

Trends and Socio-Demographic Determinants of Pulmonary and Extra pulmonary Tuberculosis Disease in West Azerbaijan Province and Iran

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ABSTRACT

Objective: To investigate and highlight the trends and socio-demographic determinants of tuberculosis disease (TB) in West Azerbaijan Province (WAP) and Iran, during 2004-2009.

Material and Methods: In this cross-sectional study, we studied the regional and national data of TB new cases which have been provided by deputy for health affairs and world health organization, respectively. The association between pulmonary and extra-pulmonary TB forms and socio-economic status was tested by means of chi squared. The national census data of 2006 were used to determine the incidence trends. Cochran-Armitage test was used to analyze the smear positive TB incidence trends.

Results: Age-specific incidence trends of smear positive TB for both of males and females are increased in concordance aging in provincial and national levels ($P=0.0001$). Regard to age-specific incidence rate ratio by gender, the younger and older females were more vulnerable to TB significantly ($P<0.05$). Considering socio-demographic status and TB forms, there were statistically significant association between age, gender, low education attainment, occupation and incidence of pulmonary TB ($P<0.05$).

Conclusion: Since Iran and WAP have experienced the declined trends of population grow rate and enhanced life expectancy in last two decades, it is predictable that there will be an increase in burden of TB among older age groups in the future. On the other hand, TB incident gap was increased among birth cohorts of older age groups and it is becoming a serious health problem in Iran.

KEYWORDS: Tuberculosis, Socio-economic status, Epidemiology, Iran.

INTRODUCTION

Tuberculosis (TB) disease is one of the serious public health concerns. It is leading cause of death among infectious disease and killed at least 1.7 millions of TB patients worldwide in 2009 (case fatality rate 18%). Globally, despite of intensive efforts to reduction in burden of disease and progress in declining incidence rates per capita, the number of new cases is increased mainly result of population growth¹. Once high and low-middle income countries (LMICs) have experienced different condition about population growth rates, so they have diverse impacts on the burden and incidence patterns of TB worldwide^{2, 3}. According to World Health Organization report (WHO) in 2005, roughly 95% of TB new cases occurred in LMICs¹. The LMICs that attributed to high rates of population growth, the young adults suffer from a considerable incidence rates of TB^{4, 5}. Iran as a middle-income country had experienced a dramatic decreased trends of TB during last 40 years(1960-2000). Nevertheless, the pulmonary and extra-pulmonary TB notification rates have been constant in the recent decade⁶. In the case of incidence trends of TB, some of studies have focused on younger age groups (0-14) and found the incidence rates (in all forms) are declined in recent years⁷. In other hand, population based studies were concentrated on anti-tuberculosis drug

resistance patterns, showed increased prevalence rate of drug resistance among middle age groups⁸. Considering studies based on epidemiology of Pulmonary and Extra-pulmonary TB disease (PTB and EPTB) with viewpoint of socio-demographic determinants are rare in Iran, understanding of the their epidemiologic patterns is critical to determine baseline figures for evaluation of effective case finding, prevention and treatment. Therefore, this cross-sectional study aimed to investigate and highlight the trends and socio-demographic determinants of TB employing regional and national data in West Azerbaijan Province (WAP) and Iran.

MATERIAL AND METHODS

Study Setting and populations characteristics

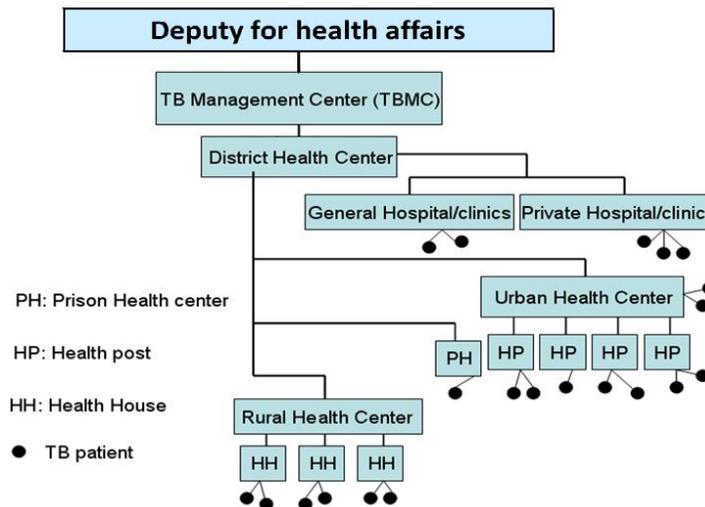
This study was undertaken in West Azerbaijan Province (WAP), a mountainous region is located in north-western of Iran with area landmass of 37.612 km², a population about three million, density of 77 inhabitants per km² and with a family size index 4.38. This province is boarding Azerbaijan, Turkey, Iraq countries and East Azerbaijan and Kurdistan provinces of Iran. It is divided into 14 districts. About 20% of its population was illiterate and 9.7% of its active population was unemployed^{9, 10}.

Data source and collection procedure

The retrospective study was based on TB patient’s database of WAP that has been recorded in Tuberculosis Management Center (TBMC) of deputy for Health Affairs at 20 March 2004 to 21 March 2009.

According to TB surveillance system in Iran, supervision and maintain of treatment course and also implementation of Directly Observed Treatment Strategy (DOTS) are taken on the TBMC health staffs and anyone TB patient cannot be treat completely without informing TBMC. So any new case of PTB/EPTB who has been diagnosis based on clinical symptoms, pathological examination and chest X-ray, in general and private hospitals and clinics, health centers, health posts, health house and prisons by qualified clinicians are obliged to report to district health center.

Health staffs of District Health Center for further completing and harmonizing of data as well as following up of family close contact cases, take face-to- face interview with patient and his/her family that took place in residence of patient, and then record information in special form (Epidemiologic Form). Finally, this information joint to clinical records and report to the TBMC (figure 1). However, in this study census sampling method was employed and all of 1330 new PTB/EPTB cases who listed in TBMC were considered. Regard to seven new cases transferred in this region so excluded and 1323 cases were analyzed. Omitting names as protect confidentiality was considered before beginning study.



Figurer1. Organizational structure of TB case reporting system in Iran.

Data treatment

Each TB notification record contains information about demographic variables as age, sex district of residence, occupation, education level and number of the room. To determine of disease category, cases with co-existing of PTB and EPTB were assigned to pulmonary array (4 cases). The national and provincial census data of 2006 (with annual

population growth rate 1.62% and 1.4%, respectively), were used to calculate of specific- incidence rates and consequential trends⁹. For analysis of significant fluctuated trends of smear-positive TB incident rates, Cochran-Armitage test by Winpepi software were used¹¹. Using smear-positive TB notification data which provided by WHO¹² in 2005 and 2009 and also provincial data by TB control office (Iran Ministry of health)⁶, comparison was carried out to reveal tuberculosis disease occurrence status in national and provincial level. Finally, association between TB categories (pulmonary and extra-pulmonary) and socio-economic status was tested by means of chi squared.

RESULTS

Age and gender specific incidence trends

Figure 2 presents the average age-incidence rates of smear positive TB by gender at provincial and national level during five year period. Generally age-specific incidence trends of TB for both of males and females are dramatically increased in concordance aging in provincial and national levels ($P=0.0001$). Regard to age-specific incidence rate ratio by sex, there were three phases of trends. First phase is related to young age groups (0-14, 15-24) that females to males have higher risk to TB ($P<0.05$). In second phase that related to middle age groups (25-54), incidence rate ratio for males is greater than females ($P<0.05$). Finally in third phase that included the older age groups (55 and above), male to female incidence rate ratio except in provincial level that was no statistically significant ($P>0.05$), is similar to first phase and males have lower risk to TB ($P<0.05$).

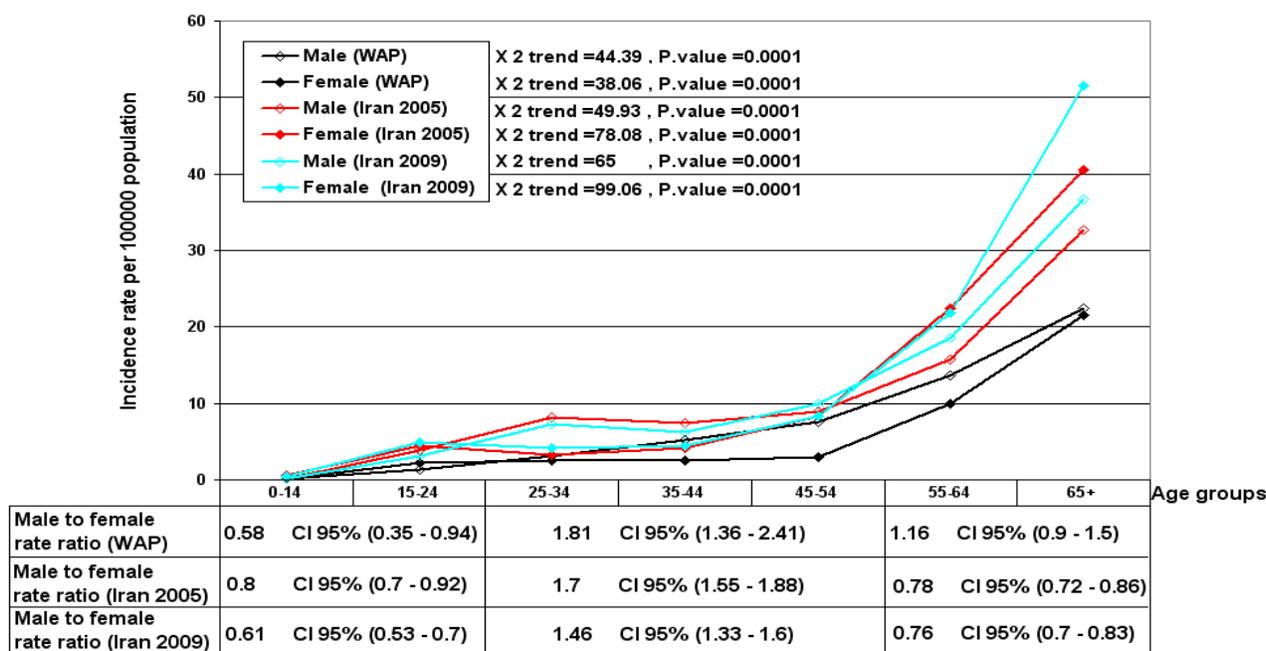


Figure2. Age-specific incidence rates of smear-positive TB by gender in WAP and Iran (2005 and 2009).

Socio-demographic characteristics

Table1 shows the distribution of TB cases by socio-demographic characteristics and category of TB forms. The last column of table assigned to regional reference statistics that provided by census data. Based on gender distribution, there was significant association between sex and TB form category and men have contributed to greater proportion of PTB ($P=0.001$). Considering age distribution, age ranged from 1 to 99 years, with a mean 47.6, standard deviation ± 20 and median of 47 years. The association of age groups and category of TB forms was significant ($P=0.001$), of those 65 and over were mainly vulnerable to PTB form (33.5%). Despite of higher proportion of PTB and EPTB cases in urban area (60.4%) there is no statistical difference between domicile and TB forms ($P=0.17$). In the case of education level, the majority of patients(67%) were from illiterate and primary school level education and there was a significant association between lower level education and PTB occurrence ($P=0.001$). Although housewife outnumbered any other jobs (35%), the higher proportions of PTB cases were among unemployed, farmers and self employed ($P=0.001$), accounting for 16.3%, 12% and 11.8% of total cases

respectively. Also, there was no statistical significant association between number of rooms and catching the PTB and EPTB ($P=0.21$), where majority of TB cases lived in accommodation with 2-3 rooms (66.9%).

Table1. Socio-demographic characteristics of tuberculosis cases by type of TB form, West Azerbaijan province, Iran, 2004/3/20-2009/3/20

Socio-demographic characteristics	TB form			Population reference in the WAP 2006 (%)
	Pulmonary N = 804 (%)	Extra-pulmonary N = 519 (%)	Total N = 1323 (%)	
Age groups				
0-14	1.9	4.2	2.8	27.5
15-24	11.2	14.9	12.6	24.5
25-34	12.6	24.1	17.1	17.3
35-44	13.2	14.9	13.9	12.6
45-54	13.1	15.6	14.1	8.5
55-64	14.5	10.1	12.8	4.5
65>	33.5	16.2	26.7	5.1
Chi squared = 75.14; df =6; p.value = 0.001				
Gender				
Male	57.5	46.6	53.2	51
Female	42.5	53.4	46.8	49
Chi squared = 14.87; df =1; p.value = 0.001				
Domicile				
Urban area	61.4	58.7	60.4	58.5
Rural area	38.6	41.3	39.6	41.5
Chi squared =1.02; df = 1; p.value = 0.17				
Education				
No schooling / illiterate	49.9	39.7	45.8	20.2
Primary school (Grade 1-5)	20.4	22.5	21.2	23.8
Lower secondary school (Grade 6-8)	7.3	9.2	8	16.9
Upper secondary school (Grade 9-12)	6.2	12.9	8.9	18.4
University	3.4	4.8	3.9	6.8
Unspecified	12.3	9.2	11.2	5.1
N/A (Children under 6 years)	0.5	1.7	1	8.8
Chi squared =34.22; df = 6; p.value = 0.001				
Occupation				
Farmer	12	11.4	11.7	
Labourer	5.5	4.8	5.2	
Self-employed	11.8	11.4	11.8	
Student	2.1	4.4	3.1	
Housewife	32.8	40	35.5	
Governmental employee	3	4.8	3.7	
Unemployed	16.3	8.9	13.4	9.7
Retired	3.4	1.9	2.8	
N/A	1	2.5	1.6	
Unspecified	12.1	9.9	11.2	
Chi squared =34.85; df = 9; p.value = 0.001				
Number of room				
0-1	12.2	9.4	11.3	10.7
2-3	65	66.9	66.9	61.2
4 >	8.4	10.6	9.5	27.5
Unspecified	14.4	13.1	12.3	0.6
Chi squared =4.424; df = 3; p.value = 0.21				

DISCUSSION

Age-sex incidence trends

Overall, national and regional specific trend figures indicate the smear positive TB incidence rate among cohorts of males and females in older age groups were highest during the study period. Once mentioned birth cohorts belong to periods with high incidence rates of TB in Iran [3], so it can be reflects the flaring up of old exposure to *Mycobacterium Tuberculosis* bacilli, in the setting of impaired immunity system related to elderly^{13, 14}.

Nevertheless, the smear positive incidence rate of TB was different in various age groups when compared with respect to sex. The younger and older females were vulnerable to TB significantly. Accordingly, several factors may be indicated about vulnerability in female adolescent group, some by physiologic evolution issues¹⁵ and other

possibly by weak access to health services as result of cultural and social stigma^{16, 17}. Further, the population based reports about the sputum smear positive TB notification found women were over represented among all age groups in Iran¹⁸. However, the higher TB notification rate among young females in this study can be indicates, the good and justice access to health services in national and provincial levels.

On the other hand, middle age groups of men had higher risk of TB than women. Several possible factors were suggested to contribute to this situation as diverse exposures to *Mycobacterium tuberculosis* result from more social participation and occupation hazards in this age group¹⁹. Notably, the previous study about Multi Drug Resistance to TB (MDR-TB) in Iran shows, the risk of this type of disease for males with age under 45 were two times higher than females. This may be explained by the immigration population structures and effects on burden of MDR-TB in Iran, the immigrate TB patients in this country have a young age distribution and the MDR-TB disease is more common in particular male Afghanistan refugees^{8, 20}.

Socio-economic factors

International studies well established link between poverty and TB incidence and socioeconomic determinants appears to be as important as any TB risk factor^{21, 22}. Accordingly, this study showed the TB occurrences are distributed an unequal socioeconomic status and there is a strong association between social characteristics, including: age, gender, education, job and category of TB form. Regard to older age groups constituted the least proportion of WAP population as whole, they included most frequency of TB disease.

In consistent of studies on EPTB and PTB risk factors that supported our results, the young age groups and females were recognized as independent risk factors for EPTB^{23, 24, 25}. In contrast, the study was performed in Turkey based on demographic determinants of EPTB showed no statistically significant increased risk for both of sex²⁶.

Different from other studies that living in urban domicile is a key factor to catch of EPTB disease but there was no significant observed difference between urban and rural residents by TB form category in this study²⁷. There is several reasons to convince that the TB notification ratio is similar for both of districts as a result of weak national and provincial coverage of primary health care (PHC) services as well as passive case finding in urban setting^{28, 29}.

The distribution of educational level was significantly different and those with higher educational attainment tend to contract the EPTB disease predominantly more often than PTB cases. Regarding the clinical manifestation of EPTB is extremely variable³⁰ and low education level is related to lower service awareness³¹, it may be hypothesized, the higher number of EPTB patients contributed to higher educational attainment groups.

In line with the international studies, regardless to housewife that mainly attributed to women, a considerable number of PTB disease occurred in people with unemployment, farmer and self-employed occupations^{32, 33} who had no job and economic security.

Strength and limitations:

This study has several limitations. First, considering higher prevalence of HIV as a main risk factor among TB cases in prisons²³, the screening of HIV is not routinely for majority of TB cases in Iran, so in this study we did not have data about HIV seroprevalence among TB patients. Nevertheless, according to WHO reports, Iran is among countries with lowest estimated HIV seropositivity among new TB cases (0-4%)³⁴. Second, despite of low TB incident with multi drug resistance status based on WHO data in Iran (3.4-6.9% of new TB cases)³⁵, the information about it was not present provincially. Third, while WHO recommended need to estimates of the burden of disease especially for women and children improved via more analysis of mortality and notification data, in this study the main cause recorded on death certification is less reliable accordance to international classification of death (ICD) and was not applicable.

Conclusion

Since Iran and WAP have experienced the declined trends of population grow rate and enhanced life expectancy in last two decades, it is predictable that there will be an increase in burden of TB among older age groups in the future. On the other hand, TB incident gap was increased among birth cohorts of older age groups and it is becoming a serious health problem in Iran.

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