ORIGINAL PAPER

Knowledge, Attitude and Compliance with Tuberculosis Treatment, Lusaka, Zambia

Mweemba P, Haruzivishe C, Siziya S, Chipimo P.J, Cristenson K, Johansson E

ABSTRACT

More than 1.5 million TB cases occur in sub-Saharan Africa every year. Lack of compliance to TB treatment has contributed to the steady rise of TB incidence in Zambia. The prevalence of TB was 511 per 100,000 population in 2000. Much of the increase in incidence has been attributed to co-infection with HIV, there are HIV rates of 70-80% in TB patients

Objectives: To determine knowledge, attitude and compliance with TB treatment by PTB patients attending chest clinic at a tertiary hospital.

Design and Measures: A descriptive study was conducted on a convenience sample of 104 pulmonary PTB patients receiving health care at chest clinic of a tertiary hospital in Lusaka, Zambia. An Interview Schedule comprising of four sections (demographic, knowledge, attitude, and compliance) was used to collect data.

Results: A total of 104 respondents aged 18 to 66 years took part in the study. Forty-nine percent were female, 51.9% were married and 42.3% had primary education only. About half of the respondents (49%) had no monthly income and majority of those with no income were female. Two thirds of the respondents (76%) lived in high-density areas.

Half of the respondents (49%) had average knowledge of TB treatment. Majority of the respondents (89.4%) had positive attitude towards TB treatment rating high in all the attitude subscales

74 % in commitment, 84.6% in challenge and 55.8% in control. Most of the respondents' (80.8%) reported complying with TB treatment regimens. There was a positive relationship between compliance and attitude, indicating that as the level of attitude increases, compliance level also increases (r = 0.59, p < 0.001). The results further showed that there was a significant positive correlation between knowledge and attitude (r = 0.25, p = 0.005). However, there was no relationship between knowledge and compliance (r = 0.12, p = 0.12) indicating that knowledge did not have an influence on compliance.

Conclusion and Implications
The trend of an increased prevalence of TB leading to increased incidence of infection needs to be broken in Zambia and the world over. There is great need to understand the problem of non-compliance with TB treatment. Compliance with TB treatment is one of the great determinants of TB control. The Study revealed a very important aspect that knowledge is not a direct determinant of compliance but that attitude has a lot of influence on compliance with TB treatment, indicating that attitude mediates the relationship between knowledge and compliance. It is vital therefore, to find ways of improving attitude in order to improve compliance. To improve compliance, there is need to adopt a very systematic and comprehensive view of patient compliance.

The implication of this study is that there is need for health workers to better understand the attitude of individual patients, particularly those that influence compliance and to take these into account when developing teaching strategies to enhance assimilation of information. The results have shown that when knowledge level is high it influences a positive attitude that consequently influences compliance positively.

Corresponding Author:
MWEEMBA PRUDENCIA,
Univeristy of Zambia
School of Medicine
Department of Post Basic Nursing
P.O.Box 50110
LUSAKA,ZAMBIA 10101
Teleppphone: 00-260-977-754368
Email: prudencia.mweemba@unza.zm or
          pmweemba@yahoo.com

INTRODUCTION

After decades in decline, tuberculosis (TB) is increasing worldwide[1]. Tuberculosis has become an increasing cause of morbidity and mortality in the world and it has become a global health problem claiming the lives of 2-3 million people each year and accounting for 4-5% of deaths globally[2,3].

So great was the concern about the modern tuberculosis epidemic in 1993, that the World Health Organisation took an unprecedented step and declared tuberculosis a global emergency. It was estimated that between 2000 and 2020, nearly one billion people will be newly infected, 200 million people will get sick and 35 million will die from TB if control is not further strengthened[4].

The Ministry of Health in Zambia has declared the TB epidemic a national disaster as 70% of all hospitalisations in the country are estimated to be due to TB[5]. The Ministry of Health has forecasted that unless something is done, 33 percent of the country's more than 10 million people will be infected over the coming years. Whilst much of this increase has been attributed to co-infection with HIV, as evidenced by HIV rates of 70 to 80 percent in tuberculosis patients[6], declining socio-economic conditions undoubtedly have fuelled the escalating infection rates[7].

The TB epidemic in Zambia has been compounded with lack of isolation of spuum positive patients, poor contact tracing, scarcity of drugs, poor compliance to TB treatment, poorly managed tuberculosis program, movement of people, the HIV/AIDS pandemic and the dwindling economy[7]. The poor economic situation has contributed to the increase in incidence of tuberculosis by increasing poverty levels and weakening the Health Ministry's ability to carry out effective TB prevention and control work[8].

Tuberculosis control activities were initiated by the colonial administration and the new Government of the Republic of Zambia in 1964 launched the National Tuberculosis Control Programme[8]. The main thrust of the TB control activities have been centred on passive case finding and treatment. Active contact tracing is not done at any level. To promote compliance, Zambia adopted the recommendations

by WHO [9] on treatment of TB in high prevalence countries. Among these is uninterrupted provision of supervised TB treatment (DOTS), the reduction of health workers' overload as well as prevention of adverse reactions especially those due to Thiacetazone[10]. In March 2000, Zambia formed the cabinet level HIV/AIDS/STD/TB Council and Secretariat. The new council is to provide national leadership, coordination, policy guidance and resource mobilization[1].

Despite all the efforts to combat the spread of TB, the case detection and prevalence have continued to rise steadily. A sharp increase of TB cases and rate during the period 1985 to 1996 is noted in Zambia[8]. In this period the absolute number of notified new cases increased from 8,246 in 1985, 38,863 in 1996 and to 142401 in 2000. Tuberculosis prevalence increased by more than threefold from 124 in 1985, 409 in 1996 and to 511 per 100,000 population in 2000. Non-compliance to tuberculosis treatment has also contributed to this rise in incidence and prevalence because it is one of the principal causes of treatment failure. Other causes are inappropriate treatment regimens and poorly planned and managed TB control programs[11]. Compliance with TB treatment is a complex issue, influenced not only by social, cultural and economic factors but also by knowledge and attitude of patients towards TB. In Zambia, very little information is available on patients' attitude toward tuberculosis chemotherapy.

Further, high notification rate of TB poses a challenge for Zambia today. Tuberculosis is the leading cause of morbidity and mortality in Zambia. However, DOTS has not been fully implemented in Zambia, therefore the defaulter rate has remained high. The Lusaka province prevalence rate was 1,328 per 100,000 in 2000[8].

PURPOSE

The purpose of this study was to describe knowledge, attitude and compliance with tuberculosis treatment of adult pulmonary tuberculosis (PTB) patients.

METHODS

Study Design and Setting

A descriptive quantitative design was used[12]. The study sought to describe knowledge, attitude and compliance of TB patients towards tuberculosis treatment. The study was conducted at the chest clinic of a tertiary institution in Lusaka. Lusaka is the capital city of Zambia and it has a population of 2 million people. This centre was chosen because it is the only centre at this tertiary level and hence attends to patients from different health institutions in the country.

Study Population

The accessible population comprised all pulmonary tuberculosis patients during the period of data collection. All PTB patients receiving health care at the chest clinic were targeted. Adult PTB patients (18 years and above); on tuberculosis treatment for at least one month; physically and mentally able to undergo a 30-40 minute interview; and receiving health care at chest clinic were invited to participate in the study. All those who were invited to participate in the study accepted to take part. The sample size of 104 calculated from Lipsey[13] tables at the power 0.80 and significance level (alpha) of 0.05 was obtained.

Data Collection

A structured interview schedule was used to collect data. It consisted of four sections. Section A sourced information on demographic variables (age, sex, marital status, education level, occupation, monthly income and area of residence). Section B elicited information on knowledge of tuberculosis treatment (cause, how often tuberculosis drugs are taken, duration of intensive and continuation phases, drugs in intensive and continuation phases, reaction to tuberculosis drugs and discontinuation of tuberculosis treatment). Pollock 's Health Related Hardiness Scale[14] was modified and used to measure attitude (commitment, challenge and control) in Section C. Section D assessed information on compliance. Compliance was defined as attendance for drug collection measured on a sliding scale using the ratio of expected number of attendances and actual number of attendances. Compliance data were

obtained respondents and verified by patients' attendance cards.

Ethical clearance was obtained from the Zambia Research and Ethics Committee. Permission to collect data from the chest clinic was obtained from the Executive Director of the tertiary hospital and authorities at the chest clinic. Informed consent was obtained from the respondents prior to the interviews.

Definition of Variables

Knowledge was related to what PTB patients knew about TB treatment and was measured through asking questions on tuberculosis treatment, developed by the investigators. Clinical experts reviewed the questionnaire to maintain validity. Fourteen questions were asked, one mark was allocated to each correct answer and zero for incorrect or don't know response.

Attitude was defined as the strength of resiliency and involved how a TB patient looks at her/himself, her/his world and the way these two interact[15]. Pollock's Health Related Hardiness Scale (HRHS.SS)[14] was modified and used to measure attitude. Three subscales were used to measure attitude: commitment, control and challenge.

Commitment is related to how the pulmonary tuberculosis patients believe that they and their world are important and worthwhile to engage in fully. Therefore, they would fully involve themselves in complying with tuberculosis chemotherapy.

Control is related to the way in which pulmonary tuberculosis patients see themselves as capable of solving the stressful changes of the disease and are able to comply with tuberculosis chemotherapy.

Challenge is related to the way in which pulmonary tuberculosis patients see their conditions as an opportunity of new learning and personal growth.

Attitude scale is a self-reporting questionnaire containing a three-point Likert type scale; agree, disagree and don't know. It had a total of 34 questions. Three marks were allocated to a correct answer, two to don't know and one to incorrect answer. The total score for attitude was 102. The total score was obtained from the measurement of

the three beliefs/variables that make up attitude: commitment, control and challenge; these were also analysed individually. The individual questions and scores for the three subscales of attitude were: commitment 7 questions and 21 scores; control 14 questions and 42 scores; and challenge 13 questions and 39 scores.

Compliance was related to patients' attendance to the chest clinic to collect drugs as required. Actual attendance was compared to required attendance on a ratio scale of 0 to 100. Compliance was measured on a sliding scale using the formula *required attendance divided by actual attendance multiplied by 100.*

Statistical Analysis

Raw data were edited for completeness and clarity, data from open-ended questions were categorised and grouped. A codebook was developed and study variables were coded. Data were entered and analysed on a computer software program Statistical Package for Social Scientists (SPSS) version 11.0. Descriptive statistics of frequency distributions and measures of dispersion were used to describe the study variables. Probability plotting, gave no evidence of vast skewness. Inferential statistics, Pearson's correlation coefficient, was used to determine the relationship between variables.

RESULTS

Sample Characteristics

The age of the respondents ranged from 18 to 66 years, 49% were female, 51.9% were married and 48.1% were single, separated, divorced or widowed. Secondary or higher level of education was attained by 57.7%, while 42.3% had only primary education. Half of the respondents (49%) had no monthly income and majority of those with no income were female. Two thirds of the respondents (76%) lived in high-density areas whereas 24% lived in either medium or low-density areas.

Knowledge

Knowledge levels ranged from 4.0 to 14 (Mean 10.6, SD 2.12). Most of the respondents (49%) had average level of knowledge (see figure 1).
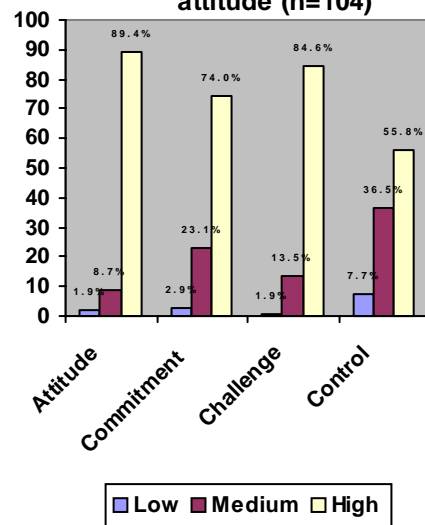

Distribution of respondents' Knowledge (n=104)
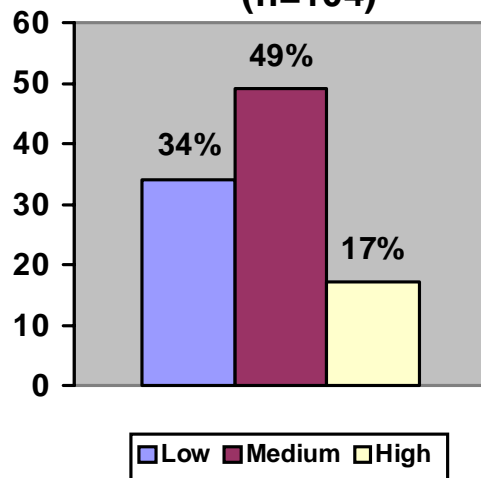
Attitude

The attitudes scale ranged from 42 to 93. The subscales of the attitude scale (commitment, challenge, control) were also analysed. Commitment ranged from 7 to 21, Challenge ranged from 17 to 39, and Control ranged from 16 to 40. Most of the respondents reported positive attitude (89.4% Mean 75.15, SD 9.97), commitment (74 % Mean 15.79, SD 2.91), challenge (84.6% Mean 30.42, SD 4.18), and control (55.8% Mean 28.9, SD 5.77) (see figure 2).
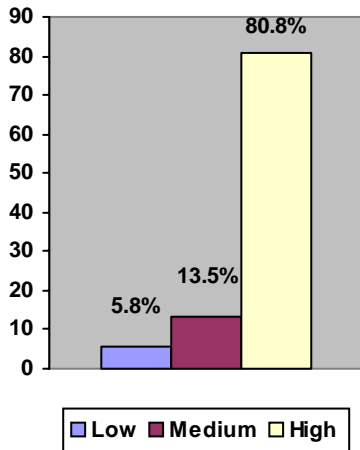

Distribution of respondents' attitude (n=104)

Compliance

Compliance levels ranged from 0.10 to 1.00 (Mean 0.79, SD 0.25). Most of the respondents (80.8%) reported high level of compliance to TB treatment (see figure 3).

Distribution of respondents' Compliance (N = 104)

Relationship among Knowledge, Attitude and Compliance with TB Treatment

A Pearson correlation co-efficient was used to establish relationships among knowledge, attitude and compliance. The results showed a positive relationship between compliance and attitude, indicating that as the level of attitude increases, compliance level also increases ($r = 0.59$, $p = 0.000$). The results also showed a positive relationship between each subscale of attitude and compliance: commitment ($r = 0.35$, $p < 0.001$), challenge ($r = 0.29$, $p < 0.01$) and control ($r = 0.63$, $p < 0.001$).

The results further showed that there was a significant positive relationship between knowledge and attitude ($r = 0.25$, $p < 0.005$) indicating that when attitude is high, knowledge increases as well. Knowledge also had significant positive relationship with two of the attitude subscales (commitment, $r = 0.22$, $p < 0.01$ and challenge, $r = 0.25$, $p < 0.01$) and showed no relationship with the third subscale (control, $r = 0.15$, $p < 0.07$) indicating that as commitment and challenge increase, knowledge also increases and that control does not directly influence knowledge.

However, there was no relationship between knowledge and compliance ($r = 0.12$, $p = 0.12$) indicating that knowledge did not have a direct influence on compliance.

Variables	Compliance		Knowledge	
	r	p	r	p
Knowledge	0.12	0.12	1.0000	=.
Hardy attitudes	0.59	0.000***	0.25	0.005**
Commitment	0.35	0.000***	0.22	0.01*
Challenge	0.29	0.001**	0.25	0.006**
Control	0.63	0.000***	0.15	0.068

DISCUSSION

Demographic

Tuberculosis is affecting everyone regardless of age but a majority of the respondents (77.7%) were aged between 20 and 39 years, which is the same age group that has high level of HIV/AIDS infection rate. The increase in incidence of tuberculosis is probably due to the HIV/AIDS pandemic, which makes people more prone to chronic illnesses such as TB[5]. In Zambia, about 97% of all those with tuberculosis are said to be also HIV positive[5].

Half of the respondents (49%) mostly female had no monthly income. There was a significant gender difference in income ($p = 0.011$) showing that more females than males had no monthly income. More men than women earn an income in Zambia[10,16]. Females in Zambia are less empowered and most of them depend on their husbands for basic needs such as food and shelter[10,16]. Poverty as defined by the World Bank poverty assessment of Zambia has a household food security implication and is based on the cost of minimum food basket. The food basket contains foods eaten by an average Zambian that meets the nutritional requirements of household members. Poverty is defined as expenditure less than the cost of a food basket to which 30% of that cost is added for non-food expenses. Core poor is expenditure less than the cost of food basket and below the cost of a food basket plus 30% of the food basket. In 1991, 68% of the population were estimated to be poor in 1991 whereas the proportion of the poor people was estimated to be 85% in 1993 in Zambia[17].

The majority (76%) lived in high-density area It is essential for TB patients to have sufficient income in order to access better nutritional food and better accommodation, which are contributing factors for successful treatment of TB. Moreover, improved income might decongest the high residential areas as people can afford to live in the medium and low-density areas.

Knowledge

Orem[18] states that if an individual lacks knowledge about self-care, he/she would also lack self-care practices; in this case, lack of TB treatment knowledge would lead to non-compliance with TB treatment.

The findings of the present study on knowledge of TB treatment showed that 49% had average level of TB treatment knowledge while only 17% had high level of knowledge. This demonstrated that the level of TB treatment knowledge was medium to low. This is not the picture expected in a context where most of the respondents had secondary level of education as education is perceived to enhance receptivity of information given. There is need to evaluate the teaching strategies used to determine how they influence assimilation of information given to PTB patients.

A study was conducted on defaulting from DOTS and its determinants in three districts of Asi Zone in Ethiopia[19]. They concluded that major factors contributing to high rates of defaulting were lack of family support, inadequate knowledge about treatment and medication side effects. They also argue that default reduction maybe successful if control programs consider these factors. The Asi Zone study[19] findings do not coincide with the results of the current study, which found no direct relationship between knowledge and compliance.

A project to determine the TB awareness was conducted in Kitwe, Zambia[7]. At the end of the project, the results showed improved knowledge, skills and commitment of health workers, patients were encouraged to complete their courses of treatment and there was increased awareness and concern about tuberculosis in the community. This shows that there is a potential to improve the knowledge of PTB patients. Other studies also show

that the level of knowledge of PTB patients increased after intervention programs[20,21,22]. This may imply that education programs need to be intensified in order to increase the level of knowledge with TB treatment.

Attitude

Most of the respondents (89.4%) had positive attitude, majority also scored high in all subscales of attitude. This indicates that the PTB patients had positive attitude towards TB treatment. The findings of the current study agree with what was suggested in a study in Botswana that high level of attitude would lead to appropriate health seeking behaviour and perceptions which should be encouraged and improved in patients in order to improve compliance with TB treatment[23].

Some studies[11,24] found that TB was considered a "*dirty disease*" with social stigmatisation leading to a delay in seeking medical advice and non-compliance. Many respondents described feelings of depression, anger and apathy associated with the disease process. These feelings appeared to contribute to a temptation to cease therapy once symptoms disappeared, implying that those with poor attitude or those who felt the strain of the disease were less likely to comply with treatment. The fact that most of the patients in the current study had positive attitude probably increased the compliance with TB treatment.

Compliance

Compliance was measured as a continuous from compliance to non-compliance. Most of the respondents (80.8%), complied with TB treatment. There are varying levels of compliance, which is also depicted in the following three studies. Treatment of outpatients in Ciskei varied between 50-80% in different districts[25]. Intensive follow up of 584 patients showed that 184 (31.5%) did not complete the course of tuberculosis treatment. A retrospective study found that there were varying degrees of non-adherence in 24% of the patients[26]. The third study examined adherence to appointments and medication taking[27]. They found that appointment keeping ranged from 81% on the first visit to 59% by the sixth visit. Medication adherence dropped from 89% in the first month to 64% at six months.

Approximately 19% of the respondents in the present study did not comply with TB treatment. This indicates that they are likely to have treatment failure or treatment resistance leading to further spread of the disease. Tuberculosis is a droplet infectious disease, where very high treatment compliance is the goal. The global targets for WHO are 70% for case detection and 85% for treatment success[28]. Zambia is also striving for at least 85% compliance[8]. Patients receiving anti tuberculosis therapy are rendered increasingly less infectious as their therapy progresses and are generally not infectious after one month of appropriate treatment[4,28]. Left untreated, each person with active tuberculosis will infect on average between 10 and 15 persons every year[4,28]. To reverse this situation, there is need for compliance TB treatment. The high rate of patient non-compliance has been identified as a major factor contributing to treatment failure; consequently, an extensive number of infectious people are spreading the disease rapidly in the global village[29].

Relationship among Knowledge, Attitude and Compliance

Results showed a positive relationship between compliance and attitude and a positive relationship between knowledge and attitude. However, there was no significant relationship between knowledge and compliance.

The findings of the present study that compliance was higher in those respondents who had high level of attitude agree with the findings of an exploratory study that found that patients who remained active and adjusted well to their illness also had positive attitude. Misconceptions regarding transmission of TB led to social ostracism of PTB patients which led to poor attitude[30].

A study conducted among black TB clinic attendees in Cape Town[30] found that patients were less knowledgeable about the disease and its treatment than respondents in the Ravensmead study[32]. The Ravensmead study was conducted in Cape Town to investigate knowledge and beliefs about tuberculosis. Despite the fact that the respondents in Ravensmead exhibited a level of good knowledge of the disease, this knowledge did not necessarily result in appropriate change in health behaviour. This agrees with the findings of the present study in that there was no relationship between knowledge and

compliance, hence there is need for positive attitude for one to comply with treatment.

CONCLUSION AND IMPLICATIONS

The trend of an increased prevalence of TB leading to increased incidence of infection needs to be broken in Zambia and the world over. There is great need to understand the problem of non-compliance with TB treatment. Compliance with TB treatment is one of the great determinants of TB control. To improve compliance, there is need to adopt a very systematic and comprehensive view of patient compliance. The Study revealed a very important aspect that knowledge is not a direct determinant of compliance but that attitude has a lot of influence on compliance with TB treatment. It is vital therefore, to find ways of improving attitude in order to improve compliance.

REFERENCES

1. Garbus, (2000). Zambia, context of epidemic. http://hivinsite.ucsf.edu/international/africa/2098.41aa.html.
2. Long, N. H., Johansson E., Diwan, V. K., Winkuist A. (1999). Different TB in men and women: beliefs from focus groups in Vietnam. *Social Science Medicine* Vol. 49 (6): 815-22
3. Bosman, C. J. M. (1996). Report no. 4 of the visit to the national AIDS/ STD/ TB & Leprosy control program of Zambia
4. World Health Organisation, facts sheets. (2000). Tuberculosis, http://www.who.int/inf-fs/en/fact/104.html Retrieved 29th March, 2007
5. IPS Wire. (1999). Health: Zambia declares tuberculosis a national disaster. http://hivinsite.ucsf.edu/ads/1999/04/05.GENERAL MEDIA.08.html Retrieved 29th March, 2007
6. Farmer, P., Ramulus, S. & Robin, S. (1991). Tuberculosis, poverty and compliance: lessons from rural Haiti. *Seminar Respiratory Infection* Vol. 6: 254-260
7. Mouli, C., Walker, L., Chondoka, S., Mwanayambe, N. (1992). Tuberculosis: Paper Presented to VIIIth International Conference on AIDS, Amsterdam
8. Central Board of Health, (2000). National Tuberculosis Care and Control, Strategic Plan 2001-2003. Lusaka, Zambia

9. World Health Organisation, 2003. Global Tuberculosis Control, surveillance, planning, financing.
http://www.who.int/gtb/publication/globrep/index.html

10. Minisry of Health. (1995). *National Tuberculosis Manual*. The National AID/STD/TB&Leprosy Program. Republic of Zambia, Ministry of Health

11. Johansson, E., Diwan, V. K., Huong, N. D., & Ahlberg, B. M. (1996). Staff and patient attitudes to TB and compliance with treatment: an exploratory study in a district in Vietnam. *Tubercle and Lung Disease* Vol. 77: 178-183

12. Polit, D. F., & Hungler, B. P. (1997). Nursing research: principles and methods (6th ed.). Philadelphia, J.P. Lippincott

13. Lipsey. (1990). Design Sensitivity: statistical power for experimental research. Newbur Park: Sage Publications 47-56

14. Pollock, S.E. & Duffy M.E. (1986). The health related hardiness scale: Development and Psychometric analysis. *Nursing Research*, Vol. 39: 218-222

15. Kobasa, S.C. (1979). Stressful life events, personality and health: An inquiry into hardiness. Journal of Personality and Social Psychology, 1979, 37:1-11

16. Ministry of Health. (1996). Demographic and Health Survey. Lusaka, Zambia. Central Statistics Office

17. Luma-Kanyangwa, J., Hambayi, N., Maunaumo, A., Kasonde, P., & Range, S., (1999). Household food security and child nutrition in Zambia, status, trends and key determinants. Social recovery project, Lusaka. Central Statistics Office

18. Orem, D.E. (1990). Nursing concepts of practice (4th ed.). St. Louis: Mosby Year Book

19. Teckle, B., Mariam, D.H. & Ali, A. (2002). Defaulting from DOTS and its determinants in three districts of Arsi Zone in Ethiopia. *Int. J. Tubercle Lung Disease* Vol. 6, (7): 573-9

20. Messmer, P. R., Jones, S., Moore, J., Tagart, B., Parchment, Y., Holloman, F., & Quintero, L.M. (1998). Knowledge, perceptions and practice of nurses towards HIV/AIDS patients diagnose with tuberculosis. *Journal of Continuing Education in Nursing*, Vol. 29 (3); 117-25

21. Carey, J.W. at el. Tuberculosis beliefs among recent Vietnamese refuges in New York state. *Public Health Reports*, Vol. 112, (1): 66-72

22. Lombard, C., & Dick, J. (1997). Shared Vision – a health education project designed to enhance adherence to anti tuberculosis treatment. *International Journal of Tuberculosis & Lung Disease Vol. 1(2): 181-6*

23. Mazonde, G. N., & Steen, T. W., Ngaka ya Sestwana, & Ngaka ya Sekgoa. Health seeking behaviour in Bostwana with pulmonary tuberculosis. *Social Science & Medicine.* Vol. 48, (2): 163-72

24. Dick, J., Schoeman, J.H., Mohammed, A., Lombard, C. (1996). Tuberculosis in the community: Evaluation of volunteer health worker program to enhance adherence to anti tuberculosis treatment. *Tubercle & Lung Disease*, Vol. 77, (3): 274-9

25. Shennan, D. H. (1993). The Ciskei tuberculosis information system. *Central African Journal of Medicine* Vol. 39, (8): 159-165

26. Pang, S.C., Harrison, R.H., Brearly, J., Jegathesan, V., & Clayton, A. S. Preventive therapy for tuberculosis in Western Australia. *International Journal of Tuberculosis & Lung Disease*, Vol. 2, (12): 984-8

27. Ailinger, R. L., Dear, M. R. (1998). Adherence to tuberculosis preventive therapy among Latino immigrants, *Public Health Nursing*, Vol. 15, (11): 19-24

28. World Health Organisation. (2003). What is DOTS? Tuberculosis, strategy and operations, monitoring and evaluation
http://www.who.int/gtb/dots/whatisdots.html
Retrieved 9th July, 2007

29. Enarson, D.A., Grosset, J., Mwiinga, A., Hershfield, E. S., O'brien, R., Cole, S. & Reichmann, L. & finalized by conference participants. (1995). The challenge of tuberculosis: statement on global control and prevention. The Lancet. Vol. 345, 14-15

30. Lee, L.T., Chen, C.J., Suo, J., Chen, C.Y., & Lin, R.S. Family factors affecting the outcome of tuberculosis treatment in Taiwan. *Journal of Formosan Medical Association*, Vol. 92 (12): 1049-56

31. Simao, T. (1987). Drug resistance in tuberculosis control. *Tubercle*, 68:5-15

32. Khan, M., Manderson, L. (1992). Focus groups in tropical diseases research. *Health Policy and Planning*. Vol. 7: 56-66

33. Dick, J., Vander wat, H., Hoogendoom, L., & Tobias, B. (1996). Development of a health education booklet to enhance adherence to tuberculosis treatment. *Tubercle & Lung Disease*, 173-177