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Knowledge, attitudes and practices of community health agents regarding pulmonary tuberculosis in a capital city in northeastern Brazil

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Abstract *This article analyses the knowledge, attitudes and practices of community health agents (CHAs) regarding tuberculosis in Recife, a municipality with a high incidence of tuberculosis and high treatment dropout rates in Brazil. The cross-sectional study was conducted with a representative sample of CHAs and a standardized questionnaire. The frequencies of the variables related to knowledge, attitudes and practices were described, and the association between satisfactory knowledge and appropriate practices of CHAs was analysed. Of the 401 eligible CHAs, 385 (96.0%) were interviewed. The majority were women (87.5%) aged ≥ 40 years (66.0%) and had been on the job for more than nine years (74.5%). A large percentage (61.7%) had satisfactory knowledge about tuberculosis, and this knowledge (75.8%) was associated with appropriate practices (p = 0.008). Regarding attitudes, 97.1% of CHAs were believed to be at risk of contracting tuberculosis, and 53.2% attributed this risk to their job. The results suggest the need for investment in training actions that may help improve tuberculosis indicators in the municipality.*

Key words *Tuberculosis, Community health agents, Knowledge, Attitudes and practices in health*

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Introduction

The World Health Organization (WHO) estimates that one-third of the world's population is infected with tuberculosis (TB) and that approximately 10 million people, most of whom are from developing countries, are carriers of TB[1]. Brazil has an annual incidence rate of approximately 40 per 100,000 inhabitants[2] and accounts for approximately one-third of cases reported in the Americas and is included on the list of the 22 countries with the highest TB burden in the world[1,3].

Considering the high burden of TB in Brazil, and in line with the international goal to detect 70% of bacilliferous cases and cure at least 85% of treated cases[4], the Ministry of Health (MS) established the National Tuberculosis Control Program (PNCT based on its Portuguese name) in 2004; its directives included the decentralization and horizontalization of TB surveillance, prevention and control actions of the basic health system, particularly the Family Health Strategy (ESF based on its Portuguese name) and the Community Health Agents Program (PACS based on its Portuguese name)[5,6]. Thus, with the institution of the PACS, important actions, such as BCG vaccination of newborns and the surveillance, prevention and treatment of TB, have become the responsibility of the basic health system[7]. Therefore, the activities leading to the identification of symptomatic patients, treatment follow-up (avoiding dropout) and guidance on preventive measures for family members began to be carried out by community health agents (CHAs)[7].

In 2015, WHO launched the global "End TB Strategy" aimed at reducing the incidence of TB by 90%, which should not reach levels higher than 10 new cases per 100,000 people, and reducing TB deaths by 95%, which cannot exceed the incidence of one death per 100,000, by 2035[8]. In the same year, the MS launched the National Plan to End TB in order to reach the WHO goals. The national plan is based on three pillars of action: Pillar 1, prevention and integrated care with a focus on the patient and an emphasis on the early diagnosis of the disease; Pillar 2, encourage the establishment of bold policies and strengthen social participation; and Pillar 3, advocate for the intensification of research and innovation[9]. In this context, CHAs, together with other professional members of the ESF health team, play a relevant role in TB control actions at the local level.

Studies of knowledge, attitudes and practices (KAP) use a specific methodology and are designed with the objective of measuring what people know, feel and how they behave with regard to a certain subject[10]. This type of study helps with the planning, execution and evaluation of health actions and allows for the identification of problems and barriers, as well as solutions aimed at improving the quality of health care. Considering the potential contribution of KAP studies to the greater effectiveness of TB prevention and control programmes and actions, WHO provides a methodological guide for the development of KAP studies on this disease[10]. Given the importance and multiplicity of CHA responsibilities in the PNCT,[7,11] it is assumed that the KAP of these professionals affects the quality and effectiveness of their actions and, consequently, disease indicators at the local level.

The northeast region of Brazil has historically been characterized by a high incidence of TB[12]. In this region, Recife, the capital city of the state of Pernambuco, has ESF coverage of approximately 50%[13] and some of the highest rates of TB incidence, mortality and treatment dropout in Brazil[9]. According to the data from the municipal health department, the incidence of TB has stayed at high levels of approximately 100 per 100,000 inhabitants[13]. The cure, dropout and mortality rates were 71.9%, 8.2%, and 7.7/100,000 inhabitants, respectively; these levels are far from the global targets of a cure rate of 85%, a dropout rate of 5% and mortality rates of approximately 2/100,000 inhabitants[2,4].

Thus, considering the magnitude of TB in the region and the important role of CHAs in local disease control activities, a KAP study to identify problems and obtain information that helps with the planning and evaluation of disease control actions in municipalities with high disease burden is timely. This study aims to analyse the KAP of CHAs regarding pulmonary TB in Recife.

Methods

A cross-sectional study was carried out with a representative sample of CHAs who worked in the Family Health Units (FHUs) of the city of Recife, Brazil, between May and July 2016.

Recife has an estimated population of 1,600 inhabitants[14] and is divided into eight administrative regions, which correspond to the territorial areas of the health districts (HD). The municipal TB control programme, in accordance with the PNCT, aims to decentralize control actions in the basic health care system, specifically the ESF

and PACS[13]. Thus, basic health units are the user's gateway to the health system and are responsible, when necessary, for the treatment and referral of TB cases for more complex health services. In 2016, the municipality had 126 FHUs where 269 ESF teams worked, of which 1,509 members were CHAs[13].

The sample size was calculated based on the following parameters: an expected frequency of the event (satisfactory knowledge) of 50%, a sampling error of 5%, a confidence interval of 95% and a percentage of losses of 30%, generating a sample size of 390. Cluster and probability sampling were conducted, that is, the number selected was proportional to the number of CHAs in each HD[15]. The ESF were randomly drawn in each HD, and all CHAs that were active on the teams were included in the study.

The data were collected at the FHUs by a trained team using semi-structured and standardized questionnaires that were administered after the CHAs were informed about the study objectives and read and signed the informed consent form.

The data collection instrument was based on the WHO Guide for KAP studies of TB[10] and the TB booklet for CHAs published by the MS[16], and the instrument contained four information blocks: (1) demographics and work; (2) knowledge; (3) attitudes and (4) practices concerning pulmonary TB. This instrument was previously evaluated by experts and tested in a pilot study with 20 CHAs that were not included in the sample to ensure the adequacy of the questions, to ensure that they were properly understood and to make any necessary adjustments.

The demographics and work information block requested information on gender, age, level of education, time on the job, number of families for which they are responsible, work satisfaction, the HD where they worked and previous training (TB training, time since the last training in years, number of trainings, type of courses completed in the last five years).

To minimize information bias, questions about knowledge and attitudes, 30 in total, were self-reported, while those pertaining to practices, 10 in total, were obtained through the interviews.

KAP questions addressed different dimensions of TB knowledge (local epidemiological situation, definition of disease, transmission, symptoms suggestive of TB and TB contact investigation as well as questions on prevention, differentiation between infection and disease, laboratory tests, BCG vaccination, treatment, including directly observed therapy (DOT), and behaviours related to treatment dropout). The multiple-choice questions had only one correct answer, and only thirteen were scored, since two of them were not related to knowledge of TB. Correct answers were assigned scores ranging from 1 to 2, depending on the relevance of the subject. The maximum score, corresponding to 100% of hits, was 18. Considering the average of hits among CHAs, a scores ≥ 15 (83.3%) was considered satisfactory knowledge.

The five questions about attitudes were self-reported, not scored, and referred to the feelings and impressions of the CHA about TB and of how the patient was treated in the community.

The block of practices-related questions comprised 10 multiple-choice questions that addressed information about CHAs' actions regarding the detection of new TB cases and contacts, referral and treatment of cases, DOT and education about the disease. Of these questions, five were assigned scores of two. The maximum score, corresponding to 100% correct answers, was 10. Four or more correct answers or scores ≥ 8 (80%), the average number of hits, was classified as appropriate practice.

Data analysis

A descriptive analysis of the demographics, work characteristics, and KAP of the CHAs was carried out. The associations between satisfactory knowledge and appropriate practices with individual characteristics of CHAs were analysed using Pearson's Chi-squared test with a significance level of 5%. EPI INFO software, version 7, was used for data entry and analysis.

Ethical considerations

The project was submitted to and approved by the Research Ethics Committee of the Aggeu Magalhães Research Centre, Fiocruz.

Results

Of the 401 eligible CHAs, 385 (96%) were interviewed, and 16 (4%) refused to participate (n=4) or were absent at the time of the interview (n = 12). The majority of CHAs were female (87.5%), over 40 years of age and had completed secondary (67.8%) or higher education (16.3%) (Table 1). Regarding work characteristics, more than 70% of the CHAs had 10 or more years on the

Table 1. Demographics and work characterization of CHAs. Recife, Pernambuco, 2016.

Demographic characteristics of CHAs (n=385)	Number (%)
Sex	
Female	337 (87.5)
Male	48 (12.5)
Age group (years)	
18-29	25 (6.5)
30-39	106 (27.6)
40-49	133 (34.6)
> 50	121 (31.4)
Level of education*	
Primary	6 (1.5)
Incomplete secondary	7 (1.8)
Complete secondary	261 (67.8)
Incomplete higher	48 (12.5)
Complete higher	63 (16.3)
Time on the job (years)*	
0-9	97 (25.5)
10-19	189 (49.6)
> 20	95 (24.9)
Number of families*	
Up to 150	63 (16.3)
151-200	202 (52.5)
> 201	99 (25.2)
Satisfaction with work*	
Dissatisfied	47 (12.1)
Satisfied	289 (75.0)
Very satisfied	47 (12.2)
Are there are cases of TB being treated in your area	
Yes	125 (32.5)
No	260 (67.5)
Number of TB cases in your area	
1-2	116 (93.0)
3-4	6 (4.8)
> 5	3 (2.4)

*Small variation in the number of records due to missing information.

job, the majority of CHAs were responsible for more than 150 families (77.7%), and most reported being satisfied with their work (75.0%). Approximately 30% of CHAs reported cases of TB in their area of operation. Regarding TB training, 159 (44.7%) reported having completed at least one training in the last two years. When asked about their sources of TB information, 210 (54.8%) reported having received information from their work colleagues and 175 (45.7%) from leaflets, the internet, radio or TV (data not shown in the table).

Among the participants, 292 (61.4%) had satisfactory knowledge of pulmonary TB, which was not statistically associated with gender, age, level of education, time on the job, previous training in TB or area of operation (HD) (Table 2).

Regarding attitudes, 374 (97.1%) reported being at risk of contracting TB, 174 (46.3%) of whom attributed this risk to their job, and a high proportion (46.5%) reported concern about contracting the disease. Regarding their feelings about TB, the majority (66.2%) reported compassion or desire to help the patient, while 30% reported the absence of any feeling. Regarding the CHAs' perceptions of the behaviours of the community towards patients with TB, approximately 70% stated that they were friendly and showed support (data not shown in the table).

A total of 292 (75.8%) CHAs engaged in appropriate practices, that is, those recommended by the PNCT, which was statistically associated with satisfactory knowledge about TB ($p = 0.008$) (Table 3). The majority of CHAs reported actively searching for respiratory symptoms among patients (e.g., a cough lasting more than three weeks) in their area of operation and referring patients for further investigation at the FHUs. A small proportion (13.8%) reported requiring sputum smear tests to confirm diagnosis (Table 4).

Among the CHAs that reported TB cases in their area, all reported DOT with a frequency of 1 to 2 (48%) or 3 to 5 visits per week (52%). Approximately 80% of CHAs reported providing guidance on TB prevention for contacts, and 60% reported advising patients about the treatment regimen (Table 4). A small proportion (20.5%) frequently provided education about TB (Table 4).

Discussion

TB has affected mankind from ancient times to the present day and is a leading cause of death from infectious disease in developing countries[1]. The WHO Stop TB Strategy aims to control the global epidemic and proposes actions such as increasing the detection of new cases, combating stigma around the disease and, above all, providing greater access to early diagnosis and treatment[17]. In this context, the CHA assumes an important role in view of their responsibilities in the PNCT.

Table 2. Satisfactory knowledge of pulmonary TB among CHAs according to demographic characteristics, time on the job, previous training and health district. Recife, Pernambuco, 2016.

Characteristics	Knowledge of TB		Total	p value*
	Satisfactory	Unsatisfactory		
	N (%)	N (%)		
Sex				0.987
Female	208 (61.7)	129 (38.3)	337	
Male	29 (60.4)	19 (39.6)	48	
Age (years)			0.235	0.235
18-29	15 (60.0)	10 (40.0)	25	
30-39	74 (69.8)	32 (30.2)	106	
40-49	77 (57.9)	56 (42.1)	133	
> 50	71 (58.7)	50 (41.3)	121	
Education level				0.786
Incomplete/complete secondary	107 (39.1)	167 (60.3)	274	
Incomplete/complete higher	41 (36.9)	70 (63.1)	111	
Service tenure (in years)			0.340	0.340
0-9	57 (58.8)	40 (41.2)	97	
10-19	124 (65.5)	65 (34.4)	189	
> 20	55 (57.9)	40 (42.1)	95	
TB training			0.441	0.441
Yes	221 (62.3)	134 (37.7)	355	
No	16 (53.3)	14 (46.7)	30	
Health district			0.826	0.826
I	17 (60.7)	11 (39.3)	28	
II	42 (61.8)	26 (38.2)	68	
III	7 (77.8)	2 (22.2)	9	
IV	37 (66.1)	19 (33.9)	56	
V	28 (58.3)	20 (41.7)	48	
VI	18 (52.9)	16 (47.1)	34	
VII	34 (57.6)	25 (42.4)	59	
VIII	54 (65.1)	29 (34.9)	83	
Total	237 (61.4)	148 (38.6)	385	

*Pearson chi-square.

This study showed that the level of education of most CHAs was high and that approximately 60% had satisfactory knowledge about pulmonary TB, with no correlation between this knowledge and the level of education, time on the job or previous training. Similar levels of TB knowledge were found in Ethiopia, an African country, where it was observed that 60% of CHAs had satisfactory levels of knowledge[18,19]. In the Brazilian cities of Vitória, Espírito Santo state[20], and Belo Horizonte, Minas Gerais state[21], approximately 60% and 80% of CHAs, respectively, had satisfactory knowledge about the disease. However, it is important to note that a considerable proportion of the CHAs studied (38.3%) showed low levels of knowledge about the disease, a fact that may negatively affect the quality of their practices, such as delays in or difficulty with identifying suspected cases, inappropriate management during follow-up with patients under treatment, which may contribute to the poor programme indicators observed in Recife.

Regarding the association between knowledge about TB and specific training on the subject, our results differ from the data reported in other KAP studies conducted in Brazil[21] and in Africa[19,22], which observed a strong relationship between them. However, it is worth mentioning

Table 3. Associations between appropriate practices concerning pulmonary TB among CHAs and knowledge about TB, education level, time on the job, training on the disease and time since the last training. Recife, Pernambuco, 2016.

Characteristics	Practices concerning TB		Total	p value *
	Appropriate	Inappropriate		
	N (%)	N (%)		
Knowledge				0.008
Satisfactory	190 (65.1)	102 (34.9)	292	
Unsatisfactory	47 (50.5)	46 (49.5)	93	
Education level				0.640
Elementary/incomplete Secondary	11 (84.6)	2 (15.4)	13	
Complete secondary	195 (74.7)	66 (25.3)	261	
Complete/incomplete higher	86 (95.5)	25 (4.5)	111	
Time on the job (years)			0.731	0.731
0-9	69 (71.1)	28 (28.9)	97	
10-19	145 (76.8)	44 (23.3)	189	
> 20	74 (78.8)	20 (21.2)	94	
TB training			0.281	0.281
Yes	271 (76.3)	84 (23.7)	355	
No	21 (70)	9 (30)	30	
Time since training (years)			0.342	0.342
<2	147 (78.6)	40 (21.4)	187	
2 to 4	60 (70.5)	25 (29.5)	85	
> 4	61 (74.4)	21 (25.6)	82	

*Pearson chi-square.

that these results are not fully comparable due to differences in study design, participants' profiles and the level of difficulty of the questions.

Consistent with other studies conducted in Brazil[21,23,24], it was observed that time on the job for most CHAs was over 10 years, indicating the considerable experience of the professionals studied. This result was interpreted as satisfactory considering that a prolonged time on the job helps strengthen the bonds between the CHAs and the families they serve and promotes community respect for these professionals.

The majority (more than 70%) of CHAs reported being responsible for more families than the number recommended by the MS, which is up to 150 families or 750 people[25]. This factor admittedly compromises the quality of the actions provided by these professionals due to the number of activities and care demanded by an excessive number of residents with different needs[26]. Therefore, this problem can also affect the quality of the actions developed by the PNCT. However, despite this likely work overload, the majority of CHAs stated that they were satisfied with the work they performed.

In regard to attitudes, a significant portion of CHAs believed that they were at risk of contracting TB, and they attributed this risk to their jobs. At the same time, a considerable proportion (46.5%) reported concern about contracting the disease. These results point to the occupational risks inherent in CHA activities and the greater risk of contracting TB and other communicable diseases compared to the general population, as observed in other studies[27,28].

Regarding practices, most CHAs engaged in appropriate practices, which in turn, were associated with appropriate knowledge about TB. These results confirm data from studies conducted internationally[18,19,22,29] and in Brazil[20,21] and strengthen the evidence that a higher level of knowledge about the disease improves the quality of the practices of these professionals.

Also regarding practices, the majority reported that they screened for respiratory symptoms during home visits and referred suspected cases to the FHUs, as recommended by the MS[7,11]. However, only a small proportion reported requesting sputum smear tests and providing guidelines on sputum collection to patients with respiratory

Table 4. Frequency of practices concerning pulmonary TB among CHAs. Recife, Pernambuco, 2016.

Practices (n=385)	No. (%)
Search for suspected TB cases	
Cough lasting more than 3 weeks	345 (89.6)
Fever/sweating	29 (7.5)
Weight loss/diarrhoea	11 (2.8)
Actions when a case is suspected	
Refer to FHU urgently	320 (83.1)
Request smear microscopy	53 (13.8)
Communicate with the nurse	12 (3.2)
Type of follow-up*	
FHU visits	121 (96.8)
Unit outside neighbourhood/ reference hospital	4 (3.2)
Performs DOT	
Yes	125 (100.0)
No	0 (0)
How often is DOT performed	
1 or 2 times/week	60 (48.0)
3 to 5 times/week	65 (52.0)
Actions regarding contacts	
Provides guidance and refers to FHU	103 (82.4)
Refers for further tests	17 (13.6)
Does not know	5 (4.0)
Guidance for TB patients and contacts **	
How to take medication	256 (66.5)
Diet	229 (59.5)
Preventive measures for family contacts	173 (44.9)
Duration of treatment	120 (31.2)
Stopping drinking or smoking	147 (38.2)
Airing and cleaning house/personal hygiene	87 (22.6)
Signs and symptoms requiring follow-up at FHU	35 (9.1)
Separate utensils	34 (8.8)
Sputum collection	30 (7.8)
Side effects of treatment	23 (5.9)
Carries out educational activities on TB	
Sometimes	221 (57.4)
Never	85 (22.1)
Always	79 (20.5)
Last educational activity you did on TB ***	
≤ 3 months	106 (35.3)
> 4 months to < 2 years	159 (53.0)
> 2 years	32 (10.7)

symptoms, suggesting knowledge gaps on the part of these professionals or problems related to the structure or organization of the programme at the local level. Studies have shown that CHAs need to be prepared for and aware of the need to screen individuals with productive coughs lasting more than three weeks, aiming for early diagnosis and treatment[30,31]. This measure helps reduce the risk of infection and illness in the community, improving the prognosis of patients[7]. In priority municipalities, the incorporation of this practice into routine home visits by CHAs, the provision of the necessary supplies for sputum collection, continuous training and appropriate municipal supervision are necessary measures to reduce the risk of transmission to those exposed to TB.

One-half of CHAs that monitored TB cases reported DOT at a frequency of three to five visits per week, as recommended by the PNCT. However, when surveying 2016 data from the PNCD provided by the municipal health department, it was found that the proportion of new cases receiving DOT was less than 50%. National and international studies demonstrated greater treatment success when performed by DOT, with higher cure rates and earlier negative sputum smear test results[32,33]. Thus, it is advisable to stimulate and provide the conditions for CHAs and patients to perform DOT in all cases of pulmonary TB in the municipality. The adoption of such a measure could help greatly reduce TB incidence, dropout and mortality rates in the municipality. It would be also important the provision of continuing education as well as the supervision of CHAs by trained and sensitized professionals about the value of DOT.

More than 80% of the CHAs reported that they screen for exposure, provide guidance and refer patients to the FHUs. This activity is very important considering the risk of becoming ill following exposure to TB in addition to being potential sources of infection and maintaining the chain of transmission of the disease in the community[34]. Thus, contact surveillance actions need to be given special attention by municipal programme managers in order to stimulate the health teams and provide the necessary conditions for the systematic performance of this activity.

Most CHAs reported providing occasional or no educational activities on pulmonary TB in the community. Data on this practice among these professionals are scarce in the literature. In their study of CHAs in Ribeirão Preto (state of São Paulo), Scatolin et al.[31] identified weaknesses in the performance of health education activities

by CHAs in the community. The data show that educational activities need to be implemented in the daily routines of CHAs, who therefore need appropriate training and supervision, as well as an adequate infrastructure for such activities.

This study has limitations, particularly potential information bias, since data collection did not include observation of practices in the field or attitudes of CHAs in their areas of operation. It should be noted, however, that the questions related to knowledge and attitudes were self-reported, while those related to practices were obtained through interviews. This strategy, in addition to preventing discomfort among the CHAs, may have reduced the odds of information bias. In addition, the low percentage of losses and the high degree of CHA participation in the study certainly helped minimize the potential biases of the study. Thus, we conclude that the results obtained are likely to reflect the profile of the reference population.

Finally, the study showed that a considerable proportion of CHAs had unsatisfactory levels of knowledge about TB. Considering the relationship between knowledge and good practices concerning TB, which was confirmed by the results of this study, this problem may be contributing to the unfavourable performance indicators of the programme in this municipality. Thus, actions aimed at improving the management of the programme at the municipal level, with an emphasis on training, continuing education and programme supervision at the primary care level, are essential for the improvement of performance indicators.

In addition, it is important to help CHA teams perform sputum smear microscopy among patients with respiratory symptoms and to provide effective supervision of the actions and results of the health teams. It is also necessary to improve management mechanisms aiming at increasing DOT, screening infection among contacts, and routine community-targeted educational activities.

The results of this study possibly reflect the reality of other municipalities in the northeastern region of Brazil and therefore may help managers improve policies and actions aimed at the work of CHA in the screening, treatment and cure of pulmonary TB cases at the local level.

Colaborations

LMS Gaspar worked on study design, data collection and analysis, interpretation of results and writing of the manuscript. C Braga, MFPM Albuquerque, UR Montarroyos and M Maruza worked on study design, data analysis and interpretation, and manuscript writing. GDM Albuquerque and MPN Silva worked on fieldwork and manuscript writing.

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