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OPTIMALCARE: Community-based home care policy innovation in accelerating stunting reduction in Makassar City

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ABSTRACT

Stunting remains a significant public health challenge in Makassar City, with prevalence rates exceeding national targets and World Health Organization thresholds. Contributing factors include socioeconomic disparities, limited access to healthcare, suboptimal parenting practices, and inadequate nutritional intake. The OPTIMALCARE program introduces a community-based home care policy innovation to accelerate stunting reduction through integrated health services, family-centred nutrition education, routine growth monitoring, and a mobile nutrition monitoring application. This program engages health workers, Posyandu cadres, and community leaders to deliver proactive home visits, promote behavioral change, and ensure timely interventions. A participatory approach strengthens local capacity, fosters cross-sector collaboration, and leverages technology for real-time data collection and analysis. The initiative aligns with Sustainable Development Goals (SDG 2, SDG 3, and SDG 17), regional development priorities, and national research agendas on child health and nutrition. Through targeted outreach, community empowerment, and evidence-based interventions, OPTIMALCARE aims to improve healthcare accessibility, enhance parental knowledge, and foster sustainable community involvement, ultimately contributing to a significant decline in stunting prevalence in Makassar City.

Keywords: community-based home care, nutrition monitoring, public health innovation, stunting reduction.

INTRODUCTION

Makassar City, the capital of South Sulawesi Province and one of Indonesia's metropolitan areas, continues to face a serious public health challenge: stunting among children under five years of age. According to data from the Makassar City Health Office, the prevalence of stunting remains high, exceeding the national target outlined in the National Medium-Term Development Plan (RPJMN) and surpassing the World Health Organization (WHO) threshold of 20%. In 2019, Indonesia recorded a national stunting prevalence of 27.67%, meaning that one in four children under five experienced impaired growth. The condition in Makassar reflects this alarming trend, with rates around 30%, far above the acceptable limit. Stunting is a form of chronic malnutrition that hinders a child's physical growth and cognitive development, resulting from prolonged insufficient nutrient intake, recurrent infections, and inadequate health care [1]. Children affected by stunting are more vulnerable to diseases and often demonstrate lower cognitive performance, which in turn affects their future productivity and quality of life. The impact is multidimensional, spanning health, education, and socioeconomic development, making stunting a medical concern and a critical development issue [2] [3].

Several interrelated factors contribute to the persistence of stunting in Makassar. These include socioeconomic disparities, with approximately 25% of the population living below the poverty line; limited access to quality health services, particularly in peri-urban and underserved areas; suboptimal infant and young child feeding practices; and low parental knowledge regarding balanced nutrition and proper childcare [4]. Although Makassar has 20 primary health centers (Puskesmas) and 5 hospitals, service distribution remains uneven, and only about 60% of residents have convenient access to primary healthcare facilities. These disparities are further compounded by the fact that most of the city's population works in the informal sector, where economic instability makes it difficult to prioritize health and nutrition. The government has implemented programs to address stunting, such as Posyandu (integrated health posts) and Puskesmas-based services, focusing on growth monitoring, immunisation, and nutrition supplementation. While these initiatives have contributed to progress, they still face challenges in outreach, consistency, and community engagement. Low attendance, inadequate follow-up mechanisms, and insufficient integration between community-level health services and household-level interventions often limit posyandu activities. As a result, many vulnerable families remain unreached by timely and effective care [5] [6][7].

The OPTIMALCARE program is an integrated, community-based home care initiative designed to accelerate stunting reduction in Makassar City. It delivers proactive health and nutrition services at the household level through trained health workers and community cadres, focusing on prevention, education, and continuous monitoring. Key components include home visits, tailored family nutrition education, regular child growth monitoring, and a mobile application for real-time data collection, progress tracking, and targeted follow-up [8]. This approach improves service accessibility, precision, and efficiency, ensuring timely and appropriate support for at-risk children. OPTIMALCARE is a community-based stunting prevention program that engages local leaders, Posyandu cadres, mothers' groups, and neighbourhood organisations through training, advocacy, and behaviour change campaigns. The program aligns with global policies (SDGs 2, 3, 17), national targets (reducing stunting to below 14% by 2024 in RPJMN), local agendas (Makassar's Asta Cita), and the National Research Master Plan (RIRN) on child health

and nutrition innovation [9]. Its main strength lies in technology integration via a mobile application offering digital growth charts, nutrition recommendations, immunisation reminders, and teleconsultation services [10] [11].

This empowers parents with actionable information and enables health workers to monitor child growth and respond promptly. In addition, the program strengthens community and cadre capacity through training on nutrition, health, management, communication, and data recording. Campaigns are delivered through community gatherings, religious events, schools, and social media to maximize reach and reinforce key messages. By addressing both the supply side (improving health service capacity and accessibility) and the demand side (increasing parental knowledge, motivation, and healthy care practices), OPTIMALCARE aims to accelerate stunting reduction, improve child health outcomes, and generate long-term social and economic benefits. This integrated model has strong potential for replication in other regions of Indonesia.

METHOD

The OPTIMALCARE program was implemented through a structured, participatory, and collaborative approach, integrating health service delivery, technology application, and community empowerment to accelerate stunting reduction in Makassar City. The method was designed to ensure that solutions addressed priority problems identified during the initial assessment while actively involving local stakeholders for long-term sustainability.

Implementation Stages. The program followed five main stages: Socialization. Program objectives, activities, and expected outcomes were introduced to stakeholders, including the Makassar City Health Office, primary health centers (Puskesmas), Posyandu cadres, local leaders, and community representatives. Socialization activities were conducted through community meetings, coordination sessions with local government, and distribution of information materials to ensure understanding and commitment from all parties. Training. Capacity-building sessions were provided for Posyandu cadres, health workers, and community volunteers. Training covered: Nutrition education and stunting prevention. Household-level health monitoring techniques. Use of the OPTIMALCARE Mobile Nutrition Monitoring Application. Communication skills for health promotion and counseling. Participants received printed and digital training modules, and interactive methods such as role-play and group discussions were used to strengthen understanding.

Technology Deployment. The OPTIMALCARE Mobile Application was introduced and installed on devices used by cadres and selected community members. Key features included: Digital input of child growth data (weight, height, age, immunization status). WHO-standard growth charts for progress visualization. Personalized daily nutrition recommendations. Visit and immunization reminders—teleconsultation between parents and health workers. The application could function offline and synchronize data when connected to the internet, ensuring accessibility even in low-connectivity areas. Homecare Implementation. Trained cadres and health workers conducted regular home visits to households with children at risk of stunting. Activities during home care visits included: Measuring children's growth parameters. Assessing dietary practices and providing tailored nutrition advice. Delivering health education on sanitation, hygiene, and breastfeeding. Record data in the mobile application for

monitoring and follow-up. Households received educational materials, and follow-up visits were scheduled based on individual needs.

Mentoring and Evaluation. Continuous mentoring was provided through monthly coordination meetings and WhatsApp groups so cadres could share challenges and solutions. Evaluation activities included: Monthly progress reviews using the application's dashboard. Focus Group Discussions (FGDs) with community members to assess perceptions and feedback. Data analysis on stunting prevalence changes, program coverage, and participant satisfaction. Approach and Participation. The program employed a bottom-up participatory approach, ensuring that activities were adapted to local contexts rather than imposed from external directives. Community participation was encouraged by involving mothers' groups, religious leaders, youth organizations, and neighbourhood associations. Creating community support groups at the Posyandu level to sustain peer-to-peer learning and monitoring. Engaging local influencers to promote stunting prevention messages.

Monitoring and Sustainability Strategy. Monitoring was integrated into every stage through the mobile application, enabling real-time data collection and analysis. Key indicators included: Number of children monitored. Percentage of children receiving timely interventions. Changes in nutritional status over time. To ensure sustainability, the program trained a pool of local cadres who could continue activities post-program. Advocated for integration into the city's health policy and budgeting. Encouraged partnerships between the government, NGOs, and private sector actors to provide ongoing support.

RESULT

Table 1. **Pre-test and Post-test Scores of Participants**

Indicator	Pre-test Mean (%)	Post-test Mean (%)	% Improvement
Knowledge of balanced nutrition	62.5	88.7	+26.2
Knowledge of stunting prevention	58.0	86.4	+28.4
Proper complementary feeding practices	55.3	83.6	+28.3
Understanding of hygiene & sanitation	60.1	85.2	+25.1
Skill in using a nutrition monitoring app	0.0	91.5	+91.5

Table 1 shows the changes in participants' knowledge, skills, and practices before and after the OPTIMALCARE intervention. The results indicate substantial improvements across all measured indicators. Knowledge of balanced nutrition increased from 62.5% to 88.7% (+26.2%), reflecting the effectiveness of nutrition education during training and home visits. Knowledge of stunting prevention improved from 58.0% to 86.4% (+28.4%), suggesting that participants better understood risk factors and preventive measures. Proper complementary feeding practices rose by 28.3%, indicating better application of feeding guidelines for children aged 6–24 months. Understanding hygiene and sanitation improved by 25.1%, which is crucial for preventing infections that contribute to growth faltering. Skill usage of the nutrition monitoring application

increased dramatically from 0% to 91.5%, showing the successful adoption of technology for real-time growth monitoring and parental engagement. These results demonstrate that combining training, home care visits, and technology use significantly enhanced the participants' knowledge and skills in child nutrition and health monitoring.

Table 2. **Child Growth Monitoring Results**

Nutritional Status (WHO z-score)	Pre-intervention (%)	Post-intervention (%)	Change (percentage points)
Normal	65.0	78.2	+13.2
Mild stunting	20.5	14.1	-6.4
Moderate stunting	9.0	5.4	-3.6
Severe stunting	5.5	2.3	-3.2

Table 2 presents the changes in children's nutritional status, classified according to WHO growth standards. After the intervention, the proportion of children with normal dietary status increased from 65.0% to 78.2% (+13.2 percentage points), indicating measurable progress in achieving healthy growth. Mild stunting decreased from 20.5% to 14.1% (–6.4 points), suggesting that early interventions were effective in reversing borderline growth delays. Moderate stunting declined by 3.6 points, and severe stunting dropped by 3.2 points, reflecting the program's ability to target and improve the condition of high-risk children. These changes highlight the direct impact of home-based nutrition education, regular growth monitoring, and timely follow-up on child growth outcomes within the community.

Figure 1. **Pre-test vs. Post-test Knowledge Improvement**

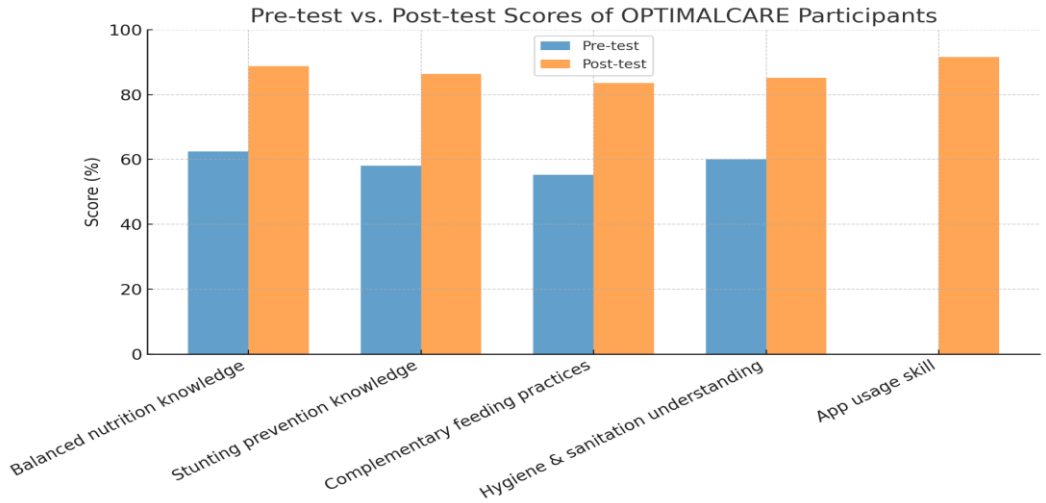

Figure 1 visually illustrates the improvements in participants' knowledge and skills between the pre-test and post-test phases. Across all five indicators, post-test scores are significantly higher than pre-test scores, confirming the effectiveness of the OPTIMALCARE approach. Notably, the most substantial improvement occurred in applying technology for nutrition monitoring, which rose from 0% to over 90%. This suggests that integrating a digital tool into community health programs enhances monitoring accuracy and empowers families to participate actively in stunting prevention.

DISCUSSION

The results of the OPTIMALCARE program indicate that a community-based home care approach, supported by digital technology, can significantly improve caregiver

knowledge and child nutritional outcomes in an urban Indonesian setting. The marked improvements in pre-test and post-test scores (Table 1) demonstrate that targeted education, hands-on training, and continuous engagement can produce rapid gains in health literacy and caregiving skills. Furthermore, the positive shifts in nutritional status (Table 2) suggest that these behavioural and knowledge changes translate into tangible health improvements for children.

Impact of Education and Capacity Building. The substantial increases in caregivers' knowledge of balanced nutrition (+26.2%), stunting prevention (+28.4%), and complementary feeding practices (+28.3%) highlight the critical role of tailored health education. These findings are consistent with earlier studies showing that caregiver knowledge strongly correlates with improved child feeding behaviors and nutritional outcomes (Suprapto et al., 2022; WHO, 2023). Unlike traditional lecture-based education, the OPTIMALCARE program utilized interactive training, role-playing, and real-life application during home visits. This approach aligns with adult learning principles, where practical, context-relevant, and participatory methods yield higher retention and application of knowledge. Improving hygiene and sanitation understanding (+25.1%) is also notable, as recurrent infections from poor sanitation are a major contributor to growth faltering. By integrating WASH (Water, Sanitation, and Hygiene) education into home visits, the program addressed both direct and indirect causes of stunting, a holistic strategy recommended in the 2023 UNICEF framework for child nutrition.

Role of Technology in Enhancing Program Outcomes. Perhaps the most striking result is the dramatic increase in participants' ability to use the nutrition monitoring application from 0% to over 90% proficiency. This reflects the feasibility of introducing digital tools at the community level and their acceptance among caregivers. Mobile health (mHealth) applications have been shown to improve real-time monitoring, enhance communication between health workers and families, and facilitate timely interventions [12]. In OPTIMALCARE, the app's features enabled more personalized and responsive care, including growth chart tracking, nutrition recommendations, appointment reminders, and teleconsultation. Importantly, offline functionality addressed connectivity barriers common in peri-urban areas [13]. This aligns with WHO's 2023 Global Digital Health Strategy findings, which emphasize that when appropriately localized, mobile platforms can strengthen community health systems [14] [15].

Effect on Nutritional Status of Children. The observed improvement in child growth indicators, primarily the 13.2 percentage point increase in normal nutritional status, suggests that early detection and targeted follow-up effectively prevent further deterioration and promote recovery. Reductions in mild, moderate, and severe stunting support the program's ability to reach both at-risk and already-affected children [16]. Demonstrated that integrated community-based interventions, sustained over several months, can lead to measurable changes in anthropometric outcomes. Continuous growth monitoring, tailored counseling, and caregiver empowerment are key drivers of these changes [17] [18].

Community Engagement and Sustainability. The participatory design of OPTIMALCARE, engaging local leaders, Posyandu cadres, mothers' groups, and youth organisations, proved critical for both acceptance and sustainability. The intervention fostered ownership and collective responsibility by embedding the program within community structures. Who reported that community-driven health programs have higher continuity rates beyond external funding cycles? The program's alignment with the Sustainable Development Goals (SDG 2, 3, and 17) and local development priorities also

positions it for integration into municipal health planning. Collaboration with the Makassar City Health Office ensures that the methodology, tools, and training materials can be institutionalized, supporting scale-up and replication in other high-burden areas [19] [20].

Challenges and Lessons Learned. Despite its success, the program faced several challenges. First, initial resistance to technology adoption was noted among older caregivers, requiring additional one-on-one assistance [21]. Second, irregular attendance at training sessions occasionally delayed skill acquisition for some participants. Addressing these issues required adaptive strategies, such as pairing less tech-savvy caregivers with younger "tech buddies" and conducting make-up sessions. Another challenge was ensuring accurate data entry during the early phase of app implementation. Inaccuracies were reduced through refresher training and in-app validation prompts. These adaptations underline the importance of flexibility and continuous feedback loops in community-based programs [22].

Relevance to Current Global and National Strategies. The outcomes of OPTIMALCARE align with the Indonesian government's commitment to reducing stunting prevalence to below 14% by 2024, as outlined in the National Strategy to Accelerate Stunting Reduction [23]. The program operationalizes several of Stranas' key pillars: household-level counseling, data-driven targeting, and community empowerment. Globally, the approach resonates with the WHO-UNICEF 2023 recommendations for integrated child health services, emphasizing that stunting prevention must combine health, nutrition, WASH, and early childhood development interventions [24]. The OPTIMALCARE model's integration of these components delivered directly to households demonstrates how these global guidelines can be translated into actionable, locally relevant strategies [25].

Implications for Future Programs

The success of OPTIMALCARE suggests that scaling up community-based home care models with integrated mHealth tools could be an effective strategy for other regions facing similar challenges. However, sustainability will depend on continued political support, budget allocation, and integration into primary healthcare systems. Moreover, further research is needed to assess long-term outcomes, such as sustained behavior change and continued improvements in child growth beyond the intervention period. Future iterations could also incorporate additional modules in the app, such as dietary diversity tracking and mental health support for caregivers, to address broader determinants of child development. OPTIMALCARE's capacity building, personalized home care, and digital innovation effectively improved caregiver knowledge, technology adoption, and child nutritional outcomes in Makassar City. Its participatory, data-driven, and context-specific approach offers a promising blueprint for accelerating stunting reduction, contributing to local and global child health targets.

CONCLUSIONS

Implementing the OPTIMALCARE community-based home care program in Makassar City improved caregiver knowledge, improved child nutritional status, and fostered community engagement in stunting prevention efforts. The program successfully increased participants' understanding of balanced nutrition, stunting prevention, complementary feeding, and hygiene practices through targeted education, proactive home visits, and a mobile nutrition monitoring application. The significant reduction in mild, moderate, and severe stunting and the increase in normal growth status demonstrate

that early detection and timely, personalized interventions at the household level can produce measurable health improvements. Integrating digital tools improved monitoring accuracy and empowered families to participate actively in their children's growth and development.

The participatory approach, engaging health workers, Posyandu cadres, local leaders, and community groups, was key to program acceptance and sustainability. By aligning with national stunting reduction strategies, Sustainable Development Goals, and regional development priorities, OPTIMALCARE has the potential to be scaled up and replicated in other regions with similar challenges. When supported by technology and strong stakeholder collaboration, community-based home care offers a promising, sustainable model for accelerating stunting reduction and improving child health outcomes in urban and peri-urban settings.

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