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ORIGINAL

Development and Evaluation of SIADIL (Sistem Informasi Aktivitas Dukungan Instrumental Lansia): A Community-Based Digital System to Enhance Older Adults' Care in Rural Indonesia

Desarrollo y evaluación de SIADIL (Sistema de Información sobre Actividades de Apoyo Instrumental para Personas Mayores): un sistema digital comunitario para mejorar la atención de los adultos mayores en zonas rurales de Indonesia

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ABSTRACT

Introduction: older adults in rural areas face challenges in performing instrumental activities of daily living (IADLs) due to limited access to resources. However, intergenerational social support and increasing digital literacy among older adults present new opportunities for community-based technological interventions. This study aimed to develop and evaluate SIADIL (*Sistem Informasi Aktivitas Dukungan Instrumental Lansia*), a community-based digital system to optimize care for older adults in rural settings.
Method: this study used the ADDIE model. Data were collected from older adults, family caregivers, youth, and nurses through focus group discussions and usability testing. The evaluation was assessed using a structured questionnaire adapted from the System Usability Scale, covering the domains of usability, functionality, transportability, reliability, and acceptance. Quantitative data were analyzed using descriptive statistics. Qualitative feedback was analyzed thematically to identify areas for improvement in design and functionality.
Results: during the development phase, 21 participants, including older adults, family caregivers, youth, and nurses, were involved. The system also underwent expert validation focusing on content accuracy, functional suitability, and user interface quality. Seventy participants were included in the study during the evaluation phase. Overall, 95,7 % of respondents found the navigation clear and intuitive. Nearly all respondents (98,6 %) reported that the application was useful, efficient, and enhanced communication between caregivers and older adults.
Conclusions: SIADIL is a feasible, user-accepted innovation to enhance IADL performance among rural older adults through intergenerational and digital collaboration. Further testing is recommended to evaluate its long-term impact on older adults' independence and quality of life.

Keywords: Access to Health Services; Community Vulnerability Assessment; Health Care for the Poor; Health Services Accessibility; Social Care Service.

RESUMEN

Introducción: los adultos mayores que viven en zonas rurales enfrentan dificultades para realizar las actividades instrumentales de la vida diaria (AIVD) debido al acceso limitado a los recursos. Sin embargo, el apoyo social intergeneracional y el aumento de la alfabetización digital entre los adultos mayores presentan

nuevas oportunidades para intervenciones tecnológicas basadas en la comunidad. Este estudio tuvo como objetivo desarrollar y evaluar SIADIL (Sistema de Información de Actividades de Apoyo Instrumental para Personas Mayores), un sistema digital comunitario destinado a optimizar el cuidado de los adultos mayores en contextos rurales.

Método: este estudio utilizó el modelo ADDIE. Los datos se recopilaron de adultos mayores, cuidadores familiares, jóvenes y enfermeras a través de discusiones en grupos focales y una encuesta de prueba de usabilidad. La evaluación se realizó mediante un cuestionario estructurado adaptado de la System Usability Scale, que abarcó los dominios de usabilidad, funcionalidad, transportabilidad, fiabilidad y aceptación. Los datos cuantitativos se analizaron mediante estadísticas descriptivas. Los comentarios cualitativos se analizaron temáticamente para identificar áreas de mejora en el diseño y la funcionalidad.

Resultados: durante la fase de desarrollo participaron 21 personas, incluidos adultos mayores, cuidadores familiares, jóvenes y enfermeras. El sistema también fue sometido a validación por expertos centrada en la precisión del contenido, la idoneidad funcional y la calidad de la interfaz de usuario. En la fase de evaluación se incluyeron 70 participantes. En general, el 95,7 % de los encuestados consideró que la navegación era clara e intuitiva. Casi todos los participantes (98,6 %) informaron que la aplicación era útil, eficiente y mejoraba la comunicación entre cuidadores y adultos mayores.

Conclusiones: SIADIL es una innovación factible y bien aceptada por los usuarios para mejorar el desempeño de las AIVD en adultos mayores rurales mediante la colaboración digital e intergeneracional. Se recomienda una evaluación adicional para analizar su impacto a largo plazo en la independencia y la calidad de vida de los adultos mayores.

Palabras clave: Accesibilidad de los Servicios de Salud; Acceso a los Servicios de Salud; Atención Sanitaria para Personas de Bajos Recursos; Evaluación de la Vulnerabilidad Comunitaria; Servicios de Atención Social.

INTRODUCTION

Indonesia is currently experiencing a rapid demographic shift toward an aging population. In 2024, older adults aged 60 and above accounted for approximately 12 % of the total population, and this figure is projected to increase to 20,3 % (about 65,8 million people) by 2045.[1] This demographic transition poses significant challenges to health and social care systems, particularly in rural areas where access to healthcare facilities, assistive services, and social support remains limited.[2] Older adults living in rural settings often face greater barriers to performing Instrumental Activities of Daily Living (IADLs), including managing finances, preparing meals, maintaining the home, taking medications, using transportation, and shopping.[3] Evidence shows that physical decline, depression, and sensory impairments, especially hearing loss, are key determinants of IADL difficulties among older adults.[4,5,6] Consequently, older adults in rural areas are at higher risk of functional dependency and reduced quality of life.

Although Indonesia has a deeply rooted cultural expectation of family caregiving, recent studies have indicated that the actual level of community participation in supporting older adults' care varies across regions.[7,8,9] Migration, urbanization, and changing lifestyles have gradually weakened the traditional intergenerational bonds, especially in rural communities.[10,11] This situation highlights the need for innovative, community-based interventions that can reinforce intergenerational support and bridge existing service gaps for older adults. Technological progress has provided new opportunities to address these challenges. Digital literacy among the older adults in rural areas, although still limited, has shown steady improvement, rising from 3,8 % internet use in 2020 to 15 % in 2024, while mobile phone ownership has increased from 40,6 % to 42,7 % during the same period.[1] These trends highlight the potential of technology-assisted systems in facilitating communication, coordination, and intergenerational caregiving.

Intergenerational social support has been widely recognized as an essential determinant of physical, psychological, and social well-being in older adults.[12,13,14] Previous studies have shown that meaningful.[15,16,17] However, barriers such as digital inequality, limited awareness, and a lack of structured community programs continue to hinder the full realization of intergenerational support in practice.

Responding to these challenges, this study introduces SIADIL (Sistem Informasi Aktivitas Dukungan Instrumental Lansia), a digital platform designed to strengthen intergenerational and community-based support for older adults' care in rural Indonesia. SIADIL serves as an integrated information system that connects older adults with family members, youth groups, and nurses to facilitate the fulfillment of IADL needs. The system is grounded in the ADDIE development model[18] and emphasizes the principles of community participation, local cultural wisdom, and digital inclusion. SIADIL lies in its ability to merge traditional social values with modern technology to support the independence of older adults. Unlike existing digital health applications, which primarily focus on clinical monitoring, SIADIL adopts a holistic, community-centered approach that integrates social support,

health education, and local volunteer engagement. By leveraging intergenerational collaboration, SIADIL aims to optimize care for older adults, promote aging in place, and contribute to the Sustainable Development Goals (SDGs), particularly Goals 3 (Good Health and Well-being) and 10 (Reduced Inequalities). The objective of this study was to develop and evaluate SIADIL as a community-based, intergenerational digital support system to enhance the fulfillment of instrumental activities of daily living among older adults in rural areas. This study aimed to assess the application's usability, functionality, and acceptance among its diverse user groups, thus providing empirical evidence for its potential implementation in gerontological nursing practice.

METHOD

Research design

This research employed Research and Development (R&D) design guided by the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) to create and test the SIADIL application.[18] The ADDIE model was selected for its systematic, iterative approach, which allows continuous refinement based on user input and expert feedback. Facilitated by an iterative approach with R&D, this study was an explanatory sequential mixed-methods design. The study was conducted in two stages: (1) the development of the SIADIL prototype with a qualitative approach through Focus Group Discussions (FGDs), and (2) the evaluation of its usability, functionality, and acceptance among end users with a quantitative approach through surveys.

Setting and Time Frame

The study was conducted from July to September 2025 in Melinggih Village, a rural community in Bali, Indonesia. The total population of this village was 7,724, with 14,5 % aged 60 years and above.[19] Access to health care for the older population includes a public health center and an integrated health post. This setting was selected because of its strong intergenerational community structure and the researchers' prior engagement with local health programs.

Population, Samples, and Sampling

A total of 91 participants were involved in the two phases of this study. Phase 1 (Development stage): twenty-one participants were purposively selected for FGDs, comprising five older adults, two youth, ten family caregivers, four community health nurses. The number of participants was determined based on FGD methodological recommendations (4-6 participants per session) and the need to represent stakeholder groups.[20] Four FGDs were conducted to achieve saturation of key themes. These participants provided insights into user needs, preferred system features, and contextual considerations for the care of rural older adults. Phase 2 (Evaluation stage): seventy participants participated in the evaluation process, including ten nurses, eleven family caregivers, eleven older adults, and thirty-eight youth volunteers. The inclusion criteria were: (a) aged 18 years and above; (b) residing in the study area for at least 2 years; and (c) ability to provide informed consent. No formal sample size calculation was conducted because usability testing within an R&D framework typically prioritizes iterative feedback rather than statistical power. Older adults with cognitive impairments or severe physical limitations were excluded. All participants in both phases were purposely selected via collaboration with the village leader, community health nurses, and volunteers in the integrated health post. Lists of eligible older people, caregivers, and youth volunteers were obtained through the integrated health post and community youth organization records. The research team approached prospective participants in person, explained the study objectives, and obtained written informed consent.

Instruments

During the development phase, we used the FGD guidelines for the interview. We provided information about the application prototype and asked for further feedback. During the evaluation phase, we adapted and modified the System Usability Scale (SUS).[21,22] The original SUS measured only one domain, usability, with 10-item questions (annex 1). The original SUS framework was expanded and refined through expert consultation to capture better dimensions relevant to digital health innovation and community-based care for older adults. Additional items addressing functionality, transportability, reliability, validity, and user perceptions were drafted. The modified instrument consisted of 24 items, with six domains: (1) usability, (2) functionality, (3) transportability, (4) validity, (5) reliability, and (6) user views (supplementary 2). Each domain comprised multiple items rated on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Content validity index (CVI) was reviewed by a panel of seven experts in gerontic nursing, community health, and information technology, ensuring that all domains accurately reflected user experiences across different stakeholder groups (older adults, families, youth, and healthcare workers). All items in the domains of usability, functionality, transportability, and user views had CVI scores of 0,86-1. Meanwhile, all items in the domain of validity and reliability had a CVI of 1. Internal consistency testing indicated that the instrument demonstrated acceptable reliability, with Cronbach's α values of at least 0,70 across all domains, with the total scale of 0,92

(table 1), confirming its suitability for assessing the usability and acceptance of the SIADIL system. In addition, we also asked the participants to provide feedback through open-ended questions. In this study, we measured agreement among those who answered 'agree' or 'strongly agree' to each item.

Table 1. Content validity index and internal consistency of the modified questionnaire of usability testing of SIADIL

Item	Number of items	Summary of CVI	Cronbach's Alpha
- Usability	5	0,86-1	0,84
- Functionality	5	0,86-1	0,78
- Transportability	3	0,86-1	0,70
- Validity	3	1	0,80
- Reliability	3	1	0,78
- User Views	5	0,86-1	0,88
- Total Usability	24	-	0,92

Data Collection

This study follows the sequential phases of the ADDIE model. 1) Analysis: user needs were identified through FGDs, focusing on the content and the prototype of SIADIL. We conducted four homogenous FGDs (first with five older adults, second with four nurses, third with six families, and fourth with two youth and four families with a similar age to the youth). Three nursing researchers with doctoral qualifications facilitated the sessions, assisted by four nursing students who had been trained in data collection. Before starting, facilitators outlined the study's purpose and procedures. All groups received the same set of guiding questions based on the study objectives. The FGDs were conducted face-to-face in Bahasa Indonesia at the village office, audio-recorded, and supplemented with field notes, lasting approximately 1 to 1,5 hours each. Transcriptions were then produced for subsequent content analysis. The data were analyzed thematically to define functional and system requirements for SIADIL. 2) Design: a prototype of the SIADIL application was designed with six key features: (1) older adults' profile, (2) IADL screening using the validated Lawton IADL Scale, (3) requested assistance, (4) available sources of help, (5) educational resources, and (6) progress monitoring. The interface design prioritizes simplicity, readability, and accessibility for users with varying levels of digital literacy. 3) Development: the application was built collaboratively by an IT developer team. Validation was conducted by experts in Gerontic Nursing, community health, and information technology to assess the content accuracy, usability, and technical feasibility. Modifications were made based on the feedback from these experts. 4) Implementation: the validated SIADIL prototype was introduced to participants through a structured training session. The training lasted 30–45 minutes, facilitated by the researchers and one community health nurse in small groups (5–8 participants) to ensure individualized assistance. Participants were guided through the installation of the application on their personal smartphones, creation of user accounts, navigation of each feature using step-by-step demonstrations, examples of how to request or provide assistance, and how to record IADL data and access educational resources. Hands-on practice was encouraged, and facilitators offered direct support for older adults or participants with low digital familiarity. 5) Evaluation: evaluation was assessed using a structured questionnaire adapted from the System Usability Scale covering usability, functionality, transportability, reliability, and acceptance domains. Respondents rated each statement on a 5-point Likert scale. Internal consistency was measured using Cronbach's alpha.

Data Analysis

Qualitative feedback was analyzed thematically to identify areas for improvement in design and functionality. The process began with multiple readings of the transcripts to develop a holistic sense of the discussions, followed by a line-by-line review to extract significant ideas. Two research teams generated preliminary codes and grouped them into categories based on conceptual similarities and relationships. These categories were then further refined into major themes and corresponding subthemes through content analysis across all four participant groups. Quantitative data were analyzed using SPSS 27.0 for descriptive statistics and the Kruskal-Wallis H test to assess group differences.

Ethical Consideration

Ethical approval for this study was obtained from the Research Ethics Committee of the Institute of Technology and Health Bali (Approval No. 04.158/KEPITEKES-BALI/V/2025), ensuring compliance with the established ethical standards for research involving human subjects. Data confidentiality and anonymity were maintained throughout the study, and the participants were informed of their right to withdraw at any time without penalty.

RESULTS

Development of SIADIL

The development of SIADIL followed the ADDIE model systematically in five stages: analysis, design, development, implementation, and evaluation. The process aimed to produce a user-friendly digital platform that connects older adults with intergenerational and community-based support systems to assist with daily instrumental activities. During the analysis phase, four focus group discussions (FGDs) were conducted with 21 participants, including older adults, family caregivers, youth, and nurses (table 2).

Table 2. Demographic characteristics of respondents

Characteristics	Analyses Stage (n=21)		Evaluation Stage (n=70)	
	n	%	n	%
Age				
- 18-21	0	0,0	28	54,3
- 22-59	15	71,4	21	30,0
- 60+	6	28,6	11	15,7
Gender				
- Male	6	28,6	17	24,3
- Female	15	71,4	53	75,7
Education				
- Elementary school	0	0,0	3	4,3
- Junior high school	0	0,0	1	1,4
- Senior high school	8	61,9	43	61,4
- University graduate	13	32,9	23	32,9
Roles				
- Nurses	4	19,1	10	14,3
- Family	10	47,6	11	15,7
- Older adults	5	23,8	11	15,7
- Youth	2	9,5	38	54,3

Qualitative thematic analysis identified five key themes: (1) Clarification of target users and roles in care, (2) Integrated and efficient data management, (3) User-friendly and accessible interface features, (4) Scheduling, reminders, and monitoring, and (5) Strengthening family and youth-based support. Theme, sub-theme, description, and participants' quotations are summarized in table 3. These findings form the foundation for defining the user needs and system features for SIADIL.

Table 3. Theme and subtheme of thematic analyses in the analysis part of FGDs

Theme	Sub-theme	Description	Representative quotation
1. Clarification of Target Users and Roles in Care	Adolescents as technology mediators	Adolescents aged 15+ can support older adults and understand technology.	"Can adolescents or grandchildren aged 15 years and above be included? Because they better understand the condition of older adults and the technology used in the application." (Nurse 1)
	Broadening definition of family	Family should include not only children but spouses, in-laws, etc.	"Does 'family' only refer to the children? What about other family members, such as spouses, in-laws, and so on?" (Family 2)
	Youth outside family as caregivers	Non-family adolescents may assist due to time and empathy.	"Youth who are not family members can also help, because they tend to have more time and increasing concern for older adults." (Youth 2)
	Clarifying information sources	Need to identify who provides data in the app.	"Who will be the informant? If it is someone else, who exactly is the informant?" (Nurse 2)
2. Integrated and Efficient Data Management	Linking with demographic databases	Integrate SIADIL with population data to avoid duplication.	"Can older adults' data be linked with demographic data? If it can later be bridged with other older-adult applications, we won't need to re-enter the same information." (Nurse 4)
	Using National ID documents	Use national ID for identification.	"For integrated data, do we need the national ID number, like in the screening of older people?" (Nurse3)
	Socioeconomic and living conditions	Add economic status, bedroom, residence, and income details.	"The socioeconomic condition of the older adult… their place of residence, bedroom condition, and income." (Family 5)

	Supporting social assistance and notifications	Data can support assistance proposals and auto-alerts.	"After screening, notifications will appear for all users stating what kind of assistance is needed." (Nurse 3)
3. User-Friendly and Accessible Interface Features	Use of images and icons	Images help older adults with limited literacy.	"Include pictures, not only text; users should be able to click the images. If the older adult cannot read, the images can help." (Elderly 1)
	Structured scoring options	Items should be scored using structured formats.	"Will each option be assessed individually? Wouldn't it be better to structure it like the table above with scores included?" (Nurse 2)
4. Scheduling, Reminders, and Monitoring	Communication and activity scheduling	Plan communication and activities based on older adults' abilities.	"Communication schedules… and types of activities that can be done according to the older adult's abilities." (Family 3)
	Reminder alarms for routines	Add alarms for medications and appointments.	"Add reminder alarms for each component: medication schedules, follow-up appointments, family accompanying older adults…" (Elderly 3)
	Medication availability and safety monitoring	Include features to check stock, sorting, and expiry dates.	"Check medication availability… add color labels and check for expiry dates." (Family 8)
5. Strengthening Family and Youth-Based Support	Practical health-support tasks	Assisting with medication purchases and appointments.	"Helping older adults buy medication at the pharmacy." (Elderly 4)
	Emotional and social support	Promote harmony, conversations, and recreational activities.	"Remind family members to stay harmonious." (Family 10)
	Digital support for entertainment/ information	Helping older adults use phones for entertainment and health info.	"Helping older adults access health information via the phone." (Family 6)
	Assistance with daily living	Include support with tasks such as laundry.	"Finding a laundry service so it can help wash clothing (delivery service)." (Elderly 1)

In the design phase, SIADIL was conceptualized to include six major features: (1) user profile, (2) IADL screening using the validated Lawton IADL scale, (3) requested assistance, (4) available support sources, (5) educational content, and (6) progress monitoring. The interface was designed to ensure simplicity, intuitive navigation, and accessibility to users with varying levels of digital literacy. Expert validation from nursing and IT specialists confirmed the relevance and usability of the proposed features.

The development phase involved collaborating with a professional software developer to produce the initial SIADIL prototype. The system underwent expert validation focusing on content accuracy, functional suitability, and user interface quality. The feedback led to iterative revisions, including improvements in color contrast, font size, and page transitions.

During the implementation phase, SIADIL was introduced to user groups through structured training sessions. The participants learned how to install and use the application independently. The training was followed by a pilot usability test in one village, where users applied SIADIL to record and monitor IADL-related activities among older adults.

Evaluation of SIADIL

The evaluation focused on measuring usability, functionality, transportability, reliability, and acceptance. Seventy participants (10 nurses, 11 family members, 11 older adults, and 38 youth) completed the assessment. Most respondents strongly agreed that SIADIL was easy to use, clearly structured, and visually consistent. Overall, 95,7 % of the respondents found the navigation clear and intuitive, while 98,6 % agreed that the features worked as intended. All user groups rated the application as helpful in facilitating older adults' care coordination and IADL monitoring. About 80 % of the participants agreed that SIADIL could be used effectively across devices, although several users suggested improving compatibility beyond Android platforms. Reliability ratings were high, with over 90 % of the respondents reporting that the application operated smoothly, rarely crashed, and securely stored data. Overall satisfaction with SIADIL was high. Nearly all respondents (98,6 %) reported that the application was useful, efficient, and enhanced communication between caregivers and older adults (table 4). Users especially appreciated the educational content, progress tracking, and the ability to connect with community volunteers.

A Kruskal-Wallis Test revealed a statistically significant difference in the agreement level across four different groups in the domain of usability ($P < 0,001$), functionality ($P = 0,012$), validity ($P = 0,003$), reliability ($P = 0,007$), user view ($P < 0,001$), and total ($P = 0,006$). Only in the domain of transportability was there no statistically significant difference, with $P = 0,116$ (table 5). This represents variability in respondents' feedback,

but agreement remains strong.

Table 4. Agreement on the usability of SIADIL among respondents

Item questions	Agreement N (%)					Md (Range)
	Nurse (n=10)	Family (n=11)	Older adults (n=11)	Youth (n=38)	Total (n=70)	
Usability						
- This application is easy to use even when trying it for the first time.	10 (100)	11 (100)	8 (72,7)	38 (100)	67 (95,7)	4(2-5)
- The navigation of this application is clear and easy to understand.	10 (100)	11 (100)	9 (81,8)	37 (97,4)	67 (95,7)	4(2-5)
- The information displayed in the application is easy to understand.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- I did not experience confusion while using this application.	10 (100)	11 (100)	7 (63,6)	35 (92,1)	63 (90,0)	4(2-5)
- This application is consistent in appearance and function in every part.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
Total usability						20(12-25)
Functionality						
- The features of the application work as expected.	10 (100)	11 (100)	11 (100)	36 (94,7)	68 (97,1)	4(2-5)
- I did not experience interruptions/errors while using the application.	10 (100)	11 (100)	11 (100)	34 (89,5)	66 (94,3)	4(2-5)
- The application responds quickly when used.	10 (100)	11 (100)	11 (100)	37 (97,4)	69 (98,6)	4(2-5)
- I feel the functions in the application meet my needs as a user.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- I feel safe and comfortable when using the application.	10 (100)	11 (100)	11 (100)	37 (97,4)	69 (98,6)	4(2-5)
Total functionality						19 (14-25)
Transportability						
- This application can be used on various devices (smartphones, tablets, etc.).	6 (60)	11 (100)	11 (100)	28 (73,7)	56 (80,0)	4(1-5)
- The application functions well on different operating systems.	8 (80,0)	11 (100)	11 (100)	34 (89,5)	64 (91,4)	4(1-5)
- Installation and updating of the application run smoothly.	10 (100)	11 (100)	11 (100)	36 (94,7)	68 (97,1)	4(2-5)
Total transportability						11 (5-15)
Validity						
- The information in this application is accurate and reliable.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- The educational materials provided are relevant to care needs.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- The language and terms in the application are easy to understand.	10 (100)	10 (90,0)	10 (90,9)	36 (94,7)	66 (94,4)	4(2-5)
Total validity						12(9-15)
Reliability						
- This application rarely experiences errors during use.	8 (80,0)	11 (100)	11 (100)	36 (94,7)	66 (94,3)	3,5(2-5)
- The application is stable and does not easily crash.	8 (80,0)	9 (81,8)	11 (100)	37 (97,4)	65 (92,9)	3,5(2-5)
- My data is stored securely and is not lost.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
Total reliability						10,5(7-15)
User Views						
- I am satisfied with the experience of using this application.	10 (100)	10 (90,9)	11 (100)	38 (100)	69 (98,6)	4(2-5)

- This application helps me complete tasks or needs more efficiently.	10 (100)	10 (90,9)	11 (100)	38 (100)	69 (98,6)	4(2-5)
- I am willing to use this application again in the future.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- I will recommend this application to others.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
- Overall, I consider this application to be of good quality.	10 (100)	11 (100)	11 (100)	38 (100)	70 (100)	4(3-5)
Total user views						20(13-25)

Table 5. Kruskal-Wallis H analysis of each domain among participants

	Usability	Functionality	Transportability	Validity	Reliability	User view	Total
- Kruskal-Wallis H	22,215	10,890	5,914	13,641	12,091	16,838	12,423
- Df	3	3	3	3	3	3	3
- Asymp. Sig	<0,001	0,012	0,116	0,003	0,007	<0,001	0,006

Feedback and Areas for Improvement

Qualitative user feedback provides valuable input for further refinement. Key suggestions included: (1) increasing font size and color contrast for readability, (2) adding tutorial videos to guide first-time users, (3) expanding access to iOS and desktop platforms, (4) incorporating a medication reminder alarm system, and (5) improving offline usability in areas with unstable internet connectivity (table 6). These suggestions highlight the importance of a continued iterative design to enhance accessibility and user experience.

Table 6. Feedback for SIADIL

Item questions	Family	Older adults	Nurses	Teenager
What do you like most?				
- Provide beneficial information on health	3	11	0	3
- Easy to use	1	1	4	25
- Very helpful for older adults	2	0	2	1
- To monitor progress of older adults	2	0	0	4
- Contain complete and interesting features	2	0	4	9
- Helpful for IADL disability screening	1	0	2	4
- Provide reliable information		2		1
Perceived benefits				
- Provide new information on how to monitor health of older adults	2	0	0	0
- Make it easier to monitor older adults conditions	5	0	8	18
- Better understand information around health	2	9	2	2
- Assist older adults' IADL	2	0	0	8
- Bridge communication between caregivers and older adults	0	0	2	10
- Increase the opportunity for family involvement in providing IADLs	2	0	2	0
- Increase the quality of life of older adults	0	0	0	3
- Provide access for information and service around IADLs	0	0	0	1
Suggestions for improvement				
- Bigger font size	2	1	0	1
- More video-based media around health of older person	1	0	0	3
- Add tutorial on how to use the apps	2	7	0	15
- Better color	1	1	0	0
- Better, more complete, more interesting features	1		0	5
- Accessible on all mobile phone types	1	1	0	2
- Add "search feature" to find older adults	0	0	4	1
- Make sure data privacy	1	0	2	1
- Provides the opportunity to select more than one option in the action feature				7
- Integrated with existing services	0	0	2	
- Differentiate data access among different user's types	0	0	0	1
- Add recommendations if screening ALDs resulted in no disability	0	0	2	

- Add alarm system for medication time	0	0	0	1
Perceived challenges in using this apps				
- Font size	2	0	0	0
- System error during download and application	1	1	0	0
- Language barrier	1	0	0	0
- Internet connection	3	3	6	24
- Unfamiliar for the new users	1	0	0	0
- Confusing steps and no tutorials	0	7		6
- Currently available only in Android based smartphones	0	0	0	3
- Ability of older person in using mobile phones	0	0	0	2

DISCUSSION

This study aimed to develop and evaluate SIADIL, a community-based digital platform designed to enhance care for older adults through intergenerational collaboration in rural Indonesia. The most important finding is that SIADIL achieved high usability, functionality, and acceptance across all user groups, demonstrating its feasibility as a digital solution to support aging in place. The strong internal reliability of the evaluation instrument and the consistently positive user responses indicate that SIADIL successfully integrates technological innovation with community-based care models.

The high levels of agreement with the usability statements obtained in this study reflect the growing openness among community members, including older adults, to adopting digital solutions in daily life. Similar trends have been observed in other low- and middle-income countries, where digital interventions have been increasingly used to support aging populations.[23,24,25,26] Importantly, SIADIL leverages intergenerational interaction as a key mechanism, consistent with research showing that youth engagement enhances both technological accessibility and social cohesion.[27,28,29] In this study, youth participants not only assisted older adult users but also expressed increased awareness and empathy toward aging issues, highlighting the reciprocal benefits of intergenerational programs.

The high acceptance levels observed in this study suggest that SIADIL aligns well with the needs and social dynamics of rural Indonesian communities. Rather than simply reflecting a global trend toward digital adoption, the positive response appears to be driven by the culturally ingrained norm of intergenerational support, in which youth routinely assist older adults with mobility, communication, and technology-related tasks. This pattern supports socioemotional selectivity theory and intergenerational solidarity models, which suggest that cross-generational interaction enhances engagement, mutual trust, and learning. Interestingly, youth participants showed the highest acceptance scores. This is not merely because they are "tech-savvy," as often stated in the literature, but because SIADIL positions youth in meaningful caregiving roles, increasing their sense of social responsibility and agency. Prior research indicates that youth involvement in caregiving strengthens digital intervention sustainability, as young people serve as "technology mediators" for older adults,[30] a pattern clearly reflected in the present findings.

In contrast, older adults provided slightly lower ratings on items related to ease of navigation and information clarity. This is consistent with gerontechnology literature, indicating that sensory limitations, unfamiliarity with icons, and cognitive processing differences affect digital task performance.[31] However, the fact that older adults still expressed overall satisfaction suggests that the app's simplified interface and step-by-step guidance helped mitigate these challenges. The mixed responses underscore the importance of ongoing design refinement tailored to older adults' evolving digital competencies.

The development of SIADIL responds to an urgent need in Indonesia's demographic context, where the aging population is rapidly increasing, particularly in rural regions with limited access to formal healthcare services. This aligns with prior studies indicating that older adults in such settings face greater challenges in fulfilling their IADLs because of restricted mobility, limited social support, and inadequate infrastructure.[3,32] By integrating digital tools with local community structures, SIADIL represents a practical model for optimizing care delivery, while reinforcing the cultural values of mutual support and collective responsibility.

The findings also emphasize the role of user-centered design in technology adoption among older adults. Participants suggested improvements such as larger fonts, tutorial videos, and enhanced cross-device compatibility, as well as recommendations aligned with gerontechnology design principles that emphasize simplicity, visibility, and interactivity.[33,34,35] Addressing these usability factors is essential to ensuring accessibility for users with limited digital literacy or sensory impairments. Moreover, these suggestions highlight that the successful implementation of digital health innovations in rural areas depends on contextual adaptation rather than uniform design.

Participants' suggestions for improvement offer critical insights into the design of gerontechnology for low-resource settings. The request for offline functionality reflects structural inequalities in rural digital access.[36] Limited or unstable internet connectivity is a known barrier to digital health adoption in low and middle-

income countries.[37] This feedback highlights the need for systems that do not rely on continuous connectivity, an essential step toward closing the rural digital divide. Demand for larger fonts, clearer icons, and video tutorials echoes universal design principles that recommend compensating for age-related sensory and cognitive changes. Implementing these features would not only improve usability for older adults but also align SIADIL with best practices in accessible digital health design. Calls for easier cross-device compatibility highlight the diversity of mobile devices used in rural areas, which often run older operating systems or have smaller screens. Ensuring compatibility across smartphones is essential to prevent excluding users with limited resources.

The study's findings complement global research showing that digital platforms can effectively support older adults' IADLs, health monitoring, and social engagement.[38] However, SIADIL extends the literature in several important ways. First, the intergenerational mechanism. Few digital interventions explicitly operationalize intergenerational collaboration as a core design element. SIADIL demonstrates that youth can be leveraged not only as "helpers" but as active partners in elder care, strengthening the cultural norm of mutual assistance. Second, integration with existing rural health structures. Unlike many digital tools piloted in urban or clinical settings, SIADIL was tested in a real-world rural environment characterized by limited healthcare access. This strengthens the evidence base for community-based digital health models in low and middle-income countries. Third, user-centered adaptation. The iterative R&D approach ensured that the platform was shaped by the daily lived experiences of older adults, caregivers, and community health actors, reinforcing earlier studies' findings on the importance of co-design in gerontechnology.

Findings from this study highlight several critical implications for gerontological nursing practice and opportunities for future research. From a nursing perspective, SIADIL represents an innovative and practical tool for expanding gerontological care beyond traditional clinical environments. By providing a structured system to assess and monitor IADLs, nurses and community health workers can more effectively identify functional limitations, tailor interventions, and collaborate with families and youth in caregiving roles. The platform encourages shared responsibility and strengthens community engagement, consistent with the Community as Partner model, which emphasizes community involvement as fundamental to health promotion and resilience-building.[39,40]

The development and pilot evaluation of SIADIL also highlight opportunities for further research. Future studies could examine the system's effectiveness across diverse cultural and geographical settings and evaluate long-term outcomes, including functional independence, quality of life, caregiver burden, and intergenerational engagement. Research using mixed-methods or longitudinal designs could explore how SIADIL influences behavioral change, service utilization, and family–community collaboration over time. Additionally, there is potential to integrate SIADIL with existing digital health platforms and population databases, which warrants investigation into data governance, interoperability, and ethical considerations. Studies focusing on user interface optimization, accessibility for low-literacy populations, and technological adaptations for multiple operating systems would further support system refinement.

This study has several limitations that should be considered when interpreting the findings. First, this study was conducted in a single rural village in Bali, which may limit the generalizability of the results to other regions with different cultural, socioeconomic, or infrastructural contexts. Future studies should include multiple settings across rural areas to ensure broader applicability. Second, the study involved a relatively small sample size, particularly during the development phase and evaluation phase, which may not fully capture the diversity of user experiences and technological competencies among Indonesia's older population. Expanding the participant base to include older adults with varying levels of digital literacy and health status would enhance the comprehensiveness of the findings. Third, the evaluation period for SIADIL was relatively short, focusing primarily on the initial usability and functionality rather than the long-term outcomes. Consequently, this study was unable to assess the sustained impact of SIADIL on the independence, quality of life, and social engagement of older adults. Longitudinal studies are recommended to examine these outcomes over extended periods. Despite these limitations, this study provides a valuable foundation for future innovation and policy development in community-based gerontological nursing. The insights from this study serve as an essential step toward scaling digital solutions that bridge generational gaps and enhance care for older adults in Indonesia's rural settings.

CONCLUSIONS

The development and evaluation of SIADIL highlight its potential as a community-based digital innovation to enhance care for older adults in rural Indonesia. This study demonstrated that SIADIL is a feasible, reliable, and user-accepted application that facilitates intergenerational collaboration to support the IADLs of older adults. High usability and functionality acceptance reflect its appropriateness for diverse user groups, including older adults, families, youth, and healthcare workers. SIADIL contributes to strengthening gerontological nursing practice by integrating the cultural values of mutual assistance with modern technological approaches. It supports nurses and community health teams in monitoring older adults ' functional capacity, promoting self-

care, and fostering social engagement through intergenerational participation. This aligns with national health priorities to improve the quality of life of older adults and global commitments to the Sustainable Development Goals (SDG 3 and 10). However, successful implementation requires attention to contextual barriers such as limited digital literacy and infrastructure gaps in rural areas. Continuous community engagement, user training, and cross-sectoral collaboration are essential for sustaining its use and scalability. SIADIL offers a replicable model for digital health innovation in gerontological nursing, emphasizing participatory, intergenerational, and community-based approaches. Future research should focus on the long-term evaluation of its impact on older adults' independence, social connectivity, and mental well-being, as well as on its integration with national health information systems, to ensure broader accessibility and policy relevance.

REFERENCES

1. BPS-Statistics Indonesia. Elderly Population Statistics 2024. Jakarta: BPS-Statistics Indonesia; 2024.

2. Wenang S, Schaefers J, Afdal A, Gufron A, Geyer S, Dewanto I, et al. Availability and accessibility of primary care for the remote, rural, and poor population of Indonesia. Frontiers in public health. 2021; 9:721886. https://doi.org/10.3389/fpubh.2021.721886

3. Suyasa IGPD, Sutini NK, Kamaryati NP, Nuryanto IK. Determinant of functional disability in instrumental activities of daily living among elderly living in a rural area in Bali: a cross-sectional study. Jurnal Ners. 2023;18(2):110-6. https://doi.org/10.20473/jn.v18i2.45700

4. Mercan Y, Selcuk KT, Sayilan AA. The relationship between types of physical disabilities and the Instrumental Activities of Daily Living (IADL) in the elderly. Family Medicine & Primary Care Review. 2021;23(1). https://doi.org/10.5114/fmpcr.2021.103153

5. Kodama S, Hoshi T, Kurimori S. Decline in independence after three years and its association with dietary patterns and IADL-related factors in community-dwelling older people: an analysis by age stage and sex. BMC geriatrics. 2021;21(1):385. https://doi.org/10.1186/s12877-021-02332-5

6. Yévenes-Briones H, Caballero FF, Struijk EA, Rey-Martinez J, Montes-Jovellar L, Graciani A, et al. Association between hearing loss and impaired physical function, frailty, and disability in older adults: a cross-sectional study. JAMA Otolaryngology–Head & Neck Surgery. 2021;147(11):951-8. https://doi.org/0.1001/jamaoto.2021.2399

7. Ekadinata N, Hsu H-C, Chen Y-M, Chuang K-Y. Effects of social capital on healthcare utilization among older adults in Indonesia. Health Promotion International. 2023;38(5):daad104. https://doi.org/10.1093/heapro/daad104

8. Widyastuti RH, Sahar J, Rekawati E, Kekalih A. Barriers and support for family caregivers in caring for older adults with dementia: a qualitative study in Indonesia. Nurse Media Journal of Nursing. 2023;13(2):188-201. https://doi.org/10.14710/nmjn.v13i2.55729

9. Putri TWS, Kafaa KA, Yuda TK. Community-care approach for social work practice: Learning from community-based healthcare for elderly in yogyakarta. J Ilmu Sos Ilmu Politik. 2020;23(3):198-209. https://doi.org/10.22146/jsp.51896

10. Absor MU, McDonald P, Utomo A, Houle B. Care arrangements of older persons in rural Indonesia: a study of six villages. Asian Population Studies. 2024;20(3):245-67. https://doi.org/10.1080/17441730.2023.2193520

11. Mete APKDA, Sudarsana P. Comparing well-being among rural and urban Indonesian older people: a quantitative analysis of the related factors. International Journal of Public Health. 2022;11(4):1553-61. https://doi.org/10.11591/ijphs.v11i4.21752

12. Lestari MD, Stephens C, Morison T. The role of local knowledge in multigenerational caregiving for older people. Journal of Intergenerational Relationships. 2023;21(3):339-59. https://doi.org/10.1080/15350770.2022.2059606

13. Jahangir S, Patil DS, Gangopadhyay J, Vogt TC. Understanding intergenerational dynamics and social support's impact on health and well-being of older adults in South Asia: a scoping review. Systematic Reviews.

2025;14(1):86. https://doi.org/10.1186/s13643-025-02833-z

14. Jia Q, Li S, Kong F. Association between intergenerational support, social integration, and subjective well-being among migrant elderly following children in Jinan, China. Frontiers in Public Health. 2022;10:870428. https://doi.org/10.3389/fpubh.2022.870428

15. Pinazo-Hernandis S, Carrascosa C. Effectiveness of intergenerational programs to reduce loneliness: A scoping review and reflections. Journal of Intergenerational Relationships. 2025;23(3):361-78. https://doi.org/10.1080/15350770.2024.2400278

16. Whear R, Campbell F, Rogers M, Sutton A, Robinson-Carter E, Sharpe R, et al. What is the effect of intergenerational activities on the wellbeing and mental health of older people?: A systematic review. Campbell systematic reviews. 2023;19(4):e1355. https://doi.org/10.1002/cl2.1355

17. Suragarn U, Hain D, Pfaff G. Approaches to enhance social connection in older adults: An integrative review of literature. Aging and Health Research. 2021;1(3):100029. https://doi.org/10.1016/j.ahr.2021.100029

18. Samsudin R, Sulaiman R, Guan TT, Yusof AM, Firdaus M, Yaacob C. Mobile Application Development Through ADDIE Model. International Journal of Academic Research in Progressive Education and Development. 2021;10(2):1017-27. http://dx.doi.org/10.6007/IJARPED/v10-i2/10328

19. BPS-Statistics Gianyar Regency. Payangan District in Figures. Gianyar: BPS-Statistics Gianyar Regency,; 2025.

20. Guest G, Namey E, McKenna K. How many focus groups are enough? Building an evidence base for nonprobability sample sizes. Field Methods. 2017;29(1):3-22. https://doi.org/10.1177/1525822X16639015

21. Brooks J. SUS—A "quick and dirty" usability scale. Digital Equipment Corporation. 1986.

22. Sharfina Z, Santoso HB, editors. An Indonesian adaptation of the system usability scale (SUS). 2016 International conference on advanced computer science and information systems (ICACSIS); 2016: IEEE.

23. Fikri MA, Huda H, editors. React Based Village Website Front-End Application. 2024 IEEE 22nd Student Conference on Research and Development, SCOReD 2024; 2024: Institute of Electrical and Electronics Engineers Inc. https://doi.org/10.1109/SCOReD64708.2024.10872683.

24. Lekapol A, Raksanam B, Sornkaew W, Thirarattanasunthon P, Nak-ai W, Bunmalert A, et al. Community-Driven Development of the Chalerm App: A Mobile Health Application for Chronic Disease Management and Elderly Care in Southern Thailand. Journal of Multidisciplinary Healthcare. 2025;18:6115-25. https://doi.org/10.2147/JMDH.S541792

25. Mohamed Nazar NI, Ab Rahman NS, Alias NE, Zaini S, Tg Mohd Kamil TK, Jamani NA, et al. Impak Sihat: A telehealth system development and feasibility evaluation to empower rural population in Malaysia on the quality use of medicines. PLOS Digit Health. 2025;4(8 August). https://doi.org/10.1371/journal.pdig.0000937

26. Villa-García L, Davey V, Peréz LM, Soto-Bagaria L, Risco E, Díaz P, et al. Co-designing implementation strategies to promote remote physical activity programs in frail older community-dwellers. Frontiers in Public Health. 2023;11. https://doi.org/10.3389/fpubh.2023.1062843

27. Díaz M, Gil RM, Cabeza LF, Cerezo E, Teixidó M. Enhancing active aging through IRAGE: Mitigating social isolation with intergenerational gaming. Heliyon. 2024;10(12). https://doi.org/10.1016/j.heliyon.2024.e32979

28. Fang ML, Sixsmith J, Hamilton-Pryde A, Rogowsky R, Scrutton P, Pengelly R, et al. Co-creating inclusive spaces and places: Towards an intergenerational and age-friendly living ecosystem. Frontiers in Public Health. 2023;10:996520. https://doi.org/10.3389/fpubh.2022.996520

29. Abdulmunem SA, Shok ME, Hussain Al-Hussaini ZI, Alkinani AS. Multigenerational Urban Design: Creating Urban Spaces That Support Active Aging and Intergenerational Interaction. International Journal of Sustainable Development & Planning. 2024;19(10). https://doi.org/10.18280/ijsdp.191004

30. Fernandez-Bueno L, Torres-Enamorado D, Bravo-Vazquez A, Rodriguez-Blanco C, Bernal-Utrera C. Technological Innovations to Support Family Caregivers: A Scoping Review. Healthcare. 2024;12(23):2350. https://doi.org/10.3390/healthcare12232350

31. Yazdani-Darki M, Rahemi Z, Adib-Hajbaghery M, Izadi-Avanji FS. Older Adults' Barriers to Use Technology in Daily Life: A Qualitative Study. Nursing and Midwifery Studies. 2020;9(4):229-36. https://doi.org/10.4103/nms.nms_91_19

32. Handajani YS, Schröder-Butterfill E, Hogervorst E, Turana Y, Hengky A. Functional dependency and its associated factors among older adults in Indonesia. Aging Medicine and Healthcare. 2022. https://doi.org/10.33879/AMH.XXX.2022.05051

33. Parra-Rodríguez L, Reyes-Ramírez ED, Pérez-Sanpablo AI. Gerontechnology. Aging Research—Methodological Issues: Springer; 2024. p. 197-210.

34. Wei Y, Chen J. Sustainable Design for the Silver Society: Developing the Silver Model for Gerontechnology Product Innovation. Sustainability. 2025;17(1):42. https://doi.org/10.3390/su17010042

35. Kulrattanarak C, Anantaransi P, Kanchanarusmeechoti P, Suwannapasri N, Weeramongkolkul M, Mekintharanggur D, et al. Design and Development of a Mobile-based Caretaking System for the Elderly People in Thailand: A Design Thinking Approach. Infocommunications Journal. 2023

36. Lee HY, Choi EY, Kim Y, Neese J, Luo Y. Rural and Non-Rural Digital Divide Persists in Older Adults: Internet Access, Usage, and Perception. Innovation in Aging. 2020;4(Supplement_1):412-3. https://doi.org/10.1093/geroni/igaa057.1329

37. Kaboré SS, Ngangue P, Soubeiga D, Barro A, Pilabré AH, Bationo N, et al. Barriers and facilitators for the sustainability of digital health interventions in low and middle-income countries: a systematic review. Frontiers in digital health. 2022;4:1014375. https://doi.org/10.3389/fdgth.2022.1014375

38. Kawaguchi K, Nakagomi A, Ide K, Kondo K. Effects of a Mobile app to promote Social Participation on older adults: Randomized Controlled Trial. Journal of Medical Internet Research. 2024;26:e64196. https://doi.org/10.2196/64196

39. Anderson ET, McFarlane J. Community as Partner: Theory and Practice in Nursing. 8th ed: Lippincott Williams & Wilkins/Wolters Kluwer Health; 2018.

40. Efendi F. Community Health Nursing in Indonesia: Bridging the Gap Between Urban and Rural Healthcare. Indonesian Nursing Journal of Education and Clinic (INJEC). 2023;8(1):1-2

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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collection, analysis, or interpretation of the results. The authors affirm that this manuscript represents original work and complies with the ethical standards for academic writing and publication.

AUTHORSHIP CONTRIBUTION

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APPENDICES

Supplementary 1. The Original System Usability Scale (SUS)

No	Items	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I think that I would like to use this system frequently.					
2	I found the system unnecessarily complex.					
3	I thought the system was easy to use.					
4	I think that I would need the support of a technical person to be able to use this system.					
5	I found the various functions in this system were well integrated.					
6	I thought there was too much inconsistency in this system.					
7	I would imagine that most people would learn to use this system very quickly.					
8	I found the system very cumbersome to use.					
9	I felt very confident using the system.					
10	I needed to learn a lot of things before I could get going with this system.					

Supplementary 2. Modified System Usability Scale

No	Items	Options					Score
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
A	**Usability**						
1	This application is easy to use even when trying it for the first time.						
2	The navigation of this application is clear and easy to understand.						
3	The information displayed in the application is easy to understand.						
4	I did not experience confusion while using this application.						
5	This application is consistent in appearance and function in every part.						
B	**Functionality**						
6	The features of the application work as expected.						
7	I did not experience interruptions/errors while using the application.						
8	The application responds quickly when used.						
9	I feel the functions in the application meet my needs as a user.						
10	I feel safe and comfortable when using the application.						
C	**Transportability**						
11	This application can be used on various devices (smartphones, tablets, etc.).						
12	The application functions well on different operating systems.						
13	Installation and updating of the application run smoothly.						
D	**Validity**						
14	The information in this application is accurate and reliable.						
15	The educational materials provided are relevant to care needs.						
16	The language and terms in the application are easy to understand.						
E	**Reliability**						
17	This application rarely experiences errors during use.						
18	The application is stable and does not easily crash.						
19	My data is stored securely and is not lost.						
F	**User View**						
20	I am satisfied with the experience of using this application.						
21	This application helps me complete tasks or needs more efficiently.						
22	I am willing to use this application again in the future.						
23	I will recommend this application to others.						
24	Overall, I consider this application to be of good quality.						