e-ISSN : 2597-6052

MPPKI MEDIA PUBLIKASI PROMOSI KESEHATAN INDONESIA

Research Articles Open Access

Communicable Disease Patterns and Public Health Policy Responses: A SWOT Analysis in an Island Region

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ARTICLE INFO

Manuscript Received: 25 Feb, 2025
Revised: 22 May, 2025
Accepted: 26 May, 2025
Date of Publication: 03 Jul, 2025
Volume: 8
Issue: 7
DOI: 10.56338/mppki.v8i7.7358

KEYWORDS

Patterns;
Communicable Diseases;
Health Policies;
SWOT Analysis;
Island

ABSTRACT

Introduction: Communicable diseases pose a major threat to public health with significant impacts on mortality rates. Despite efforts to control these diseases, challenges in addressing their spread remain, especially in regions with limited resources. Kabupaten Pangkajene and Kepulauan faces this issue, with diseases such as ISPA, Diarrhea, and Tuberculosis (TBC) being the main concerns.

Objective: This study aims to analyze the trends in the spread of communicable diseases and evaluate the health policies implemented in Kabupaten Pangkajene and Kepulauan from 2021 to 2023.

Methods: This research adopts a mixed-methods approach. The quantitative approach analyzes disease trends based on case report data from the Health Office and Public Health Centers (Puskesmas). The qualitative approach involves Focus Group Discussions (FGD) and interviews with program implementers to evaluate health policies. SWOT analysis is used to identify the strengths, weaknesses, opportunities, and threats related to disease prevention policies.

Results: ISPA, Diarrhea, and Tuberculosis (TBC) are the main communicable diseases in Kabupaten Pangkajene and Kepulauan from 2021 to 2023. The SWOT analysis reveals strengths in community awareness but weaknesses in healthcare infrastructure. Opportunities to strengthen the health system are abundant, while threats from disease spread and resource shortages remain significant.

Conclusion: Communicable diseases are rising in Pangkajene and Kepulauan Regency, notably respiratory infections, diarrhea, and tuberculosis. The SWOT analysis reveals both systemic strengths and areas for policy intervention. Strengthening public health education, healthcare infrastructure, disease surveillance, and GIS-based risk mapping is essential. These findings offer critical insights for policymakers to redesign regional health strategies, allocate resources more effectively, and build a resilient, data-driven response framework for managing current and future public health threats.

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Communicable diseases pose a serious threat to public health, including in Indonesia. These diseases are caused by various infectious agents such as viruses, bacteria, parasites, and fungi, which can be transmitted between individuals through various mechanisms, either directly through physical contact, air, or bodily fluids, or indirectly through intermediaries such as water, food, or insect vectors. The impact of communicable diseases is vast, encompassing health, social, and economic aspects, and thus requires effective and sustainable management (1).

In the United States, communicable diseases (CDs) are among the most reported diseases, with approximately 270,000 infections recorded annually, including 1,390 hepatitis A cases reported from all states (2). Countries with strong routine vaccination programs show a significant decrease in case numbers, with a 95% reduction in cases in Europe due to the implementation of disease control policies (3). In Indonesia, although the prevalence of communicable diseases has decreased, major challenges remain. According to RISKESDAS data, diseases such as Pulmonary Tuberculosis (0.4%) and Malaria (0.4%) still show significant prevalence. Additionally, the number of HIV cases has increased each year, from 30,935 cases in 2015 to 48,300 cases in 2017. Other threats come from new infectious diseases that have the potential to become pandemics, such as COVID-19, H1N1, Ebola, MERS-CoV, and SARS, which further burden the national health system.

Indonesia faces significant challenges in controlling communicable diseases, amid the phenomenon of triple burden disease, which involves high rates of communicable diseases like tuberculosis, malaria, and dengue; an increasing prevalence of non-communicable diseases (NCDs) such as diabetes, hypertension, and heart disease; and the emergence of new or re-emerging infectious diseases like drug-resistant tuberculosis and COVID-19 (2). Communicable diseases remain a serious threat that requires more intensive policies and management, especially considering geographic conditions, climate, and population mobility, which exacerbate the challenges.

The shifting patterns of communicable diseases are strongly influenced by lifestyle changes, such as urbanization, unhealthy eating, lack of physical activity, and increased tobacco and alcohol use (4), (5). These factors disrupt both individual health and community productivity (6). In Indonesia, addressing these diseases requires a comprehensive, integrated approach involving various sectors and stakeholders. Prevention, early detection, proper treatment, and raising public awareness are key strategies for overcoming this challenge and improving public health quality in the country (7).

Globally, the epidemiology of communicable diseases is influenced by sanitation and environmental conditions, especially in developing countries, which significantly contribute to the increase in infection cases. Reports indicate four main patterns in the spread of communicable diseases, divided into areas with high, moderate, low, or very low prevalence. High-prevalence areas, such as parts of Africa, Asia, and Latin America, experience widespread infections among children, while in low-prevalence areas like Europe and North America, infections primarily occur in adults (8), (9).

Communicable diseases require prompt and appropriate management, as many diseases like HIV, hepatitis A, B, and C, as well as blood-borne diseases, require rapid responses to prevent widespread transmission (10), (11). Therefore, managing communicable diseases in Indonesia should focus on a more systematic, evidence-based approach, supported by accurate data to guide effective health policies. This study aims to analyze the trends in the spread of communicable diseases and evaluate the health policies implemented in Kabupaten Pangkajene and Kepulauan from 2021 to 2023.

METHOD

This study employed a mixed-methods approach, integrating quantitative and qualitative techniques to enhance data validity and provide a comprehensive understanding of communicable disease patterns and policy implementation.

Quantitative Analysis

The quantitative component focused on identifying trends in communicable disease cases (2021–2023) in Kabupaten Pangkajene dan Kepulauan. Data were sourced from case reports submitted by the District Health Office and local Public Health Centers (Puskesmas). The study population comprised all reported cases during the period,

with total sampling applied. Data analysis was conducted using SPSS to describe distribution patterns and disease trends across the region.

Qualitative Analysis

Qualitative data were collected through Focus Group Discussions (FGDs) and in-depth interviews involving communicable disease program implementers at the Health Office and Puskesmas representatives. This approach aimed to explore how policies and programs were applied at the local level.

Rationale and Triangulation

The mixed-methods design was chosen to allow data triangulation—cross-validating findings from statistical trends with stakeholder perspectives. Triangulation strengthened the interpretation of results by combining numerical patterns with contextual understanding, thus improving the study's reliability and relevance for local health planning.

RESULTS

Analysis of the Patterns of Communicable Disease Spread

Table 1. Analysis of the Pattern of Communicable Disease Spread

Disease	2021 (Number of Cases)	2021 (%)	2022 (Number of Cases)	2022 (%)	2023 (Number of Cases)	2023 (%)	Comparison
Acute Respiratory Infection (ISPA)*	10,787	65.8%	17,104	59.7%	23,251	66.3%	Continuously increasing
Diarrhea	2,299	14.1%	4,619	16.3%	7,906	22.9%	Sharp increase
Tuberculosis (TBC)	686	4.3%	843	2.9%	773	2.2%	Percentage decrease
Typhoid	500	3.1%	679	2.3%	857	2.5%	Increase in cases
Dengue Fever (DBD)	–	–	182	0.6%	57	0.2%	Effective control

*ISPA = Infeksi Saluran Pernapasan Akut (Acute Respiratory Infection)
Note: "–" indicates no data recorded for the respective year.

Based on the table above, it is observed that the number of ISPA cases has continuously increased from 10,787 (65.8%) in 2021 to 23,251 (66.3%) in 2023. Diarrhea has also seen a sharp increase from 2,299 (14.1%) in 2021 to 7,906 (22.9%) in 2023. TBC shows a percentage decrease from 4.3% in 2021 to 2.2% in 2023, although the number of cases remains stable. Typhoid cases have increased from 500 (3.1%) in 2021 to 857 (2.5%) in 2023. Dengue Fever (DBD) appeared in 2022 with 182 cases (0.6%) and decreased to 57 cases (0.2%) in 2023, indicating effective mosquito control.

Table 2. Analysis of the Trend of ISPA Communicable Disease from 2021 to 2023

Year	Number of ISPA Cases	Percentage Increase	Remarks
2021	10,787	N/A	Initial cases
2022	17,104	58.2%	Significant increase
2023	23,251	35.8%	Continually increasing

Table 3. Analysis of the Trend of Diarrheal Disease from 2021 to 2023

Year	Number of Diarrhea Cases	Percentage Increase	Remarks
2021	2,299	N/A	Initial cases
2022	4,619	101.5%	Significant increase
2023	7,906	71.8%	Continually increasing

The number of diarrhea cases significantly increased from 2,299 in 2021 to 4,619 in 2022, with a rise of 101.5%. In 2023, the cases continued to increase to 7,906, with a percentage increase of 71.8%. This sharp increase indicates worsening sanitation issues that require immediate attention.

Table 4. Analysis of the Trend of Tuberculosis (TBC) from 2021 to 2023

Year	Number of TBC Cases	Percentage Increase	Remarks
2021	686	N/A	Initial cases
2022	843	23.0%	Significant increase
2023	737	-12.6%	Decrease

The number of TBC cases significantly increased from 686 in 2021 to 843 in 2022, with a rise of 23.0%. However, in 2023, the number of cases decreased to 737, showing a decline of 12.6%. This reduction indicates success in efforts to control TBC, although more attention is still needed.

SWOT Analysis of Policy Implementation

Table 5. SWOT Analysis of Communicable Disease Policy Implementation

Strengths	Weaknesses	Opportunities	Threats
Increased awareness of ISPA management. (Data source: Health Office reports, 2023)	Weak healthcare infrastructure, limiting service access. (Data source: District Health Office, 2022)	Opportunity to strengthen the health system through policy reforms. (Data source: Regional health planning documents, 2023)	Rapid disease spread in dense communities due to poor sanitation. (Data source: Epidemiological data, 2021–2023)
Intensive mapping and early detection efforts. (Data source: Puskesmas Minasa Tene, 2023)	Lack of effective social media use for public health education. Policy implication: Increase investment in social media campaigns. (Data source: Local health campaigns, 2023)	Expand public health education through digital platforms to reach younger populations. (Data source: Local health education program reports, 2023)	Lack of resources for ISPA prevention programs. (Data source: Budget allocation reviews, 2023)
Increased case reporting for diarrhea aids in control efforts. (Data source: Health Office, 2023)	Lack of prevention education for vulnerable groups, especially children under 5. Policy implication: Target education programs to high-risk groups. (Data source: Local health surveys, 2023)	Enhance public education efforts on diarrhea prevention. (Data source: Health education materials, 2023)	Increased health burden due to rising cases of diarrhea. (Data source: Health Office case reports, 2021–2023)
Successful TBC case management with decreasing cases. (Data source: TBC control program reports, 2023)	Fluctuating TBC case numbers indicate instability. Policy implication: Stabilize TBC control with more consistent efforts. (Data source: Puskesmas TBC records, 2022)	Strengthen healthcare services to maintain TBC control. (Data source: District Health Office, 2023)	Risk of TBC resurgence without sustained prevention. (Data source: TBC case follow-up reports, 2023)

DISCUSSION

ISPA (Acute Respiratory Infections)

Over the past three consecutive years, cases of ISPA (Acute Respiratory Infections) have shown a significant increase. In 2021, a total of 10,787 ISPA cases were reported, indicating a relatively high prevalence of this disease. However, the situation worsened the following year, with the number of cases rising to 17,104 in 2022. This indicates that ISPA is becoming an increasingly pressing public health issue. Acute Respiratory Infections (ISPA) continue to be a major public health problem due to the high associated mortality rates, especially among infants and young children. Every child is estimated to experience 3-6 episodes of ISPA annually (12). This disease is the leading cause of death in children worldwide, including in Indonesia. The high number of ISPA cases is largely due to the lack of preventive behavior by families. Factors such as young maternal age, low educational levels, poor knowledge, unsupportive attitudes, and low family income contribute to the lack of ISPA prevention.

This study aims to identify factors influencing family behavior in preventing ISPA in children (13). Statistical analysis using the chi-square test revealed a significant relationship between ISPA and knowledge (p-value = 0.022, OR = 0.464), ventilation (p-value = 0.024, OR = 0.461), housing density (p-value = 0.029, OR = 0.480), smoking (p-value = 0.027, OR = 2.114), and nutritional status (p-value = 0.028, OR = 2.167) (14). The immunization status of toddlers was identified as the dominant factor influencing ISPA occurrences. It is recommended to carry out regular health education on ISPA prevention by healthcare workers and health cadres (15). Other statistical tests also showed a significant relationship between home ventilation (p-value = 0.015), housing density (p-value = 0.006), and smoking habits (p-value = 0.00) with ISPA occurrences in toddlers in the working area of the Penambungan Health Center in Makassar City (16). A study in Takatidung Village, Polewali Mandar Regency, in 2016 showed that housing density was related to ISPA occurrences in toddlers, but the presence of ventilation was not related (17). In addition, basic immunization, exclusive breastfeeding, nutritional status, and the environment were also found to be related to ISPA occurrences in toddlers at the Tamalanrea Jaya Health Center in Makassar City (18).

To reduce morbidity due to ISPA, it is necessary to improve information to mothers with infants and toddlers about ISPA and the factors that influence it (19). Adequate nutrition is crucial for the development of the immune system and preventing diseases. Poor nutrition increases the risk of ISPA. Therefore, education for parents on ISPA prevention is essential, especially since ISPA is increasingly affecting toddlers with various characteristics (20).

Tuberculosis (TBC)

Tuberculosis is a disease caused by *Mycobacterium tuberculosis*. This disease can affect the lungs and all parts of the body. TB is one of the top 10 causes of death and the leading cause of death from a single infectious agent (21). Previous research analysis showed that housing density (0.014), ventilation (0.038), humidity (0.008), lighting (0.002), floor type (0.000), and wall type (0.002) are factors that can affect pulmonary TB incidence. Meanwhile, temperature (0.540) does not influence pulmonary TB incidence (22). Among 76 respondents studied, the majority did not have pulmonary TB (46 or 60.5%), most were of productive age (52 or 68.4%), male (43 or 56.6%), had higher education (40 or 52.6%), had good knowledge (56 or 73.7%), were smokers (54 or 71.1%), had no contact with TB patients (40 or 52.6%), met housing density standards (59 or 77.6%), and had adequate ventilation (65 or 85.5%). There is a relationship between age (p-value = 0.045), gender (p-value = 0.032), education (p-value = 0.013), knowledge (p-value = 0.000), smoking status (p-value = 0.001), history of contact (p-value = 0.000), housing density (p-value = 0.007), and ventilation (p-value = 0.021) with pulmonary TB incidence.

Knowledge is the most influential factor (p-value = 0.001) (23). Based on the results of research using chi-square, the risk factors for pulmonary TB are close contact (p = 0.006), knowledge (p = 0.045), comorbidities (p = 0.020), and smoking (p = 0.004) (24). Efforts to prevent TB during the new normal era are influenced by behavior, as well as knowledge and positive attitudes that must continue to be applied to break the chain of transmission and manage infections effectively (25). Over the past three years, tuberculosis (TB) cases have shown variation in numbers. In 2021, 686 cases of TB were reported, indicating a significant occurrence but still within a manageable range. However, in 2022, the number of cases increased to 843, reflecting the potential for wider disease spread or increased awareness in detecting TB cases.

Diarrhea

Over the past three years, cases of diarrhea have shown a significant increase. In 2021, 2,299 cases of diarrhea were reported, indicating a significant event but still within a manageable range. However, the situation worsened the following year, with the number of cases rising to 4,619 in 2022. This marks a sharp increase and should be closely monitored. This data illustrates the urgency of enhancing efforts to prevent and manage diarrhea to reduce its impact on public health. Previous studies showed that knowledge, immunization, and hand-washing habits were related to diarrhea occurrences. There is also a relationship between mothers' knowledge of diarrhea, hand-washing habits, and the provision of clean water facilities (26). Exclusive breastfeeding is a dominant factor influencing diarrhea occurrences. Exclusive breastfeeding acts as a protective factor that can reduce or prevent diarrhea in infants (27).

Based on the results of a systematic literature review, 17 journal articles indicate a relationship between hand-washing behavior with soap and the incidence of diarrhea in schools, while 4 journal articles state that no such relationship exists (28). The causes of diarrhea are not only related to age, gender, nutritional status, and immunization

history but also to other aspects such as children not washing their hands with soap, having dirty nails, unclean environments, and improper disposal of feces (29). It is recommended that health workers continuously promote health education to mothers of toddlers (30).

Previous studies found that environmental factors such as access to clean water, toilet facilities, household waste management, liquid waste management, maternal knowledge, and personal hygiene are risk factors for diarrhea in toddlers. The conclusion of this study emphasizes that poor sanitation, maternal knowledge, and personal hygiene are risk factors for diarrhea in toddlers that need to be addressed (31).

This study emphasizes the need for an integrated communicable disease control strategy that includes vector management, public health education, and the improvement of healthcare infrastructure, especially in endemic areas (32). The communicable disease surveillance system has strengths like established sub-systems for rapid outbreak detection. However, weaknesses such as fragmented responsibilities and poor data management hinder effectiveness (33). Political instability poses significant threats to disease control (34). In the context of communicable disease control policies, a SWOT analysis helps assess these factors and calls for continued research to refine control measures and improve detection, focusing on sustainable and context-specific solutions (35).

CONCLUSION

The spread of communicable diseases in Pangkajene and Kepulauan regency has shown a significant increase in ISPA, diarrhea, and TB cases. Prevention and control programs are primarily funded through BOK and DAU, supporting training, coaching, and evaluation of communicable disease control. SWOT analysis highlighted strengths such as increased public awareness, weaknesses like inadequate health infrastructure and education, opportunities to strengthen the health system, and threats including rapid disease spread and resource shortages. In light of these findings, there is an urgent need to invest in strengthening healthcare infrastructure and improving health education at the community level. Strategic policy reforms should focus on enhancing disease prevention programs, especially for vulnerable populations, and ensuring that health systems are equipped to handle the growing burden of communicable diseases. Moreover, integrating technology and data systems could improve disease surveillance and response efforts. These steps are critical to ensuring long-term health security in the region and developing more resilient health policies.

AUTHOR'S CONTRIBUTION STATEMENT

Fais Satrianegara contributed to conceptualization, research design and drafting of the initial manuscript. Nildawati was responsible for data collection, data analysis and writing of the final manuscript. Syamsul Alam contributed to the literature review and writing of the final manuscript.

CONFLICTS OF INTEREST

The authors confirm that there are no conflicts of interest or personal relationships that could have influenced the work presented in this paper.

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DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors declare that no generative artificial intelligence (AI) tools or AI-assisted technologies, such as ChatGPT, Grammarly, or DeepL, were used during the writing process. All aspects of writing, data analysis, and manuscript writing were performed independently by the authors.

SOURCE OF FUNDING STATEMENTS

This research received a grant from the Postgraduate Program of Universitas Islam Negeri (UIN) Alauddin Makassar in 2024.

ACKNOWLEDGMENTS

Thank you to the Rector of UIN Alauddin Makassar who has provided the funding policy for this research and the Pangkajene Kepulauan District Health Office who has provided data access during the research.

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