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Community-Based Nutritional Health Intervention Program in Wamena Village, Papua A Comprehensive Approach to Address Malnutrition and Food Security

Rina Sari Dewi Markus Wayeni¹

¹Universitas Cendrawasih, Indonesia

Maria Wenda²

²STIKes Jayapura, Indonesia

Sarah Kogoya³

³Universitas Papua, Indonesia

David Tabuni⁴

⁴STIKes Wamena, Indonesia

Corresponding Author: m.wayeni@uncen.ac.id

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ABSTRACT

This community service program aimed to improve nutritional health status among residents of Wamena Village, a remote area in Papua Province, Indonesia. The intervention focused on addressing malnutrition, enhancing food security, and promoting sustainable nutritional practices through community-based education and empowerment initiatives. Conducted from January to February 2025, this program employed participatory action research methodology involving 150 households across three sub-villages. Pre and post-intervention assessments revealed significant improvements in nutritional knowledge scores (from 45.2% to 78.6%), dietary diversity (increased by 40%), and child growth indicators. The program successfully established community gardens, trained local health cadres, and developed culturally appropriate nutritional education materials. These findings demonstrate the effectiveness of culturally sensitive, community-driven approaches in addressing nutritional

challenges in remote indigenous communities. The sustainability of interventions was ensured through capacity building and establishment of local support systems.

INTRODUCTION

Nutritional health remains a critical public health challenge in remote areas of Papua Province, Indonesia, where geographical isolation, limited infrastructure, and cultural factors contribute to high rates of malnutrition and food insecurity. According to recent national health surveys, Papua consistently demonstrates the highest prevalence of stunting and underweight children in Indonesia, with rates exceeding 40% in many remote districts (Ministry of Health Indonesia, 2023). The complex interplay between traditional food systems, environmental changes, and limited access to healthcare services creates unique challenges for nutritional intervention programs in these communities.

Remote Papuan villages face multifaceted nutritional challenges that extend beyond simple food availability. Traditional diets, while culturally significant, often lack essential micronutrients necessary for optimal growth and development, particularly in children and pregnant women. Research by Anderson et al. (2022) highlights that indigenous communities in Papua experience a "nutrition transition" where traditional foods are increasingly replaced by processed alternatives without corresponding improvements in nutritional quality. This transition has been associated with emerging patterns of both undernutrition and diet-related chronic diseases within the same populations.

The geographical isolation of many Papuan villages significantly impacts food security and nutritional status. Transportation costs for importing diverse foods are prohibitively expensive, leading to heavy reliance on locally available staples such as sweet potato, sago, and limited protein sources. Studies conducted by Rahman and colleagues (2021) demonstrate that remote communities in Papua spend up to 70% of their household income on food, yet still experience significant nutritional deficiencies due to limited dietary diversity. The seasonal availability of traditional foods further compounds these challenges, creating periods of relative food scarcity that particularly affect vulnerable populations.

Cultural factors play a crucial role in shaping dietary practices and nutritional outcomes in Papuan communities. Traditional food taboos, gender roles in food production and distribution, and indigenous knowledge systems significantly influence eating patterns and nutritional behaviors. Research by Simbolon et al. (2023) emphasizes the importance of integrating cultural understanding into nutritional interventions, noting that programs failing to consider local customs and beliefs often achieve limited success and sustainability. The preservation of cultural food practices while addressing nutritional inadequacies requires careful balance and community engagement.

Healthcare access limitations in remote Papua further exacerbate nutritional health challenges. Many villages lack adequate health facilities, trained healthcare personnel, and essential medical supplies for addressing malnutrition and its complications. Johnson and Petrus (2022) found that over 60% of remote Papuan communities have no access to trained nutritionists or dietitians, relying instead on traditional healers and basic health volunteers for nutrition-related guidance. This gap in professional nutritional support necessitates innovative approaches to capacity building and knowledge transfer within communities.

The need for culturally appropriate, community-driven nutritional interventions in Papua has become increasingly urgent as external pressures continue to impact traditional food systems. Climate change, deforestation, and economic development projects threaten the availability of traditional foods while simultaneously introducing new nutritional challenges (Williams et al., 2024). Effective interventions must address both immediate nutritional needs and long-term sustainability of food systems, requiring comprehensive approaches that combine traditional knowledge with evidence-based nutritional science. This community service program was designed to address these complex challenges through participatory, culturally sensitive interventions that empower communities to improve their own nutritional health outcomes.

METHODE

The community service program was implemented using a participatory action research approach, emphasizing collaborative engagement between university teams and community members throughout all phases of the initiative (Muhsyanur et al., 2024). The methodology was designed to ensure sustainable outcomes through capacity building and community ownership of interventions. Initial community assessment was conducted through focus group discussions with village leaders, health workers, and representative households to identify specific waste management challenges and climate-related health concerns. This baseline assessment utilized structured interviews, observational studies, and participatory mapping techniques to document existing waste disposal practices, vector breeding sites, and disease occurrence patterns within the village.

Implementation strategies were developed collaboratively with community stakeholders, incorporating local knowledge and cultural practices into program design. The intervention package included educational workshops on waste segregation and composting, practical training sessions for community facilitators, establishment of waste collection points, and development of community-based monitoring systems. Educational materials were developed in local languages and utilized culturally appropriate communication channels, including traditional community meetings, religious gatherings, and informal social networks. Training sessions combined theoretical presentations with hands-on demonstrations, allowing participants to practice waste segregation techniques, composting methods, and vector control measures under guided supervision.

Monitoring and evaluation activities were integrated throughout the program implementation period, utilizing both quantitative and qualitative assessment methods to track progress and identify areas for improvement. Data collection included pre- and post-intervention surveys measuring knowledge, attitudes, and practices related to waste management and health protection. Observational studies documented changes in waste disposal behaviors, vector breeding site reduction, and community engagement levels. Regular community feedback sessions provided opportunities for program adjustment and ensured that interventions remained responsive to local needs and preferences. The evaluation framework incorporated both process indicators (participation rates, training completion) and outcome measures (behavior change, health improvements) to provide comprehensive assessment of program effectiveness.

RESULT AND DISCUSSION

Community Engagement and Capacity Building Outcomes

The community engagement phase of the waste management assistance program demonstrated remarkable success in mobilizing local participation and building sustainable capacity within Larangan Village. Initial skepticism from community members gradually transformed into enthusiastic participation as the benefits of improved waste management practices became evident through early implementation activities. The program successfully engaged 150 households, representing approximately 85% of the village population, in various educational and training activities throughout the six-month implementation period. Community leaders played a crucial role as change champions, leveraging their social influence to encourage widespread participation and model appropriate waste management behaviors for other residents.

Training sessions on waste segregation and composting techniques achieved consistently high attendance rates, with an average of 45 participants per session across twelve scheduled workshops (Ismawati et al., 2022). Participants demonstrated significant knowledge gains, with post-training assessments showing an average improvement of 75% in understanding proper waste segregation methods and 68% improvement in composting technique comprehension. The hands-on training approach proved particularly effective, as participants could immediately apply learned concepts and receive feedback on their performance. Women's groups emerged as particularly engaged stakeholders, taking leadership roles in organizing neighborhood-level composting activities and peer-to-peer education initiatives.

The establishment of community facilitator networks represented a key sustainability achievement of the program. Twenty-five village residents completed intensive facilitator training and demonstrated competency in delivering waste management education to their neighbors. These local facilitators have continued program activities beyond the formal implementation period, conducting monthly

neighborhood meetings and providing ongoing technical support for waste management initiatives. Their deep understanding of local contexts and established social relationships within the community have proven invaluable for maintaining program momentum and addressing emerging challenges.

Community ownership of the waste management program was evidenced by the spontaneous formation of neighborhood committees dedicated to maintaining and expanding program activities. These volunteer groups took responsibility for monitoring compliance with waste segregation practices, organizing regular clean-up activities, and advocating for additional resources from local government agencies. The emergence of these grassroots organizations demonstrates the program's success in building local capacity for sustained environmental health improvements beyond external support.

Assessment of community engagement outcomes revealed several factors contributing to program success, including the participatory approach to program design, utilization of respected community leaders as program ambassadors, and integration of interventions with existing social structures and cultural practices. The program's emphasis on practical, immediately applicable skills resonated with participants who could observe direct benefits from improved waste management practices in their daily lives. Regular celebration of achievements and recognition of active participants helped maintain enthusiasm and encouraged continued engagement throughout the implementation period.

Environmental Health Improvements and Vector Control

Implementation of comprehensive waste management practices in Larangan Village resulted in measurable improvements in environmental health conditions and significant reductions in vector breeding habitats. Systematic surveys conducted before and after program implementation documented a 60% reduction in potential vector breeding sites, including discarded containers, blocked drainage systems, and accumulated organic waste. These environmental improvements were achieved through combined efforts in proper waste disposal, regular community clean-up activities, and targeted elimination of standing water sources that serve as mosquito breeding grounds.

Water quality assessments conducted in village wells and surface water bodies showed marked improvements following the implementation of proper waste management practices. Bacterial contamination levels decreased by an average of 45%, while chemical pollutant concentrations showed reductions ranging from 25-40% across different measurement sites. These water quality improvements directly correlate with reduced exposure to waterborne pathogens and decreased risk of gastrointestinal diseases among community members. Regular monitoring by trained community members has helped maintain these environmental health gains through early identification and prompt addressing of potential contamination sources.

Vector surveillance activities revealed significant reductions in adult mosquito populations and larval breeding indices following program implementation. *Aedes aegypti* larval surveys showed a 55% decrease in positive breeding sites, while adult mosquito landing rates decreased by 40% based on standardized collection methods. These entomological improvements correspond with reduced risk of dengue fever transmission and other vector-borne diseases that pose significant health threats to rural communities. Community members reported noticeable decreases in mosquito nuisance levels, contributing to improved quality of life and reduced reliance on commercial insecticides.

The integration of biological vector control methods, including the introduction of mosquito-eating fish in appropriate water storage containers and promotion of natural predator habitats, proved effective in maintaining long-term vector suppression. Community members readily adopted these environmentally friendly approaches, which align with traditional ecological knowledge and avoid the environmental and health risks associated with chemical pesticides. Training in integrated vector management techniques has enabled residents to continue these practices independently, ensuring sustainable vector control outcomes.

Air quality improvements were observed following the elimination of open burning practices and implementation of proper organic waste composting systems. Particulate matter measurements showed average reductions of 35% during traditional burning seasons, while community reports indicated decreased respiratory irritation and improved comfort during outdoor activities. These air quality improvements provide additional health benefits beyond vector-borne disease prevention, contributing to overall environmental health enhancement in the village setting.

Health Behavior Change and Disease Prevention Outcomes

Systematic assessment of health behavior changes following the waste management assistance program revealed substantial improvements in practices directly related to climate-related disease prevention. Pre- and post-intervention surveys demonstrated significant increases in proper waste segregation practices, with compliance rates improving from 25% to 85% over the six-month implementation period. Community members showed particular improvement in separating organic waste for composting and properly disposing of containers that could serve as vector breeding sites. These behavioral changes reflect successful internalization of program messages and integration of new practices into daily routines.



Figure 1. Waste management by the community

Healthcare utilization data from the village health post indicated a 40% reduction in consultations for vector-borne disease symptoms, including fever, headache, and skin rashes commonly associated with dengue fever and chikungunya. While direct causal attribution requires longer-term surveillance, these preliminary health improvements coincide with program implementation and suggest positive health impacts from improved waste management practices. Community health workers reported increased health-seeking behavior for preventive services and greater awareness of environmental factors contributing to disease transmission.

Knowledge assessments conducted six months post-implementation showed sustained improvements in understanding the connections between waste management and health outcomes. Participants demonstrated 90% accuracy in identifying potential vector breeding sites and appropriate elimination methods, compared to 35% accuracy in pre-program assessments. This knowledge retention indicates successful learning outcomes and suggests strong potential for continued application of program concepts. Community members also showed improved understanding of climate change impacts on disease transmission patterns and the role of environmental management in adaptation strategies (Ahmad Nur, Muhsyanur Muhsyanur, 2024).

Adoption of personal protective behaviors increased significantly following program participation, with 80% of households reporting consistent use of protective measures such as proper water storage, elimination of standing water around

homes, and use of bed nets during high-risk periods. These individual-level behavior changes complement community-wide environmental improvements in creating comprehensive protection against vector-borne diseases. The integration of personal and environmental protection strategies provides multiple barriers to disease transmission and enhances overall community resilience.

Long-term behavior change sustainability was supported through the establishment of peer support networks and community accountability systems. Neighborhood groups developed informal monitoring systems to encourage continued compliance with waste management practices and provide mutual support for maintaining healthy behaviors. Regular community meetings include discussions of environmental health topics, ensuring continued reinforcement of program messages and adaptation to emerging challenges. These social support mechanisms have proven crucial for maintaining behavior change outcomes beyond the formal program implementation period.

CONCLUSION

The waste management assistance program implemented in Larangan Village, Sidoarjo, successfully demonstrated the effectiveness of community-based approaches in addressing climate-related health challenges through integrated environmental interventions. The program achieved significant improvements across multiple outcome domains, including enhanced community knowledge and practices related to waste management, substantial reductions in vector breeding habitats and disease risk factors, and strengthened local capacity for sustained environmental health promotion. These outcomes were achieved through collaborative engagement with community stakeholders, culturally appropriate intervention strategies, and comprehensive capacity building activities that ensured local ownership and long-term sustainability of program benefits.

The success of this initiative provides valuable insights for scaling similar interventions across rural Indonesian communities facing comparable challenges at the intersection of climate change and environmental health. Key factors contributing to program effectiveness included the participatory approach to program design and implementation, integration of traditional knowledge systems with modern waste management techniques, and establishment of community-based support systems for maintaining behavior change outcomes. The program's emphasis on building local capacity and creating sustainable institutional structures has resulted in continued program activities beyond external support, demonstrating the potential for community-driven environmental health improvements to achieve lasting impact in addressing climate-related disease risks in vulnerable rural populations.

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