



## KNOWLEDGE OF TUBERCULOSIS INFECTION CONTROL AMONG HEALTH CARE PROFESSIONALS IN RWANDA

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### **Abstract**

**Background:** Tuberculosis (TB) infection is one of the major causes of death among infectious diseases worldwide. Health Care Professionals (HCPs) are more vulnerable compared to the rest of the people. Increased nosocomial infection of TB transmission in health facilities is due to poor knowledge among HCPs. This study aimed to assess the knowledge of Health Care Professionals toward TB infection control in health centers of Gasabo district, Rwanda.

**Methods:** This study was conducted under a cross-sectional study design. A structured questionnaire was used for data collection. This study's population was 303 healthcare professionals with a sample size of 173 study participants. The descriptive statistic analysis was carried out by the SPSS version 22. The overall rating regarding the knowledge level was based on Bloom's cut-off where the poor level of the overall score was set under 60% while the rate above 60% was taken as a good level.

**Results:** The results showed that the socio-demographic characteristics were dominated by a young age structure from 31 to 40 years with 70.5% while females were 71.7%. The nursing profession was the most represented with 87.9%. The overall good knowledge was 74.6% while the poor knowledge was 63% among the study participants.

**Conclusion:** The study concluded that the level of knowledge was high among healthcare professionals. This requires a sustainable improvement with programmed training to continually increase the TBIC knowledge level to protect health and limit tuberculosis infection among health professionals.

**Keywords:** Knowledge, practice, tuberculosis, Infection, control.

## **Introduction**

Globally, the tuberculosis toll death was estimated to be 1.7 million in 2016 and 1.4 million in 2019 (Abdullahi, 2019; WHO, 2020). Africa and southeast Asia remain the epicenter of TB burden all over the world (Boah, 2020). In 2015, tuberculosis was the second leading cause of death globally. 40% of the global TB was attributed to the South Asia region in 2015 (Basnyat, 2018). Although the sub-Saharan African region's total population was estimated to be 12% of the global population, TB prevalence was 29% of the 9 million global TB prevalence (Alimuddin, 2015). Around 48% of sub-Saharan African patients presumably had undiagnosed TB (Jayasooriya, 2022). The new TB cases globally increased to 10 million in 2019 (Uwamahoro, 2021).

The middle-income countries are still very burdened by TB at 95% of global toll deaths. In 2012 a survey conducted in Rwanda showed that the smear-positive results presented 74.1/100,000 adult people while the confirmed mycobacterium tuberculosis prevalence was 119.3/ 100,000 adult people (Migambi, 2020). Although the incidence of TB reduced from 96 to 57 per 100,000 in 2017, it was recently reported that the incidence increased by 1/100,000 population with a death rate of 4.9 per 100,000 population (Knoema, 2020; Uwamahoro, 2021).

Health Care Professionals are among those who are at high risk of acquiring TB, due to the routine work with many patients attending health centers, delays in the health centers, lack of isolation wards, overcrowding of admission wards, with inadequate knowledge about tuberculosis infections control (Zungu, 2011). This study aimed to assess the knowledge of Health Care Professionals toward TB infection control in health centers of Gasabo district, Rwanda.

## **Methods**

This study was conducted under a cross-sectional study design. A structured questionnaire was used for data collection. This study's population was 303 healthcare professionals with a sample size of 173 study participants. The descriptive statistical analysis was carried out by the SPSS version 22. Proportionate stratified random sampling was used to select the study participants from their respective health centers and simple random sampling was applied in each stratum. The score level was based on the scale where (0=false, 1=true) and the overall rating regarding

the knowledge level was based on Bloom’s cut-off where the poor level of the overall score was set under 60% while the rate above 60% was taken as a good level.

## Results

As shown in table 1 the young age structure from 31 to 40 years dominated other group age structures with 70.5% whereas females dominated the gender with 71.7% among all study participants. The Remera health center was the most represented Health center with 11%. Nurses and A1 education level were mostly presented with 87.9%, and 61.8%, respectively.

**Table 1: Socio- demographic characteristics among health professionals of Gasabo District health centers in August 2022.**

Variable	Frequency(n=173)	Proportion (%)
<b>Age structure</b>		
20-30	42	24.3
31-40	122	70.5
41-50	3	1.7
51+	6	3.5
<b>Total</b>	173	100%
<b>Gender</b>		
Male	49	28.3
Female	124	71.7
<b>Total</b>	173	100%
<b>Education level</b>		
A2	66	38.2
A1	107	61.8
<b>Total</b>	173	100%
<b>Occupation</b>		
Nurse	152	87.9
Midwife	4	2.3
Dentist	5	2.9
Labo Technician	12	6.9
<b>Total</b>	173	100%
<b>Health center participants</b>		
Kabuye	8	4.6
Solace HC	14	8.1
Remera HC	19	11.0
Kagugu HC	8	4.6
Kinyinya HC	10	5.8
Rubungo HC	10	5.8
Nyacyonga HC	8	4.6
Gikomero HC	12	6.9
Rwanda women network HC	10	5.8
Jali HC	8	4.6
Gatsata HC	10	5.8
Kayanga HC	12	6.9
Gihogwe HC	12	6.9
Bumbogo	10	5.8
Nduba HC	10	5.8
Kacyiru HC	12	6.9
<b>Total</b>	173	100%

**Source: Primary data, 2022.**

The level of knowledge regarding tuberculosis infection control among Gasabo district Health center's skilled health care professionals. The participants showed elevated levels of Knowledge where 90.8% knew the microorganism that causes tuberculosis, 84.4% knew common symptoms of tuberculosis and 97.7% that Tuberculosis is contagious (Table 2). The knowledge level was

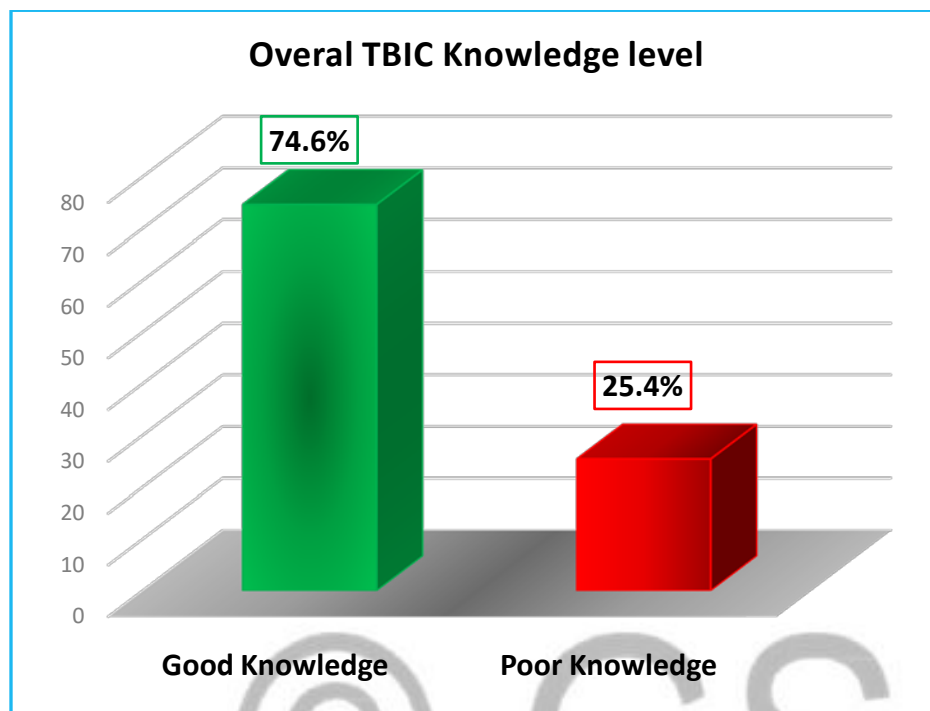
reduced to a minimal extent for certain items such as how can we contract TB with 39.3%, the TB prevention measures with 44.5% who don't know the preventive measures.

**Table 2. Knowledge on the tuberculosis infection control among health professionals of Gasabo District health centers in August 2022.**

Variable	Frequency(n=173)	Proportion (%)
<b>Which of the following microorganism is the cause of TB?</b>		
Streptococcus Pneumonia	3	1.7
Mycobacterium Tuberculosis	157	90.8
Don't know	13	7.5
<b>What are the most common symptoms of TB?</b>		
Persistent cough for more than 2 weeks	26	15.0
Fever for more than two weeks	1	.6
All are applied	146	84.4
<b>Is TB contagious?</b>		
Yes	169	97.7
No	4	2.3
<b>The diagnosis of TB is confirmed from two sputum specimens?</b>		
Yes	143	82.7
No	20	11.6
Don't know	10	5.8
<b>Does HIV increase person's susceptibility to TB infection?</b>		
Yes	161	93.1
No	5	2.9
Don't know	7	4.0
<b>For how long a person must take their TB medication after being diagnosed with TB</b>		
6 months	169	97.7
Don't know	4	2.3
<b>Is TB curable?</b>		
Yes	166	96.0
Don't Know	7	4.0
<b>Putting on N95 or N100(Protective masks) can reduce the risk of transmission of TB?</b>		
Agree	119	68.8
Not sure	50	28.9
Disagree	4	2.3
<b>In your opinion, which of these measures can prevent a person from getting pulmonary TB?</b>		
Agree keeping windows closed at work	24	13.9
Always washing hands	35	20.2
Immunization with BCG vaccine	96	55.5
Use personal protective equipment	18	10.4
<b>How can we contract tuberculosis?</b>		
By exposure to a potentially infectious case	55	31.8
By inhaling droplet nuclei produced by a person who sneezes	105	60.7
By sharing dishes with TB patients	13	7.5
<b>Total</b>	<b>173</b>	<b>100%</b>

**Source: Primary data, 2022**

The categorization of a good level of knowledge and a poor level of knowledge was based on the bloom's cut-off, which inspired the generated overall knowledge level (Mohammed, 2018).



**Figure 1. Overall level of knowledge regarding the TBIC among health professionals of Gasabo District health centers in August 2022.**

Good knowledge was based on a score above or equal to 60% while poor knowledge was below 60%. Good knowledge presented at 74.6% while the poor knowledge level was 25.4% among the study participants Figure 1.

### Discussion

The Nurses dominated other groups with 87.9% whereas other professions (Midwife, dentist, laboratory technicians) occupied only 12.1% (Table 1).

This study's findings showed that the overall knowledge level was 74.6% while the poor knowledge was 25.4% (Figure 1). This was also due to some low scores for certain items, where 39.3% didn't know exactly how a person can contract the TB, and 44.5% didn't know the TB preventive measures (Table 2). This study level of knowledge result was very high compared to 28.2% of good knowledge in the Gabon study (Vigenschow, 2021), 70.6% in Malaysia (Ramlan, 2020), and 10.5% of good knowledge in the Nigerian study (Akande, 2019). And yet this study's good knowledge results of 74.6% were relatively similar to the Ethiopian study's result of 74.4% of good knowledge (Temesgen, 2011). About 60.7 of the study participants knew that TB was

transmitted through droplet nuclei whereas the Ugandan study presented a good result of 98% (Buregyeya, 2016).

### Conclusion

This study revealed that the level of knowledge towards tuberculosis infection control was high among the health care professionals. This requires a sustainable improvement with programmed training to continually increase the TBIC knowledge level to protect the health and limit the tuberculosis infection among health professionals.

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**Authors contribution:** IT organized the manuscripts; NC supervised the study process and evaluated the data analysis and manuscript quality.

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### Reference

- Abdullahi OA, Ngari MM, Sanga D, Katana G, Willetts A.(2019). Mortality during treatment for tuberculosis; a review of surveillance data in a rural county in Kenya. *PLoS One*. Jul 11;14(7):e0219191. doi: 10.1371/journal.pone.0219191. PMID: 31295277; PMCID: PMC6622488.
- Akande, P. A. (2020). Knowledge and practices regarding tuberculosis infection control among nurses in Ibadan, south-west Nigeria: a cross-sectional study. *BMC healthservices research*, 20(1), 1-10.
- Boah Michael, Timothy Adampah, Baiming Jin, Wenji Wang & Kewei Wang (2020) Trend of tuberculosis case notifications and their determinants in Africa and South-East Asia during 2000–2018: a longitudinal analysis of national data from 58 countries, *Infectious Diseases*, 52:8, 538-546, DOI: 10.1080/23744235.2020.1761560
- Buregyeya, E., Nuwaha, F., Verver, S., Criel, B., Colebunders, R., Wanyenze, R., ... & Mitchell, E. M. (2013). Implementation of tuberculosis infection control in health facilities in Mukono and Wakiso districts, Uganda. *BMC infectious diseases*, 13(1), 1-9.
- Basnyat B, Caws M, Udwardia Z. Tuberculosis in South Asia: a tide in the affairs of men. *Multidiscip Respir Med*. 2018 Mar 22;13:10. doi: 10.1186/s40248-018-0122-y. PMID: 29599974; PMCID: PMC5868053.

- Jayasooriya Shamanthi , Francesca Dimambro-Denson, Claire Beecroft, Julie Balen, Babatunde Awokola, Caroline Mitchell1, <http://orcid.org/0000-0002-6546-4709>Beate Kampmann, Fiona Campbell, Pete Dodd(2022). <http://orcid.org/0000-0002-8118-8871>Kevin Mortimer, Patients with presumed tuberculosis in sub-Saharan Africa that are not diagnosed with tuberculosis: a systematic review and meta-analysis, *BMJ*, <https://thorax.bmj.com/content/early/2022/01/23/thoraxjnl-2021-217663>
- Knoema. (2021). Rwanda - Tuberculosis death rate. <https://knoema.com/atlas/Rwanda/topics/Health/Risk-factors/Tuberculosis-death-rate>
- Migambi, P., Gasana, M., Uwizeye, C. B., Kamanzi, E., Ndahindwa, V., Kalisvaart, N., &Klinkenberg, E. (2020). Prevalence of tuberculosis in Rwanda: Results of the first nationwide survey in 2012 yielded important lessons for TB control. *PloS one*, 15(4), e0231372.
- Ramlan, W., Huda, B. Z., & Kamarudin, R. (2020). Knowledge and practice on tuberculosis infection control among government primary Health Care Professionalsin a district in Malaysia. *International Journal of Public Health and Clinical Sciences*, 7(4), 178-192.
- Temesgen, C., Demissie, M(2014). Knowledge and practice of tuberculosis infection control among health professionals in Northwest Ethiopia; 2011. *BMC Health Serv Res* 14, 593 (2014). <https://doi.org/10.1186/s12913-014-0593-2>
- Uwamahoro D, Beeman A, Sharma VK, Henry MB, Garbern SC, Becker J, Harfouche FD, Rogers AP, Kendric K, Guptill M. Seasonal influence of tuberculosis diagnosis in Rwanda. *Trop Med Health*. 2021 May 12;49(1):36. doi: 10.1186/s41182-021-00328-w. PMID: 33980306; PMCID: PMC8114710.
- Vigenschow, A., Edoa, J. R., Adegbite, B. R., Agbo, P. A., Adegnika, A. A., Alabi, A., ... & Grobusch, M. P. (2021). Knowledge, attitudes and practices regarding tuberculosis amongst Health Care Professionalsin Moyen-Ogooué Province, Gabon. *BMC infectious diseases*, 21(1), 1-7.
- WHO. (2021). Tuberculosis facts sheet. World health organization, regional office for Africa.<https://www.afro.who.int/health-topics/tuberculosis-tb>
- Zungu, M., &Malotle, M. (2011). Do we know enough to prevent occupationally acquired tuberculosis in healthcare professionals.*Occup Health S Afr*, 17-21.