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Application of Dedi Nataniel Application in Early Detection of Childhood Intellectual Disability and Delay to Increase Public Health Resilience Through an Interprofessional Approach to Education

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ABSTRACT Early detection of intellectual disabilities and developmental delays in children remains a challenge in community-based health services, particularly in rural areas where developmental monitoring primarily focuses on physical growth indicators, while cognitive, language, and intellectual development receive limited attention. Inadequate knowledge among health workers, community health cadres, and parents, combined with the limited utilization of digital screening technology, may contribute to delayed identification and intervention. This community service program aimed to improve the knowledge and capacity of health workers, Posyandu cadres, Bina Keluarga Balita (BKB) cadres, and parents in conducting early detection of childhood intellectual disabilities and developmental delays through the implementation of the DeDi NaTaNiel application using an Interprofessional Education (IPE) approach. The program employed a pre-experimental design with a participatory and evaluative-descriptive approach, conducted from March to September 2026 in five Posyandu (Anggrek 1–5) in Ngiliran Village, Magetan Regency, East Java. The intervention involved 60 participants and included educational sessions, application demonstrations, hands-on training, and supervised screening of 159 toddlers. Knowledge improvement was assessed using pre-test and post-test questionnaires, while application acceptance was evaluated across six dimensions. Data were analyzed descriptively and using the Wilcoxon signed-rank test. The results demonstrated a substantial improvement in participants' knowledge, with the proportion of participants in the good knowledge category increasing from 20.0% (12 participants) before the intervention to 91.7% (55 participants) afterward. Meanwhile, the poor knowledge category decreased from 41.7% (25 participants) to 0%. The improvement was statistically significant ($p < 0.001$). Participants also demonstrated positive acceptance of the application's usability and perceived benefits. In conclusion, integrating the DeDi NaTaNiel application with an IPE-based educational approach effectively improved participants' short-term knowledge and supported community-based early detection capacity. Broader implementation, continuous training, and longitudinal evaluation are recommended to strengthen sustainable child development monitoring and improve early intervention services.

INDEX TERMS Early Detection, Intellectual Disability, Developmental Delay, DeDi NaTaNiel Application, Interprofessional Education

I. INTRODUCTION

Early childhood is a critical period for neurological development, cognitive functioning, language acquisition, and social adaptation. Delays or abnormalities in these developmental domains, particularly intellectual disabilities and global developmental delays, require early identification to facilitate appropriate assessment, intervention, and support. However, developmental concerns are frequently overlooked in community-based healthcare settings because routine child health monitoring tends to emphasize physical growth indicators rather than comprehensive developmental assessment [1]–[3]. Although standardized developmental screening is recommended in primary healthcare, its implementation remains constrained by limited professional capacity, inadequate screening resources, and insufficient referral pathways [4], [5]. These challenges are particularly relevant in low- and middle-income countries (LMICs), where access to standardized and culturally appropriate developmental assessment instruments remains uneven [6], [7]. Consequently, strengthening early detection at the community level is essential to minimize delays in identifying children who require further developmental evaluation.

Recent developments in digital health have provided

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opportunities to improve the accessibility, standardization, and efficiency of child development monitoring. Mobile health (mHealth) applications and electronic screening systems can facilitate data collection, support developmental assessment, improve documentation, and assist healthcare personnel in identifying children who require further evaluation [8]–[11]. Previous studies have demonstrated the potential of digital interventions to improve caregiver knowledge and support community health workers in delivering maternal and child health services [12], [13]. Furthermore, electronic developmental screening has been implemented in primary healthcare settings to improve screening consistency and integrate developmental monitoring into routine clinical workflows [14]. Recent systematic reviews have also highlighted the potential benefits of mHealth interventions for cognitive, language, motor, and socio-emotional development, although the available evidence remains limited, particularly in resource-constrained settings [15], [16]. In Indonesia, digital child-monitoring initiatives have increasingly emerged; however, existing applications and monitoring systems still demonstrate a considerable emphasis on anthropometric measurements rather than comprehensive developmental assessment [17].

Despite these technological advancements, the effectiveness of digital screening depends not only on application functionality but also on the knowledge, readiness, and collaboration of its users. Community health workers and Posyandu cadres play an important role in facilitating preventive healthcare, identifying developmental concerns, and connecting families with healthcare services. Nevertheless, their effectiveness is influenced by training opportunities, professional support, and coordination with other healthcare providers [18], [19]. Interprofessional Education (IPE) offers a collaborative learning framework that brings together healthcare professionals and community stakeholders to develop shared knowledge, clarify responsibilities, and strengthen communication in healthcare delivery [20]. Evidence suggests that IPE can improve interprofessional knowledge, mutual understanding, and collaborative practice [21]. However, the integration of digital developmental screening applications with structured interprofessional education remains insufficiently explored in community-based child health services, particularly for identifying intellectual disabilities and developmental delays at the Posyandu level.

To address this gap, this community service program aimed to improve the knowledge and operational capacity of healthcare workers, Posyandu cadres, Bina Keluarga Balita (BKB) cadres, and parents in conducting early detection of childhood intellectual disabilities and developmental delays through the implementation of the DeDi NaTaNiel Android application combined with an IPE-based educational approach. The program was implemented across five Posyandu in Ngiliran Village, Magetan Regency, East Java, involving participant training and developmental screening activities. The contributions of this article are summarized as follows:

a) Digital screening integration: Introducing the DeDi NaTaNiel application as a community-based digital decision-support instrument for early identification of childhood intellectual disabilities and developmental delays.
b) Interprofessional capacity development: Integrating healthcare professionals, community cadres, and parents through an IPE-based educational and practical training approach to strengthen collaborative early detection.
c) Community-based implementation: Demonstrating the implementation of digital developmental screening across five Posyandu, involving 60 training participants and screening activities for 159 toddlers.
d) Program evaluation: Assessing improvements in participants' knowledge through pre-test and post-test measurements and evaluating application acceptance across six dimensions of usability and technology acceptance.

The remainder of this article is organized as follows. Section II describes the methods, including the study design, implementation setting, participants, intervention procedures, and data analysis. Section III presents the results of the community service activities and evaluation findings. Section IV discusses the findings in relation to previous studies, practical implications, and program limitations. Finally, Section V presents the conclusions and recommendations for future implementation.

II. METHODS

A. STUDY DESIGN

This study employed a pre-experimental, single-group pre-test–post-test design with a participatory and evaluative-descriptive approach. The intervention combined digital application training with Interprofessional Education (IPE) to improve participants' knowledge and capacity for the early detection of childhood intellectual disabilities and developmental delays. Knowledge was assessed before and after the intervention without a separate control group. The evaluation was conducted prospectively during program implementation; participants were not randomly allocated to intervention groups. This design was selected to assess changes in participants' knowledge following the educational intervention in a real-world community healthcare setting [22]. In addition, the IPE framework facilitated collaboration between healthcare professionals and community stakeholders through shared learning, practical activities, and coordinated responsibilities [23], [24].

B. STUDY SETTING AND DURATION

The program was conducted from March to September 2026 over seven months in Ngiliran Village, Panekan District, Magetan Regency, East Java, Indonesia. Implementation involved five integrated healthcare service posts (Posyandu), namely Anggrek 1, Anggrek 2, Anggrek 3, Anggrek 4, and Anggrek 5, which collectively formed the Anggrek Posyandu cluster. These locations were selected to facilitate the integration of developmental screening into existing community-based maternal and child health services. The implementation setting was particularly relevant because developmental monitoring at the community level requires coordination between

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midwives, community cadres, and families [25].

C. STUDY POPULATION AND PARTICIPANTS

The program involved two participant groups. The first group consisted of 60 training participants selected through purposive sampling based on their involvement in maternal and child healthcare activities. They comprised Posyandu cadres, Bina Keluarga Balita (BKB) cadres, pregnant women, mothers of toddlers, village midwives, nurses, and village officials. These participants were selected because of their potential roles in developmental monitoring, health education, application operation, and referral coordination. The second group consisted of 159 toddlers registered at the five Anggrek Posyandu, who constituted the target population for the community-based screening activities. The 60 trained participants subsequently conducted the screening activities for these toddlers under the supervision of the implementation team. No random sampling or random allocation was performed.

D. INTERVENTION MATERIALS AND INSTRUMENTS

The primary intervention material was the DeDi NaTaNiel application, an Android-based digital decision-support tool developed to facilitate early screening of childhood intellectual disabilities and developmental risks. Its screening procedures were adapted from Indonesian child development screening guidelines, including the Kuesioner Pra Skrining Perkembangan (KPSP) and the Stimulasi, Deteksi, dan Intervensi Dini Tumbuh Kembang (SDIDTK) framework [26]. The application was supported by operational guidelines and instructional video materials to standardize its use. These materials were registered as intellectual property under HKI No. EC002026114424 for the application guide and HKI No. EC002026115646 for the video tutorial.

Two questionnaire instruments were used for evaluation. First, a structured knowledge questionnaire was administered before and after training to assess participants' understanding of early childhood intellectual disability and developmental delay detection. The questionnaire was reported to have undergone validity and reliability testing, with knowledge categorized as good, adequate, or poor. Second, a four-point Likert-scale questionnaire assessed application usability and acceptance across six dimensions: system quality, ease of use, perceived usefulness, user satisfaction, interpersonal support, and behavioral intention for continued use. The assessment focused on participants' perceptions of the application's functionality and its potential integration into community health services [27].

E. INTERVENTION PROCEDURES

The intervention was implemented through four sequential phases. First, the preparation and coordination phase involved administrative preparation, activity planning, and coordination meetings with the Panekan Health Center, Ngiliran Village government, and local healthcare personnel. Second, the training and socialization phase involved educational sessions on child growth and development, recognition of developmental warning signs, and the principles of early detection. Demonstrations and practical simulations were subsequently conducted to familiarize participants with the DeDi NaTaNiel application.

Third, the implementation phase involved supervised field screening at all five Posyandu. Health professionals acted as clinical facilitators responsible for supervision and referral guidance, while Posyandu and BKB cadres assisted with application operation and data entry. Parents contributed information regarding their children's developmental histories and participated in the screening process. The team facilitated screening activities for 159 toddlers using the application. Fourth, the follow-up phase involved interpreting screening results, providing education on home-based early stimulation, and facilitating referrals to appropriate healthcare facilities or special schools (Sekolah Luar Biasa/SLB) when indicated by the screening results. This collaborative implementation was intended to strengthen coordination between healthcare providers and community members [23], [24].

F. DATA COLLECTION AND OUTCOMES MEASUREMENT

Data collection focused on participants' knowledge and acceptance of the DeDi NaTaNiel application. Knowledge data were obtained through paired pre-test and post-test questionnaires administered before and after the educational intervention. Application acceptance data were collected following participants' exposure to the application and practical screening activities using the six-dimensional evaluation questionnaire. Screening activities also generated information to support follow-up recommendations for the participating toddlers. The principal outcome was the change in participants' knowledge classification, while application acceptance represented the secondary evaluative outcome.

G. STATISTICAL ANALYSIS

Quantitative data were analyzed using descriptive and inferential statistical procedures. Descriptive analysis was used to summarize participant characteristics, knowledge classifications, and application acceptance responses through frequency distributions and percentages. Pre-test and post-test knowledge scores were compared using the Wilcoxon signed-rank test because the measurements involved paired ordinal data that did not satisfy the normality assumption. Statistical significance was established at a threshold of $p < 0.05$. The analysis was intended to determine whether participants' knowledge changed significantly following the intervention

H. ETHICAL CONSIDERATIONS

Ethical principles were maintained throughout program implementation. Participants received information regarding the objectives, procedures, and anticipated benefits of the activities before participation. Informed consent was obtained verbally and in writing. Confidentiality and anonymity were maintained when handling participants' personal information and toddlers' developmental screening records. Screening findings were used to support appropriate follow-up and referral recommendations.

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III. RESULTS

A. IMPLEMENTATION OF THE COMMUNITY SERVICE PROGRAMME

The community service programme was conducted from March to September 2026 at five Posyandu in the Anggrek cluster (Anggrek 1–5), Ngiliran Village, Panekan District, Magetan Regency, East Java. A total of 60 participants attended the training and screening activities. The participants consisted of Posyandu cadres, Bina Keluarga Balita (BKB) cadres, pregnant women, mothers of toddlers, village midwives, nurses, and other community representatives. The programme involved educational sessions, demonstrations, practical training in the use of the DeDi NaTaNiel application, and supervised screening activities involving 159 toddlers. The initial community engagement and educational activities are presented in FIGURE 1, while FIGURE 2 illustrates the multidisciplinary community service team comprising lecturers, students, BKB cadres, midwives, and nurses.



FIGURE 1. Initial Community Engagement with Mothers of Toddlers

B. DISTRIBUTION OF PRE-TEST FREQUENCY OF KNOWLEDGE ABOUT EARLY DETECTION OF INTELLECTUAL DISABILITY

Participants' knowledge of the early detection of childhood intellectual disability and developmental delays was assessed before the training using a structured questionnaire. As illustrated in FIGURE 3, the pre-test results showed that the largest proportion of participants belonged to the poor-knowledge category, accounting for 25 participants (41.7%). Meanwhile, 23 participants (38.3%) demonstrated an adequate level of knowledge,



FIGURE 2. Community Service Team Comprising Lecturers, Students, BKB Cadres, Midwives, and Nurses

and only 12 participants (20.0%) were classified in the good-knowledge category. These findings indicate that, before the intervention, most participants had not yet achieved a good level of understanding regarding the early detection of childhood intellectual disability and developmental delays.

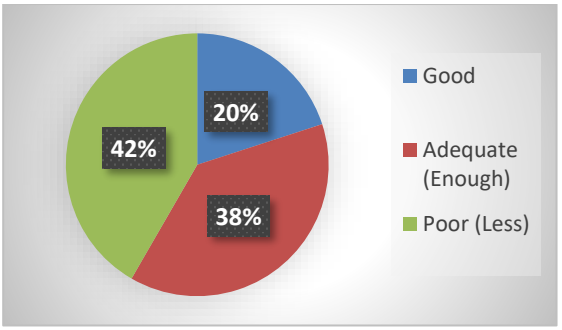


FIGURE 3. Distribution of Participants' Pre-Test Knowledge Regarding the Early Detection of Childhood Intellectual Disability and Developmental Delays in Ngiliran Village, 2026

C. DISTRIBUTION OF POST-TEST FREQUENCY OF KNOWLEDGE ABOUT EARLY DETECTION OF INTELLECTUAL DISABILITY

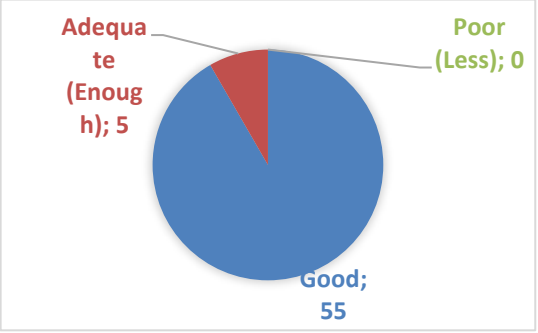


FIGURE 4. Distribution of Participants' Post-Test Knowledge Regarding the Early Detection of Childhood Intellectual Disability and Developmental Delays in Ngiliran Village, 2026.

Following the educational sessions, application demonstrations, and practical training, participants' knowledge was reassessed using the post-test questionnaire. FIGURE 4 presents the post-test knowledge distribution, showing that 55 participants (91.7%) achieved the good-knowledge category, while five participants (8.3%) were classified in the adequate-knowledge category. No participants remained in the poor-knowledge category. Compared with the pre-test distribution, these findings demonstrate a substantial shift towards a higher knowledge category after the intervention.

D. DISTRIBUTION OF PRE-TEST AND POST-TEST FREQUENCY OF KNOWLEDGE ON STUNTING PREVENTION

A comparison of participants' knowledge levels before and after the intervention is presented in TABLE 1. The proportion of participants in the good-knowledge category increased from 12 participants (20.0%) at pre-test to 55 participants (91.7%) at post-test. Conversely, the proportion in the poor-knowledge category decreased from 25 participants (41.7%) to none (0.0%). The adequate-knowledge category also decreased from 23 participants

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(38.3%) to five participants (8.3%), indicating that most participants shifted into the good-knowledge category. The Wilcoxon signed-rank test demonstrated a statistically significant difference between pre-test and post-test knowledge scores ($p < 0.001$). This result indicates that participants' knowledge scores were significantly different following the DeDi NaTaNiel application-based educational intervention.

Overall, the findings demonstrate an improvement in participants' short-term knowledge following the programme. The results also show that the intervention reached 159 toddlers through screening activities conducted at five Posyandu. However, the knowledge findings should be distinguished from the clinical outcomes of child screening, as the evaluation reported here focused on participants' knowledge and did not establish the diagnostic accuracy of the application.

TABLE 1
Comparison of Participants' Knowledge Levels Before and After the DeDi NaTaNiel Intervention

Knowledge Category	Pre-Test (n=60)	Percentage (%)	Post-Test (n=60)	Percentage (%)
Good	12	20.0%	55	91.7%
Adequate	23	38.3%	5	8.3%
Poor	25	41.7%	0	0.0%
Total	60	100.0%	60	100.0%

IV. DISCUSSION

A. INTERPRETATION OF FINDINGS ON COMMUNITY EMPOWERMENT AND KNOWLEDGE IMPROVEMENT

The findings indicate a substantial improvement in participants' knowledge of the early detection of childhood intellectual disability and developmental delays following the implementation of the DeDi NaTaNiel application-based programme. Before the intervention, only 12 of the 60 participants (20.0%) were classified as having good knowledge, whereas 25 participants (41.7%) were in the poor-knowledge category and 23 (38.3%) demonstrated adequate knowledge. Following the intervention, the number of participants in the good-knowledge category increased to 55 (91.7%), while the remaining five participants (8.3%) were classified as having adequate knowledge. No participants remained in the poor-knowledge category. The Wilcoxon signed-rank test also indicated a statistically significant difference between pre-test and post-test knowledge scores ($p < 0.001$). These results suggest that the programme was associated with improved short-term understanding of childhood developmental screening among the participating community members and health personnel.

The improvement may be understood in relation to the combined educational and practical components of the intervention. Participants did not receive information solely through classroom-based instruction; they also took part in demonstrations, application simulations, and supervised screening activities. This sequence provided opportunities to connect theoretical knowledge about child growth and development with practical experience in identifying developmental warning signs. The involvement of 60 participants from different community and professional groups may also have supported the exchange of knowledge and experiences. In this context, the DeDi NaTaNiel application functioned as a decision-support tool that helped participants follow a more structured screening process. Nevertheless, the findings should be interpreted as an improvement in participants' measured knowledge rather than proof that the application independently improved screening accuracy or diagnosed developmental conditions.

The interprofessional education (IPE) approach was another relevant component of the programme. Midwives and nurses provided clinical guidance and supervised the screening and referral processes, while Posyandu and Bina Keluarga Balita (BKB) cadres supported community mobilisation and application operation. Parents contributed information about their children's histories and participated in observing the screening process. This division of responsibilities created opportunities for collaboration between health professionals and community members. Such collaboration is important because early identification of developmental concerns requires more than the availability of a screening instrument; it also requires communication, appropriate interpretation, and access to follow-up services. Reviews of IPE implementation have similarly identified the importance of interactive learning, appropriate role distribution, institutional support, and sustainability in collaborative educational programmes [29], [30].

The programme also extended beyond training by involving participants in screening 159 toddlers across five Posyandu in Ngiliran Village. This field-based activity provided a practical context in which participants could apply the knowledge and skills introduced during training. The subsequent provision of information about home-based stimulation and referral pathways further connected screening activities with potential follow-up actions. However, the number of children screened should not be interpreted as the number of children diagnosed with intellectual disability or developmental delay. DeDi NaTaNiel is intended to support early screening and identify children who may require further assessment; it does not replace a comprehensive clinical or developmental evaluation. Therefore, the principal contribution demonstrated by this programme is the strengthening of community-level knowledge and participation in an organised early-screening process.

B. COMPARISON WITH PREVIOUS STUDIES AND POSITIONING WITHIN THE LITERATURE

The findings are consistent with recent evidence indicating that digital training can improve the knowledge of community health workers and other non-specialist personnel. A 2026 scoping review by Tembo et al. examined digital training outcomes among community health workers in low- and middle-income countries. The review found that most included studies reported positive learning outcomes, particularly improvements in knowledge. It also identified acceptability and feasibility as commonly assessed implementation outcomes, while noting that clinical outcomes were rarely evaluated [28]. The increase in the proportion of participants with good knowledge in the present programme is consistent with this

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pattern. Both bodies of evidence suggest that structured digital learning and training approaches can support the development of community health workers' knowledge. However, the present programme combined application use with face-to-face education, practical demonstrations, and supervision. Consequently, the observed improvement should be attributed to the overall intervention package rather than to the digital application alone.

The findings are also relevant to literature on interprofessional education. Bogossian et al. reported that IPE implementation involves multiple factors, including learning activities, the educational environment, leadership, resources, administrative processes, and wider policy support [29]. Similarly, Joubert and Reid highlighted the contribution of community health workers' knowledge, skills, and training to interprofessional learning and collaboration [30]. The DeDi NaTaNiel programme applied these principles at the community level by involving midwives, nurses, Posyandu cadres, BKB cadres, parents, and village representatives. Rather than positioning cadres and parents only as recipients of information, the programme involved them in screening-related activities under professional supervision. This approach illustrates how community-based IPE can connect professional expertise with local participation in primary health services.

The use of digital tools in community health programmes also requires attention to practical implementation conditions. Digital training may improve knowledge and support service delivery, but its effectiveness in routine settings depends on factors such as user competence, access to devices, technical support, and integration into existing health-service workflows. The findings of Tembo et al. indicate that digital training evaluations frequently focus on knowledge, acceptability, and feasibility, while providing less evidence about sustained changes in clinical outcomes [28]. The present programme has a similar evidence profile: it documents a marked short-term improvement in knowledge and describes positive application acceptance, but it does not establish long-term effects on screening quality or child development. Thus, the programme adds a community-based example of combining a digital screening-support application with interprofessional mentoring, while also demonstrating the need for more comprehensive evaluation.

The interpretation of the pre-test and post-test findings must also consider the study design. Nianogo et al. explained that before-and-after evaluations require careful consideration of alternative explanations for observed changes and that stronger quasi-experimental approaches may provide more robust evidence of intervention effects [31]. Bierer et al. likewise emphasised that a one-group pre-test/post-test design cannot establish causality because changes may be influenced by factors such as exposure to other information, testing effects, maturation, or changes in measurement conditions [32]. Accordingly, although the statistically significant result in this programme supports the conclusion that participants' knowledge scores differed after the intervention, it does not establish that DeDi NaTaNiel alone produced the improvement. The combined training, demonstrations, field supervision, and interaction among participants may all have contributed to the observed change.

C. LIMITATIONS, STRENGTHS, AND IMPLICATIONS FOR PRACTICE AND POLICY

Several limitations should be considered when interpreting these findings. First, the programme used a single-group pre-test/post-test design without a comparison group or random allocation. Therefore, the observed improvement cannot be attributed exclusively to the application or intervention, because other sources of information and external influences were not controlled. Second, the evaluation focused primarily on knowledge measured immediately before and after the educational activities. It did not establish whether the improvement was maintained over time or translated into consistent screening practices. Third, the programme was conducted in five Posyandu within one village. The findings may therefore not be generalisable to communities with different demographic characteristics, health-service resources, levels of digital literacy, or access to mobile technology.

Fourth, although the programme screened 159 toddlers, the reported findings do not provide sufficient information to evaluate the diagnostic accuracy of the application. Sensitivity, specificity, false-positive and false-negative results, and confirmation through comprehensive clinical assessment were not reported. The programme should therefore be understood as an early-screening and referral-support initiative rather than a diagnostic validation study. In addition, although application acceptance was assessed using six dimensions—System Quality, Ease of Use, Perceived Usefulness, User Satisfaction, Interpersonal Support, and Behavioural Intention to Use or Continue Use—the manuscript does not provide the numerical results for each dimension. These data should be reported in a future evaluation to enable readers to assess user acceptance more precisely.

Despite these limitations, the programme has several practical strengths. It involved multiple professional and community groups, combined education with supervised field practice, and applied the screening process to children attending routine community health services. The use of an Android-based decision-support application may also help standardise data entry and make screening information more accessible to participating cadres and health workers. These features provide a basis for considering the integration of DeDi NaTaNiel into routine Posyandu activities, BKB sessions, and other community-based child-development monitoring initiatives. Such integration should be accompanied by clear operating procedures, appropriate supervision, data confidentiality measures, and referral mechanisms that ensure children identified as being at risk receive further assessment by qualified professionals.

At the policy level, the findings support continued exploration of digital tools as complementary resources in strengthening primary health care and community participation. Local health authorities and village governments could consider supporting structured training, refresher sessions, technical assistance, and coordination

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between cadres and health professionals. Integration with existing maternal and child health information systems may also be explored, provided that interoperability, data governance, and technical feasibility are adequately assessed. Future studies should include comparison groups or stronger quasi-experimental designs, follow participants over a longer period, and evaluate changes in screening performance, referral completion, and child-development outcomes. They should also report detailed application-acceptance scores and assess the accuracy of screening results against appropriate professional assessments. These steps would provide stronger evidence regarding the effectiveness, sustainability, and wider applicability of the DeDi NaTaNiel programme.

V. CONCLUSIONS

This community service programme aimed to strengthen community capacity in the early detection of intellectual disability and developmental delays in children through the implementation of the DeDi NaTaNiel application and an interprofessional education approach. The programme was conducted from March to September 2026 across five Posyandu in the Anggrek cluster, Ngiliran Village, Panekan District, Magetan Regency, involving 60 participants comprising community health cadres, BKB cadres, parents, midwives, nurses, and community representatives. A total of 159 toddlers registered at the five Posyandu were identified as screening targets. The findings demonstrated a substantial improvement in participants' knowledge following the educational intervention and application training. Before the intervention, only 12 participants (20.0%) were classified as having good knowledge, while 23 (38.3%) had adequate knowledge and 25 (41.7%) had poor knowledge. Following the intervention, the proportion of participants with good knowledge increased to 55 (91.7%), while 5 participants (8.3%) remained in the adequate category and none were classified as having poor knowledge. The Wilcoxon signed-rank test indicated a statistically significant difference between pre-test and post-test knowledge scores ($p < 0.001$). These findings suggest that the combination of structured education, practical application training, and interprofessional collaboration can improve community participants' knowledge and preparedness to support early screening activities. The DeDi NaTaNiel application may serve as a practical decision-support tool for community-based screening; however, it should not be regarded as a diagnostic instrument, and the present findings do not establish its diagnostic accuracy or demonstrate long-term improvements in child developmental outcomes. Future studies should involve larger and more diverse populations, preferably using controlled or comparative research designs, to assess the sustainability of knowledge improvements and the effectiveness of the intervention across different community settings. Further evaluation is also required to examine application usability, user acceptance, screening accuracy, referral completion, and the long-term outcomes of children identified as potentially at risk. In addition, continuous training and supervision involving healthcare professionals, community cadres, and parents are recommended to support the consistent implementation of early detection and appropriate follow-up services. Overall, this programme provides an initial model for integrating digital screening support and interprofessional collaboration into community-based child development monitoring.

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DATA AVAILABILITY

The data supporting the findings of this programme may be made available by the corresponding author upon reasonable request, subject to applicable privacy and institutional requirements.

AUTHOR CONTRIBUTION

All authors contributed to the development and implementation of this community service programme and the preparation of the manuscript. The authors collectively participated in the conceptualization of the programme, coordination with relevant stakeholders, development and implementation of the educational and screening activities, data collection and interpretation, and manuscript preparation and revision. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for the integrity and accuracy of the work.

DECLARATIONS

ETHICAL APPROVAL

Informed consent was obtained from participants verbally and in writing before their involvement. Participants' confidentiality and anonymity were maintained throughout the programme. The institutional ethics approval or authorization details should be added if applicable.

CONSENT FOR PUBLICATION PARTICIPANTS

Informed consent was obtained from participants before their involvement in the educational and community empowerment activities. For participants under 18 years of age, parental or legal guardian consent should be confirmed where applicable.

COMPETING INTERESTS

The authors should declare whether they have any competing financial or non-financial interests related to this work. If none, use: "The authors declare that they have no conflict of interest.

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