

Mapping the Distribution of TB Disease Based on Medical Record Data Using a Geographic Information System at Faga Husada Hospital

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A B S T R A C T

Mapping disease is methods for analyzing distribution geographical something disease in the population . Research This aims to map distribution case Tuberculosis (TB) in the working area of Faga Husada Hospital based on address domicile patients , with use System Information Geographic Information System (GIS). Research implemented in 2025 with approach qualitative exploratory and design studies cases , as well as data collection through studies documentation use guidelines sheet documentation . The results show that 29 TB cases were spread across almost all over sub-district , with concentration The highest cases were in Wolio (8 cases), Batupoaro (7 cases), and Betoambari (6 cases), densely populated areas. population and at risk tall to transmission . Based on type gender , case more Lots found in men (14 cases) compared to women (12 cases), according to with factor risk exposure environment and style live . Analysis age show that case most occurs in groups age >45 years as well as group age productive young , signifying risk high in individuals elderly and socially active . In conclusion , the distribution of TB in the Faga Husada Hospital area No evenly , with concentration highest in the area congested population . TB control strategies are needed adapt regional characteristics , types gender and age patients for further intervention effective .

Disease mapping serves as an analytical approach to examine the spatial distribution of illnesses within a population. This study investigates the geographical distribution of Tuberculosis (TB) cases in the catchment area of Faga Husada Hospital, using patients' residential addresses and Geographic Information System (GIS) technology. Conducted in 2025, the research employs an exploratory qualitative approach with a case study design, using documentation as the primary data collection method. Data were gathered following standardized documentation guidelines. The findings reveal that 29 TB cases were recorded across nearly all sub-districts, with the highest concentrations in Wolio (8 cases), Batupoaro (7 cases), and Betoambari (6 cases), areas characterized by high population density and elevated transmission risk. Gender-based analysis indicates a higher prevalence among males (14 cases) compared to females (12 cases), reflecting differences in environmental and lifestyle exposures. Age group evaluation demonstrates that TB incidence is most prominent among individuals over 45 years and among socially and economically active younger adults, highlighting vulnerabilities in both older and active populations. In conclusion, TB cases in the Faga Husada Hospital service area exhibit an uneven spatial distribution, predominantly affecting men and older age groups. These findings emphasize the necessity of tailoring TB prevention and control strategies according to regional characteristics, demographic profiles, and age-specific risk factors to enhance intervention effectiveness.

INTRODUCTION

Disease tuberculosis (TB) is still become problem health significant community at the global level . In Indonesia, TB is a position important in the list of diseases infectious that requires attention serious , especially in urban areas with density resident high . (Sulistyo, 2022) emphasize that improvement amount TB cases show the need for a planned control strategy . (Hasan, 2021) add that proper TB treatment need intervention based proof For reduce risk spread in the community .

Demographic , social , and environmental factors play role important in spread of TB. (Irawati, 2019) show that density population and quality environment , including air and sanitation , affecting amount TB cases . (Sindi Sirituka et al., 2025) find that access to facility health also becomes factor

main in the spread of TB in Kupang City . In addition , the factors social economy like level education and income participate determine risk TB transmission (Fatkhudin, 2021) so that mapping TB cases need consider aspect environmental and social economy .

System Information Geographic Information System (GIS) has proven effective in map distribution TB spatial . (Fatkhudin, 2021) state that GIS allows visualization distribution cases and make it easier identification of risk areas high . (Sulistyo, 2022) show that GIS is very helpful in determine priority areas TB intervention in Denpasar City, while Sasmita, (Rizky Muhammad Jafar, Dwi Yuli Prasetyo, 2025) confirm importance mapping GIS -based prevention strategies can more appropriate target .

Based on observation the beginning of what was done researchers in February 2025 at Faga Husada Hospital , recorded that during From 2024 to June 2025, there were 26 patients diagnosed suffer Tuberculosis (TB). This data obtained through analysis record medical patient care road and care recorded stays at the Installation Record Faga Husada Hospital Medical Findings the show that TB is still become problem health communities in need attention special , especially related effort control its spread . However , until moment this , not yet available system mapping spatial that can display distribution geographical TB patients based on address place stay , so that required study more carry on .

Record data medical House Sick become source crucial information For TB mapping . Faga Husada Hospital have a sufficient TB patient database complete , but analysis spatial against this data Still limited . (Irawati, 2019) put forward that recording data processing medical with GIS can increase accuracy mapping case . This is reinforced by (Hanin, 2024) and (Sindi Sirituka et al., 2025) , which show that GIS is based record medical capable produce visualization accurate spatial , useful for planning intervention health .

Besides making it easier mapping , GIS from recorded data medical also supports taking more decisions effective . (Fatkhudin, 2021) and (Hasan, 2021) emphasize that mapping GIS -based help allocation source Power health become more efficient and reduce risk transmission . (Rahmanti & Prasetyo, 2022) add that GIS integration with record medical give information complete epidemiology , making it easy management House sick and on duty health in do focused interventions .

With consider findings said , research This aim For do mapping TB spread at Faga Husada Hospital using recorded data medical GIS- based approach This expected can give description distribution spatial TB cases in general accurate , supportive TB control and prevention more effective , and strengthen taking decision by the parties House hospital and health department

METHOD

Study This use approach qualitative exploratory with design studies cases to analyze distribution disease Tuberculosis (TB) at Faga Husada Hospital . Subject study consists of from recorded data medical TB patients , including information anonymous , age , gender gender , address domicile , and type of TB, whereas object study is distribution geographical TB cases visualized in a digital map using System Information Geographic Information System (GIS). Data collected through observation direct and study documentation record medical period October 2024–June 2025, thereafter encoded become coordinate geographical and mapped using ArcGIS 10.8. Data validity is guaranteed through triangulation technique between observation and documentation . Analysis done with make map zoning TB cases by region, classified become category high , medium , and low use code color , so that make things easier identification area with high TB burden and support taking decision based spatial .

RESULTS & DISCUSSION

Mapping Distribution of TB Cases in the Working Area of Faga Husada Hospital Year Period October– December 2024 and Period January-June 2025

Following This is TB case data based on recorded data Medical at Faga Husada Hospital 2024 to June 2025:

Table 1. Total Number of TB Cases in the Working Area of Faga Husada Hospital Period October– December 2024 and Period January-June 2025

No	Subdistrict	TB cases
1	Wolio	8
2	Betoambari	6

3	Batupoaro	7
4	Kokalukuna	1
5	Murhum	1
6	Bungi	0
7	Lea-lea	2
8	Sorawolio	1
Total		26

Source : Secondary Data , 2025

Based on table , total cases Recorded tuberculosis (TB) during The period of October–December 2024 and January–June 2025 reached 26 cases . Cases the spread across several sub-districts within the work area House sick , with Wolio take notes amount highest as many as 8 cases , followed by Batupoaro 7 cases , and Betoambari 6 cases . Third subdistrict This own density resident height and activity intense social , so that potential become an area with risk more TB transmission big . Lea-lea District reported 2 cases , while Kokalukuna , Murhum , and Sorawolio each have 1 case . Bungi recorded without TB cases during period the results of the mapping distribution case can seen in Figure 1 below . :

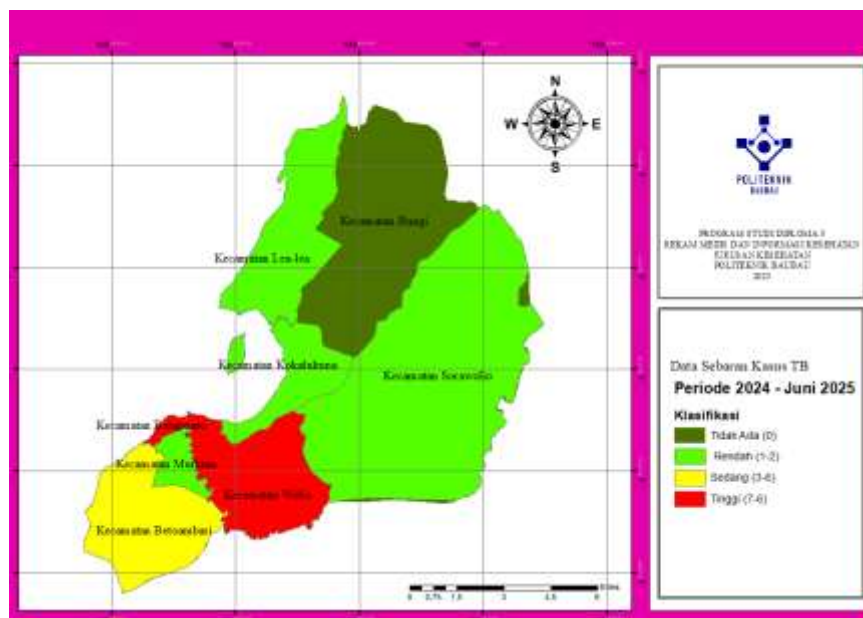


Figure 1 Distribution Map TB in the Working Area of Faga Husada Hospital Period October– December 2024 and Period January-June 2025

Distribution map case Tuberculosis (TB) in the working area of Faga Husada Hospital the period October– December 2024 and January–June 2025 shows variation amount case between subdistrict with classification color : green old (without case), green young (case low 1–2), yellow (case medium 3–6), and red (case height 7–8). District Wolio recorded with case highest (8 cases , red), so that become priority intervention , possibility influenced density population , housing dense , and mobility high . Batupoaro and Betoambari including category in progress , while Murhum , Kokalukuna , Lea-lea, and Sorawolio own case low . District Bungi No take notes case , reflects effectiveness prevention , detection early , and behavior life Healthy .

TB is disease infectious disease caused by *Mycobacterium tuberculosis* , attacks lungs and other organs, and is contagious through air , especially in the environment dense and ventilated bad (WHO, 2022) The spread of TB is influenced regional characteristics , including density population , sanitation , and quality residence (Sindi Sirituka et al., 2025) Utilization System Information Geographic Information System (GIS) allows mapping spatial case For identify vulnerable areas and determine priority intervention (Bagah & Grace D. Kandou, 2015) . Research in Kupang City and Manado City

shows that that TB cases tend to concentrated in the sub-district congested with condition environment not enough healthy , strengthening influence factor physical and social to spread of TB.

Faga Husada Hospital Findings show that more TB cases Lots occurs in areas with density resident high , such as Wolio , Batupoaro , and Betoambari , while the areas without case like Bungi need evaluation detection more continue . GIS mapping supports intervention strategies , including screening active , education , monitoring treatment (DOTS), and repair sanitation . In general Overall , the spread of TB is correlated with factor environmental , socio-economic , and regional characteristics , so that approach area -based and mapping spatial become base planning effective and appropriate TB control target .

Mapping Distribution of TB in the Working Area of Faga Husada Hospital Based on Period October– December 2024 and Period January-June 2025

Following This is TB case data by gender based on recorded data medical at Faga Husada Hospital Period October– December 2024 and Period January-June 2025.

Table 2. Total TB Cases Based on Gender in the Work Area of Faga Husada Hospital Period October– December 2024 and Period January-June 2025

No	Subdistrict	Man	Woman
1	Wolio	5	3
2	Betoambari	5	1
3	Batupoaro	1	6
4	Kokalukuna	1	0
5	Murhum	1	0
6	Bungi	0	0
7	Lea-lea	1	1
8	Sorawolio	0	1
Total		14	12

Source : Secondary Data , 2025

Based on table 2 above , during In the period October– December 2024 and January–June 2025, 26 cases were recorded Tuberculosis (TB) spread across eight sub-district , with 14 cases in men and 12 cases in women . In general Overall , TB cases are few more Lots occurs in men . District Wolio own amount case highest , namely 5 men and 3 women , followed by Betoambari with domination men (5 cases) and 1 case in women . In contrast , Batupoaro majority case occurred in women (6 cases) compared to male (1 case). District Kokalukuna and Murhum each reported 1 case in a male , while Sorawolio only recorded 1 case in a woman . Lea-lea District has amount case balanced between men and women , and Bungi No take notes same TB cases once . Distribution case based on subdistrict can seen in Figure 2.

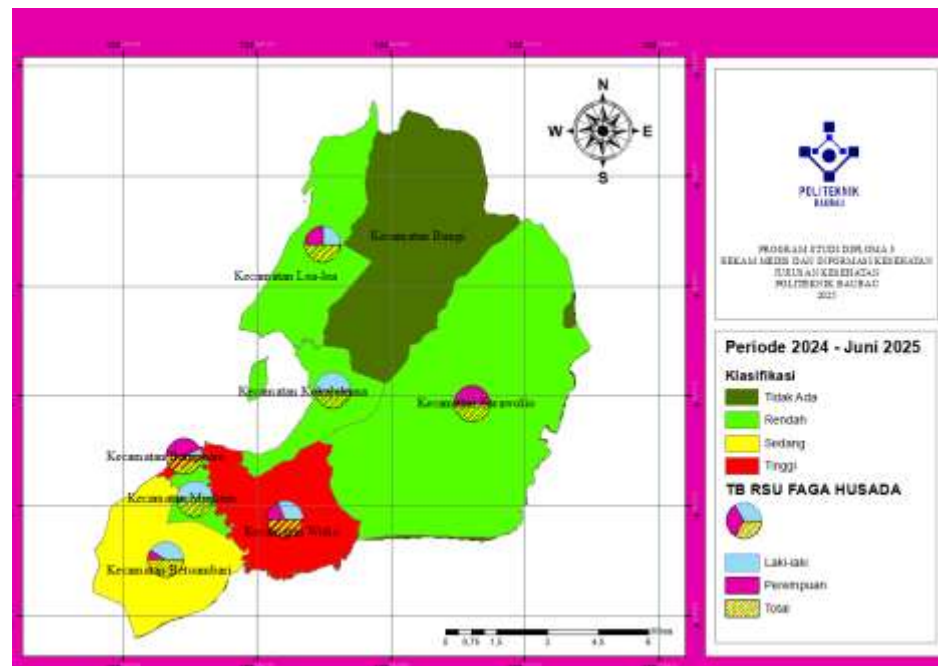


Figure 2. Map of TB Case Distribution Based on Gender in the Working Area of Faga Husada Hospital Period October–December 2024 and Period January-June 2025

Based on Figure 2, the distribution case Tuberculosis (TB) in the working area of Faga Husada Hospital according to type sex displayed through bar charts three Color : male (violet), female (cream), and total cases (blue). Graph show that more TB cases Lots occurs in men compared to women in some big sub-districts , especially in areas with case currently until height , which is influenced by factors work , style life , habits smoking , or outdoor activities house . This visual representation become base important for taking decision in TB prevention and control , with focus intervention in priority areas like Wolio , Betoambari , and Batupoaro through education , screening active , and approach gender-based . Areas without cases , such as Bungi , stay need routine monitoring for prevent emergence case new .

Findings This confirm that type sex is factor risk significant in TB epidemiology , with man tend more prone to infected . Research previously in Denpasar City showed majority TB sufferers are men (168 people) compared to women (122 people), in line with domination cases in men at Faga Husada Hospital (Sindi Sirituka et al., 2025) . Similar results found in TB mapping in the District Tuminting , Manado City, where men more Lots infected consequence factor social and work (Bagah & Grace D. Kandou, 2015) However , the dominance case women in the District Batupoaro show that factor local , such as density House stairs , ventilation , and roles domestic women , also influence risk transmission , so that intervention must customized with characteristics specific each region.

Mapping Distribution of TB in the Work Area at Faga Husada Hospital Based on Age Period October– December 2024 and Period January-June 2025

Following This is TB case data based on age obtained from file data record medical at Faga Husada Hospital

Table 3. Total TB Cases Based on Group Age in the Working Area of Faga Husada Hospital Period October–December 2024 and Period January-June 2025

No	Subdistrict	Group Age				
		14-25	26-35	36-45	45-55	56> Years
1	Wolio	1	1	1	3	2
2	Betoambari	3		1	1	1
3	Batupoaro	1		2	1	3
4	Kokalukuna				1	
5	Murhum				1	

No	Subdistrict	Group Age				
		14-25	26-35	36-45	45-55	56> Years
6	Bungi					
7	Lea-lea	1				1
8	Sorawolio		1			
Total		6	2	4	7	7

Source : Secondary Data , 2025

Based on the table above , recorded 26 cases Tuberculosis (TB) during the period October–December 2024 and January–June 2025 which are distributed according to group age group ages 45–55 years and >56 years each have amount case highest , namely 7 cases . Group ages 14–25 years recorded 6 cases , 36–45 years as many as 4 cases , and 26–35 years only 2 cases . Distribution spatial case according to age shown in Figure 3.

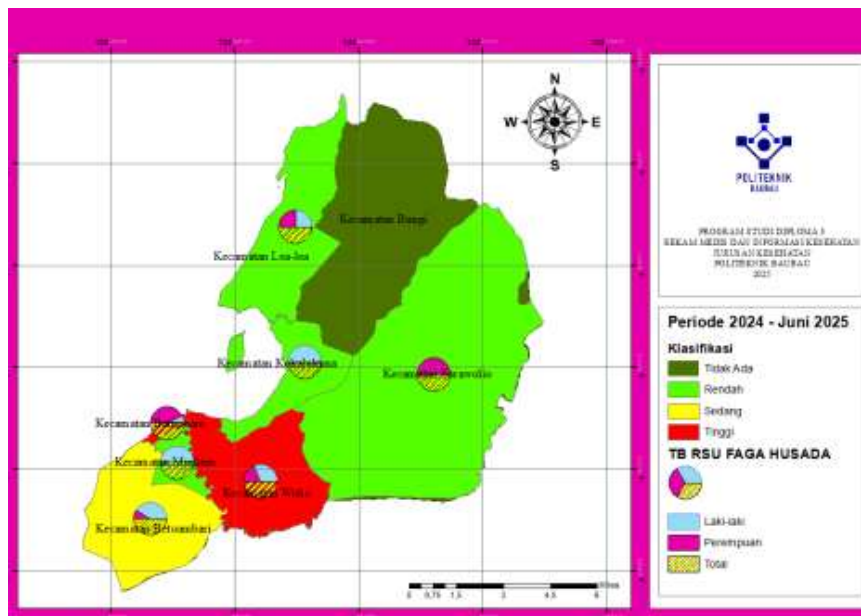


Figure 3. Map of TB Case Distribution Based on Age in the Working Area of Faga Husada Hospital 2024 to June 2025

Distribution map case Tuberculosis (TB) in the working area of Faga Husada Hospital the period October– December 2024 and January–June 2025 shows variation case between sub-districts and groups age . Wolio and Batupoaro recorded own case highest , especially in the group age productive and elderly , whereas Subdistrict Bungi No take notes case The same once . Findings This in line with (Bagah & Grace D. Kandou, 2015) which states that age , mobility , and condition environment become factor risk main spread of TB.

Distribution case according to type sex show that man more Lots infected compared to women in some big sub-district , although Batupoaro show domination case women . This is consistent with findings (Luh et al., 2022) and (Bagah & Grace D. Kandou, 2015) which emphasize the need intervention gender-based , education health , screening active , and monitoring environment For prevent TB transmission . Findings This confirm that TB control strategies must based on spatial and demographic data , as suggested by (Sindi Sirituka et al., 2025) to target priority areas , increase detection early , and develop a promotional program proper health target . Approach This important For group age productive , elderly , and areas with case tall and moderate , so that intervention more effective and efficient .

CLOSING

Based on results study about distribution case Tuberculosis (TB) in the working area of Faga Husada Hospital the period October– December 2024 and January–June 2025, can concluded that case TB is spread in almost all over sub-district , with a total of 29 cases , the highest in the sub-district Wolio (8 cases) , Batupoaro (7 cases) , and Betoambari (6 cases) , which are densely populated areas resident with activity social high . District Bungi No record case during period research . Based on type gender

, of 26 cases , male more dominant (14 cases) compared to women (12 cases), consistent with findings previously related vulnerability man consequence factor environment and style alive ; even in Batupoaro case more many in women , shows the need consideration context local in intervention gender- based . Based on group age , most cases occurred at the age of 45–55 years and >56 years (7 cases each), followed by 14–25 years (6 cases), 36–45 years (4 cases), and 26–35 years (2 cases), indicating that Good group carry on age and age young productive is population necessary risks become focus of TB control strategy .

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