



Empowering Nambo Village through physiotherapy intervention and the establishment of the *Sahabat Tumbuh Kembang* community

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ABSTRACT

Infant and toddler health remains one of the crucial indicators of public health. However, Nambo Village faced challenges due to parents' limited literacy regarding developmental delays and cadres' inadequate skills in early detection and pediatric stimulation. To address the issues, a community-based physiotherapy intervention was implemented started from June to October 2025. The program aimed to empower parents and optimize cadres' capacities through the establishment of the Sahabat Tumbuh Kembang (Child Development Companionship) community. The methodology included situational analysis, socialization, implementation, and evaluation, resulting a significant improvement in understanding developmental red flags, confirmed by an increase in average scores from 7.5 (pre-test) to 9.3 (post-test). Furthermore, the knowledge was practically applied through independent early screening targeted to five cadres and one village midwife on 30 toddlers. To ensure program sustainability, the Sahabat Tumbuh Kembang community was officially formed with six driving agents. This group currently synergizes with the local Bina Keluarga Balita (Early Childhood Family Development) program to conduct monthly basic motor development monitoring, effectively realizing independent community empowerment for a healthier generation.

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1. INTRODUCTION

Nambo Village, located in Bogor Regency, is a rural area currently having significant challenges in optimizing maternal and child health, particularly during the critical periods of infant and toddler growth and development. Optimal monitoring of child development in this region has not reached all layers of society due to limited access to healthcare and health literacy. As supplementary context, this issue aligns with global and national trends. The World Health Organization (WHO) reported a high prevalence of child developmental disorders in low-to-middle-income countries (95 percent), and data on the prevalence of early childhood developmental deviations in Indonesia reached 7.51 percent (UNICEF, 2023). These macro-level conditions are realistically reflected in Nambo Village, necessitating direct, grassroots-level problem resolution.

The primary and specific problems in Nambo Village are triggered by limited parental literacy in recognizing the red flags of developmental delays, coupled with the inadequate capacity of village health cadres serving as frontline workers. Based on a preliminary survey and situational analysis conducted by the community service team in June 2025, it was found that, out of 459 observed toddlers, 23 were at risk of undetected delayed motor development. Furthermore, the initial assessment indicated that local health cadres lacked proper pediatric functional stimulation skills, as reflected in their average pretest knowledge score of 7.5 out of 10. When left unaddressed, compounded by the high risk of stunting in rural areas and the potential history of seizures or communication disorders children are vulnerable to long-term cognitive and physical impacts (Badan Kebijakan Pembangunan Kesehatan, 2024; Fatma et al., 2025).

To specifically address partner needs, the implementation of Community-Based Physiotherapy serves as an appropriate technology (Teknologi Tepat Guna) solution. This approach is in accordance to World Physiotherapy standards within the public sector, which emphasize community-based promotion, prevention, and rehabilitation. Various findings from prior community service initiatives supported this approach, particularly the Asset-Based Community Development (ABCD) approach in community physiotherapy. The results showed high effectiveness in generating sustainable behavioral changes (Shannon et al., 2021; Wajdi et al., 2024). Hence, community-Based Physiotherapy has proven capable of optimizing the role of cadres as driving agents, increasing early detection coverage, and empowering families to independently and accurately provide motor stimulation appropriate to toddlers' developmental stages (Suyatno et al., 2024).

Given this urgency, the objective of this community service program is specifically to enhance the capabilities of parents and health cadres in detecting early developmental red flags and providing appropriate stimulation through the establishment of the *Sahabat Tumbuh Kembang* community. As an indicator of program sustainability, the community managed by driving agents to work in synergy with local *Bina Keluarga Balita* program. Consequently, to ensure that basic motor screening and monitoring for toddlers are accessible independently and continuously per month, supporting the achievement of the Sustainable Development Goals (SDGs) on good health and well-being.

2. METHODS

This community service activity employed a Participatory Action Research (PAR) approach, in which the partners were actively engaged in every stage, from planning, implementation, and evaluation aimed to address infant and toddler health issues (Handajany et al., 2025). The primary target partners for this activity were the residents of Nambo Village, specifically located in the Bhakti Sosial (BS) 04 and BS 13 units, Klapanunggal Subdistrict, Bogor Regency, West Java. The target audience directly involved consisted of 36 individuals: 6 village health cadres and midwives and 30 parents of toddlers. The involvement of this target audience was supported by the "*Sahabat Tumbuh Kembang*" (Child Development Companions) community.

The appropriate technology (Teknologi Tepat Guna) concept implemented was "Community-Based Physiotherapy" to resolve the partners' issues. Which is a modification and simplification of pediatric physiotherapy interventions, designed to be applied independently by cadres and parents in providing functional stimulation (Harahap et al., 2018). The technical components included early detection skills using the Pre-Screening Developmental Questionnaire (KPSP) appointed by the Indonesian Ministry of Health. The questionnaire serves as a valid and reliable component for community-level use, as well as basic gross-and fine-motor stimulation technique (Khair & Hotimah, 2024). In its implementation, a web-based application (Physitalk.com) was utilized as a digital platform to support exercise modeling and the

documentation of toddler development monitoring, thereby making the process more structured and accessible for partners.

The quantitative indicators for assessing the success were measured through three main parameters: (1) An increase in the average knowledge score of parents and cadres regarding the detection of red flags and the role of physiotherapy, measured using pretest and posttest questionnaire instruments; (2) The achievement of the 100 percent target for cadres' skill mastery in conducting KPSP screening; and (3) The percentage reduction in the risk status of developmental deviations or the increase in motor skill scores among toddlers in the intervention group at the end of the program. Quantitative data were collected using a pre-experimental, one-group pretest-posttest design and analyzed using descriptive statistics. The implementation of this community service program was designed to run for five months from June to October 2025, divided into four systematic stages (Handajany et al., 2025) as follows:

Socialization

The initial stage of the program included a socialization activity conducted by the service team. Involving lecturers and physiotherapy students, with partners in Nambo Village using a Community Development approach. Partners were informed that they would be participating as both subjects and objects of the activities. During this stage, the team explained the purpose and objectives of the *Sahabat Tumbuh Kembang* program, which focuses on the early detection of developmental disorders and stunting, as well as presented the implementation schedule, the importance of the first 1000 days of infant's life (HPK), and the role of physiotherapy in community health. Consequently, an agreement was reached regarding the implementation schedule, accompanied by a commitment to participate from health cadres and parents.

Training and Discussion

The training and discussion stage consists of instructional approach that integrated interactive discussions with research-based materials on child growth and development. During the preparation stage, partners arranged the facilities, including the Posyandu or community hall, while the service team prepared the supporting equipment such as mats, educational toys, Pre-Screening Developmental Questionnaire (KPSP) forms, and presentation materials. The implementation stage involved training sessions for health cadres and parents on how to understand developmental milestones, identify developmental warning signs (red flags) such as seizures or speech delays, and perform basic gross- and fine-motor stimulation techniques.

Community Physiotherapy Intervention Mentoring

The community physiotherapy intervention mentoring phase was conducted intensively, with sessions held twice a week for one month, to ensure that health cadres and parents were able to provide appropriate stimulation independently. Evaluation was carried out through a pre-test administered before the activity and a post-test conducted after the educational series to measure improvements in participants' knowledge, with the success target being an increase in the average knowledge score, for example from 75 to 93 percent. In addition, psychomotor evaluation was conducted to assess the cadres' ability to perform independent early detection and the parents' ability to provide motor stimulation at home. Documentation and direct observation were also carried out to monitor the progress of children who had previously been identified as having developmental delays.

Sustainability of Programs and Partners

The sustainability of the program is assessed through the partners' ability to continue the activities independently after the mentoring period. As part of this effort, the *Sahabat Tumbuh Kembang* group was established to create synergy with the local *Bina Keluarga Balita* (BKB) program. Health cadres also expressed their commitment to routinely conduct developmental screening using *the Pre-Screening Developmental Questionnaire (KPSP)* and to provide simple referrals when developmental deviations are identified. To ensure program continuity, the service team continues to conduct monitoring through direct visits and remote communication, ensuring that cadres remain active in carrying out their roles in early detection and community education.

3. RESULTS AND DISCUSSION

The implementation of community service activities in Nambo Village (Bhakti Sosial 04 and 13) was carried out systematically in four stages. The results of each stage are elaborated as follows:

Activity of Socialization

This initial stage focused on participatory problem identification and building partner consensus. The socialization was attended by village officials, the village midwife, 6 health cadres, and 30 parents of toddlers. This stage resulted in an establishment of mutual commitment and the formal inauguration of the *Sahabat Tumbuh Kembang* community as a driving force for child health in Nambo Village.



Figure 1. Participatory discussion and joint problem mapping with cadres during socialization in BS 13 and BS 4

Identification of partner problems was carried out in stages and done two times at BS 13 and BS 4. The activities consisted of conducting interviews with parents or guardians regarding growth and development history during the antenatal, natal, and post-natal periods, as well as immunization. In addition, growth and development examinations were also performed on infants and toddlers. Based on the interview results, the following results were obtained

Based on Table 1, the average maternal age during pregnancy was 24.6 years, and the average gestational age at delivery was full term. In the antenatal history, there are some mothers who have not consumed folic acid. Meanwhile, in the natal history, the delivery process was generally assisted by midwives, while many still gave birth at home. In the post-natal history, 19 percent still had not received exclusive breastfeeding. The knowledge and understanding of parents and cadres regarding child growth and development, as well as the role of physiotherapy, were assessed using questionnaires. The questionnaire consisted of 10 true-false questions containing basic growth and development knowledge, growth and development red flags, and the role of physiotherapy.

Table 1. Identification results of maternal pregnancy and birth history in BS 04 and BS 13, Nambo Village

Category	Question Items	Results	
	Maternal age during pregnancy	24.6 years (average)	
		Yes	No
Antenatal	Was the pregnancy planned?	52.4%	47.6%
	Routine check-ups with health workers?	95.2%	4.8%
	History of bleeding during pregnancy?	9.5%	90.5%
	History of falls during pregnancy?	0%	100%
	History of TORCH during pregnancy?	0%	100%
	Consumed medicine during pregnancy?	14.3%	85.7%
	Consumed medicine without prescription?	0%	100%
	Consumed herbal medicine (<i>jamu</i>)?	0%	100%
	Consumed folic acid?	85.7%	14.3%
		Gestational age at birth	37 weeks (average)
	Delivery method	C-section 9.5%	Vaginal 90.5%
Natal	Place/Helper of delivery	<i>Puskesmas</i> (public health center)/midwife 9.5%	Clinic/midwife 14.3%
		Hospital/doctor 38.1%	Home/midwife 38.1%
		Yes	No
	Assisted delivery (with tools)	14.3%	85.7%
	Did baby cry immediately?	66.7%	33.3%
	Yellow or blue skin at birth?	14.3%	85.7%
		Yes	No
Post Natal	History of NICU care?	4.8%	95.2%
	Exclusive breastfeeding?	81%	19%
	Yellow or blue skin after birth?	9.5%	90.5%

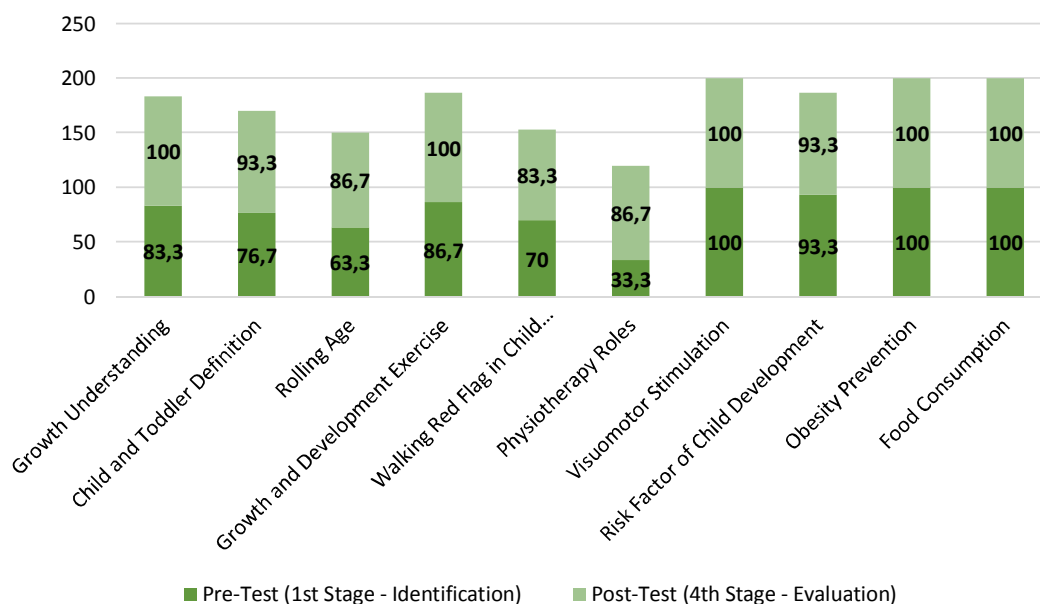


Figure 2. Identification of parental knowledge and understanding regarding child growth and development

Based on Figure 2, more than 80 percent of parents already had basic knowledge of child growth and development, growth and development red flags in infants and toddlers, and the role of physiotherapy. The community empowerment program is a key factor in increasing knowledge and parental awareness of child growth and development; therefore, parents and families are expected to attend to support the process.

Meanwhile, the results of the growth and development history identification conducted in Stage 1 (detection) through assessments of nutritional status and the KPSP screenings showed that, of 30 parents and children present, 17 were willing to have their growth and development measured thoroughly. The results indicated that of the 17 children who received growth and development assessments, 3 were classified as suspected and 1 as stunted. Thus, 4 children recorded as having growth and development and health disorders will become the focus of community empowerment to be provided with handling or intervention related to growth and development disorders. The solution to these problems was implemented in the training stage through training in basic motor-stimulation skills.

Training and Discussion

Capacity building was conducted using the Training of Trainers (ToT) method. The materials provided focused on the First 1000 Days of Life (HPK), detecting developmental red flags, and basic motor stimulation techniques. Cadres and parents were trained using mats, educational toys, and the Pre-Screening Developmental Questionnaire (KPSP) instrument.



Figure 3. Counseling on child growth and development, stimulation, and the role of physiotherapy (left) and basic motor stimulation skills training for parents and cadres (right) in Nambo Village, Bogor Regency

Counseling was conducted twice with different materials at each meeting. The first meeting provided an overview of child growth and development and the role of physiotherapy, while the second meeting covered child growth and development stimulation and basic motor stimulation skills training. The results showed a significant difference among the three children classified as suspected in the KPSP screening. These three children predominantly experienced fine motor and speech/language disorders. 1 of the 3 children experienced a gross motor disorder, specifically delayed walking. All three were able to catch up to the KPSP growth and development milestones.

Community Physiotherapy Intervention Mentoring

During this stage, the Community-Based Physiotherapy AT was directly implemented. Toddlers identified as being at risk for developmental delays received a basic motor stimulation program. As

a specific output and a key advantage of this program, the service team integrated the physitalk.com platform as supporting technology. This digital platform was used by cadres and parents to visually access exercise modeling and nutritional guidelines, and to document toddlers' daily development, ensuring that home-based interventions were more targeted and structured.



Figure 4. Implementation of community-based physiotherapy using a web platform as a supporting technology for parents and caregivers

Sustainability of Programs and Partners

A comprehensive evaluation was conducted to assess two primary aspects: (1) Knowledge/skill improvement of the partners, and (2) The successful implementation of the AT in addressing clinical issues (changes in toddlers' growth and development status). The evaluation data are presented in Figure 5 and 6.



Figure 5. A comprehensive evaluation with parents (left) and a forum group discussion with village officials, cadres, and *Puskesmas* (right) addressed program sustainability

Figure 6 presents the cadre skill mastery in Stage 2 activities, which showed increases across all three assessment components. The largest increase was in application and empowerment, which increased by 15 percent. Previous community service activities have similarly reported significant improvements in cadre knowledge followed by enhanced practical skills (Alfiya et al., 2024).

As shown in Figure 7, the evaluation of parental skill mastery in Stage 2 activities also increased across all three assessment components. The largest increase was in understanding of application and empowerment, which increased by 15 percent. Training and mentoring for cadres also effectively encouraged behavioral changes among parents of toddlers in using home-based stimulation, thus strengthening the family's role in supporting child development (Rokhaidah et al., 2024).

The evaluation results informed the formation and organization of the *Sahabat Tumbuh Kembang Anak* Community, which provides a forum for mothers to share experiences, knowledge, and support.

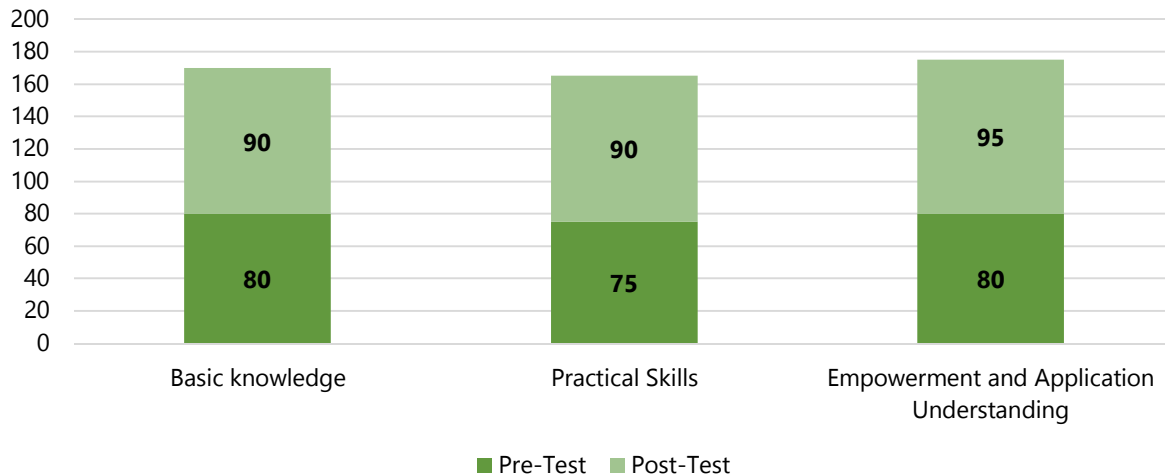


Figure 6. Evaluation of child development achievement of cadre according to age stages based on KPSP

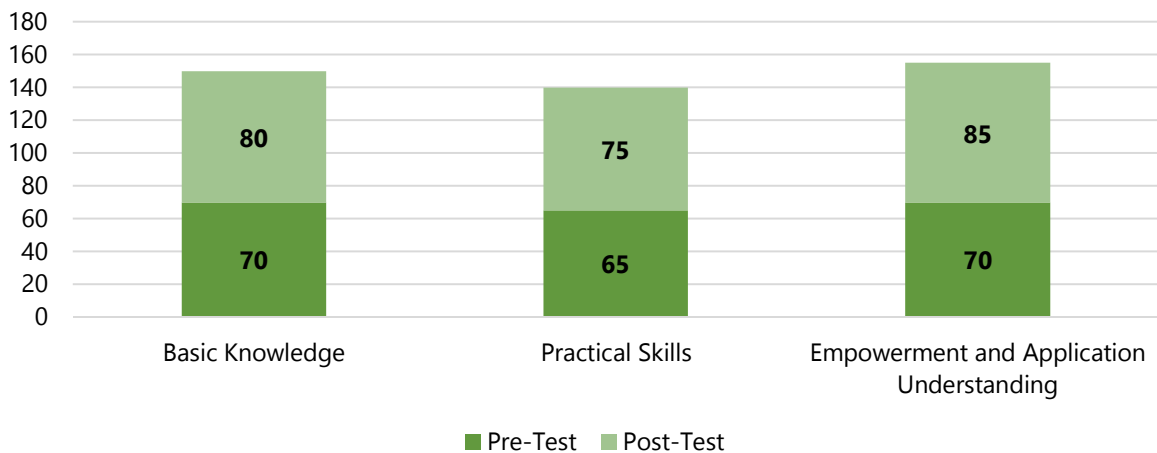


Figure 7. Evaluation of Child Development Achievement of Parents According to Age Stages Based on KPSP

Discussion

The community service program implemented in Nambo Village using a Community-Based Physiotherapy approach, demonstrated significant success as it improved community knowledge and clinical outcomes among toddlers. The success is evidenced by two main indicators: an increase in comprehension scores among parents and cadres, and a positive change in children's developmental status, moving from suspected to age-appropriate (catching-up).

Based on the evaluation results, there was a significant increase in the average knowledge score of parents and cadres, rising from 7.5 at the pretest to 9.3 at the posttest. Specifically, the understanding of

the role of physiotherapy in public health increased by over 85 percent, indicating the applied counseling and interactive discussion methods were effective in conveying information. This finding is consistent with previous studies indicating that parents play a pivotal role in supporting their children's growth and development.

It is essential to tailor education to each child's unique potential to ensure optimal progress, as the process of raising children vary across families. These differences significantly influence a child's social skills, communication style, and daily functioning (Wulandari et al., 2025; Khairunnisa et al., 2024). Consequently, parents play a crucial role in the child's immediate environment.

By understanding the red flags or warning signs of developmental disorders, such as seizures or speech delays, for which educational materials have been provided, parents can independently perform early detection. This knowledge provides a foundation for successful home-based stimulation, given that daily parenting and interaction patterns significantly influence a child's social skills and communication (Arslan et al., 2022).

Regarding clinical outcomes, the initial screening identified three children with suspected developmental concerns, primarily related to fine motor and speech development, and one child with stunting. After 4 weeks of motor stimulation and intensive mentoring, which have been done twice per week, the three children with suspected status successfully met age-appropriate developmental milestones. This success underscores the importance of intervention as early as possible.

Previous studies report the effectiveness of early physiotherapy intervention in high-risk infants with developmental delays (Saraswati et al., 2024). Exercise intensity has been identified as an important factor influencing child development and developmental achievement. One study reported that physiotherapy provided six days per week for 45 minutes per session, using neurodevelopmental treatment (NDT), sensory integration, passive stretching, and myofascial release, produced positive outcomes, including the achievement of major motor milestones up to independent sitting and improved sensory regulation (Sugiharti, 2024). Moreover, a study of children aged 10 to 18 months diagnosed with DMD (delayed motor development) reported that earlier physiotherapy intervention was associated with greater success (Jamilah et al., 2023). The study specifies that the exercise dose was administered over 4 weeks, with 2 sessions per week. Additionally, physiotherapy intervention involving personalized sensory and motor stimulation resulted in a significant increase in Alberta Infant Motor Scale (AIMS) scores (Arslan et al., 2022).

One of the most critical aspects of this program is its sustainability, which is supported through the establishment of the *Sahabat Tumbuh Kembang* community. The psychomotor evaluation showed improvements in cadres' skills in conducting early detection using the KPSP and in providing simple developmental stimulation. In addition, cadres' understanding of empowerment increased by 15 percent.

Health cadres serve as the frontline of the village public health system. By training cadres through the Training of Trainers (ToT) approach, this program not only addresses short-term problems but also helps build a sustainable and independent support system (Rokhaidah et al., 2024). Studies have shown that effective training can increase cadres' psychomotor abilities by up to 100 percent in conducting early-detection practices (Suyatno et al., 2024).

Meanwhile, continuous training is essential for health cadres to effectively identify individual and community health issues, thereby enabling them to assist in health promotion, counseling, and patient referral. Although the responsibility for empowering these cadres lies with local governments and health professionals, existing programs often fail to achieve their targets or demonstrate effective outcomes. To address this, health workers must be able to independently design appropriate training modules by recognizing the underlying factors that drive success (Wiwaha et al., 2024).

The synergy between the *Sahabat Tumbuh Kembang* cadres and the Early Childhood Family Development (*Bina Keluarga Balita*, or BKB) program ensures that monitoring of children's growth and development in Nambo Village will continue after the service team's mentoring period ends. This empowerment effectively encourages parents to apply home-based stimulation, a key to strengthening the family's role.

4. CONCLUSION AND RECOMMENDATIONS

Based on the implementation of the community service program in Nambo Village, it can be concluded that Community-Based Physiotherapy effectively addressed the partners' needs, both in terms of capacity building and tangible health service outcomes. Quantitatively, partners' (i.e., parents and cadres) knowledge of developmental red flags and the role of physiotherapy increased by 18 percent, rising from an average pretest score of 75 percent (7.5) to 93 percent (9.3) in the posttest. In terms of health service problem-solving, the cadres' psychomotor skills in conducting screening with the KPSP standard instrument significantly improved from 0 percent, prior to the program, to 100 percent capability for independent early detection and simple referrals. Moreover, the 4-week intensive motor stimulation intervention proved effective in resolving clinical issues, with 100 percent of the toddlers consist of 3 children, initially identified as having a suspected developmental status, successfully catching up to achieve an appropriate developmental stage for their age. The sustainability of this program is maintained through community empowerment via the establishment of the *Sahabat Tumbuh Kembang* community, which synergizes with the local *Bina Keluarga Balita* (BKB) program.

The following recommendations are proposed based on the limitations and aspects that could not be fully addressed during the implementation of this community service program. First, regarding digital innovation, although this program has introduced a web-based platform for exercise modeling, future activities are recommended to develop more advanced digital features, such as gamification and interactive tracking systems within the Physitalk.com platform. These features are expected to monitor parents' real-time adherence in conducting independent stimulation at home while increasing user engagement. Second, considering that this program primarily focused on early detection and motor stimulation within physiotherapy, future programs are strongly encouraged to adopt a multidisciplinary and interprofessional approach by involving professionals such as clinical nutritionists and pediatricians. This collaboration would enable the integration of motor stimulation interventions with targeted nutritional education and comprehensive stunting prevention strategies, particularly in rural communities with high malnutrition risks. Third, in terms of program scalability and impact evaluation, the current implementation was conducted within a limited area and a relatively short intervention period of four weeks. Therefore, future community service programs are recommended to expand the scope of implementation to a broader demographic level, such as sub-district coverage or comparative rural-urban settings. In addition, a longitudinal evaluation design, conducted over at least 6–12 months, is needed to assess the sustainability of cadre competencies and to examine the long-term impact of physiotherapy interventions on preventing complex developmental disorders.

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