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## Assessment of Knowledge towards Tuberculosis among general population in North East Libya

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### ABSTRACT

The study aimed to evaluate the level of Tuberculosis (TB) related knowledge among general public in North East Libya. A cross sectional study was undertaken in 2009. A pre-validated questionnaire consisting of 23 items was sent to 1500 residents among five cities in North East Libya. In addition to the demographic details, the survey instrument was designed to collect information relating to transmission, diagnosis, risk factors, treatment and prevention of TB. Descriptive analysis was used to elaborate demographic information. Inferential statistics (Chi-square test and one-way ANOVA) were used whenever appropriate. P value of less than 0.05 was considered as significant. All data was analyzed using SPSS version 16.0. The overall knowledge towards TB among general population was measured as low. Mean knowledge score was  $11.4 \pm 3.9$  which was significantly higher among Libyans ( $11.7 \pm 3.8$ ) than non Libyans ( $9.7 \pm 4.7$ ,  $t=26.13$ ) ( $P < 0.001$ ). In addition, respondents with tertiary education had significantly higher knowledge scores ( $11.8 \pm 3.5$ ) compared to those of intermediate ( $11.6 \pm 4.4$ ) and illiterate ( $7.7 \pm 5.5$ ), [ $F=19.34$ ,  $P=0.001$ ]. This study reveals that knowledge towards TB within the population is poor. It is therefore suggested that specialized educational programs should be developed for community members to promote awareness towards TB.

**Keywords:** As Tuberculosis, assessment, knowledge, North East Libya

### INTRODUCTION

According to the Collins English Dictionary, knowledge is defined as “the facts, feelings, or experiences known by a person or a group of people” (Hanks *et al.*, 1986). Knowledge about any disease is necessary and important in order to optimize the patients' treatment and to improve their quality of life (Jaramillo, 2001). Numerous studies have proved that lack of knowledge is likely to prevent appropriate positive healthcare seeking behaviors. Like other chronic illness, appropriate knowledge towards Tuberculosis (TB) was significantly associated with positive healthcare seeking action (Hoa *et al.*, 2003). Literature indicates that TB control can significantly be enhanced if more concern is given to improve knowledge and attitudes towards disease (Alvarez-Gordillo *et al.*, 2000). To the best of our knowledge and through extensive literature review, no studies have been reported from Libya focusing on TB related knowledge among general public (WHO, 2006). Therefore; the aim of this study was to assess the general public's knowledge towards TB in the North East Libya.

## METHODOLOGY

### Study design, sampling and settings

The study was conducted over a period of six months, from February 2009 to July 2009. A cross-sectional survey using a validated, self-administered questionnaire was designed for this study. The sampling frame was general public living in five cities (Benghazi, Almarj, Albayda, Darna and Tobruk) of North East Libya. Automated software program (Raosoft, 2008) was used for sample size calculation. In order to minimize erroneous results and increase the study reliability, triple value of the estimated sample was intended to be collected in addition to a 30% expected dropout from the study. The target sample size was thus calculated to be 1500 members of general population of North East Libya.

### Inclusion and exclusion criteria

People willing to participate in the survey and aging 18 years and above were included in the study. Respondents aging below 18 and over 60 years, having severe health problems, with cognitive impairments and having history of TB were excluded from the study.

### Ethical approval of the study

Ethical approval was obtained from the Libyan Center for Disease Control. In addition, respondents were asked to sign an informed consent before completing the questionnaire.

### Knowledge assessment tool

The Tuberculosis Knowledge Assessment Questionnaire (TKAQ) was developed from extensive literature review. The questionnaire consisted of 32 items which covered the following areas. First part of the questionnaire consisted of nine items focusing socio-demographic and general information about the participants. Second part consisted of five items addressing knowledge towards causes and symptoms of TB. Third part contained four questions exploring knowledge about TB transmission. Fourth part focused on the risk factors for TB and had two questions. Fifth part comprised of five items that covered knowledge towards TB diagnosis. Sixth section with two items covered knowledge concerning TB treatment. Final part consisted of five items highlighting knowledge about TB prevention. All items in the questionnaire were framed using three possible answers ('Yes', 'No', 'I don't know').

A score of 1 was given for each correct answer and a score of zero was given for an incorrect answer. 'I don't know' was scored as an incorrect answer. The maximum obtainable score was 23 (excluding 9 items being demographic). The questionnaire was tested for its face and content validity. Three lecturers at the School of Pharmaceutical Sciences, Universiti Sains Malaysia (USM) were asked to evaluate the relevancy, clarity and conciseness of the items and the ease with which these questions could be understood.

The questionnaire was piloted among 30 participants from general public, who were then excluded from the final analysis.

The reliability of the questionnaire was assessed using Cronbach's alpha with an overall internal consistency of 0.76. The final version of the questionnaire was translated into Arabic using standard translating measures. Data was collected by the principal researcher who interacted with the general public in supermarkets, streets, bus stations, police stations, cafes, schools, universities, public and private hospitals, laboratory units, pharmacies and health centers in all five cities of North East Libya.

### Statistical analysis

Descriptive statistics were applied to compute the demographic characteristics of the respondents. Difference between the categorical variables was examined with Chi-square or Fischer Exact Test where appropriate. Student's t-test was used to compare among knowledge scores between two groups. One-way ANOVA was applied to compare the differences of knowledge scores for three or more groups. Statistical package for social sciences (SPSS v 16.0) was used for data analysis.

## RESULTS

A total of 1500 participants were approached and 1000 responded to the study with an overall response rate of 66.6%. The demographic characteristics of the general public in North East of Libya, along with their knowledge scores are presented in Table 1. Mean knowledge score for respondents was  $11.4 \pm 3.9$  and the median score was 12. Mean scores for Libyans and those with higher level of education were significantly higher than non Libyans and those with lower level of education, respectively.

### Assessment of general knowledge and sources of information about TB

The respondents were asked whether they have heard of the disease called TB. Majority of the respondents ( $n=965$ , 96.5%) responded positively, where as only few of the respondents ( $n=35$ , 3.5%) answered as 'no'. The respondents TB related information from different sources, such as television ( $n=447$ , 44.7%), health workers ( $n=242$ , 24.2%) and family members ( $n=189$ , 18.9%) as shown in table 2.

### Assessment of etiology and symptoms of TB

Respondents were asked about the causes of TB. Half of the respondents ( $n=500$ , 50%) were able to answer this question correctly. There was a significant difference ( $p < 0.001$ ) among nationality, gender, age, educational level and monthly income. When asked that is TB a communicable disease, 787(78.7%) agreed to the statement. A statistically significant difference was found between nationality, gender, level of education, age, and monthly income. Seven hundred and twenty three (72.3%) respondents reported cough as one of the most common symptoms of TB whereas, 604 (60.4%) agreed that a person can suffer from TB at any stage of life. Only 112 (11.2%) of the respondents answered that TB is not a hereditary disease. The significance among study questions and variables are shown in Table 3.

**Table. 1:** Socio demographic characteristics and Knowledge scores (n=1000).

Characteristics	Frequency	Percentage	Knowledge score Mean± SD	P value
<b>Nationality</b>				
Libyan	883	88.3	11.7± 3.8	0.001*
Non Libyan	117	11.7	9.7± 4.7	
<b>Gender</b>				
Male	496	49.6	11.4± 4.4	0.351*
Female	504	50.4	11.4± 3.5	
<b>Education Level</b>				
Illiterate	46	4.6	7.8± 5.5	0.001**
Intermediate	390	39.0	11.4± 4.2	
Higher	564	56.4	11.8± 3.5	
<b>Residence</b>				
Rural	207	20.7	11.6± 3.9	0.342*
Urban	793	79.3	11.4± 3.9	
<b>Age (33.5±11.2)</b>				
<25 Years	312	31.2	11.3± 4.0	0.671**
25–40 Years	471	47.1	11.4± 3.9	
>40Years	217	21.7	11.9± 4.1	
<b>Monthly Income</b>				
<200 Libyan Dinar	316	31.6	11.3± 4.3	0.912**
200–400 Libyan Dinar	485	48.5	11.6± 3.9	
>400 Libyan Dinar	199	19.9	11.6± 3.8	

\*T-test, \*\*One-Way ANOVA

1 Libyan Dinar= 0.78 USD

**Table. 2:** General knowledge and sources of information about TB.

Question	Yes (%)	No (%)
Have you ever heard about a disease called TB?	965 (96.5)	35 (3.5)
What is your source of TB information?*		
Television	447 (44.7)	
Family members	242 (24.2)	
Health Professionals	189 (18.9)	
Radio	90 (9.0)	
Magazines	81 (8.1)	
Internet	55 (5.5)	
Newspapers	52 (5.2)	
Others**	146 (14.6)	

\*The respondents can choose more than one answer

\*\* School

**Table. 3:** Assessment of etiology and symptoms of TB.

Items	Response		P value					
	Correct n,%	Incorrect n,%	Nationality	Gender	Residency	Age	Education	Income
1	500 (50.0)	500 (50.0)	<0.001	0.001	0.815	0.025	<0.001	0.001
2	787 (78.7)	213 (21.3)	<0.001	<0.001	0.999	<0.001	<0.001	<0.001
3	723 (72.3)	277 (27.7)	0.727	0.027	0.953	0.007	0.006	<0.001
4	604 (60.4)	396 (39.6)	<0.011	0.395	0.112	<0.001	0.008	0.354
5	112 (11.2)	888 (88.8)	0.111	<0.001	0.431	0.163	0.038	0.180

Is TB caused by Bacteria, Virus or Parasite?

Is TB a communicable disease?

What do you think is the most common symptom of TB?

Is TB a condition that anyone can suffer at any time?

Is TB a hereditary disease?

**Table. 4:** Assessment of knowledge about TB transmission and TB risk factors.

Items	Response		P value					
	Correct n,%	Incorrect n,%	Nationality	Gender	Residency	Age	Education	Income
1	208 (20.8)	792 (79.2)	0.419	<0.001	0.435	0.232	0.017	0.003
2	530 (53.0)	470 (47.0)	0.325	0.260	0.408	<0.001	<0.001	<0.001
3	416 (41.6)	584 (58.4)	0.111	<0.001	0.622	0.005	0.245	0.483
4	621 (62.1)	379 (37.9)	0.378	<0.001	0.093	<0.001	0.101	0.006
5	594 (59.4)	406 (40.6)	<0.001	0.326	0.431	0.375	<0.001	0.251
6	562 (56.2)	438 (43.8)	0.033	0.134	0.917	0.484	<0.001	0.855

Can TB transmitted by the following?

Sexual transmission from infected person to his/ her partner

By kissing an infected person

Drinking un-boiled milk

By infected blood transfusion

Which of the following patients is more affected by TB?

Patients suffering from HIV/AIDS are more at the risk of TB

Patients suffering from respiratory disorders are more at the risk of TB

**Table. 5:** Assessment of knowledge about TB diagnosis and treatment.

Items	Response		P value					
	Correct n, %	Incorrect n, %	Nationality	Gender	Residency	Age	Education	Income
1	344 (34.4)	656 (65.6)	0.717	<0.001	0.236	<0.001	0.299	0.003
2	122 (12.2)	878 (87.8)	0.494	0.067	0.372	<0.001	0.650	0.044
3	420 (42.0)	580 (58.0)	0.864	0.171	0.202	0.022	0.116	0.044
4	781 (78.1)	219 (21.9)	0.014	<0.001	0.529	0.826	<0.001	0.040
5	274 (27.4)	726 (72.6)	0.046	0.024	0.634	0.095	0.046	0.677
6	193 (19.3)	807 (80.7)	0.101	0.071	0.685	0.09	0.197	0.375
7	888 (88.8)	112 (11.2)	0.974	0.004	0.589	0.19	<0.001	0.042

**Which of the following test is best to diagnose TB?**

Blood test

Urine test

Chest X ray

Saliva and sputum examination

Tuberculin skin test

**Which of the following therapies is the best treatment for TB?**

Traditional or herbal therapy medicines

Medicines prescribed by doctor.

**Table. 6:** Assessment of knowledge about TB prevention.

Items	Response		P value					
	Correct n, %	Incorrect n, %	Nationality	Gender	Residency	Age	Education	Income
1	774 (77.4)	226 (22.6)	<0.001	0.441	0.101	0.594	0.001	0.293
2	434 (43.4)	566 (56.6)	0.453	0.925	0.619	0.012	0.013	0.135
3	446 (44.6)	554 (55.4)	0.001	0.002	0.792	0.191	0.048	0.224
4	682 (68.2)	318 (31.8)	0.001	0.394	0.100	0.008	0.007	0.033
5	434 (43.4)	566 (56.6)	0.122	0.024	0.077	0.118	0.048	0.577

**Which of the following are the ways to prevent TB?**

Avoidance of TB patients can prevent TB infection

By taking a healthy diet and doing a lot of physical activities

By avoiding alcohol and other drug abuse

By using a mask while handling an infected person

By living in ventilated residences

### Assessment of knowledge about TB transmission and risk factors

Table 4 describes the knowledge of the respondents about TB transmission and risk factors. The respondents were asked whether TB can be transmitted by sexual relation (from an infected person to his/her partner). Only 208 (20.8%) respondents were able to answer this question correctly. A statistically significant difference was noted between gender, level of education and monthly income. Respondents were also inquired that whether or not TB can be transmitted by kissing an infected person. More than half (n=530, 53.0%) of the respondents were of the opinion that TB can be transmitted by kissing an infected person. A statistically significant difference was noted among level of education, age and monthly income. The respondents were asked whether or not TB can be transmitted by drinking raw milk. Only (n=416) 41.6% respondents answered the question correctly. Only (n=379) 37.9% of the respondents were able to answer the question correctly when they were inquired that whether or not TB can be spread by transmission of infected blood. About TB risk factors, the respondents were asked whether HIV-positive patient is more likely to be infected with TB. Five hundred and ninety four (59.4%) of the respondents were agreed that HIV infected patients are at greater risk of getting TB. When patients were asked that whether or not patients suffering from respiratory diseases are at a high risk of TB, more than half (n=562) 56.2% respondents were agreed that patients with respiratory diseases are at higher risk of being infected with *Mycobacterium tuberculosis*. The significance among study questions and variables are shown in Table 4.

### Assessment of knowledge about TB diagnosis and treatment

The respondents were asked that whether blood test is the most useful diagnostic method in diagnosing TB. The analysis revealed that 344 (34.4%) of the respondents answered this question correctly (table 5). When the respondents were asked that whether or not a urine test could be used to diagnose TB, only 122 (12.2%) respondents answered correctly. Four hundred and twenty (42.0%) respondents were of the opinion that chest X-ray is best diagnostic tool to diagnose TB. For More than three quarters of the respondents (n=781, 78.1%) agreed that diagnosis of TB can be based upon sputum examination. The respondents' knowledge on using a sputum examination as a method for diagnosing TB showed significant difference among nationality, gender, level of education and monthly income. When respondents were asked that whether or not tuberculin skin test is a suitable method for diagnosing TB, 274 (27.4%) answered this question correctly. While assessing knowledge about TB treatment, the respondents were asked whether traditional or herbal therapy is the best method of TB treatment. More than eighty percent of the respondents (n=807) 80.7% disagreed to this statement. Majority (n=888) 88.8% of the respondents agreed that medical treatment is best method to treat TB. The significance among study questions and variables are shown in Table 5.

### Assessment of knowledge about TB prevention

Table 6 describes the responses towards TB prevention. The respondents were asked whether avoiding TB patients can help in controlling infection. The current study showed that 774

(77.4%) of respondents agreed the avoiding contact with TB patient can halt transmission of TB. The respondents were inquired whether or not a healthy diet can prevent TB infection. Four hundred and thirty four (43.4%) respondents agreed to this question. Six hundred and eighty two (68.2%) respondents agreed that wearing a face mask can prevent transmission of TB from one person to another. Whereas, 760 (76.0%) answered that alcohol avoidance can prevent TB infection. The respondents were further asked that whether a well-ventilated home can prevent TB infection. Four hundred and thirty four (43.4%) respondents answered positively to the question. The significance among study questions and variables are shown in Table 6.

## DISCUSSION

Over the past decade, TB is on rise in Libya as a major public health problem. In 2007, incidence rate of TB in Libya was 17 cases (all forms) per 100,000 population (TB Unit of the WHO Regional Office for Eastern-Mediterranean Region, 2007) that has been raised to 40 cases (all forms) per 100,000 population in 2008 (TB Unit of the WHO Regional Office for Eastern-Mediterranean Region, 2008). This increase in incidence reflects the seriousness of the TB resurgence and has yet to receive sufficient recognition in Libya.

The present study examined knowledge of TB in 1000 Libyan residents who participated in our survey. The study is unique because of the large sample and first of its kind in Libya. Results from the current study exposed limited knowledge and momentous misconceptions about TB among study participants. The mean knowledge score among general public was  $11.4 \pm 3.8$  out of 23. In addition, mean knowledge scores were significantly higher for Libyans when compared with non-Libyans ( $11.7 \pm 3.8$  vs.  $9.7 \pm 4.7$ ;  $p < 0.001$ ). Positive association of same nature among foreign nationality is also reported by a study of same nature (Pishkar *et al.*, 2001). Similarly, knowledge scores were directly proportional to level of education among study participants. Several other studies also showed similar relationship between level of education and TB knowledge (Liam, 1999; Portero *et al.*, 2002; Abebe *et al.*, 2010). Our study findings also showed a non-significant difference for gender, age, area of residence and income. These findings are in line with other studies reported in literature (Portero *et al.*, 2002; Singh *et al.*, 2006).

All most all (95%) of the current respondents have heard about TB. Similar findings were reported from Iraq (Yousif *et al.*, 2011) and North Ethiopia where 89.3% and 86% of the study participants were aware of TB (Abebe *et al.*, 2010) respectively. While discussing the cause of TB, knowledge was low as fifty percent ( $n=500$ , 50.0%) of the respondents declared that TB is caused by bacteria. However, contrary to our findings, respondents from Vietnam (Hoa *et al.*, 2009), and Philippines (Portero *et al.*, 2002) reported poor knowledge about causative agent of TB. About three quarters ( $n=787$ , 78.7%) of our respondents knew that TB is a communicable disease and mentioned prolonged coughing as one the major symptom of TB. These findings are consistent with earlier studies reported in literature (Mfinanga *et al.*, 2003;

Yadav *et al.*, 2006; Hoa *et al.*, 2009; Mushtaq *et al.*, 2011). More than sixty percent ( $n=604$ , 60.4%) of the respondents were aware that TB is a contagious disease. Most of the respondents were aware that TB is a highly infectious but curable disease. This finding was supported by studies from Pakistan, Kenya and India (Liefoghe *et al.*, 1997; Nair *et al.*, 2002; Agboatwalla *et al.*, 2003).

From the current study, respondents with Libyan nationality and with higher education and age had better information about causes, sign & symptoms and nature of disease. These findings are in line with what is reported in literature (Pishkar *et al.*, 2001). Findings from current study also revealed that females had better knowledge than males regarding causes and nature of disease. This might be due to the fact that females in Libya are more concerned about their health or they had more contact time with electronic media which is a major source of spreading TB related information. However this finding is against to what is reported in earlier studies (Zhang *et al.*, 2007; Wang *et al.*, 2008). Majority of respondents stated that they obtained TB related information from television followed by health care workers and family members. Similarly, television as most frequently used source of information (Hadi *et al.*, 2006; Mushtaq *et al.*, 2011) has been reported in earlier studies. Thus it is strongly suggested to take full benefit of media to spread TB related knowledge in general public.

The most problematic finding was the lack of knowledge about TB transmission. Most of our study respondents were of the opinion that TB can be transmitted by sexual relation. Respondents were also of the opinion that TB cannot be transmitted by kissing the infected person or drinking the raw milk. Extent of these misconceptions was higher in male study participants and those with lower level of education and monthly income. Analogous to our findings, level of education as a significant factor in knowledge about transmission of TB has been reported in other studies (Portero *et al.*, 2002). Other studies from Zambia (Kaona *et al.*, 2004), Pakistan (Mushtaq *et al.*, 2011) and Malaysia (Liam *et al.*, 1999) also reported poor knowledge of study respondents about transmission of TB. It is evident from our study findings that general population has severe misconceptions about transmission TB. It is time for health care policy managers to strengthen health education efforts especially in young generation and those with lower education and monthly income. Our findings revealed poor knowledge about TB risk factors in study respondents specially those who were non Libyans and had low level of education. In agreement with our findings, few studies (Mfinanga *et al.*, 2003; Mangesho *et al.*, 2007) also reported misconceptions of respondents about awareness of risk factors for TB. Poor knowledge of respondents about risk factors of TB suggested clues that might be responsible for increase in incidence rate of TB in Libya. Current study revealed poor knowledge of study participants about TB diagnosis. Remarkable number of respondents were of the opinion that urine test is used as diagnosis of TB. Furthermore, poor knowledge was more prevalent in males, non Libyans, illiterate and those with lower monthly income. Koay

(Koay, 2004) also reported poor knowledge of diagnosis among people living in Kudat district of Sabah, Malaysia. Similar to our findings this study also reported significantly poor knowledge scores in those with lower educational level. However, contrary to our findings, knowledge scores were higher in respondents of lower age group. Libya has a vertical TB control system under the National TB Control Program (NTP). Directly Observed Treatment Short-Course (DOTS) coverage is 100% and free diagnostic and treatment facilities are available at all government hospitals and health centers (WHO, 2006). According to our study findings, more than eighty percent respondents were of the opinion that they give priority to allopathic way of treating TB. Comparable findings have been reported from other studies of the same nature (Koay, 2004; Mushtaq *et al.*, 2010). However, in contrast to our findings, a study from Tanzania (Mangesho *et al.*, 2007) and Philippines (Portero *et al.*, 2002) reported serious misconceptions of study respondents about treatment of TB ranking self medication, local remedies, herbal products and traditional healing as a priority treatment methods. Prevention is considered as one of the main factors that lead to limit TB transmission. In the current study, less than two third of the respondents were aware of the fact that TB can be prevented by wearing face masks and avoiding contact with TB patients. Less than 50% of our respondents especially non Libyans and those with lower level of education were aware that active TB can be a consequence of malnutrition. Similar of our findings, avoidance of contact with TB patients is reported in literature (Koay, 2004; Mushtaq *et al.*, 2011). Current findings revealed poor knowledge of study respondents regarding prevention of TB infection. Health care managers should devise health promotion strategies to improve knowledge of every community member regarding prevention of TB infection. They should emphasize venerable community members about benefits of taking healthy diet and living in well ventilated rooms.

## CONCLUSION

This study reveals that in general, knowledge about TB within the population was not adequate. It also identified number of gaps in the area of transmission, risk factors, diagnosis and prevention of tuberculosis. Furthermore these gaps were predominated in non Libyans, and those with lower education and monthly income. It is therefore suggested that specialized educations programs should be developed for community members with these characteristics. Our study respondents indicated electronic media as most frequent source of information. Hence, all measures should be taken to remove barriers to educational messages transmitted by this media. To further promote awareness of TB in Libyan community, DOTS managers should devise health promotional plans on print media as current study findings indicated print media as one of the most neglected source of TB information.

## LIMITATIONS

The study was designed as a questionnaire based survey conducted in one part of the country. Generalizing these results to

the entire Libyan population is not wise. A nationwide survey is hereby recommended to get a better insight of TB situation in Libya.

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## DISCLOSURE

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## REFERENCES

- Abebe, G., Deribew, A., Apers, L., Woldemichael, K., Shiffa, J., Tesfaye, M., Abdissa, A., Deribie, F., Jira, C., & Bezabih, M. Knowledge, Health Seeking Behavior and Perceived Stigma towards Tuberculosis among Tuberculosis Suspects in a Rural Community in Southwest Ethiopia. *PloS One* 2010; 5(10): 1042-1045.
- Agboatwalla, M., Kazi, G. N., Shah, S. K., & Tariq, M. Gender perspectives on knowledge and practices regarding tuberculosis in urban and rural areas in Pakistan. *Eastern Meditterian Health Journal* 2003; 9(4): 732-740.
- Alvarez, G. G. C., Alvarez, J. F., Dorantes, J. J. E., & Halperin, F. D. Perceptions and practices of tuberculosis patients and non-adherence to therapy in Chiapas, Mexico. *Salud Publica de Mexico* 2000; 42(6): 520-528
- Hadi, M. A. E., Jalilvand, M., & Hadian, M. Assessment of the Amount of Knowledge and Attitude of Tehran High School Students Regarding Tuberculosis. *Tanaffos* 2006; 5(4): 23-28.
- Hanks, P., Wilkes, A. P., Urdang, L., & McLeod, T. W. Collins dictionary of the English language. London: Collins, c1986, 2nd ed., edited by Hanks, Patrick 1986.
- Hoa, N. P., Chuc, K. T. N., & Thorson, A. Knowledge, attitudes, and practices about tuberculosis and choice of communication channels in a rural community in Vietnam. *Health Policy* 2009; 90(1): 8-12.
- Hoa, N. P., Thorson, A. E. K., Long, N. H., & Diwan, V. K. Knowledge of tuberculosis and associated health-seeking behaviour among rural Vietnamese adults with a cough for at least three weeks. *Scandinavian Journal of Public Health* 2003; 31(62): 59-65.
- Jaramillo, E. The impact of media-based health education on tuberculosis diagnosis in Cali, Colombia. *Journal of Health Policy and Planning* 2001; 16(1): 68-73.
- Kaona, F. A. D., Tuba, M., Siziya, S., & Sikaona, L. An assessment of factors contributing to treatment adherence and knowledge of TB transmission among patients on TB treatment. *BMC Public Health* 2004; 4(1): 68.
- Koay, T. K. Knowledge and attitudes towards tuberculosis among the people living in Kudat District, Sabah. *Medical Journal of Malaysia* 2004; 59(4): 502-511.
- Liam, C. K., Lim, K. H., Wong, C. M. M., & Tang, B. G. Attitudes and knowledge of newly diagnosed tuberculosis patients regarding the disease, and factors affecting treatment compliance. *The International Journal of Tuberculosis and Lung Disease* 1999; 3(4): 300-309.
- Liefoghe, R., Baliddawa, J. B., Kipruto, E. M., Vermeire, C., & De Munynck, A. O. From their own perspective. A Kenyan community's perception of tuberculosis. *Tropical Medicine & International Health* 1997; 2(8): 809-821.
- Mangesho, P. E., Shayo, E. H., Makunde, W. H., Keto, G. B., Mandara, C. I., Kamugisha, M. L., Kilale, A. M., & Ishengoma, D. R. Community knowledge, attitudes and practices towards tuberculosis and its treatment in Mpwapwa District, central Tanzania. *Tanzania Journal of Health Research* 2007; 9(1): 38-43.
- Mfinanga, S. G., Morkve, O., Kazwala, R. R., Cleaveland, S., Sharp, J. M., Shirima, G., & Nilsen, R. The role of livestock keeping in

tuberculosis trends in Arusha, Tanzania. *The International Journal of Tuberculosis and Lung Disease* 2003; 7(7): 695-704.

Mushtaq, M. U., Majrooh, M. A., Ahmad, W., Rizwan, M., Luqman, M. Q., Aslam, M. J., Siddiqui, A. M., Akram, J., & Shad, M. A. Knowledge, attitudes and practices regarding tuberculosis in two districts of Punjab, Pakistan. *International Journal of Tuberculosis and Lung Disease* 2010; 14(3): 303-310.

Mushtaq, M. U., Shahid, U., Abdullah, H. M., Saeed, A., Omer, F., Shad, M. A., Siddiqui, A. M., & Akram, J. Urban-rural inequities in knowledge, attitudes and practices regarding tuberculosis in two districts of Pakistan's Punjab province. *International Journal for Equity in Health* 2011; 10(1): 8.

Nair, D. M., George, A., & Chacko, K. T. Tuberculosis in Bombay. New insights from urban poor patients. *Health Policy and Planning* 2002; 12(1):77-85.

Pishkar, M. Z., Sabzevari, S., & Mohammad Alizadeh, A. A survey of knowledge and attitude in medication controls of Tuberculosis patients referring to Zahedan anti TB centers in 1999. *Journal of Kerman University of Medical Sciences* 2001; 8(3): 153-160.

Portero Navio, J. L., Rubio Yuste M., & Pasicatan M. A. Socio-economic determinants of knowledge and attitudes about tuberculosis among the general population of Metro Manila, Philippines. *The International Journal of Tuberculosis and Lung Disease* 2002; 6(4): 301-306.

Raosoft. Sample size calculator. Available from: <http://www.raosoft.com/samplesize.html>

Singh, U. P., Bala, A., & Goel, R. K. D. Knowledge about Tuberculosis in Senior School Students of Punjab. *Indian Journal of Community Medicine* 2006; 31(2): 93.

TB Unit of the WHO Regional Office for Eastern-Mediterranean Region (2007). "TB epidemiological profile, Libyan Arab Jamahiriya." Available from: <<http://www.emro.who.int/stb/pdf/CountryProfile-ly-07.pdf>>

TB Unit of the WHO Regional Office for Eastern-Mediterranean Region (2008). "Country profile 2008-2009: Libyan Arab Jamahiriya." Available from: <<http://www.emro.who.int/stb/pdf/CountryProfile-ly-08.pdf>>

Wang, J., Fei, Y., Shen, H., & Xu, B. Gender difference in knowledge of tuberculosis and associated health-care seeking behaviors: a cross-sectional study in a rural area of China. *BMC Public Health* 2008; 8(1): 354.

World Health Organization (2006). Country Cooperative Strategy for WHO and the Libyan Arab Jamahiriya 2005-2009. Available from: <[http://www.who.int/countryfocus/cooperation\\_strategy/ccsbrief\\_lby\\_en.pdf](http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_lby_en.pdf)>

Yadav, S. P., Mathur, M. L., & Dixit, A. K. Knowledge and attitude towards tuberculosis among sandstone quarry workers in desert parts of Rajasthan. *Indian Journal of Tuberculosis* 2006; 53(4): 187-195.

Yousif, T. K., Donaldson, R. I., & Husseyanova, S. Tuberculosis in Iraq: a Post-Invasion Survey of Knowledge, Attitude and Practice in the Anbar Governorate. *Middle East Journal of Family Medicine* 2011; 2(1). Available from: <http://www.mejfm.com/Jan2011/tb.htm>

Zhang, T., Liu, X., Bromley, H., Tang, S. Perceptions of tuberculosis and health seeking behaviour in rural Inner Mongolia, China. *Health Policy* 2007; 81(2-3): 155-165.