MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Medicine and Medical Sciences (ISSN: 2354-323X) Vol. 9(1) pp. 058-066, January, 2021
Available online http://www.meritresearchjournals.org/mms/index.htm

DOI: 10.5281/zenodo.4459563

Original Research Article

Knowledge Attitude and Practice of Health Care Workers on Tuberculosis Infection Control in University of Lahore Teaching Hospital

Maria Yaseen[1*], Muhammad Hussain[2], Muhammad Afzal[3], Syed Amir Gilani[4]

[1]BS Nursing, Lahore School of Nursing, The University of Lahore, PO box 54000, Lahore, Pakistan

[2]Assistant Professor, Lahore School of Nursing, the University of Lahore, PO box 54000, Lahore, Pakistan

[3]Associate Professor, Lahore School of Nursing, the University of Lahore, PO box 54000, Lahore, Pakistan

[4]Professor, FAHS the University of Lahore, PO box 54000, Lahore, Pakistan.

***Corresponding Author's Email: faisalchemist66@gmail.com**

Abstract

Tuberculosis is an infectious disease that influences humanity for more than 4,000 years. It is a prolonged disease affected by the bacillus Mycobacterium tuberculosis and extends from person to person through air. Pitiable knowledge between health care workers as well as insufficient HICPAC might be basic to improve the hazard of hospital acquired Tuberculosis spread. A descriptive cross sectional study design was used to assess the Knowledge attitude and practice of Health care workers. Data was collected through a questionnaire. The overall 150 health care workers were evaluated for awareness, assertiveness as well as observation on Tuberculosis contamination. Knowledge on Tuberculosis contamination mechanism between practically 77.3 %(1.23±.420) of Healthcare workers recorded "worthy" amounts of awareness while 22.7%of them had "deprived" awareness. The awareness was considerably related by instructive grade, also Tuberculosis teaching and coordination acknowledged. Most of the health care workers 61.3 %(1.39±.489) may be confident in Tuberculosis contamination controllers. 38.7% of Healthcare workers were diseased with Tuberculosis. Usage of breathing apparatus between the Healthcare workers were restricted as well as triage of Tuberculosis respondents were absent. Total practice and awareness of health care workers towards tuberculosis contamination controllers wasn't suitable by the awareness actually not as good as between non-therapeutic also junior workers. Consistent orientation and ability constructed teaching towards contamination controllers for entirely units of health care workers might increase contamination control performs in the well-being services In addition, TB contamination control guideline and policy is mentioned to confirm real infection control measures in wellbeing services.

Keywords: Attitudes and practices, Health care workers, Infection control, Knowledge, Tuberculosis

INTRODUCTION

Tuberculosis is an infectious disease that influences humanity for more than 4,000 years. It is a prolonged disease affected by the bacillus Mycobacterium tuberculosis and extents from person to person through air. Tuberculosis generally influences the lungs but it can also influence other body parts, such as kidneys, intestines, brain, or the spine. M. tuberculosis is a slow-growing non-motile, aerobic bacterium the virulence of M.

tuberculosis, the persistent bacteria and extremely infectious are responsible for Tuberculosis infection. A new causative factor is the capability of these bacteria to mature heritable changes that resist a number of previously effective antibiotics. The World Health Organization assessed about 480,000 cases of multiple-drug resistant. Tuberculosis identified worldwide in 2013. (WHO, 2015).

Multiple-drug resistant Tuberculosis and extensively-drug resistant and its more unaffected sibling, Tuberculosis, have become more and more common as effective antibiotic cure of Tuberculosis were exposed. Some professionals expect that Multiple-drug resistant Tuberculosis will interchange non-resistance tuberculosis as the corporate form of the disease in the following 50 years unluckily extensive use of original medication, resistance to rifampin was noticed in mycobacterium tuberculosis soon after its origination as a tuberculosis cure standards, when other drugs like streptomycin were recognized the opposition effectively put down .Bacterial resistance to isoniazid also rapidly established, but when other drugs like para-amino salicylic acid, streptomycin were exposed, the resistance was effectively suppressed. These remarks escort to the consistent use of multi-drug cure authorities (WHO, 2015).

A simple idiomatic expression for tuberculosis transference is offered in which a)A origin case of tuberculosis b) contributes to infectious atoms c) that persist in air d) are inspired by a vulnerable person. Medications that mark bacterial or interactive substances of transference will interject tuberculosis and fast track the failure in tuberculosis occurrence (Houben, 2016).

Mediation that marks behavioral catalysts, bacterial host transmission will disturb tuberculosis transmission and fast-track decline in tuberculosis occurrence and mortality. Individuals with smear positive bacterial infection of the lungs, and the degree of contagious is assumed with the amount of smear positively. In a huge study of domestic relations among domestic contacts ,associated with smear negative tuberculosis may still also transfer. tuberculosis transference is therefore more likely to occurs external domestic, in school, public conveyance, workplaces, health care facilities. Maximum people with energetic who have had suitable medicine for at least two weeks are no longer infectious, multipronged plan essential to be taken to reduce the nosocomial transference of tuberculosis. World health organizations have printed a strategy about full mechanical and operating trials that can be applicable to lessen the transference of tuberculosis. Training of health care workers as well as clients is of chief significance in monitoring the extent of tuberculosis. Talented organization and airborne infection control follows were extremely different between facilities (Hermans, 2015).

Maximum people with energetic tuberculosis who have had suitable drug treatment for at least two weeks are no longer infectious. Multi-pronged strategy needs to be taken to reduce the nosocomial transmission of tuberculosis. The Government of India and World Health Organization has issued rules about operational and mechanical measures that can be applied to lessen the imparting of tuberculosis in the highest common factor. Training of health care worker as well as the client is of chief significance in monitoring the extent of tuberculosis. Airborne infection control practices were highly varied between facilities. Tuberculosis Testing and fast looking at Antiretroviral Therapy centers is seen at bulk of centers though insufficient tuberculosis infection control teaching, to organizational and special protective procedures and absence of instrument for health care workers supervision require concentration (Rode, 2016).

The client pronounced here symbolizes many clients who are perceived for long-lasting cough: A complete curative history presented no exact prompts, no allergies and no personal history of asthma; and consequences of chest x-ray inspection and bodily inspection were normal. The client originated acceptance of a pilot antihistamine medication and later a few weeks without enhancement of the cough, a proton pump inhibitor (PPI) was additional. Backflow-induced cough was identified after indications arose to recover. The client effectively stopped treatment after two months, by which time his cough had totally resolute (Turner, 2015)

Normal Safety measures in 2007 and highlight two key basics:

Appliance trials to avoid the extent of lung contaminations from anybody in a health care setting with signs or symptoms.

Upright signs at arrivals examining clients with indications of lung contaminations to:

- Shield your mouth and nose when coughing or sneezing.
- Use soft tissue and heave them left.
- Use a hand disinfectant and Rinse your hands all time you drop your mouth or nose.
- Offer tissues and no-touch containers for their removal.
- Deliver possessions for performance hand hygiene in or nearby waiting parts

Significance

This study will be helpful to locate the poor outcome causing settings which enhance the discipline to make strategies or policies in such a mechanism that can be put in place to manage clinical anxiety among health care workers with and without learning disabilities.

Purpose of the study

The main purpose of the study is to assess the Knowledge attitude and practice of HCWs on TB infection controllers in the university of Lahore teaching hospital and to enhance the performance of the health care worker and their learning effectiveness, exploration of anxiety causing settings and to come up with a suitable environment.

Objectives of the study

The main objective of this study is to assess the knowledge attitude and practice of HCWs on TB infection controller in university of Lahore teaching hospital

Research question

To what extent does the performance of the Healthcare worker affect due to anxiety and what are some methods which help to enhance the outcome of the performance/ for increasing HCW clinical achievements? her intends to achieve the following specific objectives

LITERATURE REVIEW

Tuberculosis was well assumed between Healthcare worker as the mainstream of them were attentive of signs and symptoms of tuberculosis, and its transference. Though, Tuberculosis Infection control exact information level was deprived. Maximum Health care worker absence appropriate information in Tuberculosis Infection control even though the respectable values of thoughtful wide-ranging material about Tuberculosis. The proportion of Healthcare workers recording “good” information was 54, comparatively not as much as testified 74% happening Ethiopia. Changing the proportion might be recognized towards dissimilar procedural methods somewhere. Healthcare workers of Ethiopian research characterized medical employees although this study also involved organization as well as new staff (WHO, 2016).

On opposing to compare related educations we restrained all squads of Health care workers due to their credible experience with tuberculosis infection and having an significant role in applying infection Control events in health services. Inhibition of nosocomial tuberculosis diffusion needs that all Healthcare workers are conscious of tuberculosis infection control and confirm satisfactory practices in health services. Furthermost non-medical staff is informative status, job classification and tuberculosis teaching or alignment established by the Health care worker.

The information discrepancy and insufficient infection control practices of Healthcare workers are foremost obstacles to implement infection control methods follow-on in an improved hazard of tuberculosis transference in health services. The poor information and practices could be recognized to nonexistence of tuberculosis infection control strategy and/or recommendation both at national and recognized levels. Network Time Protocol Nepal has not up till now modified or expressed the country exact tuberculosis infection controls recommendation. Thus, health services are not appreciative to exactingly implement the optional infection control procedures and Health care workers are not acquainted with the infection control values. It is authoritative that Network Time Protocol extremely recompenses thoughtfulness towards the matter and this education can deliver a complete suggestion to initiate improvement of tuberculosis infection control recommendation. Specified incomplete properties, Network Time Protocol may not be talented to approximately have enough money and environmental modifications. As such, economical and supportable approaches can be taken into deliberation. For example, simply production Health care workers responsive to essential infection control procedures like, proper mucus treatment, triage breathing sanitation and client training can suggestively diminish the risk of tuberculosis transference in the health care surroundings.

There are certain boundaries in our education. The education was accompanied in a small inhabitants warning the generalizability of the judgments. Tuberculosis Infection control practices in the education are self-reported created on the unidentified surveys rather than surveillance. However, this is a major challenge to study Health care worker’ Knowledge attitude and practice of Healthcare workers on tuberculosis infection control in Nepal.

All the particular health services contributed in the study. Everywhere 44% of health services have contamination inhibition strategies, but very few of them have planned for tuberculosis infection control events. Fewer than one third of health services (24 out of 79hierarchical file systems) have establishment to distinct probable tuberculosis clients, Although, only 50% (12 hierarchical file systems) have twisted such establishment into act. Merely 15 hierarchical file systems (38%) out of 40 hierarchical file systems having N95 masks for health workers. Everywhere partial of the hierarchical file system (44%, 35 out of 79) was originating to have cross ventilation.(CR and Wood, 2015).

METHODOLOGY

Study design

A descriptive cross sectional study design was used to assess the knowledge attitude and practice of HCWs on TB infection controller in university of Lahore teaching hospital

Sample size

The population for this study was selected by the Health care worker from university of Lahore teaching hospital. The target population consists of 240 participants and all were the Health care workers.

Study settings

Health care worker was selected from the university of Lahore teaching hospital.

Study population

Health care workers were selected for the study population

Research tool

Likert scale close ended questionnaire was adopted for data collection from the study participants. Results will be analyzed through SPSS.

Sample size

Total population size of HCWs was 186.6 and 150 people were under study.

Study gap

The gap of this study is that, there is no study was conducted previously in Lahore, Pakistan, so we want to conduct a research on this topic in Lahore

Inclusion Criteria

Inclusion criteria were included all health care workers of the University of Lahore teaching hospital who are willing to participate in the research study.

Exclusion Criteria

Exclusion criteria were included that health care workers who were not willing to participate in our research study. These segments also exclude those who were absent at the time of the data collection process.

Ethical consideration

Permission was obtained from the ethical committee of the health care institution, before data collection. Permission was acquiring a written approval from the head of the department of teaching hospital in the form of consent. Furthermore, informed written and verbal consent was taken before data collection from participants. The purpose of this study was informed prior to the implementation of any action. The risk related to this study was discussed before Participants have the right to leave the study participation at any time. In this case other participants were added for the accomplishment of data information. Participants were informed about the aims of the study and secrecy of the collected data was assured. A written consent was taken from respondents those who willing to participate in this study. All respondents were informed that their participation is highly appreciated and they can participate voluntarily. Participants were taken in confidence that all the collected information and records remained confidential.

Data Analysis

This chapter of analysis consists of two sections A and B. A consist of Demographic Data and second Knowledge attitude and practice of Health care workers on tuberculosis infection control. Descriptive Analysis is used to assess the knowledge, attitude and practice of health care workers on tuberculosis infection control.

RESULTS

Respondents were taken from Health care worker of university of Lahore teaching hospital.

Table 1 shows demographic frequencies of participants. The range of respondents was 18 to more than 23 years.(n=94) 62.7% participant were 18-30 age group,(n=32)21.3% from 31-40 years age, (n=7)4.7% from above 40 years ,(n=17) 11.3% from more than 23 years age. Total sample size (n=150) Female nurses were dominant than male. Female nurses (n=135) 90.0% and male nurses (n=15) 10.0% are male nurses. Educational level of participants was recorded (n=52)

Table 1. Demographic characteristic of HCWs

Sr#	Variable		*f*(100%)	Mean± S.D
1	Age	18–30 years	94(62.7)	1.65±1.004
		31–40 years	32(22.1)	
		Above 40 years	7(4.7)	
2	Sex	Male	15(10.0)	1.90±.301
		Female	135(90.0)	
3	Educational level	Secondary and below	52(34.7)	1.65±.478
		Tertiary and above	98(65.3)	
4	Job category	Physician	34(22.7)	2.37±1.261
		Nurse	76(50.7)	
		CHWs	7(4.7)	
		Ward attendant	16(10.7)	
5	Duration of Employment	<1 y	58(38.7)	1.61±.988
		1–4 y	57(38.0)	
		5–9 y	21(14.0)	
		10 y and >	14(9.3)	
6	Training or orientation on TB	Clinical staff	99(66.0)	1.94±.950
		x-ray staff	24(16.0)	
		Ward attendant	13(8.7)	
		Administrative staff	14(9.3)	

Table 2. Knowledge of HCWs on TB IC

Sr#	Variable		*f*(100%)	Mean± S.D
1	What are symptoms of TB?	Cough for 2 weeks or more	87(58.0)	1.84±1.352
		Weightless		
		Fever	39(26.0)	
		Loss of appetite	3(2.0)	
		Blood in sputum	9(6.0)	
		Chest pain	6(4.0)	
2	In what ways, can HCWs Prevent TB infection.	Use of respirators by HCWs	70(46.7)	1.53±.501
		Use of masks by patients	80(53.3)	
3	What are IC measures in health facilities?	Administrative controls	58(38.7)	1.69±.612
		Environmental controls	80(53.3)	
		Personal respiratory protection	12(8.0)	

34.7% having secondary educational level and (n=98) 65.3% having tertiary educational level. 50.7% of the HCWs were nurses followed by physician

n=76) 50.7%, ward attendant (n=16)10.7%, (n=17)11.3% are administrative staff, (n=7)4.7% are CHWs. Duration of employment of the HCWs ranged from less than 1 year (n=58)38.7%, (n=57)38.0% 1 to 4 years,(n=21)14.0% have 5 to 9 years' experience and (n=14)9.3% above 10 years . Nearly Half of the HCWs reported that they had received some level of training or orientation on TB and most of them were clinical staff(n=99) 66.0% (n=24)16.0%followed by lab/X-ray staff,(n=13)8.7%were ward attendant and administrative staff (n=14)9.3%. Those who reported receiving TB training educational status, job category and TB training or orientation received by the HCWs.

Table 2 shows the knowledge of HCWs on TB IC. Most of the HCWs were aware of the major symptoms (58.0%) and route of TB transmission. 46.7% HCWs state that the use of respirators can prevent TB infection and regarding the IC measures to be implemented in health facilities, 53.3%, of them stated environmental controls followed by administrative controls (n=58) 38.7%), 8.0% personal respiratory protection. 77.3 %

Table 3. Attitudes of HCWs towards TB IC

Sr#	Variable		f(100%)	Mean± S.D
1	There is a need for guidelines regarding TB IC in a health care facility	Agree Disagree	116(77.3) 34(22.7)	1.23±420
2	HCWs should wear respirators while caring for TB patients	Agree Disagree	115(76.7) 35(23.3)	1.23±424
3	Respirators do not protect against drug-resistant TB even if I wear it all time	Agree Disagree	110(73.3) 40(26.7)	1.27±444
4	Even after a patient with TB leaves the room I am working in, I remain at risk of contracting TB	Agree Disagree	99(66.0) 51(34.0)	1.34±475
5	Most HCWs are already infected so there is no need of IC measures	Agree Disagree	92(61.3) 58(38.7)	1.39±489
6	I do not wear respirator because patients do not like me to wear it	Agree Disagree	77(51.3) 73(48.7)	1.49±501
7	There is need to screen HCWs who may be exposed to TB for TB infection or disease	Agree Disagree	95(63.3) 55(36.7)	1.37±484
8	I may turn off fans if they become noisy or cause cold air	Agree Disagree	90(60.0) 60(40.0)	1.40±492
9	Cough hygiene has no role to play in IC	Agree Disagree	81(54.0) 69(46.0)	1.46±500
10	HCWs working in HIV care and treatment clinics are at risk of infection with TB	Agree Disagree	76(50.7) 74(49.3)	1.49±502

Table 4. Practices of HCWs on TB IC

Sr#	Variable		f(100%)	Mean± S.D
1	Proportion of shift spent with TB patients	<25%	80(53.3)	1.61±.775
		26-50%	53(35.3)	
		51-75%	12(8.0)	
		Above 75%	5(3.3)	
2	Proportion of shift worn respirator	Not at all	51(34.0)	2.01±1.013
		Above 75%	7(4.7)	
		Less than 25	65(43.3)	
		26-50%	23(15.3)	
		51-75%	4(2.7)	
3	Type of respirator used	N-95 mask	57(38.0)	1.75±.667
		Surgical mask	74(49.3)	
		Ordinary mask	19(12.7)	
4	What did they do for coughing patient in queue	Ask duration of their cough	33(22.0)	
		Place them in separate waiting area	64(42.7)	2.36±1.064
		Place them in front of queue	19(12.7)	
		Inform about cough etiquette	34(22.7)	
5	What did they do for coughing patient in queue	Always	29(19.3)	2.33±1.000
		Sometimes	72(48.0)	
		Never	20(13.3)	

(1.23±.420) of HCWs scored “good” level of knowledge. while 22.7% of them had “poor” knowledge level.

Table 3 shows the attitude of health care workers. Almost 76.7 % (1.23±.424) HCWs agreed that there is a need for a TB IC guideline in health facilities. Almost all of them (76.7%) agreed that they should wear respirators while caring for TB patients. Majority of HCWs (56.7%) were concerned about being infected with TB and nearly 54% of them agreed that cough hygiene alone has no role in TB IC. The analysis shows that HCWs’ attitude level was significantly associated with their level of knowledge on TB IC.

Table 4 shows that proportion of shift worn respirator usually 43.3% (1.61±.775), 12.7% percent of them never used respirators and only 38.0% (1.75±.667) of them reported using N-95 mask. While enquiring about their practice after seeing a coughing patient in the health facility, most of them (48.0%) replied that they ask the patient to cover his/her mouth while one-fourth 13.3% (2.33±1.000) of them stated that they do nothing. For patient education, only medical staff were considered as administration and support staff were not supposed to provide health education. 22.7% of them stated that they inform TB patients or suspects of cough etiquette and respiratory hygiene on daily basis.

DISCUSSION

Total practice and knowledge of health care workers on tuberculosis infection control were not suitable.(WHO, 2015).In addition, tuberculosis infection control guideline and policy is mentioned to confirm real infection control measures in wellbeing services.

Firstly in demographic data participants by age prominent group 18-30 that were 62.7% and by gender female nurses were more dominant than male .The educational level most of the participants having tertiary educational level that were 65.3%. According to the study finding one hundred fifty HCWs stated that they established particular level of teaching and coordination towards tuberculosis also maximum was medical worker (n=99) 66.0% (n=24)16.0% charted through laboratory investigations or X-ray staff,(n=13)8.7%were ward attendant and administrative staff (n=14)9.3%

Mozambique, Peru, Ethiopia, Lesotho and Russia reported average tuberculosis awareness scores of 51.7–74%, which are near to what we originate between health care workers working in Hajj (52%). However, we thought tuberculosis awareness in the present training to be normal, the amount of these trainings informed that their scores were unsatisfactory, poorly specified their advanced score cut off ideas for decent awareness.

Training should be determined according to needs, job categories, and educational backgrounds. Extraordinary thoughtfulness should be given to training support staff, non-clinical, to improve their knowledge attitude and practice and make them to carefully work in high risk surroundings such as tuberculosis care. Education should not only highlight the imaginary parts of training

but also skill-based constituents' influence on training. Numerous resources exposed in passing about behavioural modification between health care workers should be used including non-traditional and traditional approaches of collaborating information.

These contain, distribution of education materials, audit and feedback, local opinion leaders, educational meetings ,reminders, outreach visits, small group discussions and replicated cases to teach methods of evaluation of case-finding and to communicate administration, role-plays and treatment. Training and Educational activities alone or in grouping with other intervention were previously testified to have enhanced health care workers knowledge attitude and practice concerning tuberculosis and condensed nosocomial transmission of the disease (Sharma, 2018).

We evaluated all health care workers due to their credible contact towards Tuberculosis contamination or taking a significant part in applying infection control methods in well-being services. Inhibition of nosocomial Tuberculosis diffusion needs that all healthcare workers are awake of Tuberculosis infection control and confirm suitable practices in well-being services (Chinnakali, 2016).

Vietnam and Peru where 1–12.6% of healthcare workers did not know that tuberculosis is affected by a bacterium and 2.3–8% did not know that Tuberculosis is treatable. We recognized the amount of delusions concerning the way of Tuberculosis spread which have also been testified between health care workers in other studies, albeit to a lesser extent. As well-known by others, we create health care workers indistinguishable on the worth of BCG vaccination in relation to tuberculosis inhibition..

Limitation

Study was conducted during a short period of time. Data collected from only one institute so it show only one institute Knowledge, Attitude and Practice among health care worker

CONCLUSION

This study shows that Total practice and awareness of health care workers towards tuberculosis contamination controllers wasn't suitable by the awareness actuality not as good as between non-therapeutic also junior workers. Consistent orientation and ability constructed teaching towards contamination controllers for entirely units of health care workers might increase contamination control performs in the well-being services. In addition, TB contamination control guidelines and policy is mentioned to confirm real infection control measures in wellbeing services.

ACKNOWLEDGEMENT

First of all, I would like to thank Allah almighty for He is the most beneficent and merciful and giver of strength, opportunity, knowledge, success and ability to complete this research paper satisfactorily. I would also extend my thanks to many individuals who contributed to the success of this project. I am highly indebted to my supervisor Mr. Muhammad Hussain for their useful comments, encouragement, guidance and constant supervision as well as for providing necessary information regarding the research work and also for their support in completing the research. I would like to express my gratitude to my HOD, Lahore School of Nursing Mr. Muhammad Afzal who give me golden opportunity to conduct this research work. I would also like to express my gratitude towards my parents Mr. Muhammad Yaseen and Ms. Raseeda Bibi for their support and encouragement which helped me in completion of this project. My thanks and appreciation go to my family, friends and colleagues who supported me in all perspectives. I am also thankful to the management of the University of Lahore.

REFERENCE

Alotaibi B, Yassin Y, Mushi A, Maashi F, Thomas A, Mohamed G, Yezli S (2019). Tuberculosis knowledge, attitude and practice among healthcare workers during the 2016 Hajj. *PloS one*, *14*(1), e0210913.

Dahal S, Banjara MR, Khadka D, Ghimire G, Sharma S (2018). Drug Susceptibility Profile of Mycobacterium tuberculosis Isolated from Patients Visiting National Tuberculosis Centre, Nepal. *Tribhuvan Uni. J. Microbiol. 5*, 63-68.

Dahal S, Banjara MR, Khadka D, Ghimire G, Sharma S (2018). Drug Susceptibility Profile of Mycobacterium tuberculosis Isolated from Patients Visiting National Tuberculosis Centre, Nepal. *Tribhuvan Uni. J. Microbiol. 5*, 63-68.

Engelbrecht M, van Rensburg AJ, Kigozi G, van Rensburg HD (2016). Factors associated with good TB infection control practices among primary healthcare workers in the Free State Province, South Africa. *BMC infectious diseases*, *16*(1), 633.

Farhanah AW, Sarimah A, JafriMalin A, Hasnan J, SitiSuraiya MN, Wan Mohd Zahiruddin Wan M, Mohd Shah, M. (2016). Updates on knowledge, attitude and preventive practices on tuberculosis among healthcare workers. *Malay. J. Med. Sci. 23*(6), 25-34.

Gizaw GD, Alemu ZA, Kibret KT (2015). Assessment of knowledge and practice of health workers towards tuberculosis infection control and associated factors in public health facilities of Addis Ababa, Ethiopia: A cross-sectional study. *Archives of public health*, *73*(1), 15.

Hermans S, Horsburgh Jr, CR, Wood R (2015). A century of tuberculosis epidemiology in the Northern and Southern

Hemisphere: the differential impact of control interventions. *PloS one*, *10*(8), e0135179.

Houben RM, Dodd PJ (2016). The global burden of latent tuberculosis infection: a re-estimation using mathematical modelling. *PLoS medicine*, *13*(10), e1002152.

Houben RM, Menzies NA, Sumner T, Huynh GH, Arinaminpathy N, Goldhaber-Fiebert JD, Suen SC (2016). Feasibility of achieving the 2025 WHO global tuberculosis targets in South Africa, China, and India: a combined analysis of 11 mathematical models. *The Lancet Global Health*, *4*(11), e806-e815.

Irani AD, Shahraki AH, Ghaderi E, Nasehi M, Mostafavi E (2015). Lack of optimum practice among health care workers regarding tuberculosis in Iran: a knowledge, attitude, and practice study. *Ame. J. Infection Control*, *43*(5), e7-e12.

Isara AR, Akpodiete A (2015). Concerns about the knowledge and attitude of multidrug-resistant tuberculosis among health care workers and patients in Delta State, Nigeria. *Nigerian journal of clinical practice*, *18*(5), 664-669.

Khanal S, Baral S, Shrestha P, Puri M, Kandel S, Lamichanne B, Chinnakali P (2016). Yield of intensified tuberculosis case-finding activities using Xpert® MTB/RIF among risk groups in Nepal. *Public health action*, *6*(2), 136-141.

Knowledge, attitudes and practices regarding tuberculosis care among health workers in Southern Mozambique. *BMC pulmonary medicine*, *17*(1), 2..

Malangu N, Adebanjo OD (2015). Knowledge and practices about multidrug-resistant tuberculosis amongst healthcare workers in Maseru. *Afr. J. Primary Health care & family medicine*, *7*(1), 1-5.

National Tuberculosis Centre, *Ministry of Health and Population*, Government of Nepal. National Tuberculosis Programme Annual Report 2015. Bhaktapur: NTC; 2016.

Noé A, Ribeiro RM, Anselmo R, Maixenchs M, Sitole L, Munguambe K, García-Basteiro AL (2017).

Rode SK, Varadi R, McNamee J, Malek N, Stewart S, Jamieson FB, Avendano M (2015). Multidrug-resistant tuberculosis: treatment and outcomes of 93 patients. *Canadian respiratory journal*, *22*.

Shrestha A, Bhattarai D, Thapa B, Basel P, Wagle RR (2017). Health care workers' knowledge, attitudes and practices on tuberculosis infection control, Nepal. *BMC infectious diseases*, *17*(1), 724.

Turner RD, Bothamley GH (2015). Cough and the transmission of tuberculosis. *The J. Infectious Dis. 211*(9), 1367-1372.

World Health Organization. *Global tuberculosis report 2017*. Geneva*2017*.

World Health Organization.(2013). *Global tuberculosis report 2013*.World Health Organization.

World Health Organization.(2015). *World health statistics 2015*.World Health Organization.

World Health Organization.(2016). *World malaria report 2015*.World Health Organization.

World Health Organization.(2016). *World malaria report 2015*.World Health Organization.

Yezli S, Alotaibi B, Al-Abdely H, Balkhy HH, Yassin Y, Mushi A, Raoult D (2019). Acquisition of respiratory and gastrointestinal pathogens among health care workers during the 2015 Hajj season. *Ame. J. Infection control*, *47*(9), 1071-1076.

Yezli S, Yassin YM, Awam AH, Attar AA, Al-Jahdali EA, Alotaibi BM (2017). Umrah. An opportunity for mass gatherings health research. *Saudi medical journal*, *38*(8), 868.

Yezli S, Zumla A, Yassin Y, Al-Shangiti AM, Mohamed G, Turkistani AM, Alotaibi B (2017). Undiagnosed active pulmonary tuberculosis among pilgrims during the 2015 Hajj mass gathering: a prospective cross-sectional study. *The Ame. J. Trop. Med. Hygiene*, *97*(5), 1304-1309.