ORIGINAL ARTICLE

Exploring Time Banking and Community Integration: A Pilot Study with Malaysia's Ageing Population.

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Abstract

Background: Malaysia's ageing population is expected to grow significantly, making the country an "ageing nation" by 2030. Time banking is a system in which participants earn time credits for providing services within the community, fostering mutual support, and enhancing social interactions. *Methods:* A mixed-methods research approach was used to investigate the interest and feasibility of time banking among elderly individuals in Bagan Serai, Perak. Surveys and focus group discussions were conducted with 34 elderly individuals aged 60 and above, covering demographics, healthcare needs, social needs, perceptions of time banking, and participation preferences. *Results:* No participants had prior knowledge of time banking; however, after receiving an explanation, 82.4% expressed willingness to participate. Key barriers included limited digital literacy (58.8% lacked the necessary skills), privacy concerns (41.2% feared misuse of personal information), and financial or transportation constraints limiting healthcare access. Notably, 44.1% of participants who encountered healthcare barriers took no action to address them. While most participants engaged in structured communal activities (gotong-royong, 47.1%), 35.3% disagreed that they enjoyed recreational socializing, indicating heterogeneity in social preferences. Participants expressed interest in time-banking services related to safety, health, daily living needs, and transportation. Recommended strategies include comprehensive education, user-friendly platforms, and personalized instruction. *Conclusion:* This pilot study provides preliminary insights into time banking's potential for elderly healthcare and social needs. Successful implementation requires culturally tailored education, trust-building measures to address privacy concerns, and hybrid models combining digital tools with human facilitation. Future research using larger, more representative samples and controlled designs is needed. Collaboration between community organizations and healthcare providers can help create a more inclusive environment for the elderly in Perak.

Keywords: *Ageing population, elderly care, healthcare needs, social needs, time banking*

Introduction

Malaysia is facing a significant rise in its ageing population, potentially earning it the classification of an "ageing nation" (negara tua) by 2030, according to projections [1]. This demographic shift raises concerns as the number of elderly citizens continues to increase while the birth rate declines. According to the United Nations, Malaysia's elderly citizens aged 65 and above accounted for 6.7% of the population in 2020, with an anticipated surge to 14% by 2040. Forecasts estimate Malaysia will have around 6.3 million citizens aged 60 and above by 2040 [2].

The government is taking pre-emptive action to address the issues posed by an ageing populace. These include the provision of sufficient healthcare facilities and economic sustenance, and the promotion of active ageing programs that involve aged persons in the community [3]. The World Health Organization (WHO) (2023) reported the average life expectancy at birth worldwide to be 73 years in 2023 [4]. Thus, the rising prevalence of chronic non-communicable diseases (NCDs) reflects changes in lifestyle and dietary patterns, as well as being accelerated by the ageing process.

NCDs also impose significant economic and societal burdens that intensify with age and can affect economic development. The prevalence of outpatient and inpatient care among older individuals was 60.5% and 5.6%, respectively, with a preference for government facilities. Mohamed Nor et al. (2019) reported that the direct costs of outpatient and inpatient care averaged RM 141.24 and RM 2,527, while indirect costs averaged RM 31.44 and RM 524.07, respectively [5]. Hence, the economic cost of healthcare use among the older population was estimated at RM 3.8 billion, which corresponds to 0.34% of the gross domestic product (GDP) in 2014 and 8% of overall health spending. Projections indicate that in 2040, the burden will rise to RM 21 billion, equivalent to approximately 1.08% of the total GDP when Malaysia reaches the status of an ageing nation by 2045.

Dr Edgar Cahn (1980), the founder of TimeBanks USA, describes Time Banking as a methodological framework for trading services in which one or a set of people assist in exchange for time, rather than the conventional money economy [6]. Individuals invest their time and skills to provide community services and receive "time credits" in return, which they subsequently use to purchase services from other participants. This reciprocal model aligns naturally with Malaysia's rural cultural practices, such as gotong-royong (communal mutual assistance), suggesting that time banking may be particularly well-suited to elderly populations in these communities.

Despite its theoretical promise, little is known about the acceptability and feasibility of time banking among the elderly in Malaysia, particularly in rural communities where healthcare and social support resources may be limited.

The present pilot study provides exploratory insights into elderly individuals' interest in time banking, their healthcare and social needs, attitudes, and the possible convergence of interests.

Methodology

To minimize variability in demographic and cultural backgrounds, the study focuses exclusively on residents of Bagan Serai, Perak, which had a population of 40,009 in 2020, according to the Department of Statistics Malaysia [7]. The mixed-methods research methodology involved surveying 34 elderly individuals aged 60 and above living in Bagan Serai and conducting focus group discussions. While a sample size of 34 is modest, it is appropriate for an exploratory pilot study aimed at generating preliminary insights rather than establishing population-level generalizability. No formal power calculation was conducted. The sample population was selected by the village chief, who possesses detailed knowledge of the community and its members. This selection process also ensured that participants were from the designated focus area and met the study's

eligibility criteria. This selection method may have introduced selection bias by potentially favouring healthier or more socially connected individuals. Further discussion of this limitation is provided in the Limitations section. The research instrument included survey questions about respondents' demographic backgrounds, healthcare needs, healthcare issues, and social needs, as well as their perceptions and preferences regarding participation in time banking activities. A single focus group discussion (FGD) involving 10 participants was conducted, lasting approximately 60 minutes and facilitated by the first author (AA) in the local Malay dialect. The FGD was audio-recorded, transcribed verbatim, and translated into English. Thematic analysis was conducted manually by two researchers (AA and HS) using an inductive approach. Codes were developed independently, compared for consistency, and any disagreements were resolved through discussion. Data saturation was assessed qualitatively, with no new themes emerging from the final two participant contributions. No qualitative software was used. This FGD explored participants' understanding of time banking, their willingness to participate, perceived benefits and challenges. Additionally, the study identified areas where respondents expressed interest in time banking and utilized modal data to facilitate matches based on shared interests and needs. Although the Likert scale included a 'Strongly Disagree' option, no respondents selected this response for several items, and these are presented as zero in the tables. For consistency across all Likert-scale items, responses were coded as follows: 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, and 5 = Strongly Disagree. Consequently, lower mean scores indicate stronger agreement with the statement. This coding convention is noted in the relevant table captions.

Research ethical approval

The Unikl Research Ethics Committee, Royal College of Medicine, Perak, granted ethical clearance for this study under reference number UNIKL REC/2024/PG/TCA/02. Additionally, the research has been registered and approved by the National Medical Research Register (NMRR) with the ID number NMRR ID-23-02911-NAO.

Results

The data has been analyzed in 5 sections, including 1) socio-demographic data, 2) healthcare needs, 3) social needs, 4) perceptions of time banking, and 5) preference for the time banking pilot project.

Demographic data

This section presents the participants' demographic data, including age, gender, marital status, educational background, and monthly income. The results are presented in Table 1.

Table 1 shows that participants were distributed across age groups, with 26.5% each in the 60-65, 66-70, and 71-75 age ranges. Those aged 76-80 comprised 17.6% of the sample, while those aged 80 years or older comprised 2.9%. Regarding gender, females accounted for 58.8% and males for 41.2%. In terms of marital status, the majority were married (52.9%), followed by widowed individuals (44.1%). Most participants had either primary (52.9%) or secondary (44.1%) education, with only one respondent (2.9%) holding a diploma. Regarding income, the vast majority (82.4%) reported having no monthly income. A small percentage, 5.8%, had income below RM 400, and 8.8% falls within the RM 401-600 range. Only one respondent had an income of RM 601 or above, indicating that most participants belonged to low-income households. Notably, all respondents reported being previously unfamiliar with the concept of time banking.

Healthcare needs - Perception of health services

Respondents' opinions were evaluated using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), adapted from the WHO (2014) [8]. The results are presented in Table 2. Table 2 summarises respondents' perception of healthcare availability and access. Regarding the availability

of healthcare services within their community (Item 1), 67.6% agreed, and 17.6% strongly agreed. Similarly, 79.4% agreed, and 11.8% strongly agreed that information about health and support services was clear and accessible (Item 2). A strong understanding of how to request services as elders (Item 3) was reported by 91.2% of participants. However, views on the coordination and simplicity of service delivery (Item 4) were more variable, with 70.6% agreed, while 8.8% each disagreed or strongly disagreed. Regarding the convenient location and transport accessibility of health and social services (Item 5), 70.6% agreed, though 8.8% disagreed. In response to the availability of home care services (Item 6), 70.6% agreed, but 8.8% each disagreed or strongly disagreed. Finally, the satisfaction level concerning communication and interaction between healthcare providers and senior patients (Item 7) was favourable, with 70.6% agreed, and 11.8% strongly agreed; conversely, 8.8% of participants each reported disagreed or strongly disagreed. Collectively, these findings highlight the importance of accessibility, coordination, and effective communication in addressing the healthcare needs of the elderly population, while also identifying potential areas for improvement in service delivery and accessibility. On another note, Table 3 shows the reported healthcare needs, access to services, and the solution used if there are any obstacles faced by the elderly to access the healthcare services. Panel A reported a current condition among the elderly participants which hypertension was the most common reason for seeking medical care (43% of respondents), followed by diabetes (31%). Other conditions, including cholesterol, numbness, hearing problems, gout, eye check-ups, knee pain, and cough, were each reported by 3% of respondents. Panel B shows the problems encountered while seeking medical care by the elderly. Among the concerns reported, 11.8% experienced overcrowding during their healthcare visits, and 29.4% reported difficulty affording routine medical check-ups. Notably, 47.1% reported no problems accessing healthcare services, while 2.9% indicated fear that their care might be limited due to past drug treatment experiences. Transportation barriers affected 5.9% of participants.

Panel C shows the strategies participants used to address problems with healthcare service accessibility. More than two-fifths (44.1%) took no specific action. Among those who did act, 29.4% rescheduled appointments, 5.9% received assistance from others, and 2.9% sought private doctors. A small percentage (2.9%) reported modifying their dietary patterns or using home remedies. Other strategies included seeking help from others, arriving early for appointments, or renting a car (each used by 2.9% of respondents).

Social needs

Respondents' perceptions of social needs were evaluated using a 5-point Likert scale [8,9]. The data present how elderly participants perceive society's focus on their social needs (Table 4). Most participants (67.6%) identified volunteer opportunities in their community, suggesting favourable conditions for civic participation. The survey data reveal that 76.5% of respondents reported being encouraged to actively participate in developing policies relevant to their lives, and a similar proportion (76.5%) agreed that a wide variety of activities were offered to the elderly. However, perceptions of the appeal and timing of activities were more mixed. While 58.8% felt activities had no hidden costs, a notable minority (23.5%) disagreed. Family connections remained important, with 73.5% reporting that they dedicate holiday periods to being with family. Table 5 reports the social participation and isolation among elderly participants in community-based activities. Panel A shows that the communal work (gotong-royong) was the most common activity (47.1%), followed by porridge cooking (bubur lambuk) (11.8%) and Tadarus Al-Quran (8.8%). Participation in Moreh (supper) activities was lowest (5.9%). A substantial proportion (26.5%) did not respond to this question.

Panel B presents data on social isolation experienced by the elderly. Half of the respondents (50%) reported not experiencing social isolation or disconnection. However, 20.6% reported feeling socially isolated, and 11.8% attribute their isolation to age. A further 17.6% did not respond to the question.

Perceptions of Time Banking

Perceptions of time banking were measured using a 5-point Likert scale, and the results are presented in Table 6. Overall, respondents demonstrated generally positive perceptions of time banking, particularly regarding its benefits and usability. A large proportion of participants agreed that time banking helps them access needed services (85.3%; mean = 3.85), makes their life easier (88.2%; mean = 3.82), and is easy to use (79.4%; mean = 3.79). Similarly, more than two-thirds of respondents reported that it is easy to learn how to use time banking (67.6%; mean = 3.62).

Regarding social support, 64.7% of respondents indicated that family and friends support their use of time banking (mean = 3.59). A comparable proportion also reported having access to the necessary technology, such as internet and smartphones, to participate in time banking (64.7%; mean = 3.53).

However, a notable concern was observed regarding digital skills. More than half of the respondents (58.8%) disagreed that they possess the skills needed to use time banking, reflected in the lower mean score (mean = 2.79). Despite this limitation, the intention to use time banking in the future remained relatively positive, with 64.7% of participants expressing willingness (mean = 3.50). Overall, while participants viewed time banking favourably in terms of its usefulness and ease of use, gaps in digital skills and, to a lesser extent, access to technology remain important barriers that should be addressed.

Besides positive reports on time banking perceptions among the elderly, the study also reported participants' awareness, interest, and concerns about time banking during its implementation (Table 7). Most participants (97.1%) had no prior knowledge of time banking, with only 2.9% not responding. After receiving an explanation, 82.4% expressed willingness to join time banking, while 17.6% showed no interest (Panel A).

Furthermore, the study presents perceived advantages of time banking, with enhanced facilities being the most cited advantage (20.6%), followed by improved social connections and increased physical activity (35% combined). General approval of time banking was expressed by 17.6% of respondents, while 2.9% acknowledged better health choices as a benefit. Nevertheless, 2.9% expressed confusion about its advantages, and 20.6% did not respond, suggesting persistent knowledge gaps (Panel B).

Moreover, Panel C shows that the most frequent concern highlighted was the misuse of personal information (41.2%), reflecting serious worries about data security and privacy. Technical issues were a concern for 29.4% of respondents. Other concerns included insufficient education about the system (5.9%) and the presence of scammers (5.9%). Notably, 2.9% expressed confidence in the system's safety, while 14.7% did not respond.

Time Banking Pilot Project

Participants expressed interest in a range of services through the time banking project, including safety, health, daily needs, and transportation. Drawing on the Kano Model [10], identified needs included exercise, rehabilitation training, in-home medical care, telemedicine, and medication administration and sick care. Daily living services requested included cooking, food distribution, haircutting, oral hygiene, bathing, cleaning, lawn maintenance, and moving assistance. Participants required shared-ride services, transportation to stores and medical appointments, and help with buying basic household essentials [11]. Figure 1 presents different strategies for implementing time banking with senior citizens. Comprehensive education was identified as the most important requirement to understand time banking (38.2%

of respondents). Teaching staff (11.8%) and face-to-face instruction (11.8%) were also deemed essential. Other strategies, including charity work, regular activity organisation, and user-friendly app development, each received 2.9% support. Notably, 14.7% of respondents did not provide suggestions, potentially reflecting a lack of understanding of the concept.

Focus Group Discussion Results

One focus group discussion (FGD) was conducted with 10 participants, lasting approximately 60 minutes. The discussion was facilitated by the first author in the local Malay dialect. Thematic analysis identified four key themes.

Lack of Awareness and Initial Perceptions

All participants reported no prior knowledge of time banking before the discussion, indicating a significant awareness gap. One participant shared:
"Saya tak pernah dengar langsung tentang time banking sebelum ini. Ini kali pertama saya tahu."
("I have never heard about time banking before. This is my first time learning about it.") (Participant 3, Female, 67 years)
Another participant added:
"*Kita selalu dengar bank tempat duit, tapi ni bank tentang masa."*
("We always hear about regular banks, but this is a bank for time.") (Participant 5, Male, 62 years).
These findings suggest that time banking is not widely known and that public awareness campaigns are necessary to attract users.

Increased Interest Following Explanation and Guidance

Despite initial unfamiliarity, most participants expressed a strong interest after the concept was explained. In total, 82.4% of FGD participants showed enthusiasm for joining time banking. One participant stated:
"Bila dah faham konsep, saya rasa program ini sangat bagus dan saya berminat untuk join."
("After understanding the concept, I feel this programme is very good and I am interested in joining.") (Participant 7, Male, 62 years)
Participants also emphasised the need for continuous rather than one-time support:
"Kalau kita sentiasa ada yang tunjuk ajar dengan betul, rasanya ramai yang minat nak cuba."
("If we always have someone to guide us properly, I think many would be interested in trying.") (Participant 4, Female, 60 years)
These findings suggest that acceptance of time banking is highly dependent on awareness, structured guidance, and continuous support.

Technological Barriers

Technological challenges were a prominent concern, with many participants reporting limited digital literacy. One participant explained:
"Saya tak tahu guna telefon pintar, jadi susah nak guna aplikasi ini."
("I don't know how to use a smartphone, so it's difficult for me to use this application.") (Participant 6, Female, 72 years)
Another participant added:
"Saya pakai telefon biasa saja, maknanya tak boleh sertailah ye…"
("I only use a basic phone, meaning I cannot join, right?") (Participant 5, Male, 62 years)
Connectivity issues were also raised:
"Kalau takde internet jadi tak boleh pakai aplikasi ni, sebab selalu saya pakai internet rumah je."
("If there is no internet, we cannot use the application, as I usually only use home internet.") (Participant 1, Female, 60 years)
These findings indicate that while interest in time banking exists, technological barriers may significantly reduce uptake and the realisation of benefits.

Privacy and Security Concerns

Participants expressed concerns regarding data privacy and security, identifying trust as a critical factor for adoption. One participant stated:
"Saya takut kalau maklumat peribadi disalahgunakan."

("I am worried that my personal information will be misused.") (Participant 2, Male, 66 years)
Another participant highlighted the risk of scams: *"Sekarang banyak scammer ni, isi data lepas tu habis duit semua hilang."*
("Nowadays there are many scammers; after filling in data, all your money could disappear.") (Participant 9, Female, 60 years)
These concerns underscore the need for robust data protection measures and transparent communication to build trust among elderly users.

Summary of FGD Findings
Overall, participants reported positive perceptions of time banking and recognised its potential to enhance community cohesion and support networks. Participants acknowledged that community engagement activities through time banking need to be developed to improve social cohesion. The FGD revealed essential insights into participants' views of time banking, highlighting both challenges (technological barriers, privacy concerns) and facilitators (structured guidance, continuous support) to support Perak's elderly population.

Discussion

Given the small sample size and use of convenience sampling, the findings should be interpreted as exploratory and not representative of the wider elderly population in Malaysia. This research examined elderly participants' barriers to accessing health and social services, with particular attention to their interest in a time-banking framework. The survey data, along with focus group findings, provide a comprehensive picture of these areas.

Healthcare and Social Needs of the Elderly
Overall, participants reported generally positive perceptions of healthcare availability and understanding of how to access services. However, qualitative findings revealed a gap between perceived availability and actual utilisation. Financial constraints and transportation barriers were key factors limiting access, underscoring that service availability alone is insufficient for equitable access. This aligns with previous studies that have highlighted transportation and affordability as persistent barriers to healthcare among older populations [12,13].
A particularly concerning finding from this pilot study is that nearly half (44.1%) of participants who encountered barriers to healthcare access took no specific action to address them. This passive response pattern suggests a concerning level of healthcare disengagement or learned helplessness among some elderly individuals. Rather than actively seeking alternative solutions—such as rescheduling appointments (29.4%), seeking private doctors (5.9%), or asking for help from others (5.9%)—a substantial proportion appeared to accept access barriers as unavoidable. Possible explanations include low health literacy, resignation due to chronic financial hardship, lack of social support networks to assist with navigation, or simply not knowing what options were available. Future time banking programmes should consider incorporating peer navigation or community health volunteer roles to help elderly participants identify and access appropriate services when obstacles arise.
Regarding social needs, survey findings revealed an apparent contradiction regarding social engagement. While most participants reported participating in community activities such as gotong-royong (47.1%) and porridge cooking (11.8%) and expressed positive perceptions of volunteer opportunities (67.6%) and policy participation (76.5%), a notable minority (35.3%) disagreed that they enjoyed recreational activities with friends, such as dancing, singing, or partying. This inconsistency may be explained by the nature of the activities involved. Communal work (gotong-royong) and religious activities (Tadarus Al-Quran, Moreh) are structured, purpose-driven, and culturally obligatory or expected, whereas recreational socializing is unstructured, leisure-based, and may feel less familiar or appropriate

for some elderly individuals, particularly those from more traditional backgrounds. Additionally, physical limitations, hearing loss, or lack of confidence in social settings may discourage participation in recreational activities specifically. This distinction is important for time banking design: interventions should not assume that participation in structured community work indicates comfort with all forms of social interaction. Time banking programmes should offer a spectrum of engagement options, ranging from task-oriented services (e.g., transportation, home help) to low-pressure social activities, while respecting individual preferences for different types and intensities of social contact. These findings are consistent with prior research demonstrating that social isolation remains a concern despite the availability of community activities [14]. This disconnect between participation and meaningful connection suggests that interventions for the elderly should move beyond the availability of services and activities, focusing instead on accessibility, inclusivity, and the quality of engagement.

Interest in Time Banking

Participants demonstrated generally positive perceptions of time banking once the concept was introduced, despite having little to no prior knowledge. This is consistent with the survey findings, which showed high levels of agreement regarding the benefits and usability of time banking, including its ability to improve access to services, enhance daily living, and ease of use (mean = 3.79–3.85). This aligns with the existing literature, indicating that awareness plays a crucial role in shaping willingness to participate in community-based initiatives [15]. The positive reception may reflect unmet healthcare and social needs within the community, where alternative support mechanisms are perceived as valuable.

However, concerns regarding technological competence and access were prominent. Many participants expressed uncertainty about their ability to use digital platforms, which is consistent with previous findings that the elderly face challenges in adopting digital health technologies due to limited digital literacy and confidence [17]. This is further supported by the quantitative findings, which show that most respondents (58.8%) disagreed that they possessed the necessary skills, reflected in the lowest mean score (mean = 2.79). This highlights the importance of incorporating user-friendly design, hands-on training, and continuous support when implementing time banking systems for elderly populations.

Additionally, concerns related to privacy and data security emerged as significant barriers. More than two-fifths (41.2%) of respondents feared misuse of their personal information. These findings reflect broader concerns in digital health adoption, where trust in technology plays a critical role in user acceptance. Addressing these concerns through transparent communication and robust data protection measures will be essential for successful implementation.

Integrating Qualitative and Quantitative Insights

The combination of survey findings and FGD insights provides a comprehensive understanding of the opportunities and challenges of time banking for elderly care. Qualitative data help explain and contextualise the quantitative findings, particularly the positive perceptions of time banking alongside concerns related to digital skills and accessibility. Although participants perceived services as available, qualitative insights revealed that accessibility remained problematic, indicating a disconnection between service provision and user access. Similarly, participants engaged in social interactions, which are often insufficient to address their loneliness.

The mixed methods approach identified technological challenges and sustainability issues as crucial obstacles, indicating that successful implementation depends on developing specific technical and motivational training programs for volunteer participants. The FGD also revealed that continuous, personalised guidance—rather than one-off training—may be necessary to maintain engagement, with direct implications for

resource allocation in future time banking programmes.

Overall, the findings suggest that while time banking is well-received among elderly participants, successful implementation will depend on addressing digital literacy, technological access, and trust-related concerns.

Implications for Practice

Several practical implications emerge from this pilot study. First, given the low baseline awareness of time banking, large-scale educational campaigns tailored to the elderly are necessary. These should use simple language, visual aids, and community-based delivery methods. Second, technology platforms must be designed with accessibility in mind, including offline options or telephone-based alternatives for those without smartphones or internet access. Third, privacy and data security concerns must be addressed through clear, transparent policies and local data protection measures. Finally, the strong preference for face-to-face instruction and continuous support suggests that a hybrid model—combining digital tools with human facilitators—may be most effective for this population.

Limitations

The pilot study revealed several encountered restrictions that need attention before implementing time banking systems. First, regarding the questionnaire, participants aged 60 or older struggled to understand the questionnaire. The method needs additional supporting information and practical demonstrations to enhance comprehension. The participants demonstrated limited literacy skills due to inadequate education, making it difficult for them to understand and read the study content. A major consideration regarding age is that older participants tend to have a shorter concentration span, so researchers should adopt simple, brief communication strategies.

Second, the research has several shortcomings related to sample and bias. The study used a limited sample (n=34) with inadequate diversity within the sample population. The research provides relevant insights into time banking in elderly care, but the findings should not be applied universally to elderly people across the population. The geographic limitations of the sample recruitment prevent researchers from observing cultural, socioeconomic, and geographic variations among the elderly across Malaysia. Additionally, the reliance on the village chief to select participants introduced potential selection bias. While this method ensured that participants met the eligibility criteria and were familiar with the local context, it may have favoured the recruitment of healthier, more socially connected, or more cooperative individuals within the community. Consequently, the findings may not fully capture the perspectives of homebound, severely ill, or socially isolated elderly individuals who might have different healthcare and social needs or different attitudes toward time banking.

Furthermore, social desirability bias may have influenced participants' responses. Elderly participants, particularly those recruited through a respected community authority figure such as the village chief, may have felt inclined to provide answers they perceived as expected or pleasing to the researchers. This bias could have resulted in overreporting of positive attitudes toward community engagement, healthcare access, and willingness to participate in time banking, while underreporting negative experiences or genuine reluctance. Researchers should be cautious when interpreting the high levels of expressed interest (82.4%) and positive perceptions of time banking, as these figures may partially reflect participants' desire to be agreeable rather than their true intentions.

Additionally, the absence of a control group represents a significant limitation. Without a comparison group of elderly individuals who were not exposed to the time banking concept or who were offered an alternative community-

based intervention (e.g., traditional volunteering opportunities), it is impossible to determine whether the observed interest in time banking exceeds general interest in volunteering or community participation. The positive reception documented in this pilot study may reflect a general willingness among elderly individuals to engage in any novel community initiative rather than a specific preference for time banking per se. Future research should incorporate controlled designs to isolate the unique value proposition of time banking relative to other support mechanisms.

Third, the use of a cross-sectional design in the research provided only snapshots of participants' evaluations and time banking practices at a single point in time, without sufficient ability to assess temporal changes in belief systems or behavioural patterns. Time banking sustainability should be assessed through a longitudinal study to evaluate participant stability rates and social health impacts, alongside shifting community requirements. Future time banking research must include follow-up measurements, as such data collection enables researchers to study these behavioural dimensions over longer periods.

The reliability and generalisability of study results to other communities could be enhanced through future research that uses larger, more representative test groups, incorporates control conditions, and employs methods to reduce social desirability bias (e.g., anonymous response options or third-party data collection).

Solving these problems will enable time banking to serve as an elder care and community engagement program with expanded access for all social classes.

Conclusion

This pilot study provides preliminary evidence that time banking is a feasible and acceptable concept for addressing the healthcare and social needs of Malaysia's ageing population, particularly within rural communities such as Bagan Serai, Perak. Although participants had no prior awareness of time banking, the majority (82.4%) expressed willingness to participate after receiving a clear explanation, indicating that lack of knowledge—rather than lack of interest—represents the primary barrier to adoption.

However, successful implementation will require addressing several interconnected challenges. First, technological barriers and limited digital literacy among the elderly necessitate the development of user-friendly, accessible platforms, preferably supplemented by offline or telephone-based alternatives and hands-on, continuous training. Second, privacy and data security concerns, expressed by over two-fifths of participants, must be mitigated through transparent policies and robust local data protection measures. Third, the finding that 44.1% of participants took no action when facing healthcare access barriers underscores the need for time banking programmes to actively build self-efficacy and navigation skills, not merely facilitate service exchanges. The apparent contradiction between high participation in structured communal activities (e.g., gotong-royong) and lower engagement with recreational socializing suggests that time banking should offer a spectrum of participation options. Task-oriented services (transportation, home help, medication reminders) and low-pressure social interactions should be available alongside more intensive community activities, respecting individual preferences and varying levels of social comfort. Collaboration between healthcare providers, community organizations, and local authorities will be essential to design culturally appropriate, inclusive programmes. Recommended strategies include comprehensive educational campaigns using simple language and visual aids, age-friendly media advertisements, face-to-face instructional sessions, and ongoing mentoring rather than one-time training.

Finally, this study's limitations—including small sample size, selection bias, social desirability bias, and absence of a control group—highlight the need for future research using larger, more representative samples, longitudinal designs to

assess sustainability, and controlled comparisons against traditional volunteering models. Such research will determine whether time banking offers unique advantages beyond existing community support mechanisms.

In conclusion, time banking holds promise as a culturally grounded, reciprocal support model for Malaysia's elderly population. With targeted investment in education, accessible technology, trust-building, and intersectoral collaboration, time banking can contribute meaningfully to active ageing, social inclusion, and quality of life among older Malaysians.

Conflict of interest

None

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Authors' contributions

AA was responsible for conceptualization, methodology, investigation, formal analysis, and drafting the manuscript. HS, CSC, SI, LSL, and DSBS held supervisory roles and were responsible for project administration and funding acquisition. SS, NR, and YR were responsible for analysis, validation, and resources. All authors were involved in writing, reviewing, and final editing of the manuscript.

Table 1. Demographic of respondents

Details	Category	Frequency	Percentage
Age	60-65	9	26.5%
	66-70	9	26.5%
	71-75	9	26.5%
	76-80	6	17.6%
	above 80	1	2.9%
Gender	Male	14	41.18%
	Female	20	58.82%
Marital Status	Married	18	52.9%
	Widow	15	44.1%
	Divorcee	1	2.9%
Educational Background	Primary	18	52.9%
	Secondary	15	44.1%
	Diploma	1	2.9%
Income level	No income	28	82.4%
	Less than RM 400	2	5.8%
	RM 401-600	3	8.8%
	601 and above	1	2.9%

Note: The data show the percentage of participants' demographic characteristics in Bagan Serai, Perak. The data are presented as percentages calculated from the total respondents (n = 34).

Table 2. Healthcare needs - Perception of health services

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	SD
1. I have a range of health services in my community.	17.6% (6)	67.6% (23)	11.8% (4)	2.9% (1)	0% (0)	2.00	0.651
2. Information about health and support services is clear and accessible.	11.8% (4)	79.4% (27)	5.9% (2)	2.9% (1)	0% (0)	1.82	0.673
3. There is a good understanding of how to request services as a senior in my community.	2.9% (1)	91.2% (31)	2.9% (1)	2.9% (1)	0% (0)	2.06	0.422
4. Delivery of health and support services is coordinated and simple.	8.8% (3)	70.6% (24)	2.9% (1)	8.8% (3)	8.8% (3)	2.29	1.142
5. Health and social services are conveniently located and accessible by transportation.	8.8% (3)	70.6% (24)	5.8% (2)	5.9% (2)	8.8% (3)	2.26	1.109
6. Home care services, including health, personal care, and housekeeping, are available and accessible to me.	11.8% (4)	70.6% (23)	8.8% (3)	8.8% (3)	2.9% (1)	2.24	1.208
7. I am satisfied with the communication and interaction between healthcare providers and the elderly patients in my community.	11.8% (4)	70.6% (24)	8.8% (3)	8.8% (3)	0% (0)	1.97	0.870

Note: The data are presented as percentages calculated from the total respondents (n = 34). For this section, lower mean scores indicate stronger agreement.

Table 3. Healthcare needs and access to services among elderly participants

Domain	Category	Response	n	%
Panel A: Primary health needs	Conditions	Hypertension	15	43.0%
		Diabetes	11	31.0%
		Cholesterol	1	3.0%
		Numbness	1	3.0%
		Hearing problem	1	3.0%
		Gout	1	3.0%
		Eye check-up	1	3.0%
		Knee pain	1	3.0%
		Cough	1	3.0%
Panel B: Problems accessing care	Barriers	No issue	16	47.1%
		Financial constraints	10	29.4%
		Overcrowding	4	11.8%
		Transportation issues	2	5.9%
		Fear of treatment	1	2.9%
		Need assistance	1	2.9%
Panel C: Solutions used	Strategies	No action	15	44.1%
		Change appointment	10	29.4%
		Seek a private doctor	2	5.9%
		Ask for help from others	2	5.9%
		Home remedy	1	2.9%
		Medication use	1	2.9%
		Go early	1	2.9%
		Rent a car	1	2.9%
		Control food intake	1	2.9%

Note: Panel A shows conditions for which participants sought medical care. Panel B shows barriers encountered. Panel C shows strategies used to overcome barriers (multiple strategies possible; 44.1% took no action).

Table 4. Elderly social needs – perception of society focuses on the elderly.

Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	SD
12. There is a range of options to volunteer in my community.	2.9% (1)	67.6% (23)	17.7% (6)	11.8% (4)	0% (0)	2.21	0.914
13. I feel encouraged and able to participate in developing policies relevant to my life.	5.9% (2)	76.5% (26)	8.8% (3)	8.8% (3)	0% (0)	2.03	0.834
14. There is a wide variety of activities offered to the elderly.	5.9% (2)	76.5% (26)	8.8% (3)	8.8% (3)	0% (0)	2.12	0.769
15. The activities in my community appeal to a diverse population of the elderly.	0% (0)	58.8% (20)	17.6% (6)	23.5% (8)	0% (0)	2.12	1.297
16. Events are held at convenient times for the elderly.	0% (0)	64.7% (22)	17.7% (6)	17.6% (6)	0% (0)	2.18	1.114
17. Activities are affordable with no hidden or additional participation costs.	14.7% (5)	58.8% (20)	26.4% (9)	0% (0)	0% (0)	1.59	0.892
18. You dedicate your holiday period to being with your family.	8.8% (3)	73.5% (25)	11.8% (4)	5.9% (2)	0% (0)	1.88	0.844
19. During your spare time, you enjoy recreational activities with friends, like dancing, singing, and partying.	2.9% (1)	38.2% (13)	23.5% (8)	35.3% (12)	0% (0)	2.47	1.398

Note: The data are presented as percentages calculated from the total respondents (n = 34).

Table 5. Social participation and isolation among elderly participants (N = 34)

Domain	Category	Response	n	%
Panel A: Community activities (Ramadan)	Activities	Communal work (gotong-royong)	16	47.1%
		Porridge cooking (bubur lambuk)	4	11.8%
		Tadarus Al-Quran	3	8.8%
		Moreh (supper)	2	5.9%
		No response	9	26.5%
Panel B: Social isolation	Experience	No isolation	17	50.0%
		Feel isolated	7	20.6%
		Age-related isolation	4	11.8%
		No response	6	17.6%

Note: Panel A shows participation in community activities during Ramadan. Panel B shows participants' reported experiences of social isolation.

Table 6. Perceptions of Time Banking

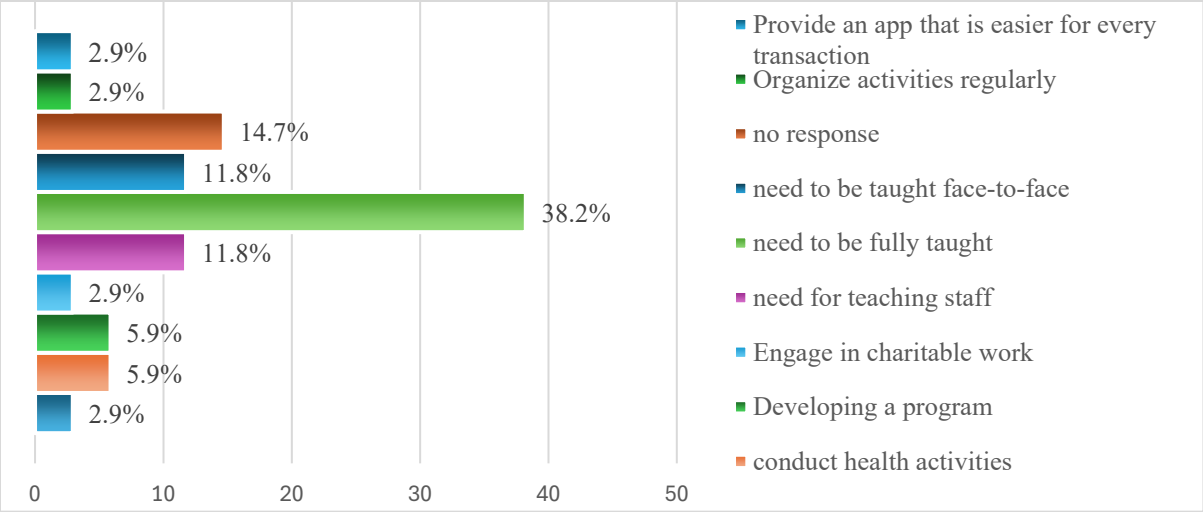
Items	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean
25. Time banking helps me access the services I need.	2.9% (1)	85.3% (29)	5.9% (2)	5.9% (2)	0% (0)	3.85
26. Time banking makes my life easier.	0% (0)	88.2% (30)	5.9% (2)	5.9% (2)	0% (0)	3.82
27. Time banking is easy for me to use.	2.9% (1)	79.4% (27)	11.8% (4)	5.9% (2)	0% (0)	3.79
28. I find it easy to learn how to use time banking.	0% (0)	67.6% (23)	26.4% (9)	5.9% (2)	0% (0)	3.62
29. Family and friends support my use of time banking.	2.9% (1)	64.7% (22)	20.6% (7)	11.8% (4)	0% (0)	3.59
30. I have access to the necessary technology to use time banking (e.g., internet, smartphone)	2.9% (1)	64.7% (22)	14.7% (5)	17.6% (6)	0% (0)	3.53
31. I have the skills needed to use time banking	2.9% (1)	32.4% (11)	5.9% (2)	58.8% (20)	0% (0)	2.79
32. I intend to use time banking in the future.	0% (0)	64.7% (22)	20.5% (7)	14.7% (5)	0% (0)	3.50

Note: Results are presented as percentages and mean scores. No categorical classification was applied to avoid misinterpretation.

Table 7. Awareness, Interest, and Perceptions of Time Banking Among Elderly Participants

Domain	Category	Response	n	%
Panel A: Knowledge & Interest	Knowledge	No knowledge	33	97.1%
		Have knowledge	1	2.9%
	Interest	Interested	28	82.4%
		Not interested	6	17.6%
Panel B: Perceived Advantages	Advantages	Social connection & physical activity	12	35.0%
		Enhanced facilities	7	20.6%
		General approval	6	17.6%
		Better health choices	1	2.9%
		No response	7	20.6%
Panel C: Concerns	Concerns	Information misuse	14	41.2%
		Technical issues	10	29.4%
		No response	5	14.7%
		Lack of education	2	5.9%
		Scammers	2	5.9%
		Confident (no concern)	1	2.9%

Note: Panel A shows prior knowledge of time banking (left) and interest after explanation (right). Panel B shows perceived advantages. Panel C shows concerns about implementation. Percentages may not sum to 100% due to non-responses or multiple response options.



Note: **The data shows a percentage of suggestions on implementing effective Time Banking**

Figure 1. Effective implementation of Time Banking

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