Knowledge

Knowledge	Pre Intervention	Post Intervention	statistics	P value
Poor	29 (74.4)	1(2.6)	62.2	0.000
Fair	9(23.0)	3(7.7)		
Good	1(2.6)	35(89.7)		

Post intervention, majority (89.7%) of the community resource persons had a good knowledge of tuberculosis, National TB treatment guidelines and community TB care

compared to the pre intervention phase (2.6%). This difference is statistically significant ($P<0.05$)

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Table 5: Effect of Engagement on Respondents' practice

Knowledge	Pre Intervention	Post Intervention	statistics	P value
Mean no of Client Seen (SD)	18.2±13.9	707.3±537.3	6.5	0.000
Identify TB Suspects				
Yes	20(51.3)	39(100.00)	26.9	0.000
No	19(48.7)	0(0.00)		
Practice with TB Suspects Identified				
Treat	4(21.1)	0(0.00)	8.81	0.005
Refer	15(78.9)	39(100.0)		
Referral of TB suspects for diagnosis				
Yes	25(62.1)	0(0.00)	36.8	0.000
No	14(35.9)	39(100.0)		
Treatment support for clients on TB Treatment				
Yes	0(0.00)	31(79.5)	51.4	0.000
No	39(100.0)	8(20.5)		
Mean No. referrals /Month (SD)	0.5±0.82	2.8±1.5	8.2	0.000

Post Intervention, all the community resource persons (100.00%) were identifying TB suspects and referring them to the DOTs facilities for diagnosis. None of them was attempting to treat persons with chronic cough as was the practice of 21.1% of them pre-intervention. These differences were statistically significant ($P < 0.05$). Furthermore, majority (79.5%) of the CORPs supported TB

patients on treatment post intervention, compared to the pre intervention phase when none of them (0.00%) did.

The mean number of presumptive TB cases referred monthly by the CORPs post intervention was 2.8 ± 1.5 compared to the mean pre-intervention (0.5 ± 0.82). The difference pre- and post-intervention was statistically significant ($P < 0.05$)

Table 6: TB Case Detection in the LGA of respondents

LGA TB Records	Pre Intervention 2012	6 months Post Intervention 2013	15 months Post Intervention Quarters 1-3 2014	18 months Post Intervention Quarters 1-4 2014
TB Case Detection in the LGA	300	632	633	835

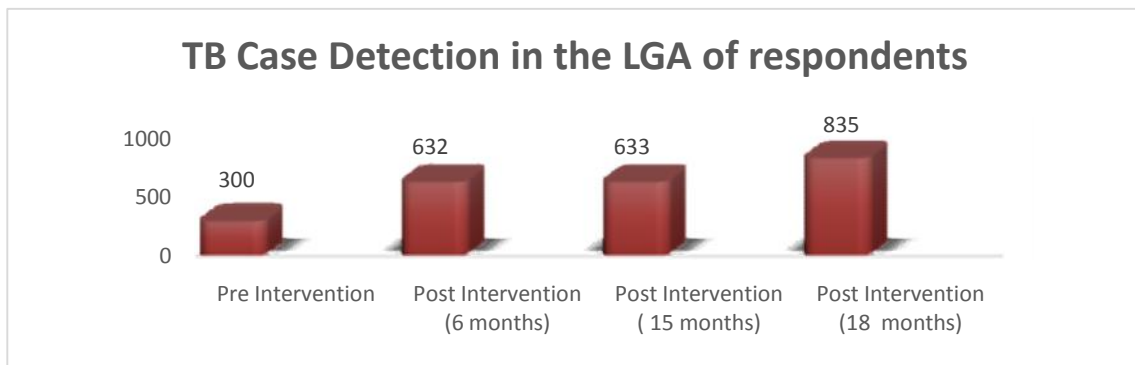


Figure 1: TB Case detection in Badagry LGA Pre and Post Intervention (2012-2014)

Pre intervention, the TB case detection in Badagry LGA for 2012 was 300. CTBC was activated in the LGA in June 2013 and by the end of that year, after only 6 months of implementation, the TB case detection for the LGA was

632. Fifteen months later at end of quarter 3 2014, the TB case detection in the LGA was 633 and by the end of the year, the TB case detection for 2014 was 835

Table 7: Contribution of CTBC activities to TB case detection in Badagry LGA (2013-2014)

YEAR	2013				2014			
QUARTER	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
LGA level TB case detection	113	126	199	194	248	233		
CTBC contribution				93	125	88	80	
Percentage contribution of CTBC to TB case detection (%)				48	50	38		

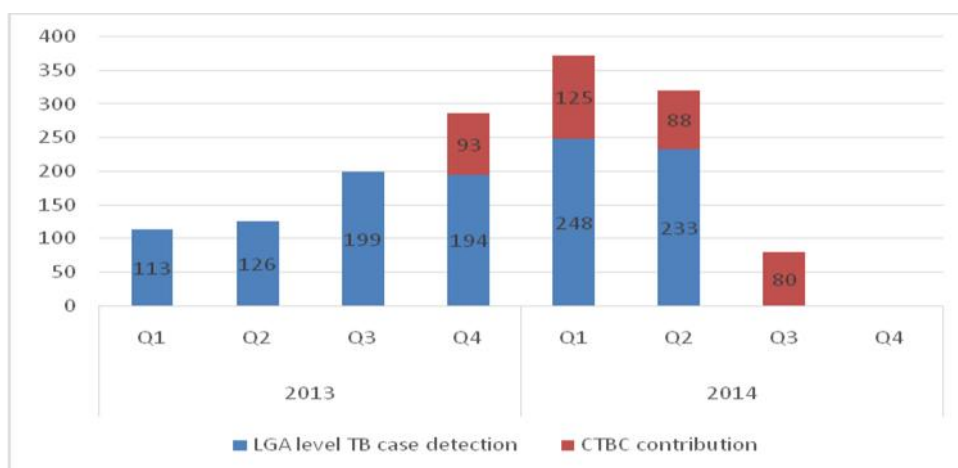


Figure 2: Contribution of CTBC activities to TB case detection in Badagry LGA

In quarter 4 (September – December) 2013, after only 3 months of intervention, 93 out of the 194 TB cases detected in Badagry LGA were referred by the CORPs (47.94%), while in quarter 1 2014, over half of the TB cases (50.4%) in the LGA were detected through the CTBC program

Discussion

We studied the role of community resource persons including community pharmacists (CPs), patent medicine vendors (PMVs) and a small mix of community volunteers (CVs) as a bridge between the health system and the community in the prevention, care and control of TB in Nigeria through the Community TB Care Program supported by FHI 360 in Badagry Local Government Area (LGA) of Lagos State, Nigeria.

The aim of the study was to determine the effect of Community TB Care (CTBC) Program on the knowledge, attitude and practice (KAP) of Community Pharmacists, Patent Medicine Vendors (PMVs) and Community Volunteers (CVs) regarding the identification and referral of presumptive TB cases for diagnosis and treatment, and the overall effect on TB case detection in Badagry LGA of Lagos State.

The intervention spanned from June 2013 to September 2014, a period of 15 months. At the end of December 2013, after only six months of intervention, the TB Case Finding in the LGA increased from 300 in 2012 to 632 in 2013, representing an increase of 111%, and by the end of the first phase of the intervention in September 2014, the TB Case Finding for 2014 was already 633, although it was still three months to the end of the year.

Patent medicine vendors make up the bulk of the community resource persons used in this study based on previous studies that have suggested that engaging PMVs in TB control efforts could improve access to quality TB care in Nigerian communities (Okeibunor *et al.*,2007). A previous study on health seeking behaviour of persons with chronic cough in southern Nigeria found that 48.4% of respondents first visited the PMVs as the care provider of first choice. This figure is higher than the proportion of respondents who reported visiting the hospital first (32%) and well above those who reported to a DOTs Clinic on noticing symptoms (2%) (Okeibunor *et al.*,2007). Patent Medicine Vendors are found in all nooks and crannies of Nigeria, they are closer to community members than the health facilities and although they often have minimal formal education, (Onyeneho and Chukwu,2010).

They are highly accepted in their communities and their opinions are often respected by community members in both rural and urban settings (Onyeneho and Chukwu,2010).

In corroboration with previous studies, our study showed that CPs and PMVs are a huge community resource for the promotion of TB messages through their abundant clientele. Pre intervention baseline data revealed that the CPs and PMVs in Badagry LGA see an average of 18 clients per day, with each CP/PMV coming across an average of 6 clients with symptoms they believed were suggestive of tuberculosis per month, pre-intervention. Although majority (62.1%) of the CORPs reported referring such clients to health facilities, the actual number of suspected TB cases ever referred by them pre intervention was negligible (<1 per month).The poor referral practice among the CPs and PMVs before they were engaged for the CTBC program was probably due to their low level of awareness of the DOTs Program as reflected by the low proportion of the CORPs (15.4%) that knew that there is a standard treatment regimen for TB despite about half of them (43.6%) claiming awareness of the TB treatment guidelines by the National TB Program. Only 12.8% of the CORPs had had any training on tuberculosis prior to our intervention. This corroborated findings from a previous study that attributed the poor referral practices among PMVs to their low level of awareness of DOTS clinics in the communities and the false confidence of PMVs in their ability to handle all cases (Onyeneho and Chukwu,2010).

After our interventions, 89.7% of the CORPs have good knowledge of TB and the National TB guidelines and all of them (100.00%) have referred presumptive TB cases throughout the period of intervention with each PMV referring an average of 2.8 clients per month (range 1-5). Compared with the number of presumptive TB cases ever referred by the PMVs pre-intervention, this difference was statistically significant ($p<0.05$)

In addition, each PMV has supported an average of 8 TB patients on treatment since the commencement of the CTBC program in the LGA (range 0-34). This is a remarkable improvement ($P<0.05$) as none of them had ever supported a TB patient on treatment prior to the intervention. TB treatment support within the community has been shown to lead to effective TB control at the district level in various WHO coordinated projects in South Africa, Botswana, Kenya and four other countries in sub-Saharan Africa (Harries *et al.*,2001).

In addition to the patent medicine vendors, the community volunteers engaged comprised of traditional healers, youth leaders and lay community members involved in other health programs such as immunization and malaria programs. The inclusion of the community pharmacists and traditional healers as community resource persons in addition to the PMVs ensured that the category of presumptive TB cases who chose to self-medicate by procuring drugs in the few local pharmacies available in the

LGA or visit traditional healers for care are also reached. This strategy was also used in a study carried out in Tanzania where it was reported that about 60% of new Smear-Positive TB cases registered first visited a pharmacist or traditional healer before seeking care at a health facility (Colvin *et al.*,2014).

The engagement of these community resource persons was supported by a range of community-based interventions namely training of the CPs/PMVs/CVs and health workers, community mobilization and sensitization, community participation through effective stakeholders' engagement and intensive supportive supervision to both the patent medicine vendors' outlets and the health facilities. These activities were clearly identified from WHO-coordinated projects in various sub-Saharan African countries as necessary for successful community-based interventions for TB control (Harries *et al.*,2001).

Comparing the routine case detection data and CTBC programmatic data in Badagry LGA, the percentage of new TB cases notified that were referred by the CPs/PMVs/CVs ranged from 38% (in the second quarter of 2014) to 50% (in the first quarter of 2014). This achievement is similar to findings from the study in Tanzania where pharmacists and traditional healers referred 38-70% of the total TB cases notified in selected quarters of intervention (Colvin *et al.*,2014).

However, there were variations in the referral practices of the community resource persons. While some were highly motivated, referring an average of 5 clients per month, some were less motivated with an average of 1 referral for many months. As noted in other studies, it would be rewarding to study the provider characteristics that might affect the individual performance of the community resource persons and apply the findings to similar interventions in order to ensure full participation of the providers.

Despite these limitations, the CTBC Program in Badagry LGA increased the TB Case Finding in the LGA by 111% within six months and by 85% at the end of 15 months, with the CORPs contributing between 38-50% of these increments despite the national TB Case Finding in Nigeria dropping to 17% within the same period.

Conclusion

Community based interventions with engagement of Community Pharmacists, Patent Medicine Vendors and Community Volunteers when properly situated with efficient referral systems and other community mobilization efforts and TB information dissemination activities can contribute substantially to improve TB case detection and notification. This intervention provides a model that can be applied to similar areas in Nigeria especially in the light of the result of the recent prevalence survey that put case notification at a paltry 17% and efforts to bridge this yawning gap. It is recommended that the National Tuberculosis and Leprosy Control programme (NTBLCP)

should continue exploring opportunities to further exploit the role of PMVs, CPs, Community Volunteers and other community stakeholders and scale up similar interventions to more Local Government Areas in the country.

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