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LINTAS Diarrhea Program Implementation for Toddlers at Community Health Centers: A Qualitative Study

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ABSTRACT

Background: Diarrhea remains a leading cause of morbidity and mortality among children under five in developing countries. Despite the availability of a structured management protocol the LINTAS Diarrhea Program coverage rates at community health centers in Indonesia consistently fall short of the 100% national target, indicating significant implementation gaps.
Objective: This study aimed to evaluate the implementation of the LINTAS Diarrhea Program for toddlers at a primary health care center in West Sumatra using a systems approach encompassing input, process, and output components.
Methods: A descriptive qualitative case study design was employed. Data were collected through in-depth interviews with nine purposively selected informants, field observations, and document reviews. Thematic analysis was conducted following the stages of data reduction, data display, and conclusion drawing. Validity was ensured through source triangulation and method triangulation.
Results: Program implementation was constrained across all system components. Key input deficiencies included incomplete policy dissemination, dual-role burden on personnel, insufficient operational funding, and lack of health promotion media. Process-level problems included suboptimal program target setting, non-compliance with standard zinc dosing protocols, inadequate preventive counseling, and delayed recording and reporting. At the output level, the program achieved only 76% of its 100% target for toddler diarrhea case management.
Conclusion and Recommendation: The underperformance of the LINTAS Diarrhea Program is attributable to systemic weaknesses in human resources, funding, infrastructure, and program governance. Health centers should prioritize policy re-socialization, dedicated staffing, adequate supply chains, and structured community education to improve program coverage and reduce diarrhea-related morbidity in toddlers.

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Introduction

Diarrheal disease remains one of the most preventable yet persistently lethal conditions affecting children under five years of age worldwide. The World Health Organization reported in 2024 that approximately 1.7 billion episodes of diarrhea occur annually among this age group, with the disease responsible for roughly 9% of all child deaths globally in 2023 — equivalent to more than 1,200 deaths per day (WHO, 2024). The vast majority of these deaths, estimated at 78%, occur in low- and middle-income countries, particularly in sub-Saharan Africa and Southeast Asia, where access to safe water, adequate sanitation, and quality health services remains constrained (IVAC, 2020; WHO, 2024). Despite the widespread availability of simple, cost-effective interventions such as oral rehydration therapy and zinc supplementation, global progress in reducing diarrhea mortality in toddlers has been inconsistent, with many countries still falling short of their program coverage targets (IVAC, 2020; UNICEF, 2022).

In Indonesia, diarrhea continues to constitute a significant public health burden, particularly among children under five. National surveillance data from the Indonesian Ministry of Health (2022) indicate that diarrhea deaths in toddlers increased from 18 cases in 2020 to 37 cases in 2021, reflecting a worsening trend despite the existence of a nationally mandated management protocol. Indonesia has been identified among the 15 countries with the highest infant mortality rates attributable to diarrhea and pneumonia, underscoring the gap between policy intent and implementation outcomes (IVAC, 2020). At the provincial level, West Sumatra recorded 54,804 diarrhea cases in 2022, ranking 14th among Indonesia's 34 provinces, with the prevalence of diarrhea among toddlers consistently higher than in any other age group (Indonesian Ministry of Health, 2022). Within West Sumatra, Padang City recorded the highest total diarrhea caseload in the province in 2022, with 11,307 cases, and has demonstrated an upward trend in under-five diarrhea cases from 886 cases in 2020 to 1,199 cases in 2022 (Pratiwi & Hendrati, 2022).

To address diarrhea morbidity and mortality at the primary care level, the Indonesian Ministry of Health established the LINTAS Diarrhea Program, an integrated five-step management protocol mandated for implementation at all community health centers (puskesmas) nationwide. The protocol encompasses oral rehydration therapy, zinc supplementation for ten consecutive days, selective antibiotic administration, continued breastfeeding and complementary feeding, and structured counseling for caregivers (Indonesian Ministry of Health, 2017a). Evidence supports each component of this protocol: oral rehydration therapy reduces dehydration-related mortality, full-course zinc supplementation reduces both episode severity and the risk of recurrence for up to three months, and caregiver counseling promotes sustained preventive behaviors (Anastakim et al., 2022; WHO, 2024). When implemented as an integrated protocol, the LINTAS Diarrhea Program has demonstrated significant potential to reduce toddler diarrhea incidence and case fatality rates at the community level (Oktavianisya et al., 2023).

However, documented evidence consistently indicates that implementation of the LINTAS Diarrhea Program falls short of the mandated 100% national coverage target across multiple Indonesian provinces and health center settings. Pratiwi & Hendrati (2022) found suboptimal implementation of diarrhea control programs in East Java, attributing gaps to inadequate human resource allocation and poor coordination between health center staff. Bon et al. (2023) similarly identified incomplete LINTAS Diarrhea protocol adherence in Eastern Indonesia, citing limited funding and infrastructure as primary barriers. Oktavianisya et al. (2023) reported that standard diarrhea management in East Java remained below target between 2021 and 2022 despite an improving trend. These studies converge on the conclusion that the gap between protocol availability and protocol compliance is driven not by lack of clinical knowledge but by systemic weaknesses in the health center implementation environment. Contributing factors identified across the literature include high personnel workload, insufficient operational funding, unreliable medicine supply chains, and limited community engagement capacity (Asmin et al., 2023; Fitrah et al., 2023; Silitonga et al., 2023; Zulfiana et al., 2024).

Despite this emerging evidence base, the existing literature presents two important limitations. First, most studies have examined individual components of program implementation — such as risk factor analysis (Firdausi et al., 2023; Romlah & Azizah, 2023; Zulfiana et al., 2024) or single-program audits (Bon et al., 2023; Pratiwi & Hendrati, 2022) without applying a holistic systems framework that captures the interdependencies among input, process, and output components. Second, qualitative in-depth investigations of LINTAS Diarrhea implementation that incorporate direct informant perspectives, field observation, and document triangulation remain scarce in the Indonesian context, limiting the granularity of available evidence for program improvement. These gaps are particularly consequential in high-burden settings, where multiple implementation failures operating simultaneously may produce compounding effects that aggregate data alone cannot reveal.

The present study addresses these gaps by conducting a qualitative case study of LINTAS Diarrhea Program implementation at a community health center with the highest documented diarrhea caseload in Padang City, using an input–process–output systems framework to evaluate implementation quality, identify root causes of underperformance, and generate specific, actionable recommendations for program improvement. The findings are intended to contribute to the evidence base for primary health care program management in Indonesia and to provide a replicable analytical model applicable to other high-burden community health center settings across Southeast Asia.

Method

This study employed a descriptive qualitative design with a case study approach, following the framework proposed by Creswell & Poth (2018). The case study approach was selected to enable in-depth examination of the LINTAS Diarrhea Program's implementation within its real-world organizational context, capturing the interplay of structural, human, and procedural factors. Data were collected from November 2023 to July 2024 at a community health center in Padang City, West Sumatra, Indonesia.

Informant Selection: Informants were selected using purposive sampling based on the following criteria: (1) directly involved in the planning, implementation, monitoring, or evaluation of the LINTAS Diarrhea Program; (2) held their current role for at least one year; and (3) willing to participate voluntarily and provide informed consent. A total of nine informants were recruited, representing all key roles in the program management hierarchy, from frontline health workers to district-level supervisors. The characteristics of informants are presented in Table 1.

Table 1. Characteristics of Research Informants (n = 9)

Code	Role	Institution	Sampling Rationale
I1	Head of Community Health Center	Andalas CHC	Overall program oversight and governance
I2	LINTAS Diarrhea Program Manager	Andalas CHC	Primary program coordinator; key informant
I3	General Physician	Andalas CHC	Clinical management of diarrhea cases
I4	Nurse	Andalas CHC	Direct patient care and treatment delivery
I5	Health Promotion Officer	Andalas CHC	Preventive counseling and community education
I6	Environmental Health Officer	Andalas CHC	Sanitation-related field activities and surveys
I7	Pharmacist	Andalas CHC	Drug supply management (ORS, zinc, antibiotics)
I8	Posyandu Cadre	Community	Field-level data collection and community outreach
I9	Diarrhea Program Coordinator	Padang City Health Office	District-level supervision and program feedback

Data Collection: Three complementary data collection methods were used. In-depth interviews were conducted using semi-structured interview guides organized around the input, process, and output components of the systems framework. Each interview lasted 45–90 minutes and was audio-recorded with the informant's written consent. Field observation was conducted to verify physical infrastructure, availability of essential supplies, and the presence of health promotion materials within the facility. Document review covered the Community Health Center

Annual Reports (2021–2023), the Padang City Health Office Annual Report (2022), program service registers, and monitoring and evaluation records.

Data Analysis: Data were analyzed using thematic analysis following four sequential steps: (1) data reduction audio recordings were transcribed verbatim and condensed by identifying and coding relevant segments according to the systems framework; (2) data display coded data were organized into thematic matrices aligned with input, process, and output components; (3) conclusion drawing patterns and relationships were identified across themes and interpreted in light of existing theory and literature; and (4) member checking key findings were reviewed by two informants (I2 and I9) to confirm the accuracy of interpretations and minimize researcher bias.

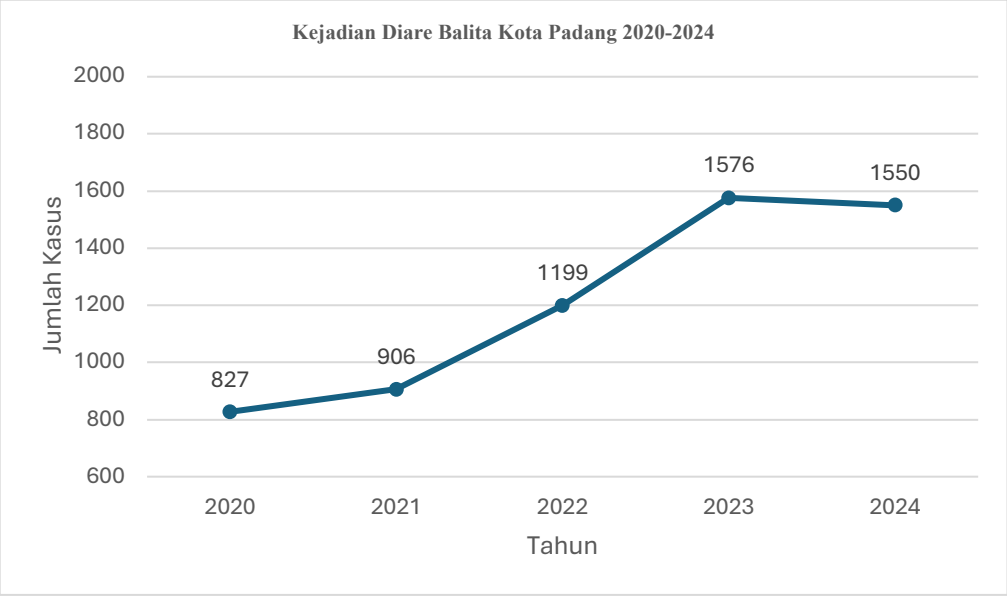
Triangulation and Data Saturation: Data credibility was ensured through two triangulation strategies. Source triangulation involved cross-checking information provided by health center staff against responses from the district health office coordinator and community cadres. Method triangulation involved comparing findings from interviews with those from direct observation and document review. Any discrepancies were re-examined through targeted follow-up questions. Data saturation was confirmed when no new codes or themes emerged after the seventh interview; two additional interviews (I8 and I9) were conducted to confirm saturation before data collection was concluded.

Ethical Considerations: All informants provided written informed consent prior to participation. Anonymity was maintained throughout through the use of participant codes (I1–I9). Audio recordings were stored securely and deleted upon completion of analysis.

Results and Discussions

Padang City recorded an increasing trend of diarrhea cases among toddlers throughout the study period. As shown in Figure 1, total cases rose substantially from 837 in 2020 to 1,576 in 2023, before a marginal decline to 1,550 cases in 2024. This upward trajectory over four consecutive years reflects a persistent and worsening public health problem, indicating that existing preventive and curative programs have not been sufficient to reverse the trend at the city level. The community health center under study consistently recorded the highest diarrhea caseload among all health centers in Padang City, with toddler diarrhea cases rising from 64 in 2020 to 136 in 2021 and reaching 186 in 2022 an increase of 191% over two years (Dinas Kesehatan Kota Padang, 2021; Nazulis, 2023).

Figure 1. Overview of Diarrhea Cases in Toddlers in Padang City from 2020 to 2024



The spatial distribution of diarrhea prevalence across Padang City's eleven sub-districts shifted considerably between 2020 and 2024, as visualized in Figures 2 through 6. In 2020, three sub-districts Pauh, Nanggalo, and Padang Utara fell into the high-prevalence category (>25 per 1,000 toddlers), while five sub-districts recorded low prevalence (<15 per 1,000 toddlers), namely Kuranji, Lubuk Kilangan, Lubuk Begalung, Padang Timur,

and Bungus Teluk Kabung (Figure 2). By 2021, the high-prevalence burden had concentrated in two sub-districts Pauh and Padang Timur while the number of low-prevalence sub-districts remained at four (Figure 3).

Figure 2. Overview of the Distribution of Diarrhea Prevalence in Toddlers in Padang City in 2020

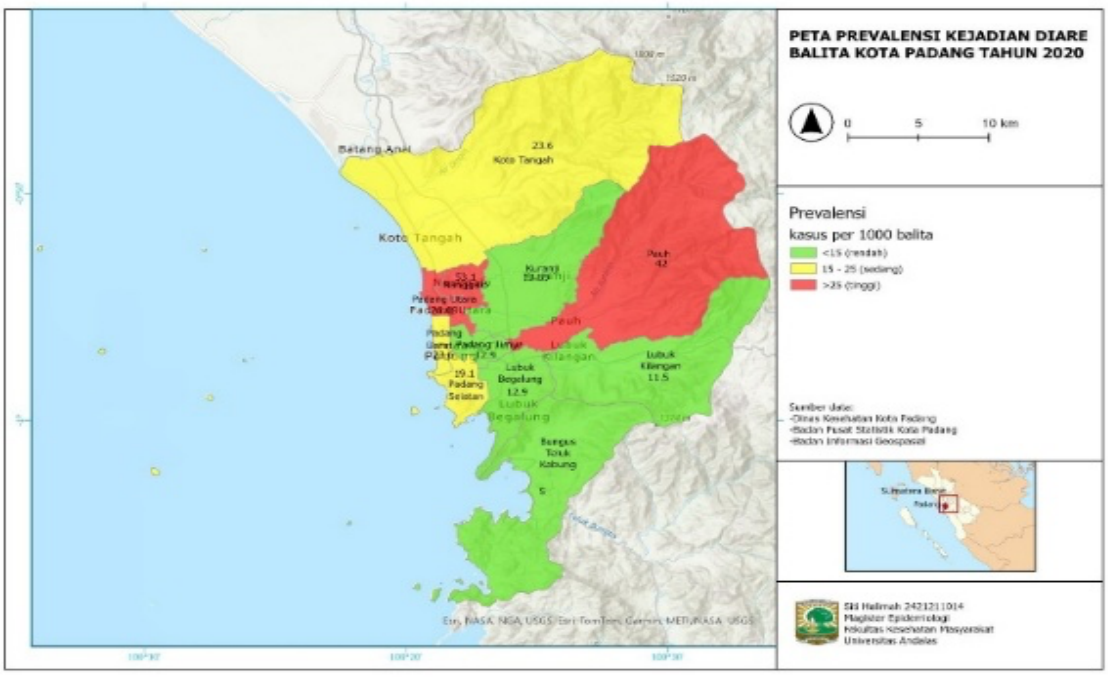
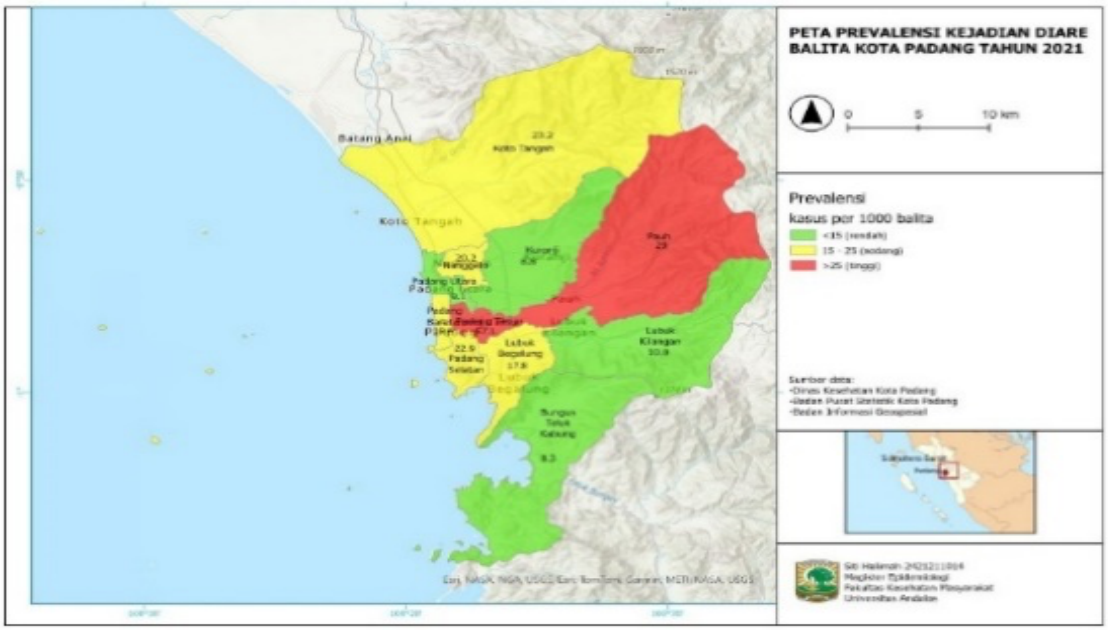


Figure 3. Overview of the Distribution of Diarrhea Prevalence among Toddlers in Padang City in 2021



A notable shift occurred in 2022, when no sub-district recorded high prevalence, though seven sub-districts clustered in the moderate range (15–25 per 1,000 toddlers), leaving only four sub-districts in the low-prevalence category (Figure 4). This apparent improvement in high-burden areas was, however, offset by the broadening of moderate-burden areas, suggesting geographic diffusion of risk rather than genuine overall reduction. In 2023, the high-prevalence burden re-emerged in two sub-districts Padang Barat and Padang Timur with seven sub-districts in the moderate range and only two in the low range (Figure 5).

Figure 4. Distribution of Prevalence of Diarrhea in Toddlers in Padang City in 2022

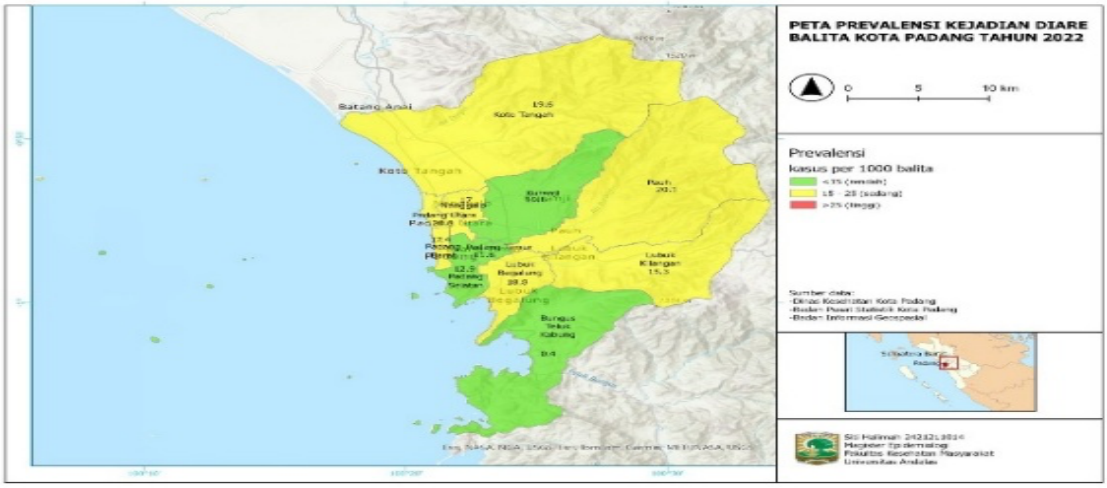


Figure 5. Distribution of Diarrhea Prevalence in Toddlers in Padang City in 2023

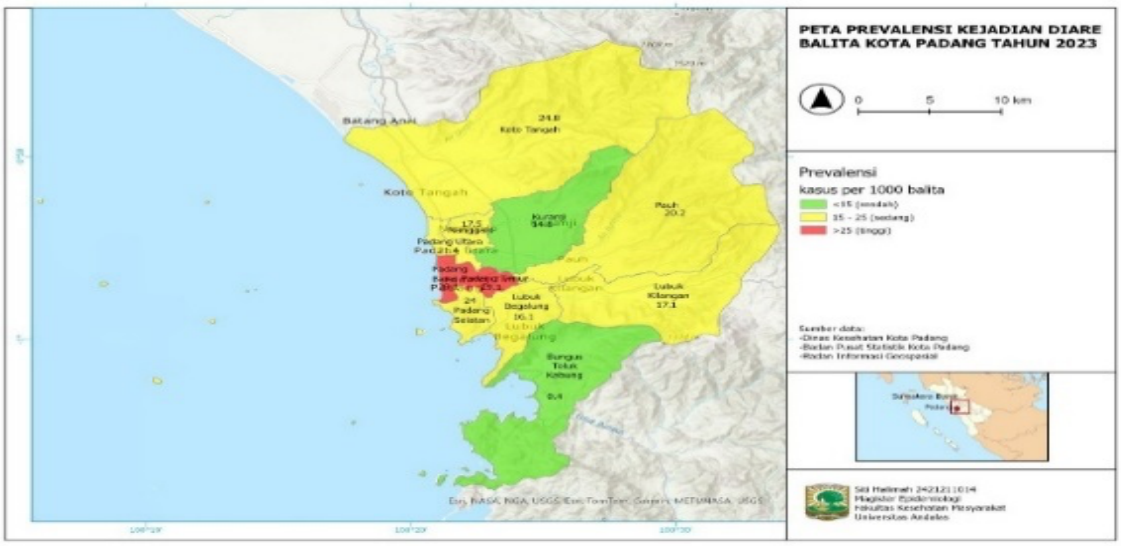
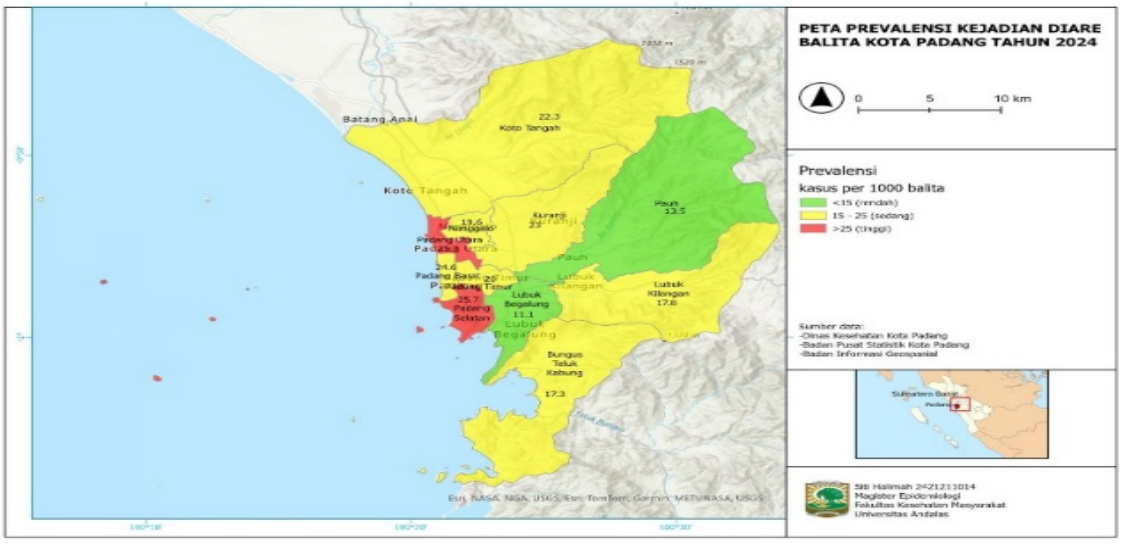


Figure 6. Distribution of Prevalence of Diarrhea in Toddlers in Padang City in 2024



By 2024, the spatial pattern had shifted once more, with Padang Utara and Padang Selatan emerging as the new high-prevalence sub-districts, while seven sub-districts remained in the moderate range and only two Lubuk Begalung and Pauh achieved low prevalence (Figure 6). Viewed across the five-year period, the proportion of sub-districts with moderate-to-high prevalence expanded from six in 2020 to nine in 2024, indicating a city-wide intensification and geographic spread of diarrhea burden that has not been effectively contained by current programmatic responses.

Input Components

Policy

The LINTAS Diarrhea Program at the study site references three regulatory instruments: the Regulation of the Minister of Health of the Republic of Indonesia Number 1216 of 2001, the 2017 LINTAS Diarrhea Pocket Book for Health Workers, and the 2017 Guidelines for Diarrhea Management at Community Health Centers. Document review confirmed that these policy documents were physically available at the facility. Senior staff reported awareness of the policies through institutional briefings and annual coordination meetings organized by the City Health Office. However, policy dissemination was not systematic, and staff who had been appointed since 2021 had not received structured orientation or protocol training. This produced variability in policy literacy, with some staff unable to enumerate all five LINTAS Diarrhea steps or articulate their respective indicators:

"I know there are steps in the LINTAS Diarrhea program, but I am not completely sure about all of them, especially the zinc standard. At the time I was assigned, there was no training given specifically about this program." (Informant 4, Nurse)

"Not all officers understand the full content of the policy. Some know about giving ORS and zinc, but they do not know about the counseling component or the environmental inspection that should accompany it." (Informant 9, City Health Office Coordinator).

The uneven policy dissemination identified in this study is a foundational input failure with cascading consequences for all subsequent implementation components. When frontline staff particularly those newly appointed are unfamiliar with the full five-step LINTAS Diarrhea protocol, deviations from the standard become structurally inevitable rather than individually attributable. The LINTAS Diarrhea Pocket Book (Indonesian Ministry of Health, 2017a) specifies not only the five clinical steps but also the environmental and counseling components that are required to achieve the program's preventive objectives. Partial knowledge of the protocol produces partial implementation, as observed in this study where oral rehydration therapy was consistently delivered but zinc dosing, continued feeding documentation, and caregiver counseling were not. This finding is consistent with Pratiwi & Hendrati (2022), who documented that health center staff in East Java with incomplete protocol knowledge were significantly more likely to omit zinc supplementation and caregiver counseling from their case management. Silitonga et al. (2023) similarly found that knowledge gaps among health workers were directly associated with lower rates of diarrhea prevention education delivery to caregivers. The implication is clear: structured, recurring policy socialization not a one-time briefing is a prerequisite for consistent protocol adherence, and this must be built into the annual work plan as a mandatory activity with dedicated budget allocation.

Human Resources

Health workers involved in the program include physicians, nurses, nutritionists, public health officers, environmental health officers, and posyandu cadres. A critical finding was that the designated LINTAS Diarrhea program manager simultaneously served as the tuberculosis program manager and assisted with general outpatient clinical services. This triple-role arrangement meant that diarrhea program-specific activities were consistently deprioritized whenever clinical service volumes were high:

"Every day I handle patients at the general clinic, then I also have to manage the tuberculosis program. When there is something to do for the diarrhea program — like a meeting or a field visit — I often cannot attend because there are patients waiting." (Informant 2, Program Manager)

"The workload of the person in charge of diarrhea is very heavy. They cannot focus on one program because they have to handle many things at once. This makes it difficult to run program activities optimally." (Informant 1, Head of Community Health Center)

Supporting staff including the health promotion officer and environmental health officer — also reported concurrent programmatic obligations that limited their availability for diarrhea program field activities. Posyandu

cadres, the primary community-level data collectors, operated without regular supervision or performance feedback mechanisms, relying entirely on informal communication with the program manager.

The dual-role burden documented in this study, in which the program manager simultaneously managed tuberculosis programming and general outpatient clinical services, represents the single most consequential input constraint identified. Its effects were not limited to any one program activity but propagated through the entire implementation system: target-setting meetings were not held because the program manager was in the clinic; counseling was conducted only three times per year because the program manager had no time for additional sessions; and reporting was delayed because data consolidation competed with clinical service demands. This pattern has been documented across multiple health programs and health center settings in Indonesia. Bon et al. (2023) found that health centers in Kupang with inadequate human resource allocation for the LINTAS Diarrhea program recorded significantly lower protocol compliance rates compared to facilities with dedicated program staff. Oktavianisya et al. (2023) reported that understaffing was among the top three barriers to achieving the 100% diarrhea management target in East Java health centers. The critical distinction this study adds is that the problem is not individual incompetence but structural overload: a well-motivated, knowledgeable program manager assigned to three concurrent roles will produce the same systemic outcome as found here. Resolution therefore requires structural action either dedicated staffing or evidence-based workload redistribution rather than performance improvement measures directed at individuals.

The unsupervised operation of posyandu cadres also contributed to the data quality and reporting problems identified in the recording and reporting sub-component. Cadres are the primary community-level data collectors for the program, yet they received no formal supervision, no feedback on reporting accuracy, and no performance accountability mechanisms. Futri et al. (2025) highlighted that community health volunteer performance is directly linked to the quality of supervisory support they receive, with unsupervised cadres significantly more likely to submit incomplete or delayed data. Addressing cadre supervision is therefore not only a reporting quality improvement measure but a precondition for accurate program monitoring and evaluation.

Funding

The program nominally operates under two funding streams: the Health Operational Assistance (BOK) grant and the Community Health Center Revenue and Expenditure Budget (BLUD). However, review of the health center's annual work plan document revealed that the BOK budget line specifically allocated for the LINTAS Diarrhea Program was recorded at Rp. 0 for the study year. ORS, zinc, and antibiotics were nominally funded through BOK, while program coordination meetings and field visits were funded through BLUD. In practice, the absence of a dedicated diarrhea operational budget meant that preventive activities depended entirely on residual BLUD funds:

"For outreach activities outside the building going to posyandu, visiting homes, doing water and sanitation inspections there is no dedicated budget. We use whatever money is left from other programs, and sometimes there is nothing left at all." (Informant 5, Health Promotion Officer)

"We have proposed a budget for diarrhea promotion activities several times, but it was not approved. So we do what we can with what is available, which is not much." (Informant 2, Program Manager).

The zero-budget BOK allocation for diarrhea program operations is a governance failure of direct operational consequence. The BOK mechanism was specifically designed by the Indonesian Ministry of Health to fund promotive and preventive activities at the primary care level precisely the category of activities (counseling, field visits, environmental surveys) that were most severely constrained in this study (Indonesian Ministry of Health, 2017b). When the diarrhea program budget is set at Rp. 0, all preventive activities must compete for residual funds from other budget lines, rendering them irregular, underpowered, and unsustainable. Fitrah et al. (2023) demonstrated that health centers with dedicated operational budgets for diarrhea prevention activities conducted significantly more counseling sessions and reached larger proportions of caregivers than those relying on residual funding. Romlah & Azizah (2023) found that the presence of take-home health education materials for mothers was independently associated with better maternal knowledge of diarrhea prevention behaviors and earlier care-seeking for sick toddlers. The absence of such materials at the study site a direct consequence of zero promotional budget therefore represents not only a process failure but a missed opportunity to reduce future case incidence.

The infrastructure gaps absent ORS corner, missing pH meter, and no health promotion media reflect both underfunding and a failure of minimum service standard enforcement. The LINTAS Diarrhea Pocket Book explicitly mandates the availability of an ORS corner and communication materials as structural prerequisites for program delivery (Indonesian Ministry of Health, 2017a). The failure of district-level M&E reviews to flag and

remediate these deficiencies which were physically observable and could have been identified during any supervision visit indicates a gap in the quality of supervisory oversight provided by the City Health Office. Zulfiana et al. (2024) showed that the absence of functional ORS corners in health facilities was associated with lower caregiver competency in ORS preparation, which directly increases the risk of dehydration-related complications in toddler diarrhea cases.

Facilities and Infrastructure

Observation of the facility confirmed multiple infrastructure gaps. No oral rehydration solution (ORS) corner was present, attributed by staff to insufficient physical space within the building. No pH meter was available for water sanitation quality measurement, which is a required component of the environmental health activities prescribed in the LINTAS Diarrhea protocol. No diarrhea-related health promotion materials including posters, leaflets, or brochures were found anywhere within the facility, including the waiting area and examination rooms. At the time of observation, the pharmacy held four boxes of ORS sachets and two boxes of zinc tablets; no antibiotics were in stock. Supply delays were described as a recurring problem:

"There is no ORS corner here because there is simply no space. We give ORS from the pharmacy counter. Patients do not see how it is prepared and do not understand how to make it at home." (Informant 3, Physician)

"Zinc and ORS sometimes arrive late from the district warehouse sometimes by two to three weeks. When that happens, patients who need zinc have to wait or we have to refer them." (Informant 7, Pharmacist)

A summary of all input component findings is presented in Table 2.

Table 2. Summary of Input Component Findings

Sub-Component	Findings from Interview & Observation	Status
Policy	Available but unevenly disseminated; newly appointed staff lack protocol training	Suboptimal
Human Resources	Program manager holds three concurrent roles; no dedicated staff; cadres unsupervised	Inadequate
Funding	BOK diarrhea budget = Rp. 0; field and outreach activities unfunded	Inadequate
Facilities & Infrastructure	No ORS corner; no pH meter; no health promotion media; recurring medicine supply delays	Inadequate

Process Components

Program Target Setting

Program target setting was intended to be a participatory process involving the program manager, environmental health officer, health promotion officer, and posyandu cadres. In practice, formal target-setting meetings were rarely convened. The primary barrier was the concurrent clinical workload of the program manager, which made multi-stakeholder scheduling consistently infeasible. The head of the health center's involvement was described as conditional and inconsistent:

"Meetings to set program targets are very hard to organize. The program manager is almost never free, and the head of the health center also cannot always attend. So the targets end up being set based on last year's numbers, without any real discussion." (Informant 9, City Health Office Coordinator)

"We do not often hold formal meetings specifically for the diarrhea program target. Coordination with the environmental health and health promotion officers is also difficult because everyone has their own program workload." (Informant 2, Program Manager)

The absence of participatory planning resulted in program targets being set without systematic field-level input, community epidemiological data, or inter-sectoral agreement, undermining the operational relevance and shared ownership of those targets.

Program Delivery (LINTAS Diarrhea Steps)

The five components of the LINTAS Diarrhea protocol were implemented with varying levels of compliance. Oral rehydration therapy was the most consistently delivered step, with ORS routinely administered to toddlers presenting with diarrhea at both the health center and through outreach channels. However, significant deviations were identified in the remaining four steps. Zinc supplementation mandated for 10 consecutive days was frequently dispensed for only 5 to 7 days due to pharmacy stockouts:

"We always try to give zinc for 10 days as required. But sometimes we only have enough for 5 or 7 days. We tell the mother to come back for the rest, but many do not return." (Informant 3, Physician)

Selective antibiotic administration was inconsistent due to intermittent supply availability. Continued feeding guidance was provided verbally during consultations but was not documented in case records, making it impossible to verify compliance through document review. The absence of an ORS corner eliminated the possibility of demonstrating ORS preparation to caregivers, a component explicitly included in the LINTAS Diarrhea Pocket Book. Cross-referencing interview data with pharmacy records and service registers confirmed that implementation of the full five-step protocol was not achieved in any documented case during the review period.

Preventive Counseling

Preventive counseling was conducted both inside the health center as part of routine clinical encounters and outside the building at posyandu sessions and community outreach events. However, structured group counseling sessions were held only three times per year. The limiting factors were the absence of an operational budget for field activities, a lack of health promotion materials, and persistently low community attendance:

"When we hold counseling sessions, sometimes only four or five mothers come. They say they are too busy with work or with other children at home. We have nothing to give them to take home either no leaflets, no pamphlets so after the session they have nothing to remind them of what was discussed." (Informant 5, Health Promotion Officer)

"Education about handwashing, clean water, and what to do when a child has diarrhea is very important. But we cannot do it as often as needed. There is no budget for it and no materials to support it." (Informant 6, Environmental Health Officer)

Recording and Reporting

Case data were recorded manually by posyandu cadres on paper registers during community visits, then consolidated by the program manager into a Microsoft Excel spreadsheet, and subsequently entered into the SIHEPI (Sistem Informasi Hepatitis dan Penyakit Infeksi) electronic reporting application. Monthly reports were due to the City Health Office by a specified date, but recurring delays were documented:

"The data from cadres in the field often arrives late sometimes 10 days after the deadline. When I receive it, I have to reconcile it with the health center records, and sometimes the numbers do not match. By then, the reporting deadline to the health office has already passed." (Informant 2, Program Manager)

Document review of the 2023 Diarrhea Program annual report confirmed the absence of entries for several scheduled counseling sessions, indicating that activity implementation and documentation were not consistently aligned. The head of the City Health Office coordination unit noted that data quality from the health center was insufficient for reliable monthly monitoring:

"When the data we receive is incomplete or late, we cannot use it to make accurate decisions about where to direct support. We end up working with estimates rather than real numbers." (Informant 9, City Health Office Coordinator)

Monitoring and Evaluation

Monitoring and evaluation was the most consistently implemented process component. An internal M&E cascade operated in the following order: field health workers reported to the program manager, who reported to the UKP (health service management unit) chairperson, who reported to the head of the community health center. Monthly internal meetings reviewed all program performances. Annual joint M&E was conducted with the City Health Office. Informants confirmed that this structure was functional:

"Every month we hold an internal meeting where all program managers report on their progress. The head of the health center attends and we discuss what is going well and what is not." (Informant 1, Head of Community Health Center)

However, while M&E consistently identified program deficiencies including supply shortages, low counseling attendance, and data reporting delays these findings were not consistently translated into formal, time-bound corrective action plans. Problems were discussed verbally but rarely assigned to responsible individuals with clear deadlines. A complete summary of process component findings is presented in Table 3.

Table 3. Summary of Process Component Findings

Sub-Component	Findings from Interview, Observation & Document Review	Status
Program Target Setting	Participatory meetings rarely held; targets set unilaterally without field input	Suboptimal
Program Delivery	Oral rehydration consistently given; zinc dosing non-compliant (5–7 days vs. 10-day standard); antibiotics intermittently unavailable; no ORS demonstration corner	Partial
Preventive Counseling	Three sessions per year; no take-home materials; low community attendance; restricted by zero operational budget	Suboptimal
Recording & Reporting	Paper-based with Excel consolidation and SIHEPI entry; recurring cadre delays; data incompleteness confirmed in document review	Suboptimal
Monitoring & Evaluation	Monthly internal and quarterly joint M&E conducted; problems identified but corrective action plans not consistently formalized	Adequate

Output Component

The primary output indicator — the proportion of toddler diarrhea cases receiving ORS and zinc in accordance with the national protocol — declined from 80% in 2021 to 76% in 2022, against a mandated national target of 100% (Table 4). This 24-percentage-point gap occurred alongside a simultaneous increase in absolute caseload from 136 to 186 cases, indicating that service delivery capacity was not only failing to meet the target but was deteriorating relative to growing program demand.

Table 4. LINTAS Diarrhea Program Achievement at the Study Health Center

Year	National Target (%)	Program Achievement (%)	Coverage Gap (%)	Total Toddler Diarrhea Cases (n)
2020	100	—	—	64
2021	100	80	20	136
2022	100	76	24	186

Source: Dinas Kesehatan Kota Padang (2021); Nazulis (2023). Achievement = proportion of toddler diarrhea cases receiving ORS and zinc per national protocol.

Process Failures: Mechanisms, Compounding Effects, and Implications

The non-compliance with the 10-day zinc supplementation protocol deserves particular clinical emphasis. The pharmacological basis for the full 10-day zinc course extends beyond the acute episode: zinc supplementation at the recommended dose for 10 days not only reduces the severity and duration of the current diarrheal episode but also provides physiological protection against new diarrheal episodes for approximately three months (Anastakim et al., 2022; WHO, 2024). Dispensing zinc for only 5 to 7 days as documented in this study therefore has a compounded negative effect: it reduces the immediate therapeutic benefit and eliminates the protective window that the full course would have provided. Given that the study site area is a high-burden zone where toddlers are

likely to experience multiple diarrheal episodes annually, systematic under-treatment through shortened zinc courses may be contributing meaningfully to the sustained high incidence observed in the trend data (Figure 1). The proximate cause is supply chain failure, but the root cause is inadequate procurement coordination between the health center pharmacy and the district pharmaceutical supply system a problem that requires district-level intervention, not health center-level management alone.

The limited frequency of preventive counseling three structured sessions per year and the complete absence of take-home educational materials represent the most significant missed opportunity for primary prevention in this program. Evidence consistently demonstrates that health education addressing handwashing with soap, safe food preparation, clean water storage, and early care-seeking is among the highest-impact and most cost-effective interventions for reducing toddler diarrhea incidence in community settings (Asmin et al., 2023; Fitrah et al., 2023; Silitonga et al., 2023). The barriers identified in this study zero operational funding, scheduling constraints, and low community attendance are not insurmountable. Low attendance at fixed-schedule group sessions is addressable through flexible mobile outreach tied to posyandu schedules, integration of diarrhea counseling into routine well-child visits, and the use of peer-to-peer education through trained cadres. These approaches require minimal additional funding but do require programmatic redesign and dedicated management attention both of which are currently crowded out by the structural workload problem documented in the human resources sub-component.

The recording and reporting delays identified in this study constitute a systemic governance problem with implications that extend beyond administrative efficiency. Accurate and timely data are the input to every subsequent management decision: budget justification, case load monitoring, geographic hotspot identification, and corrective action planning. When monthly data are incomplete or two to three weeks late as reported by both the program manager and the City Health Office coordinator program managers cannot make evidence-based decisions, and district health offices cannot allocate support resources to the facilities that need them most. Vinandyanata et al. (2021) demonstrated that health centers with weak recording and reporting systems were significantly less likely to receive targeted technical assistance from district health offices, creating a compounding disadvantage for already under-resourced facilities. Improving the cadre reporting pipeline through simplified data collection tools, digital entry at the posyandu level, and regular supervisory feedback is therefore a leverage point that would improve not only recording quality but the entire programmatic decision-making cycle downstream.

The monitoring and evaluation component, while functionally operational, failed to close the governance loop because identified problems were not converted into formal, accountable corrective action plans. Monthly internal meetings and quarterly joint reviews successfully surfaced recurring deficiencies including supply shortages, staffing constraints, and low counseling coverage but these were addressed through discussion rather than documented action planning with named responsible officers and follow-up verification. This pattern, which Pratiwi & Hendrati (2022) have described as a common feature of primary health care program management in Indonesia, renders M&E a passive observation function rather than an active management tool. For M&E to fulfill its governance purpose, it must be institutionalized as a cycle that mandatorily produces: (a) a written list of identified problems, (b) a corrective action plan with assigned responsibilities and timelines, and (c) a follow-up verification agenda item at the subsequent review meeting.

Output Trajectory and Systemic Implications

The decline in program coverage from 80% to 76% between 2021 and 2022, against a backdrop of increasing absolute caseload (136 to 186 cases), defines a trajectory of deteriorating program performance relative to growing program demand. This outcome is the predictable result of the interdependent input and process failures documented above operating simultaneously. Insufficient staffing reduces counseling frequency; reduced counseling frequency limits caregiver knowledge and early care-seeking; limited care-seeking delays treatment; delayed treatment increases episode severity and duration; and the compounding case burden further overwhelms already overloaded program staff. This self-reinforcing cycle cannot be interrupted by addressing any single component in isolation.

The spatial epidemiological data (Figures 2–6) place the program's output failure in a broader city-wide context. The expansion of moderate-to-high prevalence sub-districts from six in 2020 to nine in 2024 spanning every quadrant of the city indicates that the programmatic failures documented at the study health center are not isolated but are likely representative of structural implementation gaps across multiple Padang City health centers. This interpretation is supported by the overall trend data in Figure 1, which shows increasing total caseloads city-wide despite the implementation of the LINTAS Diarrhea Program across all facilities. Oktavianisya et al. (2023) similarly

found that standard diarrhea management coverage remained below the national target across multiple East Java health centers despite programmatic efforts, suggesting that the implementation barriers identified in this study are systemic features of the Indonesian primary health care environment rather than site-specific anomalies.

Taken collectively, these findings add to and extend the body of evidence from Bon et al. (2023), Pratiwi & Hendrati (2022), and Firdausi et al. (2023) in demonstrating that human resource allocation, operational funding adequacy, supply chain reliability, and structured community engagement are the primary systemic determinants of LINTAS Diarrhea Program performance. The consistency of this finding across geographically diverse settings underscores that effective remediation requires structural interventions at the district and national policy levels not only operational improvements at individual health center level.

Limitations and Methodological Considerations:

Several limitations of this study should be acknowledged when interpreting the findings and considering their applicability to broader contexts.

Single-site design: This study was conducted at a single community health center in Padang City, selected on the basis of its documented highest diarrhea caseload within the city. While this purposive selection strengthens the internal depth of the case analysis, it necessarily limits the transferability of findings to other health center settings with different organizational characteristics, staffing configurations, or geographic contexts. The findings should therefore be treated as generating hypotheses and program improvement propositions rather than as statistically generalizable conclusions. Future multi-site comparative studies involving health centers with varying levels of LINTAS Diarrhea program achievement would substantially strengthen the evidence base for causal inference about implementation determinants.

Qualitative design and social desirability bias: As with all qualitative research based on in-depth interviews, the data in this study reflect informants' perceptions, interpretations, and self-reported practices rather than directly observed or objectively measured behaviors. Informants may have presented program activities in a more favorable light than actual practice warranted a social desirability effect that is particularly likely in settings where program performance is known to be below target. To mitigate this risk, triangulation was applied across three data sources: interview data were systematically cross-checked against field observation findings and documentary evidence, including pharmacy records, service registers, and annual reports. Where discrepancies were identified between informant accounts and documentary evidence for example, in the case of counseling session records — the documentary evidence was treated as the more reliable source of factual data.

Purposive sampling and informant coverage: The nine informants were selected through purposive sampling to represent all key roles in the program management hierarchy, from community cadres to the district health office coordinator. While this approach ensured breadth of organizational perspective, it did not include the perspectives of program beneficiaries specifically, mothers of toddlers in the health center catchment area whose experiences of program delivery and preventive counseling quality could have enriched the demand-side analysis. The absence of beneficiary voices means that the community-level barriers to counseling attendance and care-seeking behavior, while inferred from health worker accounts, were not directly verified. Incorporating caregiver perspectives through focus group discussions in future studies would provide a more complete picture of the implementation gap between program intent and community experience.

Cross-sectional nature of the implementation analysis: Data collection for this study was conducted between November 2023 and July 2024, capturing a cross-sectional snapshot of program implementation at a specific point in time. Program output data (coverage rates of 80% in 2021 and 76% in 2022) were derived from existing administrative records and annual reports rather than from primary data collection. This means that the causal linkages drawn between identified input and process deficiencies and the documented output gap are analytical interpretations grounded in the systems framework, rather than longitudinal causal relationships established through prospective measurement. Changes in staffing, funding, or supply chain conditions that may have occurred between the administrative data period and the interview period cannot be ruled out as sources of temporal discrepancy.

Spatial data as secondary source: The spatial distribution maps of diarrhea prevalence presented in Figures 2 through 6 were derived from secondary data provided by the Padang City Health Office and were not independently verified or generated by the research team. The accuracy of these maps is therefore contingent on the quality of the underlying administrative reporting data, which as this study itself documents is subject to delays

and incompleteness at the health center level. The spatial analysis should accordingly be interpreted as indicative of epidemiological trends rather than as a precise measurement of sub-district-level prevalence.

Researcher reflexivity: The lead researcher was affiliated with the same academic institution as several health system actors in the study setting. Although informed consent, voluntary participation, and confidentiality were ensured for all informants, the institutional proximity of the research team to the health system context may have influenced both the framing of interview questions and the interpretive process during thematic analysis. To address this reflexivity concern, member checking was conducted with two key informants — the program manager and the City Health Office coordinator to verify that the thematic interpretations accurately reflected their stated experiences and did not reflect researcher projection.

Notwithstanding these limitations, the methodological strengths of this study including the triangulation of three data sources, the inclusion of all organizational levels from community cadres to district coordination, direct field observation, and structured thematic analysis provide a solid basis for the conclusions drawn. The findings offer a granular, systems-level understanding of LINTAS Diarrhea Program implementation that is not achievable through quantitative or administrative data analysis alone, and they generate specific, actionable evidence to guide program improvement at both the facility and district levels.

Conclusions

This study evaluated the implementation of the LINTAS Diarrhea Program for toddlers at a primary health care center in Padang City using an input–process–output systems framework. The findings demonstrate that the program's failure to achieve its 100% national coverage target with achievement declining from 80% in 2021 to 76% in 2022 against a backdrop of rising caseloads is not attributable to any single isolated failure but reflects the compounding effect of systemic weaknesses operating simultaneously across all implementation components.

At the input level, four interrelated deficiencies were identified. Policy dissemination was incomplete, leaving newly appointed staff without adequate knowledge of the full five-step LINTAS Diarrhea protocol. The program manager carried three concurrent role assignments diarrhea program management, tuberculosis program management, and general outpatient clinical services leaving insufficient dedicated time for program-specific activities. The BOK operational budget allocated to the diarrhea program was recorded at Rp. 0, effectively eliminating dedicated resources for preventive counseling and community outreach. Facilities and infrastructure were below minimum service standards, with no ORS corner, no pH meter, no health promotion materials, and recurring medicine supply delays.

At the process level, program target setting was rarely conducted participatorily due to coordination constraints, resulting in targets set without field-level input. Protocol delivery was partial, with zinc supplementation frequently dispensed for only 5 to 7 days instead of the mandated 10-day course due to stock shortfalls. Preventive counseling was limited to three sessions per year with no take-home educational materials and persistently low community attendance. Recording and reporting experienced recurring delays attributable to unsupervised cadre data collection and fragmented administrative systems. Monitoring and evaluation, while structurally functional, did not consistently produce documented corrective action plans, rendering it a passive observation mechanism rather than an active management tool.

At the output level, the spatial epidemiological analysis revealed that the proportion of sub-districts in Padang City with moderate-to-high diarrhea prevalence expanded from six in 2020 to nine in 2024, indicating that implementation failures at the health center level are contributing to a city-wide deterioration in diarrhea control that has not been reversed by current programmatic efforts.

Based on these findings, the following priority recommendations are directed to specific stakeholders:

For community health center management, the immediate priorities are to formally redistribute the program manager's workload to ensure dedicated time for diarrhea program activities, to establish a structured biannual policy re-socialization schedule for all clinical and community health staff, and to institutionalize M&E as an accountability cycle that mandatorily produces written corrective action plans with named responsible officers and verification timelines at subsequent review meetings.

For the Padang City Health Office, the priority actions are to ring-fence a dedicated diarrhea program operational budget within the annual BOK allocation for each health center, to enforce minimum service standard

compliance — including ORS corners and health promotion media through structured supervisory visits, to improve the district pharmaceutical supply chain by establishing automatic reorder triggers and buffer stock requirements for ORS, zinc, and antibiotics, and to introduce a cadre supervision and feedback system that improves field data quality and reporting timeliness.

For the community level, preventive counseling should be redesigned to increase frequency to a minimum of six sessions per year, integrated into routine posyandu schedules to improve attendance, and supported by locally adapted, visually accessible take-home communication materials addressing handwashing, safe water handling, and early care-seeking for toddler diarrhea.

The findings and recommendations of this study are not exclusive to the study site. The structural implementation barriers identified inadequate dedicated staffing, zero operational funding for prevention, supply chain fragility, and weak community engagement are consistent with documented patterns across multiple Indonesian provinces, suggesting that these are systemic features of the primary health care implementation environment that require both facility-level operational improvements and district- and national-level policy responses. Future research should evaluate the impact of the recommended interventions through longitudinal or quasi-experimental designs, and should incorporate caregiver perspectives to provide a demand-side complement to the supply-side analysis presented here.

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