

PROJECT EVALUATION



Evaluating a Community-Based Agronursing Program for Hypertension and Diabetes Mellitus Management in Rural East Java: A Project Evaluation

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ABSTRACT

Background: Non-communicable diseases (NCDs), particularly hypertension and type 2 diabetes mellitus (DM), present an escalating public health challenge in rural, agriculturally dominated environments. In RW 06 Dusun Jubung Lor, Desa Jubung, Jember, early screenings revealed substantial rates of uncontrolled hypertension among adults and type 2 DM among older adults, driven by low health literacy, non-adherence to treatment, and risky lifestyle choices like high-sodium diets and smoking. This project evaluation assessed the impact of an integrated community-based agronursing program on behavioral and physiological health outcomes.

Methods: This project evaluation utilized a pre-post assessment of 50 active participants to evaluate health literacy (KAP questionnaires) and clinical metrics (blood pressure and blood glucose) over a 3-week intervention. The multi-component intervention included tailored health education, Focus Group Discussions (FGDs), aerobic exercise, and herbal formulation demonstrations. Data were analyzed using paired t-tests.

Results: Program implementation achieved high fidelity. Mean Knowledge, Attitude, and Practice (KAP) scores for hypertension significantly surged from baseline. Physiologically, mean systolic blood pressure decreased from 148.83 mmHg to 135.70 mmHg ($p<0.001$), while mean blood glucose among older adults with type 2 diabetes mellitus decreased by 17.8%, from 160.36 mg/dL to 138.25 mg/dL ($p<0.001$).

Conclusion: The community-based agronursing program demonstrated promising preliminary clinical and educational outcomes in a rural setting. These findings suggest that the agronursing approach may be a viable model for community health promotion, though further long-term studies are needed to confirm definitive effectiveness.

1 | Introduction

The global epidemiological transition has caused a major shift toward non-communicable diseases (NCDs) in rural and tropical developing regions. Hypertension and diabetes mellitus, once perceived primarily as urban afflictions, have rapidly penetrated rural agrarian societies. In Indonesia, the burden of uncontrolled NCDs is exacerbated within

agricultural ecosystems, where specific ecological and sociocultural determinants delay healthcare-seeking behaviors. Populations living in rural agricultural zones face distinct occupational and lifestyle hazards, such as strenuous but seasonal physical workloads, high psychological stress linked to harvest fluctuations, and specialized dietary habits. These habits include consuming excessive sodium and instant carbohydrates for rapid energy, along with widespread tobacco consumption.

The global epidemiological transition has shifted the burden of NCDs toward rural, agriculturally dominated regions. [1] Rural agricultural populations face unique challenges, including seasonal workloads and dietary habits influenced by localized food accessibility. [2] Recent systematic reviews underscore that community-based interventions, when tailored to the specific socioeconomic and cultural context of rural settings, are essential for improving chronic disease management. [3] In the rural area of Jubung Village, Jember, initial primary screenings revealed critical NCD prevalence. The integration of agronursing—the application of nursing science within agricultural settings to leverage local resources and partnerships—provides a novel framework for addressing these rural health disparities. [4]

In the rural territory of Desa Jubung, located within the Sukorambi sub-district of Jember Regency, East Java, NCDs have reached critical thresholds. Initial primary screenings across RW 06 Dusun Jubung Lor revealed that out of 185 adult residents, 16.2% presented with Stage 1 hypertension, 27.5% with Stage 2 hypertension, and 28.1% with pre-hypertension. Concurrently, the elderly aggregate suffered heavily from type 2 diabetes mellitus (51.72%) and hyperuricemia (37.93%). These statistics reflect an urgent epidemiological necessity for community-level interventions. The local health system faced major gaps: sub-clinical symptoms were routinely dismissed as ordinary physical fatigue from field labor, healthcare was sought only when severe complications disrupted occupational activities, and formal public health communication from village institutions was lacking.

2 | Program Overview

2.1 | Program Description

To mitigate this growing healthcare gap, an integrated, multi-component community nursing program was designed and executed by Ners Profesi students from the Faculty of Nursing, Universitas Jember, under the academic supervision of agronursing specialists. The program was structured around the Community as Partner model and the core principles of Agronursing—the systematic application of nursing science within agricultural settings. Implemented over a 3-week period between April and May 2026 in RW 06 Dusun Jubung Lor, the project deployed five specialized sub-programs tailored to adult and elderly aggregates. The program was designed as a single, cohesive, and integrated series of activities grounded in the Community as Partner model. The intervention workflow was interconnected to address the unified health problems of hypertension and diabetes in a continuous process, spanning three implementation weeks:

- a. CERITA HT (*Cek, Edukasi, Relaksasi, Intervensi Aktif Hipertensi*): Bi-weekly interactive clinical check-ups coupled with structured teaching of Progressive Muscle Relaxation (PMR) techniques using native language instruction. Foundational Awareness (*CERITA HT & PEDULI*): Community-based screenings coupled with tailored educational modules to identify risks and establish a baseline for chronic disease self-management.
- b. PEDASH (*Pola Makan Sehat DASH*): Targeted dietary counseling adapting the Dietary Approaches to Stop Hypertension (DASH) framework to rural Indonesian food access, implemented within existing gender-segregated communal groups (*Muslimin and Muslimat*). SIHAT (*Senam Hipertensi Aktif Terkontrol*) & SEMANIS (*Senam Mandiri Diabetes Sehat*): Structured, low-impact aerobic exercise regimens held at local community spaces to optimize cardiovascular and metabolic efficiency. Lifestyle & Dietary Modification (*PEDASH, SIHAT, & SEMANIS*): Dietary counseling integrated with structured aerobic exercises designed to improve cardiovascular and metabolic health.
- c. TENSI ASRI (*Atasi Hipertensi dengan Ramuan Herbal Inovatif*) & RAMU DARA (*Ramuan Sehat Turunkan Gula Darah*): Evidence-based live educational demonstrations detailing the safe preparation of traditional *komplementer* therapies (e.g., using *daun salam*, *sereh*, and *kayu manis*). SEGERA (*Sehat Gerakan Ramah Anti Hipertensi*): A collaborative partnership with local agricultural groups (GAPOKTAN) to build home-based herbal gardens (TOGA), cultivating anti-hypertensive flora like *kumis kucing* to support lifestyle modification. Local Resource Integration (*TENSI ASRI, RAMU DARA, & SEGERA*): Evidence-based demonstrations on the safe preparation of traditional

herbal remedies and the promotion of household herbal gardens, leveraging local agricultural assets to support long-term self-care.

2.2 | Purpose and Rationale for Evaluation

Evaluating this project is essential to determine whether short-term academic-community partnerships can successfully drive measurable behavioral and physiological improvements in resource-limited rural environments. Given that rural communities often struggle with low health literacy and poor access to centralized medical facilities, evaluating the implementation fidelity and immediate outcomes of this model helps determine its readiness for regional scaling.

2.3 | Evaluation Objectives

The primary objective of this evaluation was to analyze the clinical, behavioral, and operational impacts of the community-based agronursing program in RW 06 Dusun Jubung Lor. Specifically, the study aimed to evaluate changes in participant health knowledge, attitudes, and lifestyle practices (KAP); analyze the project's physiological impact on blood pressure and random blood glucose levels; assess program reach and attendance across a 3-week timeline; and establish actionable recommendations for future public health policies and sustainable agronursing practices.

3 | Methods

This evaluation employed a pre-post descriptive-analytic design. The target population consisted of residents in RW 06 Dusun Jubung Lor. The sample included 50 participants (aged >19 years) who completed all three weeks of the intervention. Participant selection was based on purposive sampling of community members with hypertension or diabetes identified during initial screenings. The study was approved by the institutional ethics committee, and all participants provided informed consent prior to data collection. The instruments, including the KAP questionnaires, were validated for rural Indonesian settings with a Cronbach's alpha > 0.70.

3.1 | Evaluation Framework

This program evaluation was guided by a customized logic model incorporating elements of Lawrence Green's PRECEDE-PROCEED framework alongside the Community as Partner model. It systematically tracked how modifying predisposing (knowledge, attitudes), enabling (herbal gardens, local screenings), and reinforcing factors (family support, group exercise sessions) altered behavioral and clinical metrics.

3.2 | Setting and Target Population

The project evaluation was conducted in RW 06 Dusun Jubung Lor, Desa Jubung, Kecamatan Sukorambi, Jember, East Java, Indonesia. Desa Jubung covers a total area of 374.128 hectares, with 260.028 hectares dedicated entirely to active wet-rice cultivation and agricultural fields, establishing a deeply entrenched rural agrarian environment. The target population consisted of the adult aggregate (aged 19–60 years, total sub-population n=185) and the elderly aggregate (aged >60 years, total sub-population n=29) residing across RT 01, RT 02, and RT 03. The evaluated cohorts included all residents who actively participated across the successive implementation sessions.

3.3 | Metrics and Indicators Used

To evaluate the project rigorously, performance indicators were divided into process and outcome categories:

- a. **Process Indicators:** Measured implementation fidelity, logbook completion, and community participation rates across the 3-week implementation timeline. Total weekly attendance was tracked across all sub-programs to monitor community engagement trends.
- b. **Outcome/Impact Indicators:** Measured change in health literacy via validated Knowledge, Attitude, and Practice (KAP) questionnaires. Clinical outcome metrics included changes in systolic and diastolic blood pressure (mmHg) for the hypertensive adult cohort, and random blood glucose levels (mg/dL) for the diabetic elderly cohort, tracked from baseline to the end of the 3-week intervention.

3.4 | Data Collection and Statistical Methods

Quantitative baseline data were compiled through primary door-to-door community diagnostic surveys using structured questionnaires. Educational outcomes were measured weekly using adapted versions of the validated KAP questionnaires on hypertension and diabetes mellitus. Physiological data were collected using digital sphygmomanometers for blood pressure checks and standardized point-of-care capillary glucometers for random blood glucose screenings.

Qualitative feedback on barriers and enablers was gathered through focus group discussions and semi-structured interviews with village administrators, healthcare cadres, and participants. Quantitative variations across the pre-test and post-test scores were analyzed statistically using paired t-tests via SPSS software, with statistical significance set at $p < 0.05$. Qualitative data were analyzed using thematic analysis to identify contextual enablers and implementation barriers.

4 | Results

4.1 | Program Reach and Implementation

The program achieved high implementation fidelity, with 100% attendance from the organizing nursing team across all sessions. Operational logistics, teaching media, medical equipment, and coordination with local village cadres were fully established prior to each session. Total community participation fluctuated dynamically across the 3-week timeline, as detailed in Figure 1.

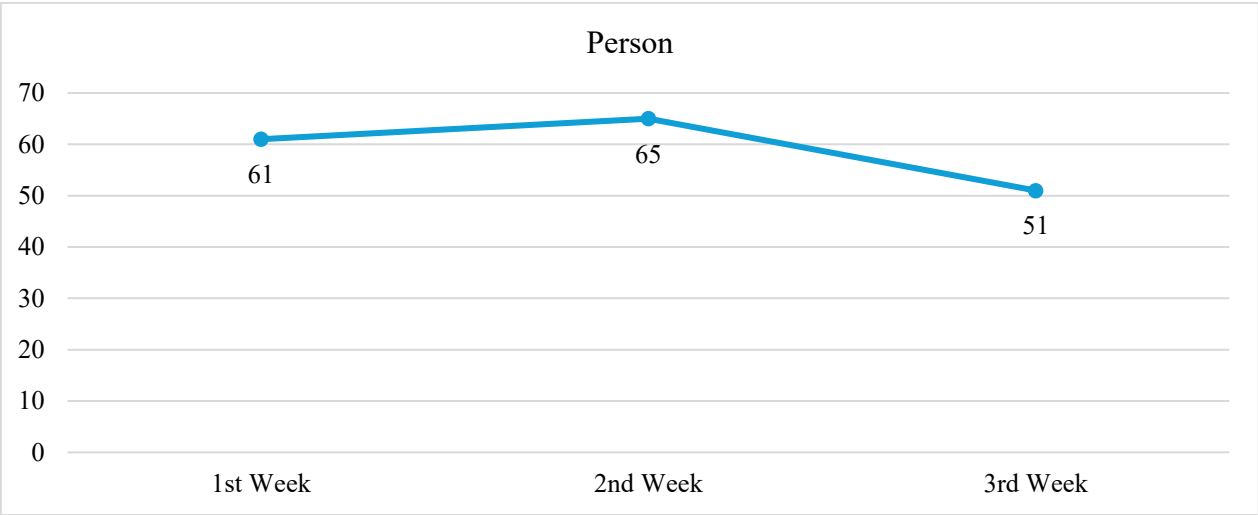


FIGURE 1 | Weekly Community Participation Trends

In Week 1, the program reached 61 residents, focusing on initial awareness through the PEDULI and CERITA HT modules. Week 2 saw an increase to 65 participants, driven by highly interactive, hands-on demonstrations such as building home-based TOGA plots with GAPOKTAN and cooking live herbal formulations (TENSI ASRI and RAMU DARA). Attendance decreased to 51 participants in Week 3 due to scheduling conflicts with seasonal agricultural harvesting duties and regional downpours.

4.2 | Program Impact and Effectiveness

- a. Educational and Behavioral Impact (KAP Scores)
The structured community interventions led to major improvements in health literacy, attitudes, and self-reported practices for both chronic conditions.
 - 1) Hypertension Cohort: Based on the adapted KAP framework, the baseline evaluation in Week 1 yielded a low overall mean score of 58.00, reflecting poor baseline understanding of hypertensive risks. Following targeted education and interactive FGDs, the total mean KAP score rose to 77.35 in Week 2 and reached 102.92 by Week 3. Looking at individual indicators, mean knowledge scores improved from 19.61 (moderate) to 34.37 (high). Attitudes shifted significantly from a negative mean baseline of 19.69 to a positive mean of 34.14 by

Week 3. Self-reported lifestyle practices also improved, with mean scores rising from 18.70 (adequate) to 34.41 (good), driven by increased low-sodium dietary compliance and home exercise.

- 2) Diabetes Mellitus Cohort: Diabetes-specific knowledge scores rose from a low baseline of 2.51 to 10.25 (high knowledge) by Week 3. Attitudinal scores shifted from a negative baseline of 1.95 to a positive mean of 7.16. Practical self-management behaviors rose from a low baseline of 1.11 to a proficient score of 5.76. For oral health management (KEGIMUT DM), post-test evaluations showed that 83.3% of diabetic participants achieved high comprehension scores regarding periodontal infection risks, compared to just 33.3% at baseline.

b. Clinical and Physiological Impact

The educational and behavioral improvements led to clear, positive changes in participants' physiological indicators (Table 1).

TABLE 1 | Physiological Tracking of Clinical Indicators Across the Program Timeline

Parameter Assessed	Baseline (Week 1)	Mid- Intervention (Week 2)	Evaluation (Week 3)	Statistical Significance (p-value)
Mean Systolic BP (mmHg)	148.83	140.00	135.70	< 0.001
Mean Diastolic BP (mmHg)	93.00	88.31	88.40	< 0.05
Mean Blood Glucose (mg/dL)	160.36	151.16	138.25	< 0.001

Description: p-value was obtained using a paired t-test.

Paired t-test analysis confirmed that the reduction in mean systolic blood pressure from 148.83 mmHg to 135.70 mmHg was statistically significant ($p < 0.001$). Diastolic blood pressure decreased from an initial mean of 93.00 mmHg to 88.40 mmHg. For the elderly diabetic cohort, mean random blood glucose levels dropped by 17.8% over the course of the project, decreasing from 160.36 mg/dL to 138.25 mg/dL ($p < 0.001$). This change highlights the metabolic benefits of the SEMANIS exercise routine and improved dietary habits.

4.3 | Unintended Outcomes

An encouraging, unexpected outcome of the project was the spontaneous formation of neighborhood walking groups among adult women following the PEDASH and SIHAT sessions. Additionally, the collaboration with GAPOKTAN during the SEGERA program led to an informal agreement among residents to share traditional herbal clippings across households, which helped lower the cost of setting up individual home gardens.

5 | Discussion

The preliminary findings suggest that the integration of agronursing principles contributed to improved clinical metrics. However, the observed outcomes must be viewed with caution due to the absence of a control group and the potential for confounding factors such as seasonal changes in agricultural workload and concurrent non-program health activities. Operational success was significantly influenced by community engagement; however, attendance was negatively impacted by seasonal harvesting duties in week 3. This highlights the operational constraint of aligning health interventions with rural economic cycles. Additionally, because the outcomes relied partially on self-reported KAP data, recall bias may exist. The program's success was likely a synergistic result of the multi-component approach, though the individual contribution of specific interventions—such as the DASH diet versus exercise—remains difficult to isolate.

5.1 | Interpretation of Program Impact

The evaluation results show that the multi-component community nursing program successfully achieved its dual goals of improving health literacy and stabilizing clinical indicators within the rural community. The steady rise in KAP scores indicates that using localized educational interventions, such as conducting focus group discussions in the native Madurese language, effectively lowered communication barriers often found in rural communities with lower formal education levels. Furthermore, the increase in attendance observed during the initial phase of the program reflected growing community trust, engagement, and acceptance of the intervention. These findings highlight the importance of

culturally sensitive and community-centered approaches in improving health literacy and promoting positive health behaviors among rural populations.

High participant engagement during exercise sessions (SIHAT and SEMANIS) demonstrated that community members were willing to adopt healthier lifestyles when interventions were accessible, practical, and socially supported. The physiological improvements are directly linked to these behavioral changes. The reduction in systolic blood pressure highlights the clinical utility of low-impact aerobic exercise (SIHAT) and progressive muscle relaxation, which help lower peripheral vascular resistance and reduce sympathetic nervous system activity. Similarly, the 17.8% drop in random blood glucose levels confirms that structured exercise (SEMANIS) enhances insulin sensitivity and stimulates glucose uptake in skeletal muscle tissues. [5] The decline observed from the first week to the third week indicates that consistent physical activity has a cumulative effect on blood glucose control. These outcomes prove that non-pharmacological interventions, when properly adapted to local contexts, offer a viable method for managing chronic diseases in resource-limited rural areas.

A particular important aspect of this program was its ability to achieve favorable outcomes through a low-cost, community-based approach. Rather than relying on specialized equipment or intensif healthcare service, the intervention combined culturally adapted health education, structured exercise program, and the utilization of locally available resources. Collaboration with local farmer groups (GAPOKTAN) enabled participants to gain practical knowledge regarding the cultivation and use of medicinal plants that may support the management of NCDs. This approach strengthened community empowerment while enhancing the sustainability health promotion activities.

5.2 | Variations or Similarities with Other Work

These findings align closely with global community nursing literature, which demonstrates that structured lifestyle modifications can produce therapeutic outcomes comparable to low-dose monotherapy for stage 1 hypertension. Our results support the findings of Lestari et al. [6], who noted that community-based chronic care models significantly improve self-care behaviors among rural populations. The observed improvement in participants' knowledge and attitudes is consistent with previous evidence indicating that health education can positively influence both attitudes toward diabetes management and motivation to control blood glucose levels. [7, 8] These findings suggest that educational interventions may facilitate behavioral changes by increasing awareness, readiness, and commitment to self-management practices, which in turn can contribute to improve glycemic control. Furthermore, the success of the SIHAT and SEMANIS sub-programs mirrors research by Nurcahyani et al. [9] and Syahleman et al. [10], which documented major reductions in capillary blood glucose following regular, group-based diabetic exercises. In addition, herbal therapy can also help manage diabetes mellitus when used properly and under medical supervision. [11] As such, the traditional herbal remedies (RAMU DARA) initiative can also help manage blood sugar levels in the community.

The observed reduction in blood pressure is likely the result of multiple complementary intervention components. While physical activity has been shown to improve cardiovascular function and vascular elasticity, [12, 13] evidence from randomized controlled trials also demonstrates that adherence to the DASH diet contributes significantly to blood pressure reduction. [14] The use of medicinal plants also supports hypertension prevention efforts and the preservation of local wisdom in traditional medicine. [15] Therefore, the integration of exercise (SIHAT), dietary counseling (PEDASH), cultivation of medicinal plants (SEGERA), and hypertension education (CERITA HT) may have produced a synergistic effect on blood pressure control.

Similar findings were reported by Susanto et al. [16], who demonstrated that community empowerment and partnership-based interventions implemented through the Healthy Community Movement (HCM) and Integrated Development Posts for NCDs resulted in significant reductions in blood pressure, Body Weights, and abdominal circumference. Their findings, together with the present Study, reinforce the effectiveness of combining Health Education, structured physical activity, and Community engagement in improving outcomes among individuals at risk for NCDs.

Another notable finding was the high level of community participation throughout the program. This finding is particularly important given previous evidence showing that participation in Integrated Primary Care (Integrasi Layanan Primer - ILP) activities is associated with improved outcomes and survival among individuals with NCDs. [3] Despite the documented benefits of ILP participation, sustaining Community engagement in routine preventive Health Services remains a challenge in many rural settings. The strong engagement observed in the present program may suggest that

interventions delivered within familiar community settings and integrated into residents' daily routines are perceived as more accessible and acceptable than conventional service-based approaches. This finding highlights the importance of accessibility and community ownership in improving participation in health promotion programs.

This project demonstrates a unique implementation approach by integrating health interventions into local agricultural practices and establishing partnerships with groups such as GAPOKTAN. This approach has been proven to increase community participation, as it is more aligned with the context of daily life in rural areas. Furthermore, these findings are supported by other studies indicating that health promotion interventions among farming communities can have a positive impact, particularly in reducing blood pressure, as a result of increased awareness and improved health-related behaviors. [17] Therefore, this project not only enhances community participation but also makes a meaningful contribution to improving health outcomes, while strengthening the development of community nursing based on local wisdom.

5.3 | Contextual Barriers and Enablers

Several unique rural factors heavily influenced the project's implementation and overall outcomes:

- a. Contextual Enablers: Strong social cohesion within RW 06 Dusun Jubung Lor, particularly through established religious and agricultural networks (Muslimin, Muslimat, and GAPOKTAN), served as an effective platform for health programs. Delivering education during routine neighborhood meetings maximized participation. Additionally, the abundance of local natural resources made cultivating herbal gardens (TOGA) highly practical and affordable.
- b. Contextual Barriers: The community's financial profile presented challenges; over 50% of households earn less than IDR 2,000,000 per month, which often limits their ability to purchase home medical supplies like personal blood pressure cuffs or glucometers. Culturally, deep-rooted habits such as high tobacco use among adult males, a preference for high-sodium foods, and a reliance on unprescribed over-the-counter medications for temporary symptom relief slowed behavioral changes. Occupationally, seasonal harvesting commitments directly caused the drop in attendance seen in Week 3, as farming duties took priority over health sessions.

5.4 | Limitations of the Evaluation

The primary limitation of this evaluation is its short 3-week implementation and assessment window, which prevents the tracking of long-term behavioral changes or clinical complications. Secondly, the evaluation did not use a randomized control group, meaning external variables like changes in seasonal weather or varying field workloads may have influenced blood pressure and glucose trends. Lastly, lifestyle adherence metrics relied partly on self-reported survey data, which can introduce recall bias.

6 | Conclusion

In conclusion, the community-based agronursing program showed promising preliminary results in improving health literacy and blood pressure control in a rural agrarian setting. While these results are encouraging, they should be interpreted as early indications of effectiveness rather than definitive clinical proof. Future research utilizing randomized control trials and longer evaluation windows is recommended to validate the agronursing approach for broader regional implementation.

This project evaluation demonstrates that an integrated, community-centered nursing program utilizing agronursing principles can successfully improve chronic disease management in rural areas. By combining targeted health education with structured group exercises and utilizing local

agricultural resources, the project achieved significant improvements in both health literacy and vital clinical metrics among adult and elderly cohorts. The success of this intervention offers clear, actionable insights for regional public health planning:

- a. Institutionalize Agronursing Collaborations: Local public health centers (Puskesmas) should transition from passive care models to active, community-based agronursing strategies. Healthcare schedules must be flexibly designed around rural harvest cycles to maintain high community engagement.

- b. Empower Local Cadres for Sustainability: To maintain these health improvements, responsibility for the SIHAT and SEMANIS exercise programs should be transferred to trained village healthcare cadres. This can be integrated into the government's Integrated Primary Care (Integrasi Layanan Primer - ILP) framework to ensure consistent, long-term tracking.
- c. Scale the Collaborative Model: Regional health authorities should use these findings to establish formal partnerships between nursing institutions, village leadership, and agricultural collectives (GAPOKTAN). This joint approach can help scale home-based herbal medical plots (TOGA), lowering systemic healthcare costs while building health independence in rural agrarian communities across East Java.

Declaration of Interest

The authors affirm that there are no conflicting objectives or commercial biases associated with the evaluation of this public health program.

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Data Availability

None

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