

Digital divide: Knowledge, attitudes and practices toward mobile phone and apps use among Indonesian older adults residing in a megapolitan city

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Abstract

Background: Smartphones not only function as a means of communication between communities but also increase access to information and health services. However, this is faced with the challenge of a global digital divide in the use of these devices between generations. Even though the younger generation easily uses digital technology, the older generation generally does not understand technology.

Objective: This study aimed to evaluate knowledge, attitudes, and practices related to cell phone and mobile application utilization among Indonesian urban older adults in relation to the use of mobile health applications.

Method: This was a cross-sectional study on community-dwelling older adult individuals aged 60 years or older in Jakarta, Indonesia, between August and November 2020.

Results: Overall, 95 out of the 109 older adults (87.16%) had used cell phones during the past month. In practice, we found that 53% of older adults used cell phones to browse online health information; however, the percentage of health application users was still low (16%). The main problem these individuals faced when using cell phones was difficulties related to learning to use mobile apps (51%). Only a small number of older adults (19%) learn how to use cell phones by themselves. There was a significant association between the level of education and the need for assistance from others in using cell phones ($p=0.005$), between the method employed to learn how to use a cell phone and sex ($p=0.043$) and age ($p=0.036$).

Conclusion: Indonesian urban older adults have tended to start embracing digital life. Family members play an important role in teaching technology skills to older adults. In addition, the higher the education level of an older adult subject, the more independent he or she was in using a cell phone. Method on how to use a cell phone by self-learning was associated with male sex and younger age (<75 years old). There is a need to improve the number of mobile health application users and eHealth literacy.

Keywords: e-Health, older adult, ICT, mobile application

INTRODUCTION

In the Industry 4.0 era, various services have been developed due to a high level of technological innovation, including in the health-related domain (Chen, 2020). Although technology has become an important part of people's lives, there is a global digital divide. The use of information and communication technologies (ICT) differs between nations worldwide and between nations on the same continent. There are also gaps in ICT use across generations. While younger generations take technology for granted, older adult individuals are far below younger adults in terms of using ICT (Zambianchi et al., 2019).

The Internet has been around for several decades, yet it became widespread in the mid 90's. Its growth has been especially large since the emergence of graphical browser software for the Web in 1993. Nevertheless, as the Internet affects significantly all spheres of life, there has been an increasing concern regarding the patterns of its diffusion across the population. Reports have documented the presence of an Internet "digital divide," i.e., inequalities in access to and use of the medium, with lower levels of connectivity among women, racial and ethnic minorities, people with lower incomes, and rural (Hargittai, 2003).

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Table 1. Demographic characteristics (N = 109)

Variables	N (%)	Variables	N (%)
Age groups		Self-reported comorbidities	
60–74 years old	78 (71%)	Hypertension	66 (61%)
75–84 years old	28 (26%)	Visual impairment	40 (37%)
85+ years old	3 (3%)	Cardiovascular diseases	39 (36%)
Marital status		Type 2 diabetes mellitus	35 (32%)
Single	2 (2%)	Musculoskeletal problems	21 (19%)
Married	75 (69%)	Neurological problems	16 (15%)
Widow	28 (26%)	Hearing impairment	11 (10%)
Widower	4 (3%)	Wearing spectacles	95 (87%)
Living arrangement		Using hearing aid(s)	4 (4%)
Living alone	2 (2%)	Functional status	
Living with spouse	14 (13%)	L-IADL independent	85 (78%)
Living with family	93 (85%)	B-ADL independent	93 (85%)
Level of education		Mildly/Minimally dependent	14 (13%)
College/University	51 (47%)	Moderately/Partially dependent	1 (1%)
High school	34 (31%)	Severely/Very dependent	1 (1%)
Junior high school	10 (9%)	IADL dependent: Ability to use telephone	
Elementary school	12 (11%)	Answers telephone, but does not dial	5 (5%)
Unfinished elementary school	2 (2%)	Does not use telephone at all	7 (6%)
Occupation		IADL dependent: Ability to manage finance	
Retired government employee	41 (38%)	Manages day-to-day purchases, but needs help with banking, major purchases, etc.	9 (8%)
Housewife	33 (30%)	Incapable of handling finances	6 (6%)
Professional/Retired private employee	28 (26%)	Monthly income	
Entrepreneur	7 (6%)	No income	19 (18%)
Living cost		>0–USD 170	44 (40%)
Supporting own expenses	46 (42%)	>USD 170–340	34 (31%)
Partial support from family	38 (35%)	>USD 340–680	11 (10%)
Full support from family	25 (23%)	>USD 680	1 (1%)

B-ADL: Barthel Index Activity of Daily Living; L-IADL: Lawton Instrumental Activity of Daily Living
1 USD ≈ IDR 14,000

Digital divide research has defined several socio-demographic variables linked to differences in internet use. The ones most commonly examined are age, gender, education, and income. High education and income levels are considered indicators of socioeconomic resources, linked by Dimaggio et al. (2004) to more productive use of the Internet. Besides the socio-demographic factors, internet patterns also mirror aspects of social structure, for example, in that people in rural areas have lower levels of access to high-quality internet connections (Van Deursen and Helsper, 2015).

There are still few studies that properly reported and discussed age-based variability/ heterogeneity (Stone et al., 2017). Studies examining age-related changes or differences provide little attention to the distribution in each age category. The issue of age-based generalization is especially challenging when studying older subjects. Gerontologists and others contend that the aged are highly diverse, regarding physiological and psychological characteristics, material security, and lifestyle (Nelson and Dannefe, 1992).

Loos and Ivan (2022) investigated changes in the use of traditional media (TV, radio, printed

newspapers/magazines) against changes to new media (Internet-based), involving teams from six countries (Austria, Canada, Israel, Romania, Spain, and the Netherlands), between 2016–2018. They analyzed the differences in the use of new and traditional media by various technological generations; 'mechanical generation' (born in 1938 or earlier), 'household revolution' (born between 1939 and 1948), and 'technology spread' (born between 1949 and 1963). The results showed significant differences in the use of SNS, Chat, and Email between the generations in this period. In several cases, both the media and its users are getting older.

An explorative qualitative study showed that the use of old-style classical information sources (such as other people, folders, newspapers, and the telephone) was more popular than the use of new media. This study also indicated that senior citizens between the ages of 55 and 75 took the time to become very well-informed and in doing so, made relatively frequent use of the new media. Apparently, these senior citizens actively made use of the internet when they had access to it. Furthermore, the senior citizens aged 75 and older for the most part neither could not nor

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Table 2. Cell phone use

Variables	Older adults (N = 95)	Variables	Older adults (N = 95)
Own a cell phone	91 (96%)	Problems with Using Cell Phones	
Need help from other people with using cell phones	24 (25%)	No problems	24 (25%)
Need help to make a phone call	6/24	Difficulties with learning to use mobile apps	48 (51%)
Need help to use apps	18/24	Visual impairment	26 (27%)
Method used to learn how to use a cell phone		Poor connection/Network	5 (5%)
Self-learning	18 (19%)	Memory impairment	4 (4%)
Taught by others	22 (23%)	Hearing impairment	3 (3%)
Both	55 (58%)	Unable to purchase prepaid phone credit	3 (3%)
Taught by children	63 (82%)	Musculoskeletal problems	1 (1%)
Taught by grandchildren	20 (26%)	Operating system	
Taught by spouse	7 (9%)	Android	52 (55%)
Taught by other family members	6 (8%)	Others (IOS, Windows)	4 (4%)
Taught by cell phone salesperson	4 (5%)	Does not know	39 (41%)
Taught by friends	4 (5%)	Most frequently used pre-installed features	
Frequency of use		Telephone	74 (78%)
Rarely (<1x/week)	7 (7%)	Internet browsing	45 (47%)
Infrequent (1–3x/week)	4 (4%)	Video	41 (43%)
Often (4–6x/week)	9 (9%)	Read/Respond to SMS	37 (39%)
Everyday	75 (79%)	Camera	28 (29%)
Duration of daily use	n = 75	Music	26 (27%)
<1 hour/day	5 (7%)	Photo gallery	25 (26%)
1–4 hours/day	57 (76%)	Calculator	16 (17%)
5–8 hours/day	9 (12%)	Alarm	15 (16%)
>8 hours/day	1 (1%)	Calendar	14 (15%)
No Answer	3 (4%)	Games	12 (13%)
General timing of cell phone use		Flashlight	8 (8%)
In the morning	63 (66%)	Email	8 (8%)
In the afternoon	9 (9%)	Radio	5 (5%)
In the evening	23 (24%)		

Apps: Applications

would not use the new media as a source of information because they did not grow up with the new media and did not learn how to use these during their formative years, which means that taking the steps to learn how to do this is probably too much to ask (Loos, 2012).

The essence of gerontechnology, which is a term derived from gerontology and technology, is making the most of technology and ICT in facilitating and improving many aspects of older adult individuals' daily lives to promote healthy ageing. The World Health Organization (WHO) led an initiative program called "Be Healthy Be Mobile" through Mobile Health for Ageing to assist older persons in preserving their functional capacity by means of self-management and self-care interventions to enable them to live as independently and healthily as possible, which are characteristics of successful ageing (World Health Organization, 2002; Lowry et al., 2012).

Smartphone usage among older people in everyday life depends on factors such as attitudes, motivations, and skills. The annual usage is distributed throughout the day starting to rise and remain high from 5 AM. until 6 PM. and usually decrease at night. These days, the population of older people is divided into young-old, middle-old, and oldest-old. The split by age group does not differentiate them either in the usage of smartphones throughout the day or in the duration of the smartphone sessions during the day. They know how to access smartphone apps/webs as they rely on different apps in their everyday life and use these with different intensities. The diversity of usage in selected apps illustrates the heterogeneity in older people groups (Loos et al., 2022).

The typology of apps used in older people does not appear to be shaped by medical conditions alone, but by personal interest, with the highest in calls and messaging, followed by social networks,

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Table 3. Internet and mobile application use

Variables	Older adults (N = 95)	Variables	Older adults (N = 95)
Internet browsing	N = 45	Mobile application use	
News/Educational content/Religious content/Lifestyle/Sports/Entertainment	35 (78%)	Entertainment apps	65 (68%)
Health	14 (31%)	Religious apps	58 (61%)
Recipes/Culinary topics	9 (20%)	Online transport	43 (45%)
Job vacancies	0 (0%)	News apps	30 (32%)
Usage of communication features/Apps		Mobile banking	23 (24%)
WhatsApp messages	78 (82%)	Online shopping	22 (23%)
Telephone	60 (63%)	e-Wallet	17 (18%)
SMS	30 (32%)	Health apps	15 (16%)
WhatsApp video call	27 (28%)	Cell phone use to browse online health information	50 (53%)
Facebook	17 (18%)	Health tips	25 (50%)
Instagram	7 (7%)	Signs and symptoms of diseases	24 (48%)
Zoom	6 (6%)	Drugs	21 (42%)
Telegram	3 (3%)	Medical treatment	20 (40%)
Google Meet	2 (2%)	Supplements, herbs, and milk	15 (30%)
LINE	1 (1%)	Medical equipment	6 (12%)
Twitter	1 (1%)	Peer groups	4 (8%)
Others	0 (0%)	Subscriptions to paid apps	0 (0%)
Most frequently used social media apps		Type of internet package	
Nonuser	17 (18%)	Prepaid phone credit	39 (41%)
WhatsApp	70 (74%)	Home internet subscription	30 (32%)
Facebook	5 (5%)	Both	21 (22%)
Instagram	3 (3%)	Nonuser	5 (5%)
Most frequently used video call apps		Cost of prepaid phone credit and/or home internet subscription per month (n =60)	
Nonuser	24 (25%)	<USD 6.8	27 (45%)
WhatsApp	65 (68%)	USD 6.8 to 17	22 (37%)
Zoom	5 (5%)	>USD 17	11 (18%)
Google Meet	1 (1%)		
Microsoft Teams	0 (0%)		

Apps: Applications

games, and gambling. The tendency of games and gambling is more relevant in older people than news and media as well as health and fitness apps hence it shows that older people do have fun and play games. The high use of social network sites shows that older people use their smartphones for self-representation (Loos et al. 2022).

As an ICT device, a smartphone not only serves as a means of communication among people but also improves access to health information and services (Zambianchi et al., 2019). In fact, the coronavirus disease 2019 (COVID-19) pandemic and the post-COVID-19 era might accelerate the need for ICT utilization among older adult individuals (e.g., telehealth consultation, remote home care monitoring, virtual meetings, and online shopping).

Most of the research on the use of mobile applications (apps) for older adult healthcare has been carried out in developed countries (Paiva et al., 2020). Currently, Indonesia, as a develop-

ing country, ranks fourth in the world in terms of population with 274.5 million people; moreover, 25.66 million (9.6%) of these are older adults with a life expectancy of 71.1 years (Badan Pusat Statistik, 2018; Badan Pusat Statistik, 2019).

Based on literature reviews, there were different characteristics of the digital divide based on socio-demographics (age, sex, education, and economic level) and internet access profile, age heterogeneity between older-age-group generations, and patterns on smartphones and mobile health application usage in later life. How the digital divide in Indonesia, especially in metropolitan cities, compares to those in other countries is still unknown, as are users' perspectives on ICT and mobile apps. Moreover, the characteristics of older adult Indonesian people are likely to change from time to time. The younger age group is expected to be more familiar with ICT and mobile apps. Therefore, we conducted research aiming to evaluate the knowledge, at-

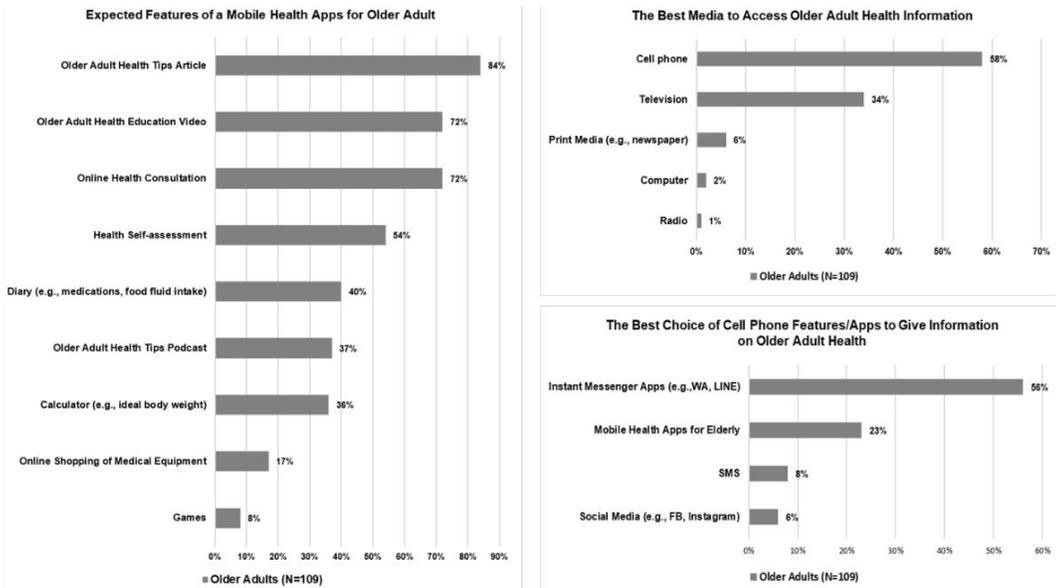


Figure 1. Expected features of mobile health applications for older adults and health information dissemination

titudes, and practices related to cell phone and mobile app utilization among Indonesian urban older adult individuals. We hypothesized that there were associations between the need for assistance when using a cell phone, the method by which individuals learned to use cell phones, the frequency of cell phone use, and problems faced when using a cell phone with sex and age group, as well as the level of education, and identified the expected features of mobile health applications for older adults and health information dissemination among subjects.

METHODS

This was a cross-sectional study on community-dwelling older adult individuals aged 60 years and older in Jakarta, the capital city of Indonesia.

Participant recruitment

The subjects were recruited from the Geriatric Clinic at Dr. Cipto Mangunkusumo Hospital, a tertiary hospital in Jakarta, and from The Older Adult Integrated Health Service Post, which closely collaborates with the Department of Community Medicine, Faculty of Medicine Universitas Indonesia. We performed simple random sampling to select the potential subjects, who were then contacted through telephone calls and/or instant messenger applications or conventional short message services (SMSs) between August and November 2020.

There were 355 potential older adults who were contacted through telephone calls and/or instant messenger applications or SMS. Out of the 172 older adult individuals who responded, two older

adults met the exclusion criteria (cognitive impairment), twelve older adults explicitly refused to participate, and 49 older adults did not fill in the online questionnaire form as promised. Ultimately, 109 older adult individuals participated in this study.

Data collection

We developed a set of questionnaires, which was adapted from the Attitude toward Technologies Questionnaire/ ATTQ (Zambianchi & Carelli, 2018), and questions regarding the use of digital technologies and applications (e.g., Internet, and social media), based on focus group discussion among this study researchers.

Each subject could choose to complete an online questionnaire form by themselves or be interviewed about the same questionnaire by an interviewer (trained, recently graduated medical students) through a telephone call. The subjects were excluded if they refused to participate in this study or had cognitive impairments that made them unable to comprehend the questions.

The functional status of the older adults was assessed based on Lawton Instrumental Activity of Daily Living (Lawton-IADL) and Barthel Index Activity of Daily Living (Barthel-ADL) (Lawton and Brody, 1969; Mahoney and Barthel, 1965). Mobile health apps were defined as health-related applications that were accessible through cell phones (smartphones), including those offering online health consultations, medication reminders, blood sugar/blood pressure diaries, and fitness/other sports mobile applications.

Statistical and data analyses

By estimating a population proportion formula with a statistical power of 80 percent and α value of five percent, we determined that the minimal sample size was 97 subjects. IBM SPSS Statistics for Windows version 20.0 (IBM Corp., Armonk, NY, USA) was used for data analysis.

The descriptive data related to subject characteristics, the knowledge, attitudes, and practices related to cell phone and mobile app utilization were presented as percentages for categorical data (in rounded numbers for better readability), while the numerical data were presented in median form (minimal–maximal) since the data were non-normally distributed. We analysed the associations between the need for assistance when using a cell phone, the method by which individuals learned to use cell phones, the frequency of cell phone use, and problems faced when using a cell phone with the social-demographic variables (sex, age, and level of education). Pearson's chi-square test and its alternative, Fisher's exact test, were used for the bivariate analysis. The associations were considered statistically significant when p value < 0.05 .

RESULTS

Demographic characteristics

The majority of older adults (81%) were outpatients at Dr. Cipto Mangunkusumo Hospital. A higher proportion of subjects were female (59%). The median age was 69 (60–88) years old with the highest proportion in the young old (60–74 years old) age group (71%). *Table 1* shows in detail the demographic characteristics of older adults. Approximately two-thirds of the older adults were still married with a much higher proportion of widows than widowers (26% vs. 3%). Almost half of the subjects (47%) have a high level of education. Most of the older adults (85%) were living with their families.

There were 85 (78%) IADL-independent subjects and 93 (85%) ADL-independent subjects. Out of 24 IADL-dependent subjects, five subjects could only answer the telephone but did not dial and seven subjects did not use the telephone at all. Moreover, nine subjects were still able to manage day-to-day purchases but needed help with banking and major purchases. The top five self-reported comorbidities were hypertension, visual impairment, cardiovascular disease, type 2 diabetes mellitus, and musculoskeletal problems (61%, 37%, 36%, 32%, and 19% respectively). Most subjects (87%) were wearing spectacles, whereas only four percent used hearing aid(s).

Cell phone use

There were ten older adults (9%) who never used cell phones and fourteen subjects (13%) who did

not use cell phones for the last month, which left 95 older adult subjects to be further analyzed on the cell phone and mobile apps utilization. The common reasons why they did not use cell phones were a perception that it is not essential or important to use a cell phone, difficulties in learning to use a cell phone, and not having the knowledge to use a cell phone. *Table 2* provides detailed data on cell phone use among the subjects.

Almost all older adults cell phone user (96%), had their own cell phones. The majority of older adults only had one cell phone (79%) and changed or purchased a new cell phone more than three years later (73%). However, a quarter of older adults (25%) need help from other people to use cell phones. In addition to eighteen subjects who needed help to use the applications/ new applications other than a phone call/ SMS/ instant messenger application (e.g., WhatsApp), there were six older adults who needed help from other people even to make a telephone call.

Only a small number of older adults (19%) learn how to use cell phones by themselves. Most of them learned both by self-learning and being taught by others, namely by their children (82%) and grandchildren (26%). There were 79 percent older adults who use cell phones every day, primarily in the morning (66%), with the average duration was 1–4 hours/day. Though 25% of older adults had no problems using cell phones, common issues encountered when using cell phones were difficulties in learning mobile apps (51%) and obstacles due to visual impairment (27%).

This study also reveals that at least half of the older adults use Android-based smartphones. Moreover, 41 percent of older adults did not know the operating system of their cell phones. Further elaboration shows that for older adults, the telephone was the most frequently used pre-installed feature on cell phones (78%), followed by internet browsing (47%), video viewing (43%), SMS reading/ texting (39%), and camera use (29%), whereas only 8% subjects who frequently used electronic mail (email).

Internet and mobile application use

Data on Internet and Mobile Application Use are shown in *Table 3*. Of 45 older adults (47%) who often browsed the internet, 35 subjects browsed topics on news/ educational content/ religious content/ lifestyle/ sport/ entertainment, 14 subjects on health content, and nine subjects on food recipes/ culinary. Approximately 53 percent of the older adults had ever used cell phones to browse online health information.

Various communication features or applications on cell phones have been used by older adults

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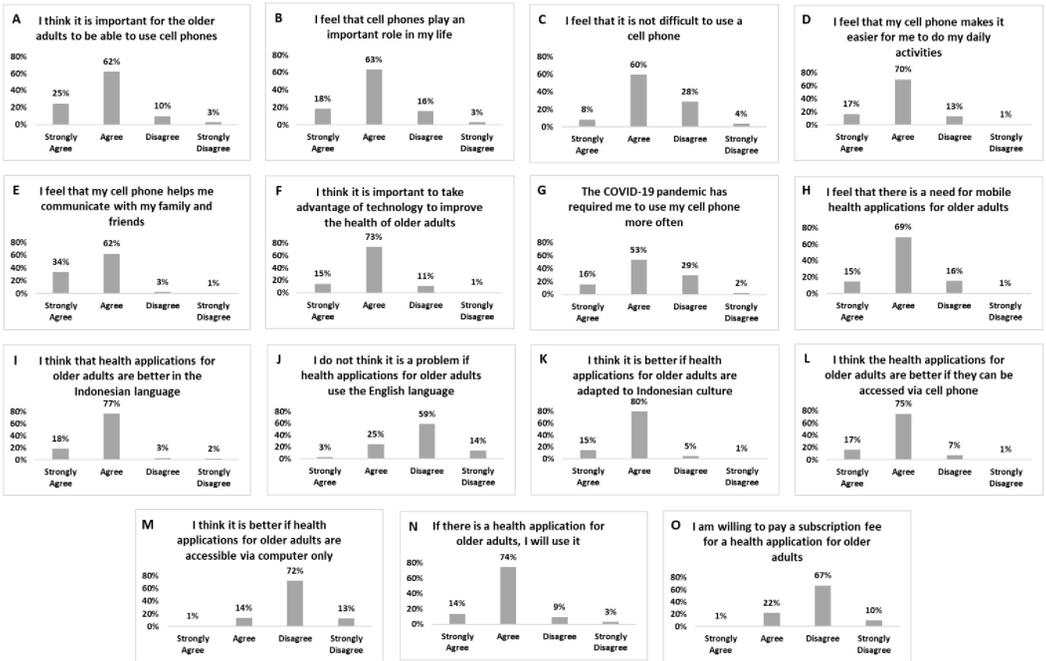


Figure 2. Attitudes on cell phone and mobile application usage

including WhatsApp messages, telephone, SMS, WhatsApp video call, Facebook, Instagram, Zoom, Telegram, Google Meet, LINE, and Twitter. Furthermore, only 18 percent and 25 percent of older adults never used social media and video call applications, respectively. More than two-thirds of the older adults used WhatsApp for video chatting and made use of its social media feature as well.

Similarly, there were approximately two-thirds of the older adults who have used religious and entertainment applications. In addition, 45 percent of older adults have already used online transport applications. Almost one-third of them also have started to read news digitally. On the other hand, there were a large number of older adults who have not used either m-banking, online shopping, e-wallet, or health applications. Moreover, none of the older adults have ever subscribed to paid applications and most of the subjects had a budget allocation of less than USD 17 per month for purchasing prepaid phone credit and/or home internet subscriptions.

The expectations regarding features in older adult health applications and health information dissemination can be seen in Figure 1. They preferred the information to be delivered through instant messenger applications and mobile health applications. The top three most expected features of a mobile-based older adults health application were health tips articles, health education videos, and online health consultation.

Association between variables

Table 4 shows the associations between the variables based on the sex, age, and level of education of the older adults. There was a significant association between the level of education and the need for assistance from others in using cell phones ($p=0.005$). In addition, there were significant associations between the method employed to learn how to use a cell phone and sex ($p=0.043$) and age ($p=0.036$).

Nevertheless, there were no significant differences in terms of the frequency of cell phone use or problems with using cell phones across the sex ($p=0.749$), age ($p=0.461$), and level of education groups ($p=0.560$); however, the older adults were, the more likely they were to face problems when using cell phones ($p=0.096$).

Attitudes and practices

Figures 2 and 3 show the subjects' attitudes and practices regarding cell phone and mobile application use ($N = 109$ subjects). Certain aspects were assessed to describe the subjects' attitudes (15 aspects) and practices (five aspects) related to cell phone and mobile application use..

Regarding the attitude aspects, there were 13 percent of older adults disagreed that it is important for older adults to be able to use cell phones. There were 32 percent of subjects felt difficulties in using the cell phone (Figure 2C) and 31 percent of subjects felt that the COVID-19 pandemic did not require them to use cell phones more (Fig-

Digital divide

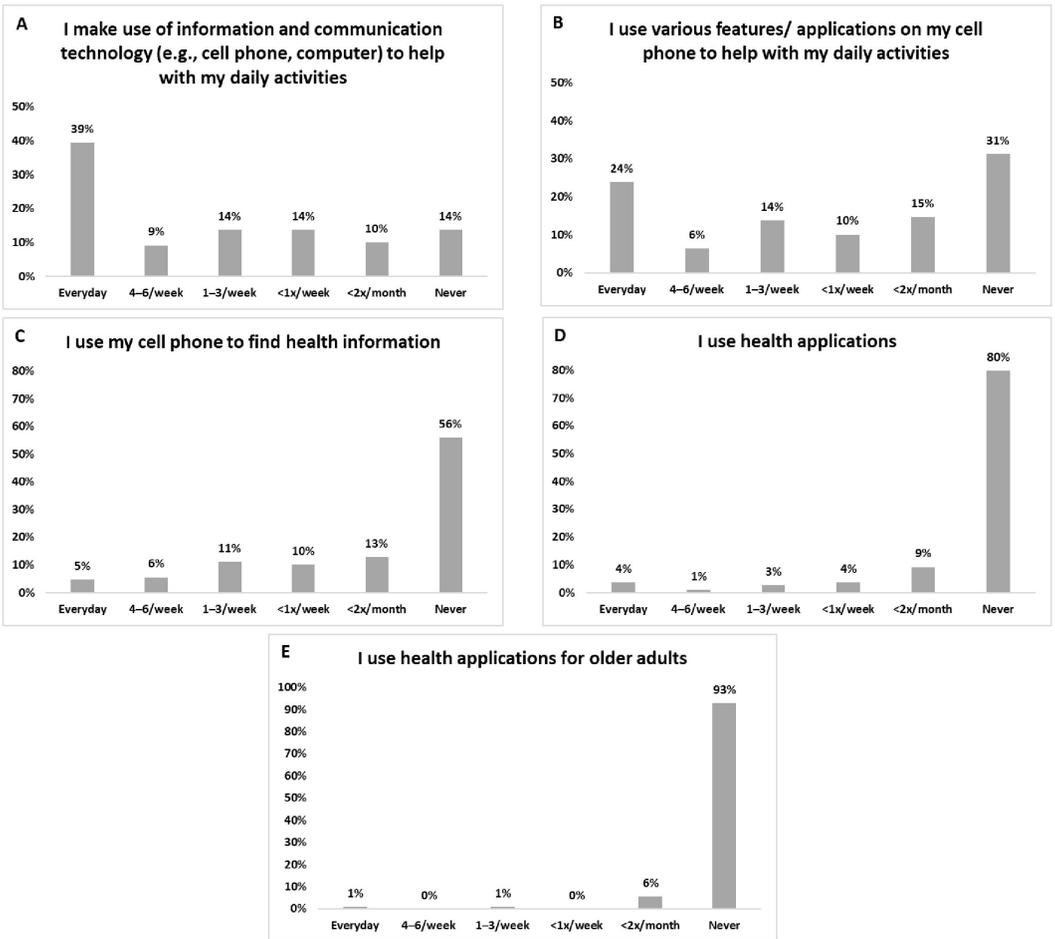


Figure 3. Practices related to cell phone and mobile application usage

ure 2G). However, most older adults felt that cell phones helped them to do their daily activities as well as to communicate with their families and friends. They also felt the importance of technology to improve health of the older adults and the need for mobile-based older adult health applications. They preferred to be able to access the health applications through cell phones and the national language to be used in the applications.

In practice, there were 39 percent of older adults regularly have already made use of ICT to help with their daily activities (Figure 3A). Nevertheless, most older adults do not routinely use various features and applications on their cell phones to help them with their daily activities (Figure 3B). Approximately 56% of older adults never used cell phones to find health information (Figure 3C) and the proportion of them who never used health applications was even higher (Figure 3D and 3E).

DISCUSSION

Perceived barriers to ICT use among older adult individuals include intrapersonal, functional,

structural, and interpersonal barriers (Leist, 2013). Based on a national social and economic survey conducted in 2019, the percentages of Indonesian older adult individuals who used cell phones, the internet, and computers were 43 percent, eight percent, and two percent, respectively. However, our study revealed that only nine percent of the participating older adult individuals never used cell phones, and 13 percent had not used cell phones for the past month. This might be because this study was conducted in a megapolitan city; 72 percent of the older adults were still relatively young, and most of the subjects were well educated, had a monthly income, and had a good functional status. Consistently, Zambianchi et al (2019) found more positive attitudes toward ICT and more frequent usage rates of technology among younger people and higher levels of education among older people regardless of nationality. Lelkes (2013) reported that in the US, younger older adult individuals who had better education, health literacy, and income status were more likely to use the internet (Lelkes, 2013), whereas Choi et al. (2013) indicated that

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Table 4. The associations between the variables based on the sex, age, and level of education of the older adults

Variables			Results		
			Independent N (%)	Need help N (%)	p^+
Help from others with using cell phones	Sex	Male	35 (49)	8 (33)	0.174
		Female	36 (51)	16 (67)	
	Age	<75 years old	52 (73)	19 (79)	0.563
		≥75 years old	19 (27)	5 (21)	
	Level of Education	College/University	44 (62)	7 (29)	0.005
		High School or less	27 (38)	17 (71)	
			Self-learning N (%)	Being taught by others – N (%)	p^+
Method used to learn how to use a cell phone	Sex	Male	12 (67)	31 (40)	0.043
		Female	6 (33)	46 (60)	
	Age	<75 years old	17 (94)	54 (70)	0.036 ⁺⁺
		≥75 years old	1 (6)	23 (30)	
	Level of education	College/University	12 (67)	39 (51)	0.220
		High School or less	6 (33)	38 (49)	
			Frequent N (%)	Infrequent N (%)	p^+
Frequency of cell phone use	Sex	Male	39 (46)	4 (36)	0.749 ⁺⁺
		Female	45 (54)	7 (64)	
	Age	<75 years old	64 (76)	7 (64)	0.461 ⁺⁺
		≥75 years old	20 (24)	4 (36)	
	Level of education	College/University	46 (55)	5 (45)	0.560
		High School or less	38 (45)	6 (55)	
			No problems N (%)	Had problems N (%)	p^+
Problems with using cell phones	Sex	Male	12 (50)	31 (44)	0.590
		Female	12 (50)	40 (56)	
	Age	<75 years old	21 (88)	50 (70)	0.096
		≥75 years old	3 (12)	21 (30)	
	Level of education	College/University	13 (54)	38 (54)	0.956
		High School or less	11 (46)	33 (46)	

+Chi-square test

++Fisher's exact test

Frequent: 4–6 times/week to every day; Infrequent: <4 times/week to never

only 17 percent of older adult individuals use the internet and identified that poor health status contributes to the lack of ICT use among older adults. Lee et al. (2020) reported that 38.1 percent and 70.2 percent of US and South Korean older adults are cell phone users, respectively. A more recent study on low-income community-dwelling older adults conducted by Arcury et al revealed that 53 percent of older adults have already used the internet and that this utilization rate is related to age, ethnicity, education, poverty level, marital status, number of e-devices at home, and computer stress (Arcury et al., 2020).

A qualitative study revealed that the very old are at considerable risk for age-related functional limitations, making it difficult and more time-consuming for them to search, for instance, for information on websites. From age 75 on, age-related

functional limitations occur with a certain regularity, and it become more common from age 85 and up (Loos, 2012). Another study stated that the percentage of older adults using new media is the highest in the 'technology spread' (age 60 - 67) generation. This is marked by the use of mobile phone applications such as SMS, instant messaging, social network sites, and games on mobile phones. Being part of one of the three technology generations could explain the preferences in a person's use of new media (time spent using new media formats), after controlling for gender, education, and working status (Ivan et al., 2020).

The obstacle to utilizing digital technology is the lack of skills to utilize digital media. The lack of experience in using technology is also one of the factors causing the lack of media utilization by older adults (Ivan et al., 2020). In addition, this is

Digital divide

also influenced by other factors such as technology companies that do not facilitate older adults in terms of accessing digital technology. Many stakeholders do not realize that older adults need a special platform to facilitate their information needs (Loos et al., 2021). Therefore, older adults are among those who may be affected by the third-level digital divide (tangible outcomes). The older age groups were less likely than the youngest age group (i.e., those aged 16-35 years old) to benefit from internet use in terms of economic (commerce and labor related activities), social (meeting people, social interaction, and online dating), political (political participation and online voting), educational (searching educational information), and healthcare-related institutional outcomes (Van Deursen and Helsper, 2015).

The most common reasons why the older adults in our study did not use cell phones were perceptions that it was not essential to use cell phones and difficulties related to learning to use cell phones. There was also a significant association between the older adult participants' level of education and their need for assistance from others while using a cell phone. The higher a participant's education level was, the more independent they became in using a cell phone.

Most of the older adults had learned how to use cell phones from their own families, especially their children. Male older adult individuals and younger older adult individuals (<75 years old) were significantly associated with being self-learners. Consistently, Clarke et al reported that the oldest group of subjects had the lowest level of computer self-efficacy (CSE), while Zhang et al found that males had higher CSE than females (Clarke, 2020; Zhang, Nyheim and Mattila, 2014).

Moreover, Chen and Chan's study revealed that younger and better-educated individuals are more likely to use gerontechnology (Chen, 2014). Although males were shown to be more likely to use gerontechnology than females, no gender differences were found regarding attitudes and beliefs concerning the technology (Chen, 2014). Melendez et al. (2012) reported that playfulness had a direct influence on attitudes toward using the studied system among females, whereas, among male subjects, this influence was mediated by perceived usefulness.

There were no significant associations between the problems faced when using cell phones and the participant's level of education, sex, or age; however, the older an older adult person was, the more likely he or she was to have problems using a cell phone. Visual impairment caused problems related to cell phone use in only 27 percent of older adults. In comparison, Lee et

al indicated that common challenges in ICT use among both US and South Korean older adult individuals were tired eyes followed by difficulties with sitting and concentrating (Lee et al., 2020).

Our study found that 47 percent of the older adults frequently used the internet through their smartphones. The proportion of internet users among Indonesian urban older adults in our study was similar to that among Italian older people (45%), which amounts to approximately half of the proportion of internet users among Swedish older adults (84%) (Zambianchi et al., 2019). In line with the findings from Sweden, Lee et al. (2020) reported that only 21 percent of US older adults and even fewer South Korean older adults (11%) never use the internet.

The number of email users among Italian and Swedish older adults, as well as that among US and South Korean older adults, is much higher than that found in our study (38%, 78%, 61%, and 73%, respectively, vs. 8%) (Zambianchi, Rönnlund and Carelli, 2019; Choi, 2013). These findings are in line with the global digital divide, although Zambianchi et al. (2019) argued that the time perspective of future positive and present hedonism seems to affect older people's attitudes towards and use of ICTs more than cultural context, age, or educational level.

The topics browsed by the internet users in our study varied from news, educational content, and lifestyle issues to health content and recipes. According to Lee et al. (2020), health information browsing among US and South Korean older adult individuals is higher than that among Indonesian urban older adult individuals as revealed in our study (48% and 71% vs. 31% respectively).

Social media may empower older adults through feelings of connectedness, control, and self-efficacy (Leist, 2013). This is in line with Loos et al. (2022) study that older people use their smartphones for self-representation. Moreover, it can be beneficial in terms of advancing and disseminating health-related knowledge. However, it also poses potentially negative impacts such as privacy violations and the uncritical sharing and adoption of hoax information, which are potentially harmful to older adults (Leist, 2013).

In our study, the older adults had already started to use video chatting, social media, and mobile applications. There was a substantial number of older adults who had used religious, entertainment, online transportation services, and news applications but not m-banking, online shopping, e-wallet, or health applications. These results might imply that older adults voluntarily and eagerly use mobile applications according to their

needs. They may not be accustomed to health applications, online shopping, m-banking, or e-money applications because they might not have an urgent need to use them or recognize whether these applications are beneficial for them.

In comparison, Xie et al. (2012) indicated that older adults have negative perceptions of social media, associate social media with inappropriate behavior, and have privacy concerns regarding social media. However, after engaging in educational weekly sessions about social media, the participants' perceptions changed to be more positive, and they ultimately started making their own social media content. Moreover, Lee et al. (2020) reported the ways in which ICTs are used by US and South Korean older adult individuals, including buying products/using online banking (43% and 37%), using social media (35% and 5%), reading papers (25% and 14%), watching videos (24% and 38%), and playing games (22% and 25%). These findings indicate that the number of social media and entertainment application users among Indonesian urban older adults is very high, while the number of online shopping/online banking users is lower than that among US and South Korean older adults.

Most of the subjects in our study had felt and experienced the benefits of using cell phones and mobile applications. Surprisingly, almost one-third of the older adults felt that the COVID-19 pandemic had not required them to use their cell phones more. This may be because most of them were living with their families. Their family members/caregivers may have also been responsible for telehealth consultations and virtual family/colleague gathering arrangements. Nonetheless, these older adults preferred to keep it simple and basic when they used cell phones to help them with their daily activities.

Although there were still many subjects who had never used health applications, these individuals tended to prefer the use of cell phones to access the health information of older adult individuals, namely, through instant messenger applications or mobile health applications. Health information was received not only in the form of written media but also by means of audiovisual and interactive online health consultations.

It is both important and challenging to be able to search for, find, comprehend, and appraise readily available information from electronic sources and apply the knowledge acquired appropriately, and this issue encompasses literacy on health information (eHealth literacy) (Shiferaw et al. 2020). Arcury et al. (2020) reported that 72 percent of internet users have poor general health literacy and 51% have low eHealth literacy, while Shif-

eraw et al. (2020) found that only 47 percent out of a group of 423 patients with the disease(s) in Ethiopia had strong eHealth literacy skills. Loos et al. (2022) reported that health and fitness apps ranked 8th out of the 12 most relevant categories of apps used, this shows that there is still low interest in health among older people.

In practice, we found that 53 percent of older adults used cell phones to browse online health information; however, the percentage of health application users was still low (16%). Many of the older adults had never used various features/applications of their cell phones to assist them in their daily activities (31%), had never used cell phones to seek health information (56%), had never used health applications (80%), and had never used health applications for older adult individuals (93%). Therefore, it is essential to improve eHealth usage and eHealth literacy among older adult individuals.

Mobile health and eHealth interventions may induce perceptions of independence among older adult individuals, enhance self-management and engagement in health care among patients with chronic diseases, and encourage lifestyle changes and disease prevention (Shiferaw et al., 2020). Nevertheless, there is still a lack of high-quality evidence-based educational interventions for the older adult population designed to improve eHealth literacy skills (Watkins and Xie, 2014). Xie et al. (2012) suggest that educational strategies, including introducing concepts before functions, addressing concerns, and promoting personal relevance, may be beneficial as a step-by-step approach to improve eHealth literacy among older adults. Furthermore, twice-a-week learning sessions about using websites to access reliable health information that last two weeks (two hours per session) have significantly improved eHealth literacy among older adults (Xie, 2011). On the other hand, the government, health care providers, and other related stakeholders should create reliable online health information sources for older adult individuals and geriatric patients.

Our study is the first to investigate knowledge, attitudes, and practices related to cell phone and mobile application utilization among Indonesian urban older adult individuals. However, it may not represent the urban Indonesian older adult as a whole since it was conducted in the capital city of Indonesia (DKI Jakarta), while Indonesia has more than 500 districts and cities. This is important to note because based on Sri Ariyanti's research in 2013, it was found that DKI Jakarta is the province with the highest infostate value in Indonesia. Infostate is the aggregation of info density (sum of all ICT stocks) and info-use. This is due to ICT infrastructure, the ability of the population

to access / ICT skills in DKI Jakarta is huge so the level of ICT use is the highest compared to other provinces. Therefore, different results are possible if this research is conducted in other provinces.

CONCLUSION

Indonesian urban older adults have tended to start embracing digital life. Family members play an important role in teaching technology skills to older adults. There was a significant association between the low level of education and the need for assistance from others in using cell phones. Method on how to use a cell phone by self-learning was associated with male sex and younger age (<75 years old). It is essential to pay more attention to older adults who are female or relatively uneducated in the context of digital empowerment. Expected features of mobile health apps were health tips articles and health education videos, which can be best accessed via cell phone with instant messenger media. There is a need to improve the number of mobile

health application users and eHealth literacy.

Limitation of the study

This study was conducted only in one megapolitan area. Our study could not assess the level of understanding of subjects who completed the online questionnaires themselves. Subjects' eHealth literacy skills were not further elaborated based on a validated tool such as the eHealth literacy scale (eHEALS) (Norman, 2006).

Implications for future studies

Further multicenter studies across Indonesia, as well as interventional studies to evaluate the effectiveness of learning methods and the impacts of ICT use on health-related outcomes, are essential and highly anticipated. The findings of our study also may serve as a valuable reference for developing mobile health applications for older adult Indonesian individuals in line with the mobile geriatric applications used by health care providers.

Conflict of interests

All the authors declare that there is no conflict of interest.

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