Factors Affecting Self-management in Iranian Tuberculosis Patients: A Path Analysis Model

Nooshin Ghavidel
Alborz University of Medical Sciences

Zohreh Mahmoodi
Alborz University of Medical Sciences

Zhila Sharifipour
Shaheed Beheshti University of Medical Sciences

Tayebeh Fasihi Harandi (✉ tfasihih@gmail.com)
Alborz University of Medical Sciences   https://orcid.org/0000-0002-8220-3770

Abstract

Background Tuberculosis is a chronic infectious disease that, if not treated and managed properly, increases the Multi Drug Resistance (MDR). Self-management behaviors can reduce the progression of illness. Although various factors affect self-management, no study has not been conducted on the self-management tuberculosis through path analysis. This study evaluated the factors affecting self-management in tuberculosis patients using path analysis. Methods This study was a cross-sectional study and was done on 133 non prisoner tuberculosis (TB) patients that referred to all health centers in Karaj, Iran from March 2016 to February 2017.The structured questionnaire was applied. Data were analyzed with SPSS-17 and Lisrel 8.8, utilizing statistical path analysis to evaluate the relationships between self-management and its related factors. Results 52.3% of the participants in the study were female and 47.7% were male. Respondents of this research were 46.9% smear-positive, 9.4% smear-negative, 43.8% extra-pulmonary TB. Fit indices confirmed the model fitness and logical relationships between the variables according to the conceptual model (X2=49.80, df=25). The final path model showed that the age (B=0.84), attitude (B=0.10), marital status (B=0.04) and house condition (B=0.03) impact self-management just through direct path. Knowledge (B=0.83) and education (0.16) affect the self-management through both direct and indirect paths. The education indirectly affects the self-management through both knowledge and attitude. knowledge indirectly impact self-management through attitude. In other words knowledge and attitude mediate the relationship between some factors and self-management. Conclusions This study provided an empirical model that illustrates the relationships between self-management and related factors in TB Patients. The most important factor that affects self-management through both direct and indirect paths was knowledge. The knowledge can be the target of interventions in support of self-management

Background

Tuberculosis is a major cause of chronic pulmonary infection (1). Approximately one third of the world's population is infected with tuberculosis (TB) bacilli and at risk of developing active TB and each year about 9 million people affected by active tuberculosis, and about 1.5 to 2 million people die from the disease. Therefore tuberculosis is a global health problem (2, 3).

Tuberculosis can cause prolonged and significant impairment of lung function such as bronchiectasis and chronic obstructive pulmonary disease (COPD) which increases the number of episodes of tuberculosis especially in MDR patients (4-6). The detection and appropriate treatment of active cases can play important role in tuberculosis prevention. TB disease is treated with at least six months of combinations of several antibiotics to reduce the risk of antibiotic resistance. Increased drug-resistant TB in some areas threatens the achievements of global TB control programs (7). Directly Observed Treatment Short-course (DOTS) Strategy, has been the mainstay of adherence promotion since its introduction in the 1990s (8).

One of the most important factors in the success of treatment and fewer complications is higher awareness and proper management of the disease by the patient. Self-management behaviors are routine activities that a person does to manage his chronic illness. It causes promoting health, control signs and symptoms of disease, and reduce the effects of the illness and includes methods that affect the performance, emotions and interpersonal communication and the quality of the treatment regimen (9, 10).

Self-management behaviors reduce the progression of illness and increase the patient's quality of life through changes in lifestyle, decision-making about treatments tailored to the patient's social context, monitoring activities and management of signs and symptoms. These behaviors are a tool that helps patients to execute safely trained skills to control their illness and solve the common problems and complications of the disease (11, 12). Socioeconomic factors such as low educational level, low income, low quality of interpersonal and family relationships are serious problems with self-management process (13).

Studies have shown that self-management behaviors in some diseases, improve patient outcomes, treatment acceptance, eliminate the complications of the disease and hospitalization and increase the knowledge and skills of patients and their caretakers to maintain and improve their health (10, 11, 14-18).

Self-management behaviors and its related factors in some chronic diseases have been done, but not studied in tuberculosis disease so far. To investigate this matter, we studied different studies. A study has shown a correlation between self-care of TB patients and socio-demographic factors, including gender, marital status, family structure, family support, income (19). Several studies have investigated factors affecting the self-management in patients with chronic disease and revealed the impacts of socio-demographic (age, education, job, income) knowledge, attitude, the presence of support from family and community, social relations and the ability to deal with stress and stigma on self management (20-24). It has been revealed that socio-demographic factors including age, education, occupation, family support, residential locality and income impact knowledge; Education and income were related to attitude (22, 24-27).

Given that no previous study has investigated the relationship between the self-management behaviors and its related factors in TB patients and due to the importance of TB as a chronic infectious disease, we used Path analysis for investigation factors involved in self-management behavior in TB patients.

According to previous studies a conceptual framework is investigated by using Path analysis. (Fig1).

Methods

Design: This survey was a cross-sectional study and has been conducted as a census on all of non prisoner TB patients in Primary Health Centers (PHC) that have been implementing the DOTS strategy across the Karaj Iran. These data were collected between March 2016 to February 2017.

Participants: The study size was 133 non prisoner TB patients that referred to all PHC in Karaj, Iran from March 2016 to February 2017. Participants were from all of kinds of TB, including smear positive/negative pulmonary TB and extra-pulmonary TB. The inclusion criterion includes all tuberculosis patients who have spent at least two months of their treatment. The exclusion criterion was mental retardation or disabled people that can't do their work themselves. All people who participate signed an informed consent form

Research Variables: Socio-demographic characteristics, including: age, gender, nationality, marital status, education, occupation, income, kind of TB disease, location of living (Urban, Rural, Margin), marital status, history of previous TB or other disease, history of TB in the family, housing conditions (number of rooms and number of people in the house), health access (distance to health facility), the number of hospitalizations after TB diagnosis and cause of hospitalization. The dependent variables were knowledge, attitude, and self-management.

Knowledge questionnaire (12 questions) included questions about the cause of TB, symptoms, ways of transmission, prevention, and treatment of disease. Each question was rated in such a way that a score of one was given to correct responses and a score of zero was used for incorrect/don't know responses. The responses to these questions were added together to generate a knowledge score ranging from 0 to 12. Attitude questionnaire (9 questions) was structured on the five-point Likert scale (1 = quite agree; 2 = agree; 3 = no idea; 4 = disagree; and 5 = quite disagree). The responses to these questions were added together; attitude score ranging was from 9 to 45. Self-management questionnire (21 questions) was included questions about drug consumption, medical visits and life style. Questions were structured on the five-point Likert scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; and 5 = always). The responses to these questions also were added together and self-management score ranging was from 21 to 105. Higher total scores correspond to more about TB self-management activities. The total questionnaire was designed with adapted from other studies (28, 29) and then for the content validity of the tools were revised by 10 health experts, physicians and infectious specialist. For the reliability of the questionnaire the Cronbach's alpha test, was done. Cronbach's alpha coefficient for the Knowledge, attitude, and Self-management was respectively 0.781, 0.714, and 0.83. The questionnaire was completed by trained experts through interviews with TB patients. Total volume of samples was 133 people.

Statistical methods:

Statistical presentation and analysis of the present studied data were carried out, using the mean, standard deviation numbers with percentage of cases. The Pearson correlation coefficient was calculated to evaluate the relationships among the variables. The data collected then analyzed using path analysis. Path analysis was applied to evaluate the relationships among socio-demographic status, self-management, knowledge, and attitude. Path analysis is a statistical method which can be used to analysis relationships between a set of independent variables and a dependent variable. Path analysis is an extension of the regression model, which researchers use to test the fit of a correlation matrix with a causal model that they test (30)

In relation to fitness indices of models in path analysis, chi-squared to degrees of freedom index ($\chi 2$/d.f.) <3 is preferred, even though some researchers consider a score of 4 and even 5 to indicate a good fit. Other indices for fitting the model include the normed fit index, comparative fit index, and the goodness of fit index, with preferred values >0.9. In the root mean square error of approximation criteria, score ≤0.05 indicates a good fit, and up to 0.08 is acceptable, although some sources consider a score up to 0.11 acceptable. SPSS-17 and Lisrel-8.8 software was used for data analysis with the application of path analysis.

Results

Demographic Characteristics

From 133 participants in the study, 52.3% of were female and 47.7% were male. The age of the people was from 7 to 88 years old (Mean±SD=48.8±17.76); the highest percentage was in the age group of 31-50 years old (34.9%). Most of the patients were Iranian (83.2%) and mostly 89.3% lived in the city. The type of tuberculosis disease in patients was: 46.9% positive smears, 9.4% negative pulmonary smear, 43.8% extra-pulmonary. Demographic Characteristics of patients were shown in Table 1.

75.6% of patients were not admitted to the hospital after diagnosis of TB, and 24.4% were hospitalized at least once. The reasons for hospitalization were respectively: exacerbation of symptoms (50%), failed to improve symptoms (16.7%), drug complications (6.7%), drug intolerance (3.3%), and disassociate in drug use (3.3%). Self-management level was significantly higher in patients were not admitted to the hospital after diagnosis of TB (self management mean±SD in non admitted and admitted TB patients, respectively was 90.39±9.4; 86.43±10.1; p value =0.045).

Correlation coefficients

Prior to path analysis, bivariate analysis was used to assess the existing correlations between variables. As seen in Table 2, self-management was directly correlated with education, number of house rooms and knowledge. Knowledge was also directly correlated with education, and the number of house rooms. The attitude was directly correlated with age and patient hospitalization.

Table2. Correlations between structural parameters.

	age	MS	Edu	HDH	NHR	PH	SM	PK	PA
age	1								
MS	.598**	1							
Edu	-.282**	-.370**	1						
HDH	.154	.142	-.060	1					
NHR	.085	-.054	.207*	.091	1				
PH	-.071	-.103	-.027	.033	-.051	1			
SM	.044	-.144	.179*	-.144	.244**	-.132	1		
PK	-.039	-.017	.342**	-.137	.224**	-.078	.236**	1	
PA	.226**	-.066	.146	.001	.027	.198*	.041	.003	1

MS: Marital status; Edu: Education; HDH: Home distance to health center; PH: Patient Hospitalization; SM: Self management; PK: Patient Knowledge; PA: Patient Attitude; NHR: Number of house rooms

The relationship between self-management and its related factors in patients with tuberculosis was studied based on the path analysis model (Fig 2 and Table 3). According to the developed path diagram, the variable of age affects the self-management from both direct and indirect paths, but indirect path was insignificant. Among the variables that affected self-management just through a path, the variable of age and number of rooms were the highest (B=0.84) and lowest (B=0.03) impact respectively; In other words, a higher age and the number of homerooms will lead to better self-management. The variable of knowledge had the highest impact on self-management among variables that influenced both direct and indirect paths (B=0.83), in other words, as the individual's knowledge increases, his level of self-management also enhances. Knowledge indirectly affects self-management through attitude (B=0.69). Education also affects self-management through direct and indirect path (B=0.16) through knowledge and attitude.

Fit indices confirmed the model fitness and logical relationships between the variables according to the conceptual model. In other words, the fitted model had no significant differences in the conceptual model (Table 4).

Table4. Goodness of fit indices (n=133)

X2	df	CFI	GFI	NFI	RMSEA
49.80	25	0.98	0.93	0.92	0.00

CFI: Comparative Fit Index; GFI: Goodness of Fit Index; NFI: Normed Fit Index; RMSEA: Root Mean Square Error of Approximation

Discussion

In this study, we provide an empirical model that illustrates the relationships between self-management and related factors in TB Patients. We revealed (i) Age, attitude, marital status and house condition (number of rooms) had respectively the most impact on self-management just through direct path. (ii) Knowledge and education had the impact on self-management among variables that influenced both direct and indirect paths; the knowledge had the greatest impact on self-management. (iii) The education indirectly affects the self-management through both knowledge and attitude. Knowledge indirectly impact self-management through attitude. In other words knowledge and attitude mediate the relationship between some factors and self-management.

Our current study is of importance because we investigated and established relationships among variables that affect self-management in TB Patients using a path analysis. No previous study has investigated the self-management behaviors and its related factors in TB patients. The previous study used a correlation method between TB self-care and related factors and revealed factors, including gender, marital status, family structure, family support, income, and knowledge affect self-care of TB patients (19, 31)

In this study, there was significant direct and indirect relationship between knowledge and self-management so that, as the individual's knowledge increases, his level of self-management also enhances which is consistent with other studies in chronic disease self-management (24, 32). The DOTS Strategy that is done in health centers has been considered as a basic and effective factor in developing countries for better treatment and adherence of aTB control program (8). One of the activities in this program is training patients about the signs and symptoms of TB, prevention, correct drug use and its complications. Increased knowledge related to disease can be very important for self-management. Therefore, the communication between the provider and the patient may play an important role in increasing knowledge, attitude, and self-management of their disease. Studies have shown educational interventions can increase the level of knowledge, behavior and self care of pulmonary TB patients (33, 34).

In our study the results demonstrated that attitude directly affects self-management and mediates the effect of knowledge and education on self-management. Studies have shown that attitude contains feelings, belief, or opinions that could be both facilitators and barriers of self-management. Positive attitude to disease such as the increased perceptions of control is an important facilitator of self-management, negative beliefs towards self-management, such as believing that self-management was time-consuming, inconvenient, complex, prevented self-management behaviors (24, 35, 36) In this study marital status had a direct effect on self-management so that people that lived with other persons had better self-management. The presence of a life partner may influence the self-management due to more supervision, providing reminders about medication, accompanying individuals to medical services and attention of partner to disease (24, 32). This provides a better emotional and informational support for the patient and it is an important factor for chronic disease. These findings are consistent with other

studies that revealed the social and family support is a determinant variable and could be important to successful self-management behavior of chronic illnesses (19, 37-39).

The results showed that house condition, including the number of rooms, directly impact self-management so that living in houses that have more room leads to better self-management. Given that living in a separate room with good ventilation and sunshine is important in the prevention and treatment of TB, house conditions can be affected on self-management. Wardani et al. studied tuberculosis incidence and related factors based on structured equation model and revealed that the variable of housing condition was as latent variables of TB incidence. The result indicates that people with lower education, occupation, income and social class, tend to have housed with overcrowded, inadequate ventilation, and indoor air pollutants. Those factors will increase risk of TB (40). Other studies have also shown the housing condition affect TB incidence (41, 42)

In this study education had directly and indirectly effect on self-management so that people with higher education had better self-management. Education indirectly through knowledge and attitude affect self-management. These findings consistent with other studies, revealed the importance of education on knowledge, attitude, and self-management (26, 32, 40).

Our study showed that age, directly impact self-management so that higher age associated with better self-management. This can suggest that when people grow older, they care more about their health. Our findings in bivariate analysis showed direct correlation between age and attitude so that whatever age is growing, attitude to TB disease increased, this can be one of the reasons of higher self-management with higher age. Other studies have shown a negative correlation between self-management/self-care or health literacy and age (25, 34, 43). Grey and colleague showed age as an individual factor is variable in self-management of chronic disease (44). This disparity in our study can be from methodological differences.

There are several limitations within this study. First, our sample size was relatively small that limit our power to detect significant results, therefore further studies are needed to establish our model. Second, self-management was assessed by self-report scales that may not have adequately reflected these constructs. Third, the factors assessed in this study are low and more factors are needed to be studied.

Conclusions

In conclusion, we provided an empirical model that illustrates the relationships between self-management and related factors in TB Patients. The most important factor that affects self-management through both direct and indirect paths is knowledge. Indirect path is through attitude so that increased knowledge leads to more positive attitudes to TB and improves the self-management. Therefore, the communication between the provider and the patient in health centers can play an important role in increasing knowledge, attitude, and self-management of their disease. It is suggested that health education be increased by health professionals to both TB patients and their families especially in support of patients. Further studies are needed with more variable and sample size to establish our model.

Abbreviations

MDR: Multi Drug Resistance

TB: Tuberculosis

COPD: Chronic obstructive pulmonary disease

DOTS: Directly Observed Treatment Short-course

PHC: Primary Health Centers

Declarations

Ethics approval and consent to participate

The study was approved by the approval of the research ethics committee of Alborz University of Medical Sciences (ABZUMS.REC.1395.9). Written consents for participation were obtained from the adult participants and parents of children (under 16 years old) after being informed of the aim of the research.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Author's contributions

NG and TFH were involved in the study conception and design, NG and ZM, analyzed and interpreted the patient data as well as drafted the manuscript. ZS involved in writing up of the manuscript and data collection. All authors have read and approved the final version of the manuscript.

References

1. Salzer HJ, Wassilew N, Köhler N, Olaru ID, Günther G, Herzmann C, et al. Personalized medicine for chronic respiratory infectious diseases: tuberculosis, nontuberculous mycobacterial pulmonary diseases, and chronic pulmonary aspergillosis. Respiration. 2016;92(4):199-214.

2. Organization WH. Global tuberculosis control: epidemiology, strategy, financing: WHO report 2009: World Health Organization; 2009.

3. Organization WH. Global tuberculosis report 2013: World Health Organization; 2013.

4. Maguire G, Anstey N, Ardian M, Waramori G, Tjitra E, Kenangalem E, et al. Pulmonary tuberculosis, impaired lung function, disability and quality of life in a high-burden setting. The International Journal of Tuberculosis and Lung Disease. 2009;13(12):1500-6.

5. De Valliere S, Barker R. Residual lung damage after completion of treatment for multidrug-resistant tuberculosis. The International Journal of Tuberculosis and Lung Disease. 2004;8(6):767-71.

6. Hnizdo E, Singh T, Churchyard G. Chronic pulmonary function impairment caused by initial and recurrent pulmonary tuberculosis following treatment. Thorax. 2000;55(1):32-8.

7. Lawn SD ZA. Tuberculosis. Lancet. 2011;378:57-72.

8. Otu AA. Is the directly observed therapy short course (DOTS) an effective strategy for tuberculosis control in a developing country? Asian Pacific Journal of Tropical Disease. 2013;3(3):227-31.

9. Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. Patient education and counseling. 2002;48(2):177-87.

10. Yadollahi S, Ashktorab T, Zayeri F, Safavibayat Z. Correlation between Epilepsy Self-Management Behaviors and Seizure Frequency among Patients with Epilepsy in Iran Epilepsy Association. Preventive Care in Nursing & Midwifery Journal. 2015;5(1):59-70.

11. Chang AT, Haines T, Jackson C, Yang I, Nitz J, Choy NL, et al. Rationale and design of the PRSM study: pulmonary rehabilitation or self management for chronic obstructive pulmonary disease (COPD), what is the best approach? Contemporary clinical trials. 2008;29(5):796-800.

12. Cooper K, Smith BH, Hancock E. Patients' perceptions of self-management of chronic low back pain: evidence for enhancing patient education and support. Physiotherapy. 2009;95(1):43-50.

13. Nelson KM, McFarland L, Reiber G. Factors influencing disease self-management among veterans with diabetes and poor glycemic control. Journal of general internal medicine. 2007;22(4):442-7.

14. McGillion MH, Watt-Watson J, Stevens B, LeFort SM, Coyte P, Graham A. Randomized controlled trial of a psychoeducation program for the self-management of chronic cardiac pain. Journal of pain and symptom management. 2008;36(2):126-40.

15. Gustavsson C, Denison E, Koch L. Self-management of persistent neck pain: A randomized controlled trial of a multi-component group intervention in primary health care. European Journal of Pain. 2010;14(6):630. e1-. e11.

16. Swerissen H, Belfrage J, Weeks A, Jordan L, Walker C, Furler J, et al. A randomised control trial of a self-management program for people with a chronic illness from Vietnamese, Chinese, Italian and Greek backgrounds. Patient education and counseling. 2006;64(1-3):360-8.

17. Wang T, Tan J-Y, Xiao LD, Deng R. Effectiveness of disease-specific self-management education on health outcomes in patients with chronic obstructive pulmonary disease: an updated systematic review and meta-analysis. Patient education and counseling. 2017;100(8):1432-46.

18. Bourbeau J, Julien M, Maltais F, Rouleau M, Beaupré A, Bégin R, et al. Reduction of hospital utilization in patients with chronic obstructive pulmonary disease: a disease-specific self-management intervention. Archives of internal medicine. 2003;163(5):585-91.

19. Cho E, Kwon Y. Factors influencing self-care in tuberculosis patients. Journal of the Korea Academia-Industrial cooperation Society. 2013;14(8):3950-7.

20. TOL A, SHOJAEZADEH D, ESLAMI A, ALHANI F, MOHAJERI TM, SHARIFIRAD GR. ANALYSES OF SOME RELEVANT PREDICTORS ON SELF-MANAGEMENT OF TYPE 2 DIABETIC PATIENTS. 2011.

21. Schulman-Green D, Jaser S, Martin F, Alonzo A, Grey M, McCorkle R, et al. Processes of self-management in chronic illness. Journal of Nursing Scholarship. 2012;44(2):136-44.

22. Angwenyi V, Aantjes C, Kajumi M, De Man J, Criel B, Bunders-Aelen J. Patients experiences of self-management and strategies for dealing with chronic conditions in rural Malawi. PloS one. 2018;13(7):e0199977.

23. Abubakari A-R, Cousins R, Thomas C, Sharma D, Naderali EK. Sociodemographic and clinical predictors of self-management among people with poorly controlled type 1 and type 2 diabetes: the role of illness perceptions and self-efficacy. Journal of diabetes research. 2016;2016.

24. Schulman-Green D, Jaser SS, Park C, Whittemore R. A metasynthesis of factors affecting self-management of chronic illness. Journal of advanced nursing. 2016;72(7):1469-89.

25. Heijmans M, Waverijn G, Rademakers J, van der Vaart R, Rijken M. Functional, communicative and critical health literacy of chronic disease patients and their importance for self-management. Patient Education and Counseling. 2015;98(1):41-8.

26. Konda SG, Melo CA, Giri PA. Knowledge, attitude and practices regarding tuberculosis among new pulmonary tuberculosis patients in a new urban township in India. International Journal of Medical Science and Public Health. 2016;5(3):563-70.

27. Ali AOA, Prins MH. Patient knowledge and behavioral factors leading to non-adherence to tuberculosis treatment in Khartoum State, Sudan. Journal of Public Health and Epidemiology. 2016;8(11):316-25.

28. Shahhamzeh M, FASIHI HT, Kabir K, Montazeri A, ASADI SM, Saei V. The Relationship between Self-Management and Quality of Life in Epileptic Patients who referred to Iranian Epilepsy Association. Journal of Health and Care. 2017;19(2):189-98.

29. Tolossa D, Medhin G, Legesse M. Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: a cross-sectional study. BMC public health. 2014;14(1):804.

30. Wright S. Correlation and causation. Journal of agricultural research. 1921;20(7):557-85.

31. Gumeyi SC. Relationship between knowledge and self-care practices regarding tuberculosis treatment among clients aged 20–40 years at Beatrice Road Infectious Hospital outpatient clinic. 2012.

32. Miles C, Arden-Close E, Thomas M, Bruton A, Yardley L, Hankins M, et al. Barriers and facilitators of effective self-management in asthma: systematic review and thematic synthesis of patient and healthcare professional views. NPJ primary care respiratory medicine. 2017;27(1):57.

33. Jadgal KM, Nakhaei-Moghadam T, Alizadeh-Seiouki H, Zareban I, Sharifi-Rad J. Impact of educational intervention on patients behavior with smear-positive pulmonary tuberculosis: a study using the health belief model. Materia socio-medica. 2015;27(4):229.

34. Howyida S, Heba A, Abeer Y. Effect of Counseling on Self-Care Management among Adult Patients with Pulmonary Tuberculosis. Life Science Journal. 2012;9(1).

35. Lundberg PC, Thrakul S. Type 2 diabetes: how do Thai Buddhist people with diabetes practise self-management? Journal of Advanced Nursing. 2012;68(3):550-8.

36. Orzech KM, Vivian J, Huebner Torres C, Armin J, Shaw SJ. Diet and exercise adherence and practices among medically underserved patients with chronic disease: variation across four ethnic groups. Health Education & Behavior. 2013;40(1):56-66.

37. Rosland AM, Piette JD, Lyles CR, Parker MM, Moffet HH, Adler NE, et al. Social support and lifestyle vs. medical diabetes self-management in the Diabetes Study of Northern California (DISTANCE). Annals of

Behavioral Medicine. 2014;48(3):438-47.

38. Carbone ET, Rosal MC, Torres MI, Goins KV, Bermudez OI. Diabetes self-management: perspectives of Latino patients and their health care providers. Patient education and counseling. 2007;66(2):202-10.

39. Mead H, Andres E, Ramos C, Siegel B, Regenstein M. Barriers to effective self-management in cardiac patients: the patient's experience. Patient education and counseling. 2010;79(1):69-76.

40. Wardani DWSR, Lazuardi L, Mahendradhata Y, Kusnanto H. Structured equation model of tuberculosis incidence based on its social determinants and risk factors in Bandar Lampung, Indonesia. Open Journal of Epidemiology. 2014;4(02):76.

41. Lönnroth K, Castro KG, Chakaya JM, Chauhan LS, Floyd K, Glaziou P, et al. Tuberculosis control and elimination 2010–50: cure, care, and social development. The lancet. 2010;375(9728):1814-29.

42. Lönnroth K, Holtz T, Cobelens F, Chua J, van Leth F, Tupasi T, et al. Inclusion of information on risk factors, socio-economic status and health seeking in a tuberculosis prevalence survey [Educational series. Serialised guidelines. Assessing tuberculosis prevalence through population-based surveys. Number 6 in the series]. The International Journal of Tuberculosis and Lung Disease. 2009;13(2):171-6.

43. Mansyur CL, Rustveld LO, Nash SG, Jibaja-Weiss ML. Social factors and barriers to self-care adherence in Hispanic men and women with diabetes. Patient education and counseling. 2015;98(6):805-10.

44. Grey M, Knafl K, McCorkle R. A framework for the study of self-and family management of chronic conditions. Nursing outlook. 2006;54(5):278-86.

Tables 1 & 3

Due to technical limitations, Table(s) 1 and 3 are only available as a download in the supplemental files section.
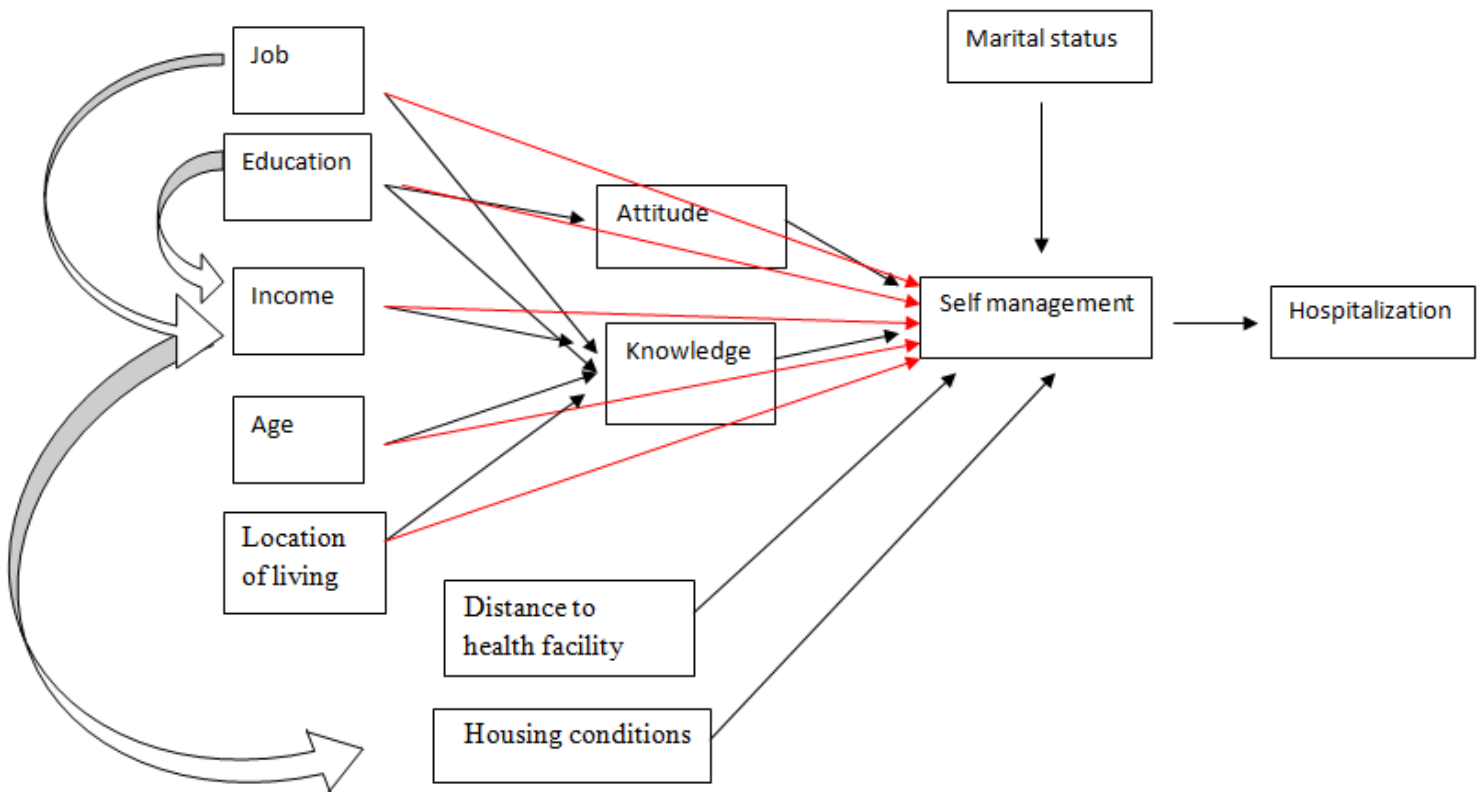
Figures

Figure 1

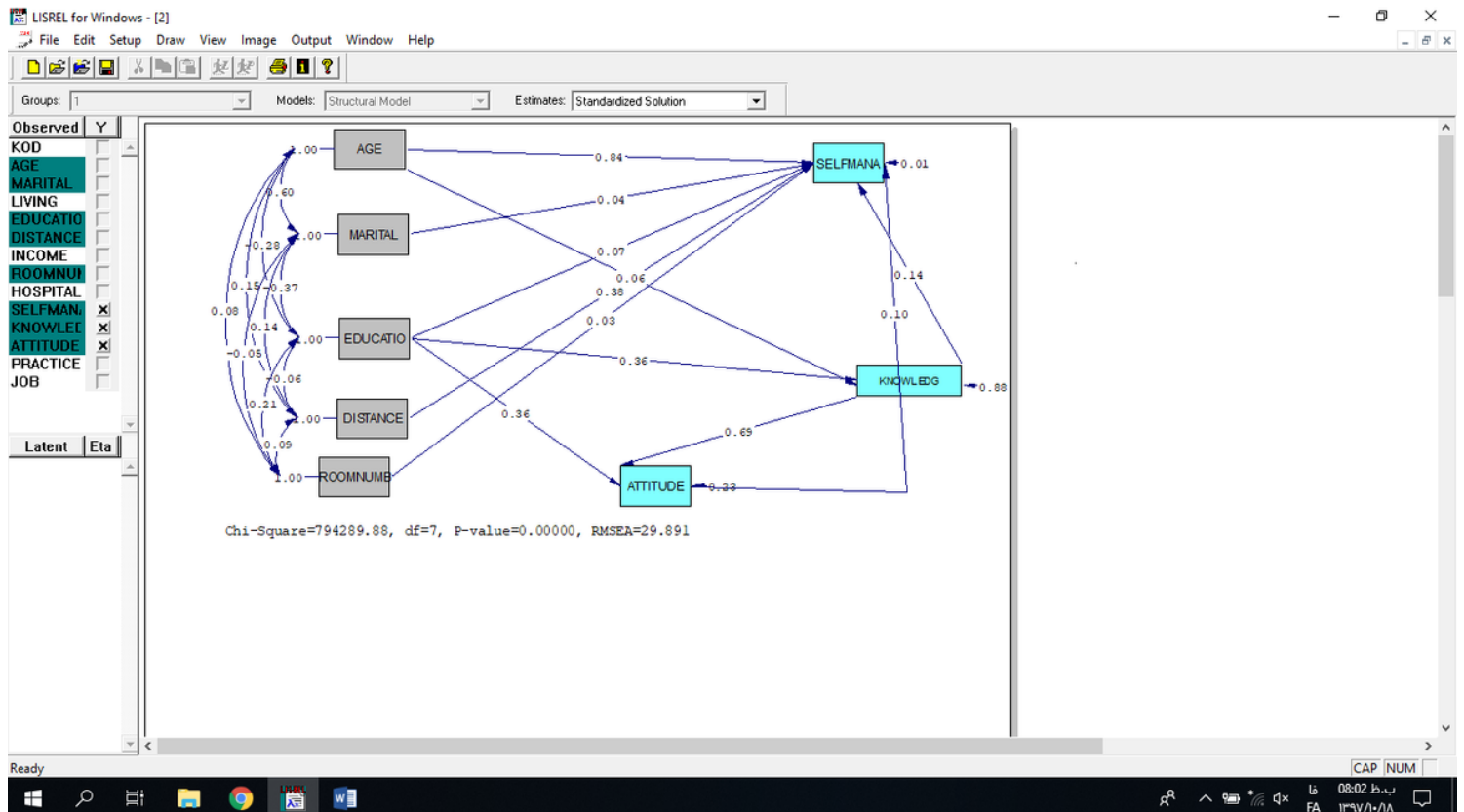Hypothesized conceptual framework of the relationships among the study variables.

Figure 2

Full empirical model (empirical path model for effects of factors among Iranian Tuberculosis Patients on self management.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1.pdf
- STROBEchecklistcrosssectional.docx
- Table3.pdf