INT J TUBERC LUNG DIS 11(5):550–555

Pulmonary tuberculosis in an indigenous community in the mountains of Ecuador

N. C. Romero-Sandoval,*† O. F. Flores-Carrera,‡† H. J. Sánchez-Pérez,§† I. Sánchez-Pérez,† M. M. Mateo†

*** Facultad de Medicina, Pontificia Universidad Católica del Ecuador (PUCE), Quito, Ecuador; † Grups de Reserca d'América I d'África Latines (GRAAL), Facultat de Medicina, Universitat Autonoma de Barcelona, Barcelona, Spain; ‡ Dirección Metropolitana de Salud, Municipio del Distrito Metropolitano de Quito, Quito, Ecuador; § Department of Society, Culture and Health, El Colegio de la Frontera Sur, Chiapas, Mexico**

SUMMARY

SETTING: An aboriginal community of 653 persons.
OBJECTIVE: To determine the prevalence of pulmonary tuberculosis (PTB) and to analyse related factors.
DESIGN: The total population was surveyed; those with chronic productive cough were asked to provide sputum specimens. PTB was diagnosed by bacilloscopy (acid-fast bacilli [AFB]). An analysis of socio-economic factors and clinical history associated with chronic cough or positive smear for PTB was carried out using multiple correspondence analysis and logistic regression models.
RESULTS: Two hundred and two patients were identified with chronic cough and 173 with chronic productive cough. Chronic cough was associated with having a history of PTB (adjusted OR = 4.89, 95%CI 2.6–9.4) and with work-related migratory movements (adjusted OR = 2.05, 95%CI 1.3–3.3). Of 92 coughers with sputum samples analysed, 44 (47.8%) were PTB-positive, giving a prevalence of 6.7% in the whole population. In the groups aged 15–34 and ⩾45 years, women had higher positivity rates than men, whereas in the group aged 35–44 years rates were higher in men. Twenty-seven per cent of families had one to four smear-positive members.
CONCLUSION: The Tuberculosis Control Programme in the area studied needs to be strengthened, taking into account the ethnic context, work-related migration and the socio-economic and geographic context.
KEY WORDS: pulmonary tuberculosis; Ecuador; diagnosis; risk factors; poverty

TUBERCULOSIS (TB) in Latin America is an important public health problem, particularly in indigenous communities.[1–3] However, the prevalence and incidence of TB in these communities may be underestimated due to inadequate detection and treatment, shortcomings in medical practice, lack of reliable information systems[4] and inadequate funding for TB control. As a result, the real magnitude of pulmonary TB (PTB) in indigenous communities is unknown, although there is anecdotal clinical experience that the problem is significant.

According to official statistics, 6.1% of the population in Ecuador is indigenous.[5] However, other statistics estimate this figure to be 45%.[6] Indigenous populations are the poorest in the country, with 91% living in poverty.[5,6] The majority of the population of Cotopaxi province is indigenous.[5] In 2001, the infant mortality rate in Cotopaxi was double the national average,[5] child malnutrition levels were the highest in the country, and rates of reported TB were 101.9 per 100 000 population,[7] compared to a national average of only 43.4/100 000.[8]

In 2001, a schoolteacher of an indigenous community in Cotopaxi ('Chine') was diagnosed with PTB. Initial and further contact tracing revealed that PTB was widespread in this community. It was therefore decided to conduct a study to analyse this situation.

MATERIALS AND METHODS

Study population

Chine is located 250 km from Quito, at an altitude of 3500 m. The 653 inhabitants are mainly Spanish-speaking, and are descended from the Panzaleos and Puruhaes ethnic aboriginal groups.[9] Chine is 2 h walk from the nearest road. Except for electricity, there are no basic services (running water, toilets, etc.). There is one school, a day care/kindergarten, a residence for the elderly and a church. Only 10% of the inhabitants are covered by social security; another 30% use only traditional medicine, while 60% seek formal health services outside the community, mainly in a rural health unit, which provides primary care and is staffed by recently graduated physicians or by a nurse or nurse

Correspondence to: Natalia Romero-Sandoval, Facultad de Medicina, Pontificia Universidad Católica del Ecuador (PUCE), avenida 12 de Octubre 1076, Quito, Pichincha, Ecuador. Tel: (+593) 2 2991521. Fax: (+593) 2 2991523. e-mail: nromeros@puce.edu.ec, natiromeros@yahoo.com
Article submitted 20 February 2006. Final version accepted 11 January 2007.

aide.[10] Secondary health care is available only at a distance of 4 h by public transport.

The main economic activities in Chine are agriculture and the raising of sheep, pigs and smaller animals for private consumption. To supplement their annual income, 30% of economically active men migrate temporarily, generally from April to August, to engage in informal economic activities (brick-laying, ambulant selling, loading, etc.), housed in communal dormitories, and return to Chine for sowing and harvesting, as well as for community festivals.

Field work

In March 2001, in an ongoing study, all the inhabitants of Chine were surveyed by visits to each house and the school, and by attending community meetings. The study protocol was approved by the community and by an ad hoc committee composed of four community leaders, two teachers, two participating doctors and ten traditional medicine providers.

Household characteristics, socio-demographic information, perceived morbidity over the past year and unhealthy (smoking and alcohol) habits among household members were collected using an interviewer-administered standardised questionnaire adapted from other, similar studies.[1,11–14]

PTB was diagnosed on the basis of acid-fast bacilli (AFB) smear. One to three sputum specimens per person were collected in the morning on consecutive days in special sputum collection tubes. These were stored in sealed cardboard boxes at 5°–10°C for 5–7 days until they could be transported to the laboratory for processing.

AFB smear testing was performed in the laboratory of the 'Ally Causai' Hospital, 200 km from Chine. External quality control of smear microscopy was performed by randomly rechecking selected positive and negative smears at the laboratory at Vozandes Hospital in Quito, which participated in the National Tuberculosis Programme (NTP).

All patients were notified of their results. Those who were diagnosed with PTB were given antituberculosis treatment following the guidelines of the NTP of the Ecuadorian Ministry of Health.[8]

Statistical analysis

The questionnaire consisted of 20 items grouped into four areas:

1 Housing characteristics: overcrowding, kitchen separate from sleeping quarters, gas used for cooking, solid roof
2 Risk of non-community exposure: a group of variables associated with work-related migratory movement of family members (none, parents only, parents and children), prolonged periods away from home
3 Presence of health problems in the previous year and unhealthy behaviour affecting a family member: abortion, death (including infant mortality), hospitalisation, chronic illness; any member a smoker or drinker
4 History of TB in the family: previous TB diagnosis or treatment, previous chest X-ray, previous smear test and bacille Calmette-Guérin (BCG) vaccination.

The total number of possible combinations of characteristics was too high compared to the population size (653 inhabitants) to properly analyse the associations between variables. To resolve this problem, multiple correspondence analysis (MCA) and cluster analysis[15–20] were first performed to reduce the number of variables and categories while maintaining maximum information, using the SPAD statistical programme (SPAD, Paris, France). This reduction yielded four new variables, with categories described in Table 1.

Each class or category used in defining the new variables was created following the criteria of maximising homogeneity among individuals of the group and heterogeneity between groups. If any original categories are not included in the new groups, it means that they have no power of discrimination to define the groups.

After this process, classical logistic modelling was performed to analyse the two outcomes of cough >15 days and PTB. Statistical analysis was performed using SPSS version 11.5 (SPSS, Chicago, IL, USA).

RESULTS

A total of 653 inhabitants of Chine were identified (49% females), with an average of 5.2 persons per household. Forty-nine per cent were aged <15 years and 17% ⩾45 years.

Table 1 shows the characteristics that led to the categories of the four new variables: housing characteristics, external exposure, social problems and prior PTB, indicating those categories of the original variables that are positively associated within the categories of the new variable, along with their frequencies.

Sixty per cent of the inhabitants lived in overcrowded homes where gas was not used for cooking. Only 21% lived in a house with minimum basic conditions for sanitation, i.e., with no overcrowding, using gas for cooking, and with the kitchen separated from the sleeping quarters.

Of the 123 families studied, 24.4% had no members who migrated. In 2002, 236 individuals (35%), including children, had migrated.

In 2002, 18.5% of the inhabitants belonged to families in which a member had been hospitalised or suffered a health problem, an infant under 1 year of age had died, or a chronically ill person had cohabited with the other members of the family.

Cough of more than 15 days

Of the 202 persons with cough of >15 days, 54.5% were women, compared to 49% women in the com-

Table 1 Description of multiple correspondence analysis outcome variables

Variable classes or categories and % of inhabitants in each class	Description of the classes or categories*
V1: Housing characteristics	
Class 1: 21.0%	Home not overcrowded, cooking gas, kitchen separate from sleeping quarters
Class 2: 19.0%	Home not overcrowded, no cooking gas, kitchen not separate from sleeping quarters
Class 3: 60.0%	Overcrowded home, no cooking gas
V2: External exposure	
Class 1: 65.4%	Nobody in the family migrates
Class 2: 19.8%	Parents migrate, children do not
Class 3: 14.8%	Children migrate with parents
V3: Social problems	
Class 1: 81.5%	No health problems. Some family members drink
Class 2: 12.7%	Problems in the last year: abortion, death in the family or hospitalisation. Smokers and chronically ill members present
Class 3: 5.8%	Death of an infant or other family member. Absence of other characteristics
V4: Prior PTB	
Class 1: 91.9%	Complete absence of factors associated with PTB
Class 2: 8.1%	Previous diagnosis of PTB, previous treatment for PTB, previous smear test and previous chest X-ray

* Refer only to those original characteristics that participate significantly in the definition of each class.
PTB = pulmonary tuberculosis.

munity. Age was significantly associated with chronic cough ($P < 0.001$): 24.3% of the patients were aged ⩾45 years, whereas in the total population only 16.5% were aged ⩾45 years (Table 2). There was no association of chronic cough with sex ($P = 0.062$).

Table 3 presents the logistic model and adjusted estimates of association with chronic cough. The most important factors were having a history of TB ($P < 0.001$) and possible exposure outside the community through work-related migratory movements ($P < 0.001$), specifically parental migration (Class 2 of external exposure). The presence of health problems in the last year was of borderline statistical significance ($P = 0.052$).

After adjustment for age and sex, the above-mentioned risks were lower; this is explained by the confounding of migration with male sex (unadjusted odds ratio [OR] 4.4) and older age (OR 1.024, 95% confidence interval [CI] 1.01–1.03, $P < 0.001$).

Prevalence of active PTB

Of the 202 persons with cough of >15 days, 173 (85%) had productive cough, but only 122 (71%) could produce one or more specimens; of these, 30 were invalid due to contamination. AFB smear test results were therefore available for only 92 subjects (75%). Of these 92, 44 were AFB smear-positive (47%), for a prevalence of active PTB of 6.7/100 inhabitants. Prevalence in subjects aged >14 years was 11.3/100 (9.0 among men and 13.5 among women). Among men, the highest prevalence was in the 35–44 age group (20.6%) and among women in the group aged ⩾45 years (16.7%).

Of the 44 AFB smear-positive cases, 13 (29.5%) gave a history of prior active TB (OR 6.0, 95%CI 2.9–12.3). Of these, four did not initiate treatment due to lack of funds, another four stopped treatment because of subjective improvement (the DOTS strategy was not implemented) and five completed antituberculosis treatment. Of another 37 persons who also had a history of PTB, 17 did not present any respiratory symptoms, 14 were AFB smear-negative and 6 refused to participate in the study.

Haemoptysis was the only clinical characteristic significantly associated with active TB (crude OR 3.8, 95%CI 1.5–10.0) and in multivariate analysis (adjusted OR 3.5, 95%CI 1.3–9.1).

Migration showed a clear association with active PTB in both women (OR 2.44, 95%CI 0.91–6.54) and men (OR 2.33, 95%CI 0.89–6.07).

In 27% of families there were one or more smear-positive cases; in 12% there were two and in 12% there were three or more cases.

DISCUSSION

The prevalence of active TB (estimated at 6700/100 000 for comparative purposes) is many times higher than the reported incidence for Ecuador as a whole (43/100 000) in 2001,[8] and that described for the Borbón coastal region (788/100 000)[21] in the same year. Similar studies carried out in poverty-stricken areas of Latin America have found rates of 276.9/100 000

Table 2 Subjects with cough of >15 days and productive coughers*

Age group, years	Subjects with cough of >15 days						Productive coughers					
	Females		Males		Total		Females		Males		Total	
	n	Rate	*n*	Rate	*n*	Rate	*n*	Rate	*n*	Rate	*n*	Rate
0–14	28	18.4	27	16.3	55	17.3	20	13.2	17	10.2	37	11.6
15–34	36	44.4	24	31.6	60	38.2	34	42.0	22	28.9	56	35.7
35–44	20	55.6	18	52.9	38	54.3	19	52.8	16	47.1	35	50
⩾45	26	48.1	23	42.6	49	45.4	23	42.6	22	40.7	45	41.7
Total	110	34.1	92	27.9	202	30.9	96	29.7	77	23.2	173	26.5

* $P < 0.001$ (among age groups); 0.062 (by sex).

Table 3 Logistic regression models for factors associated with a cough of >15 days*

					Adjusted for age and sex			
	Model OR	95%CI	ΔG^2*	*P* value	Model OR	95%CI	ΔG^2*	*P* value
Nobody in the family migrates	—	—	17.2	<0.001	—	—	15.02	<0.001
Parents migrate, children do not	5.04†	3.1–10.6			2.05	1.3–3.3		
Children migrate with their parents	0.56†	0.3–1.0			0.56	0.3–1.0		
No health problems, some family members drink	—	—	5.8	0.052	—	—	—	
Problems in last year (abortion, death in the family or hospitalisation. Smokers and chronically ill members present)	1.61‡	0.9–2.7			—	—		
Death of an infant or other family member. Absence of other characteristics	1.87‡	0.9–3.7			—	—		
Previous diagnosis of PTB, previous treatment for PTB, previous smear test and previous chest X-ray	5.71§	3.0–10.6	32.0	<0.001	4.89	2.6–9.4	25.05	<0.001
Sex, male	—	—	—		0.56¶	0.4–0.8	8.88	<0.001
Age, years#	—	—	—		1.02	1.01–1.03	29.11	<0.001

* Log likelihood changes by −2 if term eliminated from model.
† With respect to the reference category 'Nobody in the family migrates'.
‡ With respect to the reference category 'No health problems, some family members drink'.
§ With respect to the reference category 'Complete absence of factors associated with PTB'.
¶ With respect to the reference category 'women'.
# OR expresses the change per year of age.
OR = odds ratio; CI = confidence interval; PTB = pulmonary tuberculosis.

among those aged >15 years[1] and of 100/100 000 among indigenous subjects.[22] No other studies of prevalence are known in similar populations, either in Ecuador or in other countries, except for some reports in Zimbabwe, where reported prevalence is 435/100 000. These figures are not comparable, however, due to the fact that in Zimbabwe, human immunodeficiency virus (HIV) infection is reported to be around 20%, compared to 0.03% in Ecuador.[23]

Furthermore, the prevalence may have been underestimated because of problems in obtaining adequate numbers and quality of sputum specimens. Of the total number of individuals identified with chronic cough, adequate specimens were obtained from 45%, somewhat lower than in other studies carried out in Latin America in which adequate sputum samples were collected from 65–85% of subjects.[24] Although no historical data were available for this community nor on similar communities in the same region, which would allow us to determine whether or not the high observed prevalence is an outbreak, given the health and socio-economic conditions observed, it is of great concern that these observations correspond to a situation that is apparently 'usual' in marginalised communities of this kind.[1,4,22]

If this community were to be considered as a representative sample of the indigenous populations of Cotopaxi, which share many of the same demographic and socio-economic characteristics, the prevalence of undetected and hence untreated TB would be very high—a very alarming situation. This is plausible, given that the health conditions among the indigenous populations of the central Ecuador mountains are worse than those of the rest of the country, and indeed of Latin America as a whole.[1,5,11,25]

In the community surveyed, one in three inhabitants reported chronic cough, implying that many respiratory problems, and not just PTB, are highly prevalent. Chronic cough was more common with age and in women, suggesting that unfavourable living conditions may influence this problem. Prevalence of chronic cough was lower among those with better housing conditions, both among work-related migrants and non-migrants. This is consistent with other studies that have documented the association of socio-economic factors with the development of PTB in poor communities.[24–26]

The age-group distribution found for PTB was consistent with other studies affirming that in developing countries the greatest concentration of PTB patients lies in the age range 15–50 years.[27,28] Among women, the high prevalence of chronic coughers and smear positivity suggests that conditions deriving from gender inequalities and the risks related to being of reproductive age may lead to greater vulnerability to PTB.[29–33]

The phenomenon of work-related migration implies a risk of greater exposure to a variety of social and biological factors that favour the appearance of PTB. The possible economic gains of migration for work have a high cost in social and health terms, given that informal temporary work of this kind does not give migrants access to social security and exposes them to overcrowded conditions with other high-risk groups and inadequate nutrition. In men aged 35–44 years, the prevalence of PTB increases, while the prevalence rate for women of the same age remains similar to that of the group aged 15–24 years. It is clear from this analysis that work-related migration has the effect of a risk and could be interpreted as 'importation' of the disease.

The facts that one third of coughers had a history of TB diagnosis or treatment, that in 27% of the homes studied there was at least one smear-positive person, and that patients were clustered (some households

had four smear-positive members), suggest that the NTP in Chine needs to be strengthened. There is evidence of shortcomings in the NTP structure, organisation and operation, leading to problems with diagnoses, contact follow-up and the implementation of the DOTS strategy.*

It is also striking that 13 of the 44 PTB cases identified had a history of TB (four never initiated and another four defaulted), which underlines the deficiencies in the application of the DOTS strategy in the region studied.

This situation increases the chances of 1) PTB becoming chronic, with concomitant increased transmission and social and health care costs; 2) the appearance of multidrug resistance due to repeated default from treatment, as indicated by primary resistance rates of 24% and secondary resistance of 30% found in Ecuador;[36] and 3) increased PTB mortality (not measured in this study) as a consequence of the high rates of treatment failure or non-adherence.

Despite the logistic problems and complicated conditions under which this study was carried out, it was possible to provide evidence that we are dealing with a problem that has often been reported but rarely resolved. Communities marginalised due to their culture, language and poverty are penalised because the health care services are inefficient or inaccessible. Because of methodological difficulties in data gathering, the high reported prevalence of TB may still be an underestimation of the true PTB rate. Rates reported in this study are among the highest reported in the international literature.

CONCLUSIONS

Pulmonary tuberculosis in the Chine area of Ecuador is a serious public health problem. There is an urgent need to improve and strengthen health service delivery, particularly the NTP, and to initiate contact tracing and treatment according to the DOTS strategy and Ecuadorian NTP guidelines, while taking into account the ethnic background of the population, work-related migration, poverty and the inaccessibility of the community.

Acknowledgements

The authors are grateful to the Volunteers Association of Angamarca and to the Fondo Ecuatoriano Populorum Progressis, Latacunga, for contributing most of the funding for this study.

References

1 Sánchez-Pérez H J, Flores-Hernández J A, Jansá J M, Caylá J A, Martín-Mateo M. Pulmonary tuberculosis and associated factors in areas of high levels of poverty in Chiapas, México. Int J Epidemiol 2001; 30: 386–393.
2 Ministerio de Salud Pública del Ecuador (MSPE), Dirección Nacional de Control y Vigilancia Epidemiológica. Panorama Epidemiológico del Ecuador. Quito, Ecuador: MSPE, 1992.
3 Ministerio de Salud Pública del Ecuador, Dirección Nacional de Epidemiología, Programa Nacional de Control de Tuberculosis. Casos, tasas y tendencias de la tuberculosis en el Ecuador, 1992–2001. Quito, Ecuador: MSPE, 2002.
4 Conejo M. Población indígena y reforma del sector salud. El caso de Ecuador. Fondo indígena para el desarrollo de los pueblos indígenas de América Latina El Caribe. Washington, DC, USA: Organización Panamericana de la Salud, 1998. http://bvs.insp.mx/articulos/6/7/010301.pdf Accessed June 2004.
5 Secretaría Técnica del Frente Social, Unidad de información y análisis. Tendencias del desarrollo social en el Ecuador 1990–2003. Informe de Desarrollo Social 2004. Sistema Integrado de Indicadores Sociales del Ecuador. Quito, Ecuador: SIISE, 2004: pp 144–151.
6 Confederación de Nacionalidades Indígenas del Ecuador (CONAIE). Proyecto Político de la CONAIE. Quito, Ecuador: CONAIE, 1997. http://www.conaie.org/ Accessed June 2004.
7 Ministerios del Frente Social, Secretaría Técnica del Frente Social, República del Ecuador. Sistema Integrado de Indicadores Sociales del Ecuador, versión 3.5. Quito, Ecuador: SIISE, 2003.
8 Ministerio de Salud Pública de Ecuador. Manual de Normas técnicas, Métodos y procedimientos para el control de la tuberculosis. Quito, Ecuador: MSPE, 2002: pp 1–2.
9 Navas de Pozo Y. Angamarca en el siglo XVI. Quito, Ecuador: Editorial Abya-Yala, 1990: pp 22–23.
10 Ministerio de Salud Pública del Ecuador. Dirección Nacional de Áreas de Salud. Manual de organización y funcionamiento de las areas de salud. Capacidad resolutiva del area y de las unidades operativas. Quito, Ecuador: MSPE, 2000.
11 Sánchez-Pérez H J, Prat-Monterde D, Jansa J M, Martín-Mateo M. Tuberculosis pulmonar y uso de servicios del primer nivel de atención en zonas de alta marginación socioeconómica de Chiapas, México. Gac Sanit 2000; 14: 268–276.
12 Getchell W, Davis C, Gilman J, et al. Basic epidemiology of tuberculosis in Peru: a prevalence study of tuberculin sensitivity in a Pueblo Joven. Am J Trop Hyg 1992; 47: 721–729.
13 Ramírez A, Restrepo A, Ulloa M, Herrera J. Factores psicosociales y tuberculosis pulmonar en pacientes de bajo nivel socioeconómico. Av Med Soc 1994; 4: 34–37.
14 Engelsbel S, Kuijper E J, Dankert J, Bratt M C, Egas J A. Tuberculosis project in Ecuador. Ned Tijdschr Geneeskd 1991; 135: 2428–2432.
15 Benzécri J P. L'analyse des données. Tome I: La taxinomie. Paris, France: Dunod, 1973.
16 Benzécri J P. L'analyse des données. Tome 2: L'analyse des correspondances. Paris, France: Dunod, 1976.
17 Khattree R, Naik D. Multivariate data reduction and discrimination with SAS Software. Cary, NC, USA: SAS Institute Inc, 2000.
18 Heath C W Jr. Community clusters of childhood leukemia and lymphoma: evidence of infection? Am J Epidemiol 2005; 162: 817–822.
19 Guinot C, Latreille J, Malvy D, et al. Use of multiple correspondence analysis and cluster analysis to study dietary behaviour: food consumption questionnaire in the SU.VI.MAX. cohort. Eur J Epidemiol 2001; 17: 505–516.
20 Kaminska A, Ickowicz A, Plouin P, et al. Delineation of cryptogenic Lennox-Gastaut syndrome and myoclonic astatic epilepsy using multiple correspondence analysis. Epilepsy Res 1999; 36: 15–29.
21 Caicedo C, Márquez M, Moreira J, Anselmi M. DOTS in Ecuador: can pilot experiences be generalised? Lisbon, Portugal: Proceedings of the 3rd European Congress of Tropical Medicine and International Health. Abstract TuPS036. Acta Tropica 2002; 83 (Suppl): S63–S64.
22 Escobar A, Coimbra C Jr, Camacho L, Portela M. Tuberculosis

* The DOTS strategy was implemented in Ecuador in 2001 in three counties and concluded in 2004. In June 2006 a second implementation phase began that included the county of Cotopaxi.[34,35]

among indigenous populations in Rondonia, Amazonia, Brazil. Cad Saúde Pública 2001; 17: 285–298.
23 Joint United Nations Programme on HIV/AIDS. Report on the Global AIDS epidemic 2006. Geneva, Switzerland: UNAIDS, 2006. http://www.unaids.org/en/HIV_data/2006GlobalReport/default.asp Accessed February 2007.
24 Sánchez-Pérez H J, Hernán M, Hernández-Díaz S, et al. Detection of pulmonary tuberculosis in Chiapas, México. Ann Epidemiol 2002; 12: 166–172.
25 Baruzzi R, de Barros V, Rodrigues D, Medeiros de Souza A, Pagliaro H. Health and disease among Panará Indians in Central Brazil after twenty-five years of contact with our world, with an emphasis on tuberculosis. Cad Saúde Pública 2001; 17: 407–412.
26 Cantwell M F, McKenna M T, McCray E, Onorato I M. Tuberculosis and race/ethnicity in the United States—impact of socioeconomic status. Am J Respir Crit Care Med 1998; 157: 1016–1020.
27 Wagstaff A. Pobreza y desigualdades en el sector de la salud. Rev Panam Salud Publica 2002; 11: 316–326.
28 Granje J, Story A, Zumla A. Tuberculosis in disadvantaged groups. Curr Opin Pulm Med 2001; 7: 160–164.
29 Opravil M. Epidemiological and clinical aspects of mycobacterial infections. Infection 1997; 25: 56–58.
30 Tocque K, Regan M, Remmington T, et al. Social factors associated with increases in tuberculosis notifications. Eur Respir J 1999; 13: 541–545.
31 Montero-Mendoza E, Zapata-Martelo E, Vázquez-García V, Nazar-Beutelspacher A, Sánchez-Pérez H J. Tuberculosis in the Sierra Santa Marta, Veracruz: an analysis from a gender perspective. Women, Health, and Medicine: Transforming Perspectives and Practice. Women's Studies Quarterly, 2003; 1–2: 105–124.
32 Gómez Gómez E. Género, equidad y acceso a los servicios de salud: una aproximación empírica. Rev Panam Salud Pública 2002; 11: 327–334.
33 Ministerio de Salud Pública del Ecuador, Instituto Nacional de Estadísticas y Censos. Organización Panamericana de la Salud/Organización Mundial de la Salud. Situación de salud en el Ecuador. Indicadores básicos por región y provincia. Quito, Ecuador: MSPE, 2001.
34 Vaca J, Peralta H, Gresely L, et al. DOTS implementation in a middle-income country: development and evaluation of a novel approach. Int J Tuberc Lung Dis 2005; 9: 521–527.
35 Oxlade O, Vaca J, Romero E, et al. The long-term health and economic benefits of DOTS implementation in Ecuador. Can J Public Health. 2006; 97: 14–19.
36 Mertz B L, Douce R W, Brito N. Antituberculosis drug resistance in two clinics in Ecuador. Int J Tuberc Lung Dis 2000; 4: 115–117.

RÉSUMÉ

CONTEXTE : Une collectivité aborigène de 653 personnes.
OBJECTIF : Déterminer la prévalence de la tuberculose pulmonaire (TBP) et analyser les facteurs qui y sont associés.
SCHÉMA : L'ensemble de la population a fait l'objet de l'enquête ; on a demandé à ceux ayant une toux chronique productive de fournir des échantillons d'expectoration. La TBP a été diagnostiquée par bacilloscopie (bacilles acido-résistants). L'analyse des facteurs socio-économiques et les antécédents cliniques associés avec la toux chronique ou avec une bacilloscopie positive pour TBP a été menée en utilisant l'analyse des correspondances multiples ainsi que des modèles de régression logistique.
RÉSULTATS : On a identifié une toux chronique chez 202 sujets et une toux productive chronique chez 173. La toux chronique est en association avec des antécédents de TB (OR ajusté 4,89 ; IC95% 2,6–9,4) et avec des migrations dues au travail (OR ajusté 2,05 ; IC95% 1,3–3,3). Parmi les 92 tousseurs dont les échantillons d'expectoration avaient été analysés, 44 (47,8%) avaient une bacilloscopie positive. Ceci correspond à une prévalence de 6,7% de l'ensemble des habitants. Dans les groupes âgés de 15 à 34 ans et de ⩾45 ans, les taux de positivité sont plus élevés chez les femmes que chez les hommes, alors que dans le groupe âgé de 35 à 44 ans ils sont plus élevés chez les hommes. Un à quatre membres de près de 27% des familles avaient une bacilloscopie positive.
CONCLUSION : Le Programme de lutte contre la TB de la zone ayant fait l'objet de l'étude doit être renforcé et prendre en compte le contexte ethnique, les migrations liées au travail et le contexte socio-économique et géographique.

RESUMEN

MARCO DE REFERENCIA : Una comunidad indígena de 653 individuos.
OBJETIVO : Determinar la prevalencia de tuberculosis pulmonar (TBP) y analizar los factores asociados.
DISEÑO : Se estudió toda la población. Se recogieron muestras de esputo de las personas con tos productiva crónica y se diagnosticó la TBP mediante baciloscopia. El análisis de la historia clínica y los factores socioeconómicos asociados con la tos crónica o la baciloscopia positiva se realizó mediante modelos de correspondencia múltiple y de regresión logística.
RESULTADOS : De 202 tosedores crónicos encontrados, 173 tuvieron tos productiva. La tos crónica se asoció con un antecedente de TB (OR ajustado 4,89 ; IC95% 2,6–9,4) y con los movimientos migratorios relacionados con el trabajo (OR ajustado 2,05 ; IC95% 1,3–3,3). De los 92 tosedores examinados mediante baciloscopia, 44 (47,8%) tuvieron un diagnóstico confirmado de TBP, lo cual representó una prevalencia de 6,7% en la población. En los grupos de edad entre 15 y 34 años y ⩾45 años las mujeres tuvieron tasas de positividad más altas que los hombres, mientras que en el grupo de 35 a 44 años la positividad fue mayor en los hombres. En el 27% de las familias se observó de uno a cuatro miembros con baciloscopia positiva.
CONCLUSIÓN : Es necesario fortalecer el programa de control de la TB de la región estudiada, dado su contexto étnico, socioeconómico y geográfico y las migraciones de carácter laboral.