Original Article

The Community Health Agent in the control of tuberculosis in Primary Health Care*

Agente Comunitário de Saúde no controle da tuberculose na Atenção Primária à Saúde

Agente Comunitario de Salud en el control de la tuberculosis en la Atención Primaria a la Salud

Juliane de Almeida Crispim[1], Beatriz Estuque Scatolin[2], Laís Mara Caetano da Silva[3], Ione Carvalho Pinto[4], Pedro Fredemir Palha[5], Ricardo Alexandre Arcêncio[6]

ABSTRACT

Objective: To evaluate the performance of the Community Health Agent (CHA) in the control of tuberculosis (TB) in areas served by the Family Health Strategy (FHS), which established a comparative analysis with the CHAs enrolled in the traditional Basic Health Units (BHU) . **Methods:** A cross-sectional study in a priority municipality for TB control in the state of São Paulo, with a minimum sample of 108 CHAs of FHSs and the BHUs. For the collection of data, we used an instrument developed for Primary Health Care (PHC), adapted for TB care. **Results:** With regard to the actions of TB control, it was observed that there were no statistically significant differences between the performance of CHAs, the units of the FHS, and those enrolled in the BHUs. **Conclusion:** The study highlighted the fragility of CHAs to incorporate into their practice actions to control TB in the distinct modalities of PHC, despite the prominence given to the FHS.

Keywords: Community health workers; Tuberculosis/prevention & control; Primary health care

RESUMO

Objetivo: Avaliar o desempenho do Agente Comunitário de Saúde (ACS) no controle da tuberculose (TB) em áreas assistidas pela Estratégia Saúde da Família (ESF), sendo estabelecida uma análise comparativa com os ACSs inscritos nas Unidades Básicas de Saúde (UBS) tradicionais. **Métodos:** Estudo transversal, realizado em um município prioritário para o controle da TB no Estado de São Paulo, com uma amostra mínima de 108 ACSs das ESFs e das UBSs. Para a coleta de dados, utilizou-se um instrumento elaborado para a Atenção Primária à Saúde (APS), adaptado para atenção à TB. **Resultados:** No que concerne às ações de controle da TB, observou-se que não houve diferenças com significância estatística entre o desempenho dos ACSs das unidades da ESF e os inscritos nas UBSs. **Conclusão:** O estudo evidenciou a fragilidade dos ACSs em incorporar na sua prática as ações de controle da TB nas distintas modalidades de APS, apesar do destaque dado à ESF.

Descritores: Agentes comunitários de saúde; Tuberculose/prevenção & controle; Atenção primária à saúde

RESUMEN

Objetivo: Evaluar el desempeño del Agente Comunitario de Salud (ACS) en el control de la tuberculosis (TB) en áreas asistidas por la Estrategia Salud de la Familia (ESF), siendo establecido un análisis comparativo con los ACSs inscritos en las Unidades Básicas de Salud (UBS) tradicionales. **Métodos:** Estudio transversal, realizado en un municipio prioritario para el control de la TB en el Estado de Sao Paulo, con una muestra mínima de 108 ACSs de las ESFs y de las UBSs. Para la recolección de los datos se utilizó un instrumento elaborado para la Atención Primaria a la Salud (APS), adaptado para la atención a la TB. **Resultados:** En lo que concierne a las acciones de control de la TB, se observó que no hubo diferencias con significancia estadística entre el desempeño de los ACSs de las unidades de la ESF y los inscritos en las UBSs. **Conclusión:** En el estudio se evidenció la fragilidad de los ACSs para incorporar en su práctica acciones de control de la TB en las distintas modalidades de APS, a pesar de la importancia dada a la ESF.

Descriptores: Agentes comunitarios de salud; Tuberculosis/prevención & control; Atención primaria de salud

** Research developed in Ribeirão Preto, SP, as a sub-project of the research entitled: Effectiveness of Community Health Agents' actions in tuberculosis control in two Primary Health Care modes in Ribeirão Preto, SP, Regular Project FAPESP, Process 2009/17666-6.*

[1] Master's student, Graduate Program in Nursing and Public Health, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

[2] Master's student, Graduate Program in Nursing and Public Health, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

[3] Ph.D. candidate, Graduate Program in Nursing and Public Health, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

[4] Associate Professor, Maternal-Infant and Public Health Nursing Department, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

[5] Associate Professor, Maternal-Infant and Public Health Nursing Department, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

[6] Ph.D., Professor, Maternal-Infant and Public Health Nursing Department, University of São Paulo at Ribeirão Preto College of Nursing – USP – Ribeirão Preto (SP), Brazil.

Corresponding Author: **Juliane de Almeida Crispim**
Av. Bandeirantes, 3900 – Monte Alegre – Ribeirão Preto, SP
CEP 14049-902
E-mail julianecrisp@gmail.com

Received article **03/08/2011** and accepted **08/04/2012**

INTRODUCTION

For many decades, tuberculosis (TB) has affected humanity. Until the mid-19th century, the infectious and contagious nature of the disease had not been recognized. Instead, it was associated with different causes, including hereditariness, miasmas and other environmental and social determinants. After the discovery of the *Micobacterium tuberculosis*, in 1882, TB was defined as an infectious disease, starting the search for vaccines and medication treatments, which resulted in renewed possibilities[1].

Although potentially preventable and curable, until today, TB is considered a severe public health problem in developing countries. Associated with poverty and social inequity, in most cases, the disease affect young adults in the economically active age range[2]. It should be highlighted that these people are confronted with considerable obstacles to get access to health services, delaying the diagnosis, which in turn entails new TB cases in the community[3].

Among the 22 countries responsible for 80% of the global disease burden, Brazil ranks 19th, with an incidence rate of 38 cases per 100,000 inhabitants in 2009. The country also registers about 80 thousand new cases and 4.6 thousand deaths per year, due to co-infection with HIV/AIDS, besides other determinants[2]. This context calls for urgent coping measures, in view of new work guidelines, in which health authorities have underlined the decentralization of TB control actions to Primary Health Care (PHC), so as to further access to diagnosis and treatment services across the Brazilian territory[4].

In that sense, the Family Health Strategy (FHS) has turned into a priority on the TB control policy agenda[5], and the extended coverage seems to follow national trends. The FHS follows the logic of outlining the coverage area, enrolling users and prioritizing risk areas. Its practices involve users and their family in the territory which, in theory, permit the early diagnosis of the disease[6].

An important part of the cities, however, have a history of health service delivery that takes the form of accumulated experiences in traditional Primary Health Care Units (PHCUs), which together with the FHS serve as the entry door for TB respiratory symptomatics in the Unified Health System (SUS). In traditional PHCU, both spontaneous and scheduled demands are attended, and clients are not enrolled like in the FHS[7].

In these modes, the Community Health Agents (CHAs) stand out, as subject who emerge from the community, take part in health teams and are acknowledged for their ability to establish links between the community and health services[8-10]. Based on this conception, and considering that the FHS aims to take disease prevention and control actions closer to users and their families, the authors consider the premise that the CHAs, allocated to FHS units, will perform better in TB control than agents working at PHCUs.

In national disease control proposals, generically and without distinguishing between PHC modes, CHAs are expected to be capable of identifying, through home visits, individuals who cough for three weeks or more, and forwarding them to health services to investigate the disease. The CHAs are also responsible for providing orientations about the disease to families and communities, as well as monitor patients during Directly Observed Therapy[5,11].

No international studies were found that compared CHAs' activities in these two PHC modalities, possibly because these differences are peculiar to the Brazilian health system. Also, international literature reveals few studies that investigate its performance in TB control. This kind of research would permit important findings, showing that CHAs were particularly allocated to remote areas, where health services had no adequate resources. The highest levels of CHA incorporation into health systems are found in African and Asian countries. Studies have also revealed these actors' activities broadened the population's access to health services, as well as the acceptability of and adherence to TB treatment, resulting in increased cure rates[12-15].

Brazilian studies, in turn, have revealed that CHAs' knowledge about TB was incipient, and that there TB control actions were punctual, isolated and incongruent[16,17].

In view of the above, the aim in this study was to assess CHAs' performance in TB control in areas attended by the FHS, in comparison with the CHAs active at traditional PHCUs. The importance of this research is due to the fact this it is unedited and original. Its results can support current health policies, thus contributing to managers, researchers and the civil society in the definition of TB control strategies and disclosing the potential of PHC to achieve this proposal.

METHODS

A quantitative and cross-sectional study was developed in Ribeirão Preto, considered a priority city for TB control in São Paulo State.

At the time of data collection, the estimated population in the city was 563,107 inhabitants. According to the most recent census by the Brazilian Institute of Geography and Statistics, the illiteracy rate in Ribeirão Preto was about 14.45, life expectancy at birth 74.4 years, human development index 0.85 and social

exclusion index approximately 0.67. The municipal health network structure displayed 47 primary health care services, distributed across five health districts, and the population coverage of the FHS corresponded to 13%, while the total population coverage rate of the Community Health Agent teams equaled 35%. During this period, 202 cases of the disease were registered, with an incidence rate of 35.87 cases per 100,000 inhabitants[18].

The reference population comprised the universe of CHAs active at FHSs and traditional PHCUs, after a survey in the National Register of Health Facilities, totaling 333 CHAs. Then, the number of CHAs per Health District and PHC mode was obtained from this database, revealing 79 CHAs in the FHS and 254 in the PHCUs. A confidence level of 95% and 5% sampling error were considered. The following formula was considered to calculate the sample[19]:

$$n = \frac{S^2 / D}{1 + \frac{S^2 / D}{N}} \quad D = \frac{B^2}{Z_\alpha^2}$$

n = sample size and N = population size = 333

With an expected non-response rate of approximately 20%, a minimum sample of 108 CHAs was calculated. Next, this sample was stratified proportionately, corresponding to 39 CHAs from the FHSs, distributed across health facilities in the North: 10 professionals; East: 11 professionals; and West: 18 professionals. No FHSs are present in the South and Central regions of the city. Sixty-nine CHAs were active at the PHCUs, distributed across facilities in the North: 21 professionals; South: six: East: seven; West: 32 and Central: three, according to data displayed in Figure 1.

Data were collected in January 2010, using a validated instrument for PHC service performance assessment in Brazil[20], which was adapted for TB care assessment[21]. Participants were informed about the research objectives and then read and signed the Informed Consent Term. Concerning the questionnaires, the researchers instructed the CHAs on the contents of the instrument and response pattern, which included dichotomous, polytomous and Likert-scale variables. For the latter, a five-point (1-5) response pattern was used, in which the interviewees indicated their level of agreement or disagreement with the event under analysis. High scores indicated agreement, while low scores revealed disagreement. The advantages of using this scale are related to the easy construction of items and response range, which permitted collected more precise information on each assertion.

The data were analyzed in Statsoft Statistica software, version 9.0, calculating position (means and confidence intervals) *and dispersion* measures. The F-test was also used to compare the actions the CHAs developed at the FHSs and traditional PHCUs. Results were considered significant when the probability of type I error <5% and ($p < 0.05$). The F-test was applied when the variables attended to the premises of independence, homoscedasticity and normality. Levene's test verified the equality of variance premise.

The project received authorization from the Municipal Health Secretary in Ribeirão Preto, SP, and approval from the Research Ethics Committee at the University of São Paulo at Ribeirão Preto College of Nursing, under Protocol 0984/2008.

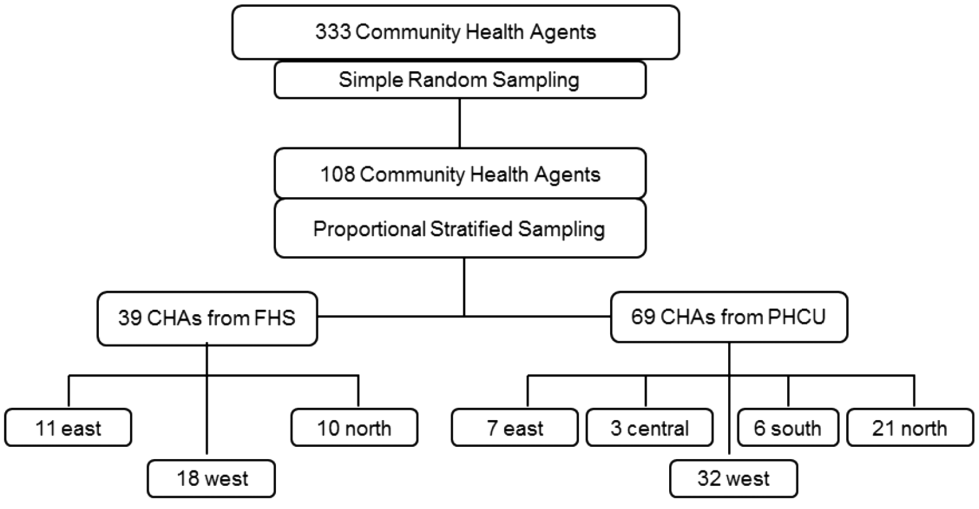

Figure 1. Schematic synthesis of research sampling plan, Ribeirão Preto, SP

RESULTS

Data on the study participants' sociodemographic characteristics are presented in Table 1.

Table 1 – Sociodemographic characteristics of Community Health Agents, according to Primary Health Care mode, Ribeirão Preto, SP

Sociodemographic characteristics of Community Health Agents	FHS	PHCU	Total
	n (%)	n (%)	n (%)
Gender			
Female	39 (36.0)	68 (63.0)	107 (99.0)
Male	0 (0.0)	01 (1.0)	01 (1.0)
Education			
Primary	07 (6.5)	11 (10.2)	18 (16.7)
Secondary	26 (24.0)	47 (43.6)	73 (67.6)
Technical	06 (5.5)	11 (10.2)	17 (15.7)
Professional experience			
≤12 months	02 (1.8)	04 (3.7)	06 (5.5)
13-60 months	19 (17.5)	15 (13.9)	34 (31.4)
61-120 months	18 (16.6)	50 (46.4)	68 (63)
Opinion on remuneration			
Very bad	14 (12.9)	10 (9.3)	24 (22.2)
Bad	07 (6.4)	23 (21.3)	30 (27.7)
Regular	13 (12)	25 (23.1)	38 (35.1)
Good	05 (4.6)	10 (9.3)	15 (13.9)
Very Good	0 (0.0)	01 (1.0)	01 (1.0)
Working at this place is			
Very bad	0 (0.0)	07 (6.5)	07 (6.5)
Bad	0 (0.0)	03 (2.8)	03 (2.8)
Regular	03 (2.7)	07 (6.5)	10 (9.2)
Good	19 (17.5)	43 (39.9)	62 (57.4)
Very Good	17 (15.6)	09 (8.4)	26 (24.0)
Total	39 (36.0)	69 (64.0)	108 (100)

Source: Authors' calculations

With regard to gender distribution in the FHS and traditional PHCU modes, data in the table reveal a predominance of female health workers. Concerning education, most CHAs finished secondary education, and a representative part of the CHAs at the FHSs have less professional experience in the PHC network when compared with CHAs at the traditional PHCUs.

When considering TB control actions the CHAs develop in their work context (Table 2), the identification of respiratory symptomatics by CHAs during home visits still only happens sporadically in both PHC modes ($\overline{\chi}$ = 3.82 at FHSs and $\overline{\chi}$ = 3.91 at traditional PHCUs). Average communicant control based on confirmed TB cases is lower at the FHSs ($\overline{\chi}$ = 3.57) when compared with the traditional PHCUs ($\overline{\chi}$ = 4.03), but this difference is not statistically significant.

The inclusion of community partners or mobilization of social equipment to search for respiratory symptomatics, as well as orientations about TB in the community, are actions that reflect an incipient practice, showing that these actions "never" or "hardly ever" take place, especially in the context of the FHSs.

According to data in Table 3, no difference is found in the CHAs' referred preparation to perform disease control actions between the care modes under analysis. Nevertheless, CHAs at the FHSs feel less prepared to identify TB suspects (FHS, $\overline{\chi}$ = 3.77 *versus* PHCU, $\overline{\chi}$ = 3.91) and to give directions on sputum collection (FHS, $\overline{\chi}$ = 3.51 *versus* PHCU, $\overline{\chi}$ = 3.88).

When considering the number of TB cases the CHAs have monitored since the start of their work in different PHC mode, the median is zero at the FHSs and one at the PHCUs, a statistically significant difference based on the F-test (p = 0.04).

Table 2 – Tuberculosis control actions by Community Health Agents according to Primary Health Care modality, Ribeirão Preto, SP

TB control actions by Community Health Agents	Primary Health Care Modes						
	FHS			PCHU			
	n	$\overline{\chi}$ *(95%CI)*	SD	n	$\overline{\chi}$ *(95%CI)*	SD	F-test P-value
Identification of respiratory symptomatics (RS) during home visits	39	3.82 (3.46 – 4.18)	±1.09	69	3.91 (3.62 – 4.20)	±1.20	ns
Identification of tuberculosis RS in the community and in health services	39	2.90 (2.61 – 3.18)	±0.88	69	3.07 (2.82 – 3.32)	±1.04	ns
Investigation of RS based on confirmed TB cases in the community	30#	3.57 (2.95 – 4.18)	±1.65	65#	4.03 (3.68 – 4.38)	±1.41	ns
Partnership with community to search for respiratory symptomatics	39	1.82 (1.41 – 2.23)	±1.27	69	1.98 (1.65 – 2.31)	±1.37	ns
Discussion with the community about TB	39	1.41 (1.09 – 1.73)	±1.16	69	1.61 (1.35 – 1.86)	±1.31	ns

Considering only CHAS who indicated that this action applies to their work context.
ns: not significant
Source: Authors' calculations

Table 3 – Preparation for tuberculosis control actions referred by Community Health Agents according to Primary Health Care mode, Ribeirão Preto, SP.

Preparation referred by Community Health Agents	Primary Health Care Modes						
	FHS			PHCU			
	n	$\bar{\chi}$ *(95%CI)*	SD	n	$\bar{\chi}$ *(95%CI)*	SD	F-test p-value
Preparation to identify TB suspects	39	3.77 (3.32 – 4.22)	±1.38	69	3.91 (3.60 – 4.22)	±1.29	ns
Preparation to give directions on TB	39	4.33 (3.99 – 4.68)	±1.05	69	4.35 (4.08 – 4.61)	±1.10	ns
Preparation to give directions on sputum collection	39	3.51 (2.98 – 4.05)	±1.65	69	3.88 (3.55 – 4.22)	±1.40	ns

ns: not significant

DISCUSSION

This study presented an approach to the assessment of CHAs' performance in TB control, through a comparative analysis between PHC modalities. The results demonstrated that there are no statistically significant differences between these actors' performance with regard to disease control actions, thus rejecting the initial research premise. One finding refers to the difference in the number of TB cases the CHAs monitor, in which agents affiliated with FHSs followed less TB cases in comparison with traditional PHCUs.

The analysis of the obtained results reveals the CHAs weakness to incorporate TB control into their practice. These findings are important for health policies, as they arouse relevant debates on the decentralization of disease control actions in the city where the research was carried out. Despite acknowledging that the study design requires some moderation and, hence, further research with other approaches and foci, the research presents reflections on the mission attributed to the FHS, which is to take the forefront in a new project considered for health.

In fact, the results found can be associated with the FHSs' incipient coverage in the city, a situation that would be considered as "FHS without FHS"[22]. In addition, the historical nature of the research context should be mentioned, comprising experiences with traditional PHCUs[7,23], whose care logic is based on spontaneous demand and scheduled appointments, without any expression of external activities and lack of partnership with the community, which does not favor TB control.

Hence, the rupture with this logic would demand a robust permanent investment plan in human resource training and qualification, the introduction of logistic and support systems, so as to allow the FHS to establish itself as the coordination axis of PHC[24].

Concerning the CHAs, some studies evidence these actors' inability to identify and manage respiratory symptomatics and the distortion of information on disease symptoms and treatment[16,17]. The findings demand reflection on changes in the health context, involving political-institutional and social factors. For the CHAs to perform effectively in TB control, investments are needed in the distinct support bases of the health system, thus permitting a practice that is based on SUS principles.

However, the change from the figure of the team messenger to that of a potential agent who successfully performs TB control actions is a complex process because, besides the personal experiences woven in the community, technical mastery and political competency should be imbricated in CHAs' practice[10].

A study[25] conducted in Capetown (South Africa) demonstrated the advances in disease control after the CHAs were involved in case planning and clinical management, resulting in important improvements in the TB control program when compared with cases that exclusively used primary health care units.

Hence, to achieve success on a large scale, the PHC modes should carefully plan disease control actions, guaranteeing political will and appealing to community support. In the synergy between professionals and users, teams should adopt a new work process, collective action, cooperative work, thus enhancing the chances of progress in TB control[26-28].

It should be highlighted that this research does not permit generalizations for other scenarios, which would require another methodological design. It can offer important contributions in collective health though, concerning TB control planning and management in PHC. As a limitation, it is highlighted that the presented results derive from the reports of one team actors, and hence demand due moderation. With a view to further research, it would be interesting to include other team members, so as to provide a more representative and global map of TB control actions in distinct PHC modes.

In data interpretation, the possibility of a memory bias in cross-sectional studies should be considered. Various factors interfere in the cognitive process of the subjects' information recovery and reminding, such as

age, education level, gender or environment in which the interview took place, so that some data may be under- or overestimated.

Therefore, the need for further research is highlighted, with a view to the systematic monitoring of CHA activities and the development of comparative studies, focusing of PHCUs, involving CHAs or not, so as to discover these actors' interference in the dynamics of the health unit and the quality of its results. The evidence produced in this study can be considered together with other Brazilian studies though[16,17], particularly contributing to understand the TB situation in the context of health services and encouraging the qualification of these professionals' practices and education with a view to TB control from a PHC perspective.

CONCLUSION

This study evidences Community Health Agents' weakness to incorporate TB control actions into their work context, in the distinct modalities of PHC. In the research scenario, the CHAs in the FHS have not effectively reached advances in disease control, despite the acknowledged relevance of this strategy to reduce morbidity and mortality due to TB.

The importance of these social actors is highlighted for the early detection of TB suspects in the community and for the management of disease cases in the PHC sphere. To construct a new practice in response to this demand, however, changes need to be promoted in work processes, sustained by the qualification, valuation and motivation of CHA, in a permanent context of professional education. As for the problems beyond their governability, municipal management is responsible for creating and supporting new institutional health production devices that are more appropriate to the epidemiological and social complexity of TB in the city where the research was developed.

Acknowledgements

To the São Paulo Research Foundation (FAPESP) for funding this research (Process 2.009/17.666-6) and to the researchers of the Epidemiological-Operational Study Group on Tuberculosis (GEOTB).

REFERENCES

1. Rodrigues L, Barreto M, Kramer M, Barata RC. Brazilian response to tuberculosis: context, challenges and perspectives [editorial]. Rev Saúde Pública. 2007; 41 Suppl 1:1-2.
2. World Health Organization. Global tuberculosis control: a short update to the 2009 report 2010. Geneva: WHO; 2010.
3. Machado AC, Steffen RE, Oxlade O, Menzies D, Kritski A, Trajman A. Factors associated with delayed diagnosis of pulmonary tuberculosis in the state of Rio de Janeiro, Brazil. J Bras Pneumol. 2011; 37(4):512-20.
4. Castelo Filho A, Kritski AL, Barreto AW, Lemos AC, Ruffino-Netto A, Guimarães CA, et al. II Consenso Brasileiro de Tuberculose: diretrizes brasileiras para tuberculose 2004. J Bras Pneumol. 2004; 30 (Suppl 1):S2-S56.
5. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de Controle da Tuberculose. Manual de recomendações para o controle da tuberculose no Brasil. Brasília (DF): Ministério da Saúde; 2010.
6. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Política nacional de atenção básica. Brasília (DF): Ministério da Saúde; 2006.
7. Elias PE, Ferreira CW, Alves MCG, Conh A, Kishima V, Junior AE et al. [Primary health care: a comparison of PSF and UBS units per stratum of socially excluded users in the city of São Paulo]. Ciênc Saúde Coletiva. 2006; 11(3):633-41. Portuguese
8. Nogueira RP. [The work of the community healthcare agent: between the technical "universalist" dimension and the social "communitarian" dimension] Interface Comunic Saúde Educ. 2002; 6(10):75-94. Portuguese.
9. Nunes MO, Trad LB, Almeida BA, Homem CR, Melo MC. [Community-based health workers: building the identity of this hybrid, polyphonic character]. Cad Saúde Pública. 2002; 18(6):1639-46. Portuguese.
10. Silva JA, Dalmaso AS. Agente comunitário de saúde: o ser, o saber e o fazer. Rio de Janeiro: Editora Fiocruz; 2002. 240 p.
11. Brasil. Ministério da Saúde. Fundação Nacional de Saúde/ Centro de Referência Professor Hélio Fraga/Sociedade Brasileira de Pneumologia e Tisiologia. Controle da tuberculose: uma proposta de integração ensino-serviço. Brasília (DF): Ministério da Saúde; 2002.
12. Islam A, Wakai S, Ishikawa N, Chowdhury AM, Vaughan JP. Cost-effectiveness of community health workers in tuberculosis control in Bangladesh. Bull World Health Organ. 2002; 80(6):445-50.
13. Kironde S, Kahirimbanyi M. Community participation in primary health care (PHC) programmes: lessons from tuberculosis treatment delivery in South Africa. Afr Health Sci. 2002; 2(1):16-23.
14. Suri A, Gan K, Carpenter S. Voices from the field: perspectives from community health workers on health care delivery in rural KwaZulu-Natal, South Africa. J Infect Dis. 2007; 196 Suppl 3:S505-11.
15. Datiko DG, Lindtjorn B. Health extension workers improve tuberculosis case detection and treatment success in southern Ethiopia: a community randomized trial. PLoS One [Internet]. 2009 [cited 2012 Feb. 10]; 4(5):e5443. Available from: http://www.plosone.ohttp://www.plosone.org/article/journal.pone.0005443
16. Nogueira JA, Rufino-Netto A, Monroe AA, Gonzales RI, Villa TC. Busca ativa de sintomáticos respiratórios no controle da tuberculose na percepção do Agente Comunitário de Saúde. Rev Eletrônica Enferm. 2007; 9(1):106-18.
17. Maciel EL, Vieira RC, Milani EC, Brasil M, Fregona G, Dietze R. Community health workers and tuberculosis control: knowledge and perceptions. Cad Saúde Pública. 2008; 24(6):1377-86.
18. Brasil. Ministério da Saúde. Sala de Situação em Saúde. Dados epidemiológicos da tuberculose no município de Ribeirão Preto [Internet]. 2009 [citado 2011 Jul 16].

Disponível em: http://189.28.128.178/sage
19. Bolfarine H, Bussab WO. Elementos de amostragem. São Paulo: Edgard Blucher; 2005. 274 p.
20. Almeida C, Macinko J. Validação de uma metodologia de avaliação rápida das características organizacionais e do desempenho dos serviços de atenção básica do Sistema Único de Saúde (SUS) em nível local. Brasília: Organização Pan-Americana da Saúde; 2006. (Técnica Desenvolvimento de Sistemas e Serviços de Saúde, 10).
21. Villa TC, Ruffino-Netto A. Performance assessment questionnaire regarding TB control for use in primary health care clinics in Brazil. J Bras Pneumol. 2009; 35(6):610-2.
22. Mendes EV. A atenção primária à saúde no SUS. Fortaleza: Escola de Saúde Pública do Ceará; 2002. 92 p.
23. Machado CV, de Lima LD, Viana LS. Organization of traditional Primary Health Care and the Family Health Program in large cities in Rio de Janeiro State, Brazil. Cad Saúde Pública. 2008; 24 Suppl 1:S42-S57.
24. Bodstein R. [Primary care in the agenda of public health sector in Brazil]. Ciênc Saúde Coletiva. 2002; 7(3):401-12. Portuguese.
25. Dudley L, Azevedo V, Grant R, Schoeman JH, Dikweni L, Maher D. Evaluation of community contribution to tuberculosis control in Cape Town, South Africa. Int J Tuberc Lung Dis. 2003; 7 (9 Suppl 1):S48-55.
26. World Health Organization. Community health workers: what do we know about them? Policy briefs. Geneva: WHO; 2007.
27. Brunello ME, Cerqueira DF, Pinto IC, Arcêncio RA, Gonzales RI, Villa TC, et al. Interaction between patient and health care professionals in the management of tuberculosis. Acta Paul Enferm. 2009; 22(2):176-82.
28. de Souza KM, de Sá LD, Palha PF, Nogueira JA, Villa TC, Figueiredo DA. Tuberculosis treatment drop out and relations of bonding to the family health team. Rev Esc Enferm USP [Internet]. 2011 [cited 2011 Mar 4]; 44(4): 365-72. Available from: http://www.scielo.br/pdf/reeusp/v44n4/07.