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**Analysis in the Directly Observed Treatment Short-course (DOTS) Strategy
implementation in children with pulmonary tuberculosis in Mataram-Indonesia:
A qualitative study**

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Abstract

Background: Tuberculosis is a global health problem, especially in children. Handling child TB cases in Mataram City, in 2022 there will be 184 TB cases in children and in 2023 there will be an increase of 310 cases. Reporting records experienced treatment failure of 43.7%, this condition indicates the phenomenon of implementing the DOTS program in the treatment of TB patients in children.

Purpose: To analyse the implementation of the Directly Observed Treatment Shortcourse (DOTS) programme in the treatment of children with pulmonary tuberculosis.

Method: Qualitative research with an exploratory descriptive design conducted on children with pulmonary tuberculosis in Mataram City. The sources of data and information were 13 informants consisting of: Persons in charge of the TB program at the Health Service, Hospitals, namely pediatricians, Community Health Center TB program holders, Medicine Drinking Supervisors and families of TB sufferers. In-depth interview methods and data analysis through reduction and triangulation, as well as document searches to record and report the implementation of DOTS program activities, including identification and diagnosis, classification and staging of TB, treatment of pediatric TB, treatment, monitoring and evaluation, prevention and education, handling side effects, and drug-resistant TB (TB-RO).

Results: The implementation of the DOTS program in handling TB in children is still not in accordance with the SOP. Active screening of new case detection rates is still low, the readiness-of professionals in identification and diagnosis, classification and staging of pediatric TB have not run optimally, the implementation process is carried out with a tiered referral system, the logistics of tools and drugs often occur out of stock, TB-RO and drug allergies are found to not be handled properly. Public compliance in treatment is still low and stigmatization is high in society. The government's commitment to handling pulmonary TB patients in children has not been implemented properly.

Conclusion: The implementation of the Directly Observed Treatment Short-course (DOTS) program has not been optimal. The government's commitment to handling TB cases in children has many obstacles and challenges, limited professional human resources, running out of medicines, high absenteeism of TB patients, and high stigmatization of TB disease in society.

Keywords: DOTS; Implementation; TB in Children.

INTRODUCTION

Pulmonary tuberculosis (Pulmonary TB) is an infectious disease caused by *Mycobacterium tuberculosis*, this disease is a global children's health problem. Pulmonary TB control is important to achieve the Sustainable Development Goals (SDGs) and requires strong commitment from various parties. The main strategies implemented include early diagnosis, appropriate treatment (DOTS), prevention through BCG immunization, and isoniazid preventive therapy (IPT).

Monitoring treatment compliance, family education, and strengthening health services play a role in reducing the incidence rate thereby improving children's quality of life (Ministry of Health of the Republic of Indonesia, 2021). Based on data from the Ministry of Health of the Republic of Indonesia, 8.3% of all tuberculosis (TB) cases occurred in children under 15 years of age, with an increasing trend in cases from 2016-2019. However, the coverage of pediatric TB discovery and treatment is still far from the global target of 90%. In 2017, treatment coverage reached 73%, but fell to 40% in 2018 and 33% in 2019 (Ministry of Health of the Republic of Indonesia, 2019).

Health interventions for people with high levels of TB, such as TB screening, BCG vaccination, and certain TB treatments, are carried out with the aim of reducing the incidence of TB and reducing the risk of wider transmission (Nordholm, Joergensen, Holm, Andersen, Koch, Andersen, & Lillebaek, 2024). This decline reflects challenges in access to health services, early diagnosis, and treatment adherence. Factors such as lack of public awareness, limited resources, and stigma can exacerbate this condition. The need for more effective strategies, including strengthening screening, increasing the capacity of health workers, and multisector collaboration to achieve the elimination of childhood TB (Ministry of Health of the Republic of Indonesia, 2020).

Tuberculosis (TB) is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. Early detection and detection of TB cases in children is very important to prevent further spread and

complications (Ministry of Health of the Republic of Indonesia, 2016). Children under 2 years of age are at risk of morbidity and death from TB, so early detection is very important. This process can be carried out through strict examination of adult TB patients and screening of children who show TB symptoms (Ministry of Health of the Republic of Indonesia, 2019).

Previous research explains that children under 15 years of age and patients identified through passive case detection were found to have a higher likelihood of delayed diagnosis. This is potentially dangerous, especially for patients suffering from severe disease due to MDR-TB because late diagnosis can worsen health conditions (Akalu, Clements, Gebreyohannes, Xu, Bai, & Alene, 2024). TB treatment programs can be optimized by improving diagnostic tools such as rapid molecular systems and X-ray machines, as well as strengthening drug management of TB in children. This can achieve the target of providing appropriate drugs, strict monitoring, and increasing public awareness to encourage involvement in fighting tuberculosis (An, Teo, Huot, Tieng, Khun, Pheng, & Yi, 2023).

The rise in rifampicin-resistant tuberculosis in children represents a complex clinical, therapeutic, and public health challenge. Reducing the threat level of TB disease and protecting the health of children worldwide requires improving surveillance, timely diagnosis, treatment, and community-based interventions as key components of a comprehensive strategy (Pal, Singh, Tomar, & Sahni, 2024). The high incidence of Tuberculosis in children in Canada is able to break the chain of transmission through targeted community-based efforts supported by adequate resources (Morris, Giroux, Consunji-Araneta, Stewart, Baikie, Kakkar, & Kitai, 2021). Previous research findings explain that the TB problem can be overcome well if the government has a good commitment to fighting TB disease.

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The Mataram City Health Service recorded the highest number of pediatric pulmonary TB cases in NTB, namely 184 cases in 2022, increasing to 310 cases in 2023. This increase shows the need to strengthen early detection, optimal treatment and prevention strategies to reduce the incidence of TB in children.

The government has made various efforts to treat pulmonary TB, but the number of cases is still high. As many as 43.7% of pediatric pulmonary TB cases fail to be treated in West Nusa Tenggara, this shows that there are still obstacles in detection, treatment and monitoring therapy compliance. This data shows the need to evaluate the implementation of the DOTS (Directly Observed Treatment Short-course) program in the treatment of pediatric pulmonary TB.

RESEARCH METHOD

Qualitative research with an exploratory descriptive design was conducted with 13 informants who were sources of data and information. The informants were the person in charge of the TB program at the Mataram City Health Service (A01), professional staff, namely pediatricians (A02), those in charge of the TB program at the Community Health Center (A03, A04, A05, A06, A07, and A08), Treatment Supervisors/PMOs from the family and community (B09, B10) and families of TB patients (C11, C12, C013). This research was conducted in 2024 at the Mataram City Health Service.

Data collection was carried out using in-depth interviews and document searches to record and report on the implementation of DOTS program activities. Forms of program implementation include identification and diagnosis, classification and staging of TB, treatment of pediatric TB, treatment, monitoring and evaluation, prevention and education, handling of drug side effects, and drug resistant TB (TB-RO). In-depth analysis to understand context and dynamics by reducing and triangulating data.

RESEARCH RESULTS

The implementation of the DOTS program in the treatment of pediatric pulmonary tuberculosis (TB) in

Mataram City reflects the government's strong commitment to overcoming this disease. However, various challenges are still faced, such as high drug withdrawal rates and limited drug availability which can reduce the effectiveness of treatment. Apart from that, problems with drug distribution and social stigma are also obstacles in ensuring continuity of treatment for children.

Efforts to increase the success of the program require more effective strategies, including increasing access to medicines, community education, and cross-sector support to ensure every child gets optimal treatment. The results of the analysis were found through interviews with people in charge of TB at the Health Service, Hospitals and Community Health Centers who were directly involved in implementing the DOTS program in Mataram City with informants A01, A02, A03, A04, A05, A06, A07, A08.

"There is a work team to accelerate the handling of TB cases formed through the Decree of the Head of the Health Office. This team involves integrated health workers from the Health Office, Hospitals, and Health Centers (PHC) to improve coordination in TB control efforts. The main focus of the team is to accelerate case detection, ensure optimal access to treatment, and increase the effectiveness of health services to reduce the incidence of increasing cases and deaths due to TB in the community." (A01, A02).

"TB treatment through the Directly Observed Treatment Short-course (DOTS) program is carried out with a region-based approach to ensure the effectiveness of treatment. This strategy allows direct monitoring of patients by health workers in their respective regions, so that adherence to therapy can be maintained. In addition, this program strengthens coordination between Puskesmas, Hospitals, and Health Offices in drug distribution, early detection, and community education. With a region-based system, it is hoped that the success rate of TB treatment will increase and the spread of the disease can be controlled more effectively." (A01, A02).

"The treatment of TB in children is carried out specifically by emphasizing early diagnosis through

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tuberculosis tests, X-rays, and sputum examinations if possible. Proper diagnosis is essential to determine the optimal treatment steps. Therapy uses Anti-Tuberculosis Drugs (OAT) in accordance with the long-term regimen recommended by the World Health Organization (WHO), to ensure the effectiveness of treatment and prevent drug resistance. This approach requires close monitoring by health workers so that patients remain compliant with therapy and achieve optimal recovery." (A02).

"The team's preparation in handling pediatric TB must include adequate resources and trained professionals. This readiness is important to ensure early diagnosis, proper treatment, and ongoing monitoring. However, the current condition is still not optimal, with limited health workers, facilities, and uneven distribution of drugs. Therefore, it is necessary to increase the capacity of medical personnel, better allocation of resources, and more effective coordination to support the maximum treatment of pediatric TB." (A01).

"The limitations of drug logistics and diagnostic tools are a challenge in handling pediatric TB. Not all cases can be handled optimally according to the Standard Operating Procedures (SOP) due to uneven distribution. These deficiencies have the potential to hinder early diagnosis and timely treatment, thereby increasing the risk of complications. To overcome this problem, improvements are needed in the distribution system, increased availability of diagnostic tools, and better coordination between health facilities to ensure that every patient receives treatment according to the set standards." (A01, A02, A03, A04, A05, A06, A07, A08).

"There are often stock outs of TB drugs, hindering the smooth treatment for patients. As a result, the process of starting therapy is often delayed because it has to wait for the delivery of drugs. This delay risks reducing the effectiveness of treatment and increase the dropout rate. Therefore, a better logistics management system is needed, including accurate stock planning and efficient

distribution to ensure the sustainable availability of medicines" (A03, A04, A05, A06, A07, A08).

"Some TB patients develop drug allergies, which can hinder the success of therapy. In these cases, treatment failure often occurs because the drug replacement process does not always go fast, taking a long time. Delays in determining appropriate drug alternatives can cause patients to drop out of treatment or experience further side effects. Therefore, a quick response, close monitoring, and good coordination between health workers are needed to ensure that therapy remains effective and sustainable." (A03, A04, A05, A06, A07, A08).

"The handling of TB cases is carried out through a referral system due to the limitations of professionals, diagnostic tools, and the availability of drugs. Primary healthcare facilities often face obstacles in handling complex cases, so patients are referred to higher levels of service for optimal examination and treatment. This referral system requires good coordination between health facilities so that patients get a quick and accurate diagnosis, appropriate therapy, and continuous monitoring to improve the effectiveness of TB treatment." (A03, A04, A05, A06, A07, A08).

"Several cases were found that had tested positive but were not successfully treated because at that time drugs were not available and some cases also occurred due to refusal of treatment caused by social stigmatization in the community" (A04).

"Several TB program officers who are new and have no experience, have not participated in the DOTS program training, we experienced several obstacles in the process of handling cases, this condition will certainly experience obstacles in handling cases, handling TB cases in children is different from adult TB, as handling TB in children must be done by a pediatrician, because the clinical symptoms resemble other diseases in children."

"Some cases of patients refusing to be treated, absent from receiving treatment, and stopping treatment. The approach efforts carried out began after a first phone exchange followed by a visit to the

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house where they lived, but in some cases it succeeded and in some others it failed." (A7).

The government's commitment plays a crucial role in the success of the DOTS program for the treatment of pulmonary TB in children. Support in the form of providing resources, training of medical personnel, and increasing public awareness is urgently needed to make treatment more accessible. This commitment creates an environment conducive to TB prevention and control, so that it can reduce incidence and mortality. The pediatric TB treatment campaign is carried out by involving various related sectors to raise awareness, accelerate case discovery, and ensure optimal access to treatment.

Through cross-sector cooperation, it is hoped that the treatment of pediatric TB will be more effective and have a positive impact on public health at large. Coordination and team readiness are very important in handling drug allergy cases in TB patients. A quick and appropriate response can prevent adverse effects and ensure continuity of treatment. Good treatment also reduces the risk of negative attitudes of patients towards TB therapy. Therefore, the medical team must be agile in detecting, handling, and providing education related to drug allergies, so that patients continue to receive optimal treatment without interfering with the effectiveness of the TB treatment program.

Ensuring access to appropriate and safe TB drugs for children is the government's top priority in efforts to control this disease. By ensuring the availability of drugs at health centers (PHCs) and hospitals, infected children should immediately receive treatment without delay, so that the risk of complications can be minimized. In addition, the government is also trying to plan and procure drugs so that there is no stock out of TB drugs, which can hinder the sustainability of therapy. Drug quality monitoring is an important aspect to ensure the effectiveness and safety of treatment, so that patients get maximum benefits. The support of health workers in providing education to parents and patient companions is also part of this strategy. With a structured approach, it is hoped that TB treatment

in children can run optimally, reduce drug resistance rates, and increase cure rates, so as to have a positive impact on public health at large.

Awareness campaigns have an important role in increasing public understanding of childhood TB. By using mass media and community education programs, information about symptoms, prevention, and the importance of treatment can be widely disseminated. Through this approach, it is hoped that the public will be more aware of the signs of TB in children, so that early detection can be carried out faster. In addition, the campaign also aims to reduce social stigma, which is often a barrier for families in seeking appropriate treatment. Increased public awareness can also encourage adherence to therapy, so that infected children get optimal care and a higher chance of recovery. With the support of various parties, this campaign is an effective strategy in reducing the incidence of childhood TB and improving the quality of public health as a whole.

The establishment of an integrated health service center that focuses on the treatment of pediatric TB is very important to provide comprehensive services. The center provides easier diagnosis and treatment access facilities for patients. Through the collaboration of health workers, such as doctors, nurses, and public health workers, the treatment of pediatric TB can be carried out more effectively. Good coordination ensures that children undergo optimal screening, so that cases can be detected faster. With this approach, it is hoped that the new case detection rate will increase, accelerate treatment interventions, and support efforts to prevent the spread of pediatric TB in the community.

Cross-sector cooperation with education, social, and community organizations is very important in handling childhood tuberculosis. This collaboration allows for wider information dissemination, improves access to health services, and provides support for patients' families. By involving various parties, TB control programs become more effective, both in public education and in encouraging early detection and treatment for infected children. In addition, the involvement of the education sector can help with

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screening in schools, while social organizations play a role in providing psychosocial support. With this approach, it is hoped that the cure rate will increase and the stigma against childhood TB will be reduced, thereby accelerating the achievement of TB elimination in the community.

The collection and analysis of pediatric TB epidemiological data is very important in the treatment of pediatric TB. By understanding the spread patterns and risk factors, the government can formulate more effective policies to reduce the incidence of TB. This data plays a role in prioritizing interventions, increasing the effectiveness of prevention programs, and optimizing the use of resources to be more targeted. In addition, epidemiological information aids in monitoring case trends, enabling rapid responses to surge infections, as well as supporting evidence-based decision-making. With a data-based approach, pediatric TB treatment can be carried out in a more directed, efficient, and positive impact on public health.

Nutrition programs are important in supporting the recovery of children infected with TB. The government provides nutritious food and supplements necessary to boost immunity and speed up the healing process. With the right nutritional intake, children are able to cope with treatment better, reduce the risk of complications, and speed up the recovery of their overall health. Psychosocial support is very important for children and families facing TB. By providing counseling and support groups, they can overcome the stigma and emotional impact of the disease. This approach helps improve mental health, provide a space for them to share experiences, and build resilience. With the right support, families can more easily undergo the treatment and recovery process.

Among the results of the analysis found through interviews with Drug Supervisors (PMO) and families of patients who are undergoing treatment and families of patients who have stopped treatment, with informants of drug supervisors/PMO from the community (B09, B10) and families of TB patients

(C11, C12, C013), the following information was obtained:

"As the patient's family experience: when stocking out drugs the fact that the officer did not know when the medicine was available, I waited for almost a month for the medicine but the information weren't clear" (B09).

"With the treatment of pediatric TB through the referral system process, tools and drugs are not available at the Health Center (PHC) and must be handled by a pediatrician, so this process takes a long time" (B10).

"Our experience as a drug taker/PMO supervisor: there was a drug stock out at the Mataram City General Hospital and because the patient had to be referred to the Provincial General Hospital (RSUP), the patient's family considered it a complicated process and as such they decided not to continue the treatment" (B09, B10).

"My experience in treating pediatric TB experienced a long process of being examined through referrals, underwent hospitalization at the hospital for 2 months, then after that outpatient treatment, there have been cases where there is no drug in stock" (C11).

"While undergoing TB treatment, my son was getting sicker, itching and getting scalds, his body temperature was increasing continuously, he was vomiting, getting weaker and had no appetite. We were worried that there was a problem, then referred to the Provincial General Hospital (RSUP). Finally, we decided not to continue the treatment. This case is certainly related to drug side effects" (C12, C13).

"Pediatric TB treatment should be available at the Health Center (PHC), so that we can get access to services closer to where we live, especially because we are undergoing a long treatment hospitalization" (B09, B10, C11, C12, C013).

"During the hospitalization of TB patients in the General Hospital, they are isolated and should not be visited by their families, as the patient's family feel afraid/feel scared" (B09, B10, C11, C12, C013).

Handling tuberculosis (TB) in children requires a long process and is more difficult than in adults.

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Symptoms of TB in children are often non-specific, so examination and diagnosis must be carried out by a pediatrician to ensure proper treatment. Diagnosis involves tuberculosis tests, sputum examinations, radiology, and a history of contact with people with active TB. Treatment of pediatric TB requires high adherence to a drug regimen that lasts at least six months. Rapid and appropriate intervention strategies are essential to prevent drug resistance and therapy failure. In addition to treatment, multidisciplinary approaches, such as family education, nutrition monitoring, and BCG vaccination, play a role in preventing the spread and increasing the success of TB therapy in children.

During the treatment of TB patients in hospitals, isolation in special rooms is necessary to prevent transmission and nosocomial infections. This step is important to protect other patients and medical personnel. However, the patient's family often feels burdened, perceiving isolation as a form of discrimination and stigmatization. A lack of understanding of the importance of isolation can create anxiety and discomfort. Therefore, education to families about isolation goals, psychosocial support, and an empathetic approach from health workers is needed. This can help families receive medical procedures better, so that patient care runs optimally without causing feelings of exclusion.

TB treatment in children should be available at the Health Center (PHC) so that access to services is easier to reach and close to where the patient lives. This is important considering that TB treatment takes a long time, with the treatment available at the Health Center, families can more easily accompany their children during the treatment process without having to travel long distances to referral hospitals. Health Center Officers (PHCs) can help ensure therapy compliance, provide education about TB treatment in children, the risk of TB transmission, and prevent drug withdrawal that is at risk of causing TB resistance in children.

"Social stigmatization of TB disease in society often causes fear of being examined and undergoing treatment. Many worry about being ostracized, being

seen as a source of infection, or losing their jobs due to their health status. This risks worsens the spread of TB because patients are reluctant to seek treatment early. To overcome stigma, broad education is needed about TB, including how it is transmitted, how to prevent it, and that this disease can be cured. The role of health workers, the government and the media is very important in changing public perceptions, so that TB patients feel supported and have more courage to access health services without fear or shame."

To overcome withdrawal from medication, steps such as patient tracking, counseling, and engaging cadres are essential. In-depth education about TB helps parents understand the importance of continuing treatment. Strong parental support, with good knowledge of TB, has a profound effect on the success of therapy. With parental commitment, children can be more disciplined in undergoing treatment, reduce the risk of recurrence, and prevent further complications. This overall analysis emphasizes the importance of collaboration between health workers and families in ensuring the effectiveness of TB treatment in children. An obstacle that is often faced when reminding parents to come for treatment is a lack of awareness of the importance of health. Many parents feel that their health condition is not serious enough to require medical treatment, so they tend to neglect the schedule of checkups or treatment.

DISCUSSION

The government views tuberculosis (TB) as a top priority in the national health program, as regulated in the presidential regulation on TB control. The target for eliminating TB by 2030 is to reduce the incidence rate to 65/100,000 population and the death rate to 6/100,000 population. This reflects the seriousness of the central government in dealing with the problem of TB (Ministry of Health of the Republic of Indonesia, 2020).

The Mataram City Government is making efforts to control TB with the DOTS strategy. Health workers actively monitor patient progress, remind parents

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about treatment, and provide education that the community needs. Human resource training programs are carried out periodically so that the necessary information and skills can be applied properly. The TB program is fully funded by the government, but the TB problem has not been resolved so appropriate strategies are needed to intervene in the community.

The working area of the Mataram City Health Service has carried out screening to detect TB cases early. Involving health cadres in carrying out screening and collecting data which is then submitted to the person in charge of TB. The form of activity takes the form of educating patients and parents about TB and the stages of treatment to increase awareness and compliance with treatment. A Medication Monitor Designation (PMO) helps ensure patient compliance with treatment.

Compliance with taking TB medication in children requires intensive caution and patience (Ratnasari, 2023). Correct and regular drug administration is important to prevent MDR resistance. If this is not done, the infection can spread to other organs, causing more severe symptoms and serious complications. Early detection has a significant influence on the success of TB control. However, the effectiveness of interventions requires a balance between detection and treatment efforts (Aldila, Ramadhan, Chukwu, Handari, Shahzad, & Kamalia, 2024). Based on this, the government needs to provide TB detection services at community health centers and hospitals, as well as build an efficient referral system so that patients who are detected positive can immediately receive treatment.

Research in Africa states that all TB cases occur in children aged 0-15 years, and 2/3 are undiagnosed due to lack of resources (Uwishema, Rai, Nicholas, Abbass, Uweis, Arab, & Nazir, 2023). The availability of medical personnel who screen and access adequate medication is an important element in the treatment of TB in children. Continuing education and training for health workers will improve their skills in caring for pediatric TB patients.

Research in Pakistan shows that factors such as poverty, overcrowding, and stigma contribute to the increase in TB cases, so effective prevention and control approaches are needed (Ullah, Ahmed, Salman, Iqbal, Hussaini, & Malikzai, 2024). Government efforts include educating the public about the signs and symptoms of disease, increasing access to health services, and strengthening monitoring systems. Apart from that, psychosocial support for patients and families is also very important to provide.

Non-compliance with TB examination and treatment risks spreading the infection. Effective education is essential to encourage parents to be open to TB treatment. The role of doctors and nurses in providing information supports the success of treatment and preventing the spread of disease in the family. Tuberculosis (TB) treatment in children lasts 6-8 months, so it requires a high level of commitment from parents.

Anxiety and frustration arise from the responsibility of ensuring children take medication and undergo examinations, making the treatment process burdensome for them. Research in Kampala, Uganda, shows that the complexity of treating TB in children is felt by the sufferer's family, and the lack of funds causes patients to despair (Makabayi-Mugabe, Musaaazi, Zawedde-Muyanja, Kizito, Fatta, Namwanje-Kaweesi, & Nkolo, 2023). In addition, frequent stockouts of TB drugs increase the risk of drug resistance. Therefore, the government must take concrete action to ensure better access and support TB control efforts.

Achieving the TB termination strategy target is important to strengthen public-private partnerships and involve all service providers in TB services (Thapa, Jayasuriya, Hall, Beek, Mukherjee, Gudi, & Narasimhan, 2021). Commitment and collaboration of all stakeholders is very important in comprehensively handling TB, so that this can increase the implementation of the DOTS program more effectively, both for detection and treatment, as well as increasing public awareness which can

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ultimately reduce infection rates and improve public health.

The availability of medicines and health supplies is very important in the success of the TB Control Program. Logistics management includes planning, procurement, storage, distribution and use to ensure medicines availability in all health services (Ministry of Health of the Republic of Indonesia, 2017). The results of this research found that there was a lack of availability of facilities in the form of tools and medicines as well as the readiness of human resources in handling and providing TB services at the City Health Service and TB Community Health Center. The condition will certainly have an impact on less than optimal health services, especially in the treatment of TB disease.

Supply chains and procurement management systems (PSM) play a critical role in the DOTS standards used to support global efforts to end TB by 2030. Countries that rely on domestic procurement are more vulnerable, and despite strengths such as external procurement mechanisms and funding support, challenges related to drug shortages, funding problems, and ineffective supplier management still exist (Mhazo, Miyango, Palani, & Maponga, 2024). Therefore, the government needs to take strategic steps in supply management and procurement chains to ensure sustainable drug availability.

There are limitations in the availability of TB drugs for children in Europe. Non-adherence to treatment is the main cause of therapy failure which is triggered by the lack of drug formulations for children, use of pills, and drug toxicity. Therefore, the development of child-friendly tuberculosis drugs is urgently needed to increase treatment compliance (Noguera-Julian, Buonsenso, McKenna, Seddon, & Ritz, 2021).

The government should consider sources of drug supply to reduce dependence on domestic procurement and minimize the risk of stock outs. Other research shows that the availability of first-line drugs for the treatment of TB is inconsistent across Europe, with rifampicin suspension being the only

child-friendly formulation available in only 10 member states. As many as 24 out of 30 countries consider TB drugs to be an unmet medical need, so to overcome this, countries use imported or adapted formulations (Cherchi, Vaz, Coelho, Fregonese, & Thirstrup, 2023).

It is important to strengthen the drug supply chain management system so that stock of TB drugs, especially for children, is always available. This can be done through better partnerships between local governments, hospitals and pharmacies. Educating the public about the importance of TB treatment and how to access health services is also very necessary.

Adverse drug reactions (ADR) in children with TB, such as gastrointestinal disorders and hepatitis, need to be watched out for (Abdusalomova, Denisiuk, Davtyan, Gadoev, Abdusamatova, Parpieva, & Sodikov, 2021). Governments and health institutions should strive to develop more pediatric drug formulations that suit children's needs. In addition, the ADR monitoring system in all health facilities must be strengthened so that the data obtained is more representative. Treatment of tuberculosis in children is a particular challenge, because existing combinations of anti-tuberculosis drugs at fixed doses have various side effects. Non-compliance due to side effects can increase the risk of death and morbidity due to TB disease (Bandgar, 2023).

The findings of this research are important for governments and health institutions to consider developing safer and more tolerable drug formulations. Clinical standards for TB treatment should include counseling regarding side effects, risk evaluation, and active monitoring for ADRs. Counseling regarding potential side effects and how to treat them should be carried out to increase patient awareness. Through a comprehensive TB drug management approach, it is hoped that the availability of safe and effective drugs for children can be guaranteed, supporting global efforts to end TB disease by 2030.

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Health education also plays an important role in patient compliance with treatment. Research in Peru shows that social support and service quality influence compliance with TB treatment (Dilas, Flores, Morales-García, Calizaya-Milla, Morales-García, Sairitupa-Sanchez, & Saintila, 2023). Based on this, educational campaigns involving community leaders can help spread information about the symptoms of TB and the importance of early detection. However, challenges in diagnosing TB in children still exist, including limited data regarding the accuracy of diagnostic tests (Kakinda, Olum, Baluku, & Bongomin, 2023).

Training for health workers is needed to improve their ability to recognize TB symptoms. Research in Pakistan shows that the use of scoring systems can help in identifying children at high risk of developing TB (Brooks, Hussain, Siddiqui, Ahmed, Jaswal, Amanullah, & Malik 2023). Collaboration between health workers and family support also contributes to the success of treatment. Support workers, such as cadres, can help overcome barriers by involving patients in decision making and providing relevant education (Ritchie & Horton 2023; Marwang, Rachmat, Balumbi, & Ohorella, 2023)

Good collaboration between doctors, nurses and cadres ensures that each party makes the right contribution, thereby increasing treatment compliance and reducing the negative stigma surrounding TB. Through a comprehensive approach, it is hoped that the chances of recovery for TB patients, especially children, can increase. Previous research shows that nurses can help parents persuade their children to undergo treatment by providing information and developing effective communication media (Rakhmawati, Fitri, Sriati, & Hendrawati, 2022). Special training for nurses regarding effective communication techniques with children and parents is also very necessary.

Treatment Monitoring (PMO) is an important component in the Immediate and Short Term Treatment (DOTS) program for the treatment of TB, especially in children. Patient compliance with treatment is very important to achieve healing,

prevent transmission, and avoid drug resistance. In accordance with the "Stop TB Strategy", surveillance and support for anti-tuberculosis drugs (OAT) aims to achieve treatment success of 85% (Ministry of Health of the Republic of Indonesia, 2020).

The PMO must be a respected individual, including health workers, cadres and family members. The PMO's duties are carried out on a voluntary basis, focusing on monitoring drinking, and ensuring patients take all prescribed medications. Implementation of PMO in Mataram City involves families, especially parents, who can ensure patient compliance. Education of health workers regarding the importance of attendance is very important from the beginning of a TB diagnosis. Social support from the family also greatly influences the fulfillment of treatment.

Previous research results show that parents provide emotional, instrumental and informative support which increases compliance (Ningtyias, Nafikadini, Hamdalah, & Muldayani, 2021). Regular monitoring by healthcare workers, either through home visits or telephone communication, can provide additional support and ensure patients remain motivated.

Research shows that family support positively improves the quality of life of TB patients. The family plays a role in providing motivation and encouragement to adopt healthy habits, thereby improving treatment results (Lutfian, Azizah, Wardika, Wildana, Maulana, & Wartakusumah, 2024). Based on this, motivational or group support sessions can be held to share experiences and strategies, as well as regular monitoring to assess patient compliance. The importance of behavior and compliance in achieving optimal health in TB patients is also emphasized. Health promotion, increasing self-efficacy, and infection prevention behavior are factors in controlling TB.

Various health promotion methods, such as conventional and digital training, have proven effective in increasing patient satisfaction (Hossain, Islam, Akter, Anisuzzaman, Abdullah-Al-Maruf, & Mohammed, 2023). Integration of various health

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promotion methods, especially those that prioritize direct interaction, must be a priority. The use of technology, such as educational videos and SMS reminders, can strengthen patient compliance. Family involvement in the monitoring process is also very important, so that they can remind patients about their treatment schedule.

Educating patients' parents about the role of PMO is critical to improving compliance. Through a good understanding of these responsibilities, parents can create a supportive environment thereby increasing the child's motivation to comply with treatment. Thus, effective education not only increases compliance but also contributes to successful treatment of TB patients.

Recording and Reporting First Level Health Facilities (FKTP), such as clinics and independent practicing doctors, are required to report TB patients to the Community Health Center. The Puskesmas then prepares a report to be submitted to the City Health Service. Meanwhile, for Advanced Referral Health Facilities (FKRTL) such as hospitals and intermediate clinics, reports are submitted directly to the Health Service using a standard TB information system. The Health Service is responsible for supervising and fostering the implementation of the notification system in its territory (Ministry of Health of the Republic of Indonesia, 2017).

Dominant human behavior refers to behavior that originates from within the individual and can be shaped and controlled. These behavioral characteristics are planned and can change over time, influenced by various factors such as experience, perception, social interactions and the environment. Each individual has the ability to adapt his behavior according to the context he faces, so that his behavior can develop and undergo transformation. Understanding these dynamics is important for improving social interactions and creating an environment that supports personal growth and better mental health.

The recording and reporting of the DOTS TB program is carried out systematically by the program holder at the community health center, supported by

administrative officers and other health workers. Recording, which includes important information such as patient identity, examination results, treatment schedules, and health developments, is carried out in two forms, namely physical through a treatment card and electronically through the Tuberculosis Information System (SITB). Health cadres play an active role in recording and reporting cases found in the community, while doctors and nurses at hospitals are also involved in the process. Recording is carried out every time a patient is controlled, making it possible to monitor and evaluate the patient's progress periodically.

SITB's integration with local health departments makes it easier to manage patient data in a structured and efficient manner. Previous research suggests that TB programs aim to promote the use of digital health platforms, such as Electronic Medical Records (EMR), to collect patient information more effectively. The development of an EMR system in Luanda, for TB in referral health facilities is expected to improve patient monitoring and care (Robbiati, Tosti, Mezzabotta, Dal Maso, Lulua Sachicola, Siene Tienabe, & Putoto, 2022). Therefore, switching from a paper-based system to a digital health platform is very important to improve recording and reporting in Mataram City.

Recording and reporting was developed by Karel Styblo in the 1980s as part of a pilot TB control program in Tanzania. Technology supports TB recording and reporting with digital systems that increase data accuracy, real-time monitoring and case tracking efficiency. Mobile applications and integrated databases allows healthcare workers to manage patient data, monitor therapy adherence, and analyze trends in TB epidemiology, there is potential to integrate patient well-being and survival more prospectively (Avaliani, Gozalov, Kuchukhidze, Skrahina, Soltan, van den Boom, & Yedilbayev, 2020).

Systematic and comprehensive recording and reporting are very important in implementing the DOTS program. This process ensures that all patient-related information is well documented, so

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healthcare professionals can easily monitor patient progress and detect problems early, such as side effects or non-adherence to treatment. Evaluation of program effectiveness is also made easier with comprehensive records, helping decision making for program improvement and resource management.

Through a good reporting system, information can be conveyed quickly to related parties, including the health department, so that intervention actions can be taken on time. Overall, effective recording and reporting is key to increasing the success of TB treatment and reducing disease transmission in the community. By supporting a good system, it is hoped that the TB control program can run more optimally and have a positive impact.

Community stigma related to TB also has a negative impact, making many people hesitant to take their children to health facilities. Therefore, education and sensitive approaches from health workers are needed to overcome this stigma to improve programs that aims at ameliorating public education, strengthening cross-sector collaboration, maintaining the availability of medicines, and providing continuous training for health workers. Social stigma can be reduced through consultation and good understanding in the community about infectious diseases, especially TB (Bosela, Brady, Delatte, & Parfitt, 2012). Educational programs targeting the wider community can increase understanding about TB and the importance of treatment.

This research explains that the parents of patients experienced various experiences during the process of treating tuberculosis (TB) in children. Even though the children's TB program provides free treatment for children, parents feel anxious and afraid when their children are diagnosed with TB, especially the effects of drugs and side effects of drugs with long treatment periods. The main challenges faced include the difficulty of ensuring that children take medication regularly, sometimes children refuse to take medication, as well as the additional burden of providing and taking medication in hospitals, as well as frequent drug stocks.

Parental involvement in TB screening in children through education and training can increase their knowledge and skills, as well as support early detection (Deswita, Mansur, & Farlina, 2024). Research shows that health workers in several countries have good knowledge about pediatric TB diagnosis, but the available workforce is limited and there are still many distance barriers between places of residence and health services (Vukugah, Akoku, Tchoupa, & Lambert, 2022).

Research shows that health workers gain valuable experience in interacting with patients' parents. However, significant challenges remain, such as parents' difficulty remembering treatment schedules, children's resistance to treatment, and a lack of understanding of the importance of long-term therapy. Parental involvement is critical to the success of treatment. Support from the health system is considered good, but there needs to be increased training of health workers and availability of medicines.

CONCLUSION

The implementation of the Directly Observed Treatment Short-course (DOTS) program in its implementation has not been optimal. Case discovery and diagnosis of pediatric TB patients (Case Detection), can only be done through referral services to hospitals for diagnostics including tuberculosis tests, chest X-rays, or molecular rapid tests (TCM), related to the unpreparedness and unavailability of tools, drugs and professional human resources at the Health Center (PHC). Duration of treatment for patients with TB for a long time, undergoing standard therapy for at least 6 months with a combination of anti-TB drugs (OAT) is the main obstacle to TB treatment in children. The availability of drugs is inadequate as there is often a stock out of drugs. In some cases, there was a delay in detecting cases of TB Drug Resistance (TB-RO), drug side effects, drug allergies that were not handled properly. The high number of TB patients who are absent from treatment has an impact on treatment failure. The stigmatization of TB disease in

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the community is still high, and the lack of government commitment to discipline community compliance in handling TB in children is to be observed.

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