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Demographic and socioeconomic determinants of internet usage in Indonesia

Wilson Rajagukguk, Adolf Heatubun, Medyawanti Pane

DEMOGRAPHIC AND SOCIOECONOMIC DETERMINANTS OF INTERNET USAGE IN INDONESIA

Abstract

Digital divide is relatively high in Indonesia. This study aimed to investigate the demographic and socioeconomic determinants of internet usage in Indonesia. The data used came from the results of the National Socioeconomic Survey in 2021. The unit analysis was population aged 15 years and above who had at least one digital gadget. The dependent variable was the number of internet usage. The independent variables included gender, age, number of household members, marital status, education, working status, place of dwelling, island of residence, and number of digital gadget type owned. Data analysis was used with univariate, bivariate and multivariate methods. Binary Logistic Regression model is used in multivariate analysis. The results of study indicated that higher internet usage was associated with being male, being younger, having smaller number of household members, being unmarried, having higher education, dwelling in urban areas, living in Java island, and owning more digital gadget types. These findings suggest the need to improve access to higher internet usage among women, older people, married individuals, rural dwellers, and Outer Java inhabitants, to promote family planning, to improve education, and to facilitate access to more digital gadgets in order to reduce digital divide and to boost 4.0 global competitiveness in Indonesia.

Key words: Digital divide, Internet usage, National Socioeconomic Survey 2021, Univariate, Bivariate, Binary logistic regression, Socioeconomic determinant, Proximate determinants, Indonesia

1. Introduction

Indonesia's global competitiveness is relatively low compared to the global competitiveness of Malaysia and Singapore. In 2018, in term of 4.0 global competitiveness index, Indonesia, Malaysia, and Singapore ranked at 45th, 25th, and 2nd respectively, of 140 countries in the world (World Economic Forum 2018). The third pillar from 12 pillars of this index is the adoption of information and communication technology (ICT). Indonesia ranked at the 50th of 140 countries in term of ICT adoption. One of the indicator that forms the ICT adoption is the proportion of population who use the internet, Indonesia ranked at the 110th of 140 countries in term of the proportion of internet users.

Low global competitiveness is one of the issues in the National Midterm Development Plan (*Rencana Pembangunan Jangka Menengah Nasional/RPJMN*) in 2020–2024 (Badan Pusat Statistik/BPS 2018). Therefore, the digital transformation becomes one of mainstreaming in the

RJPMN 20202-2024 as an effort to optimize the role of digital technology in improving the nation's competitiveness. In addition, the proportion of internet users becomes an indicator of the ninth sustainable development goal, that is to develop strong infrastructure, enhance inclusive and sustainable industry, and promote innovation (Billari et al.2020).

ICT revolution has had remarkable impacts on life and daily activities around the world (Billari et al.2020). Some studies found that in low income countries, the utilization of ICT had positive impact on market performance (Aker and Fafchamps 2014), household income (Blauw and Franses 2016), education (Aker et al.2012), political participation (Manacorda and Tesei 2020), health services (Zurovac et al. 2011), consumption and economic disruption condition (Murendo and Wollni 2016), food security (Munyegera and Matsumoto 2016) , reproductive health behavior (Samosir et al. 2020), and financial security and saving (Suri and Jack 2016).

However, there is an inequality in access to ICT and its usage, is considerable in many developing countries, including in Indonesia. As can be seen in Figure 1, the proportion of internet users in Indonesia, based on the results of the 2019 National Socioeconomic Survey (*Survei Sosial Ekonomi Nasional/SUSENAS*) in 2019 was less than half and varied greatly from the lowest of 22% in Papua and the highest of 74% in the capital, DKI Jakarta (Badan Pusat Statistik 2023).

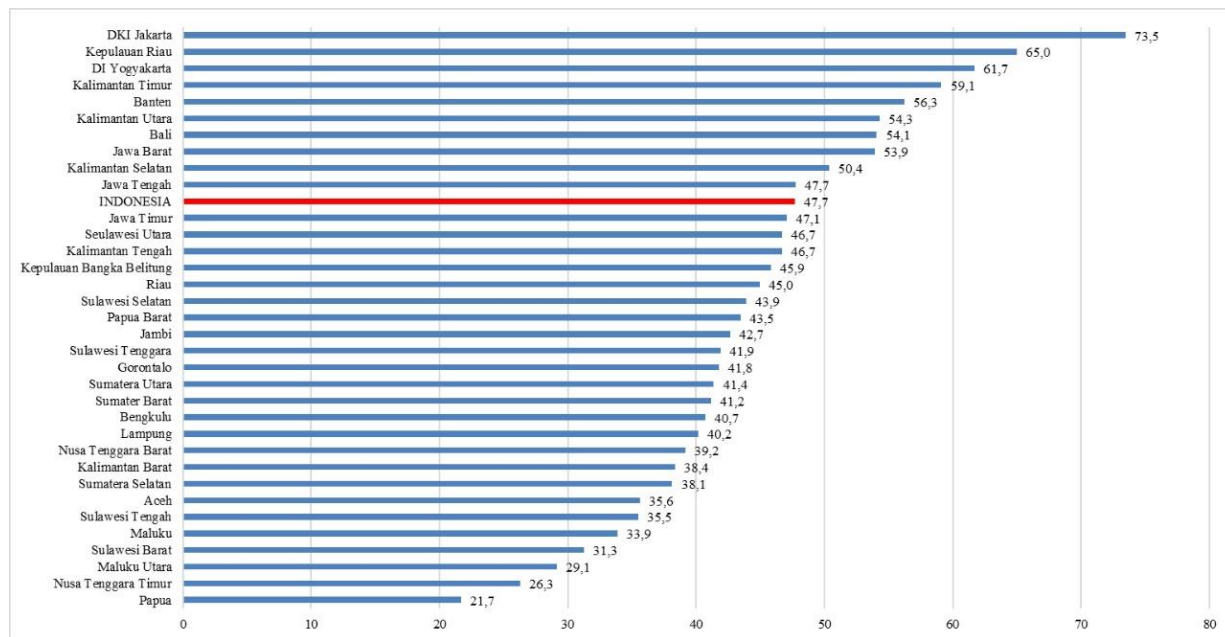


Figure 1. The Proportion of internet users by province: Indonesia SUSENAS 2019

The digital divide is defined as an inequality in access to and use of ICT technology, in particular the internet (Castells 2002). The internet usage can be classified in form of the frequency and purpose of use (Scheerder et al. 2017) In term of the purpose of internet use, it can be for economic, cultural, social, and private purposes. The economic purposes can include for work, education, property, income, and finance purposes. The cultural purposes can consist of ownership and identity purposes. The social purposes can be for informal network, citizenship formal network, e-

government network, and politic purposes. The private purposes can be for health, welfare, self-actualization, and personality purposes.

The determinants of internet usage have been proposed. These include socio-demographic, social, and economic factors (Scheerder et al. 2017). Socio-demographic factors consist of gender, age, marital status, and place of residence. Socioeconomic factors include education, working status, access to ICT, social status, and household economic status.

Studies on the determinants of internet usage have been carried out (Scheerder et al. 2017, Ali et al. 2020, Sumedia and Sumardjo 2020, Martínez-Domínguez and Fierros-González 2022, 20. Al-Hammadany and Heshmati 2011, Lera-López et al. 2011, Ghebregiorgis and Mihreteab 2018, Duplaga 2017, Alderete 2019, Yesuf 2021, Huxhold et al. 2020, Michels et al. 2020, Nishijika et al. 2017, Rajagukguk 2022). The results of a study in Australia show that access to ICT, that is ownership access to at least one ICT gadget, including personal computer, cellphone, tablet, and the internet, influenced the internet usage for health care among those who had functional difficulty (Ali et al. 2020). The results of this study also found that gender, education, income, and place of residence affected the internet usage for health care among those who had functional difficulty.

A study in Mexico also found that the internet usage was influenced by education, income, socioeconomic status, access to ICT, and place of residence (Martínez-Domínguez and Fierros-González 2022). Meanwhile, a study in Iraq shows that gender, age, education, and working status had effect on the internet usage (Al-Hammadany and Heshmati 2011). Further, a study in Spain indicates that the internet usage was mainly influenced by education, age, working status, place of residence, and income (Lera-López 2011). Furthermore, the results of a study in Eritrea show that gender, age, and education were the important determinants of the internet usage (Ghebregiorgis and Mihreteab 2018).

A study in Poland also shows that the predictors of internet usage encompassed place of residence, education, marital status, working status, income, and use of cellphone (Duplaga 2017). In addition, a study in Argentina indicates that the drivers of internet use among poor people were access to ICT, income, education, and place of residence (Alderete 2019). Meanwhile, a study in Ethiopia shows that the internet use was associated with access to ICT, young age, living in urban areas, having higher education, and having a job (Yesuf 2021).

The results of a study in Germany reveals that the probability of using the internet was higher among males, young people, higher educated people, and higher income groups (Huxhold et al. 2020). Another study in Germany suggests the important role of age in internet use among farmers (Michels et al. 2020). Further, the results of a study in Brazil show that limited education was an important factor of digital divide (Nishijima et al. 2017).

The important of demographic and socioeconomic factors on internet use at macro-level was also found. A study using country as a unit analysis found that demographic dividend typology and income were associated with higher percentage of internet users (Rajagukguk 2020).

However, studies of the determinants of contraceptive use in Indonesia is limited. It might be because the limited availability of national scale data on ICT access and use. Information on access to ICT and its use was first collected in the Indonesia Demographic and Health Survey in 2017, but it was limited only to women aged 15-149 years and married men aged 15-54years (BKKBN et al. 2017). The Statistics Indonesia gathered more detailed information on access to ICT and the internet use in the SUSENAS in 2021 (BPS 2021). Data from the results of SUSENAS in 2021 was a rich data source on the internet access and use for economic, cultural, social, and private purposes.

Therefore, the general objective of this study is to analyze the association between demographic, social, and economic factors and internet usage in Indonesia. The specific objectives are (i) to study the patterns and differentials in internet usage by demographic, social, and economic factors in Indonesia and (ii) to examine the effects of demographic, social, and economic factors on internet usage in Indonesia.

2. Methods

This study used the results of SUSENAS in 2021 as data source. SUSENAS 2021 was carried out by the Statistics Indonesia in March 2021 and covered all provinces in Indonesia (Hosmer and Lemeshow 2000). SUSENAS 2021 was conducted to meet the need of social and economic development data at district, provinces, and national level, including the sustainable development goal achievement data. The sample size was 340,032 households. SUSENAS 2021 data was a cross-sectional data.

The unit of analysis of this study was population aged 15 years and above. This group of population was selected because working status was among the independent variables. The Statistics Indonesia used 15 years and above as the working age.

The dependent variable of this study was the number of usage of the internet (USE). There were 10 uses of the internet collected in SUSENAS 2021. These included (i) to get information/news, (ii) to get information for learning process, (iii) to send/receive e-mail, (iv) for social media/networking, (v) for purchase of goods/services, (vi) for sale of goods/services, (vii) for entertainment, (viii) for financial facility (e-banking), (ix) to obtain information about goods/services, and (x) others. USE was divided into two groups, that is 1-3 and 4 or more.

Meanwhile, the independent variables were gender (GENDER), age (AGE), number of household members (NHH), marital status (MARITAL), education (EDUCATION), working status (WORK), place of dwelling (URBAN), island of residence (ISLAND), and number of digital gadget type owned (NGADGET). GENDER was grouped into male and female. AGE was divided into 15-24, 25-54, and 54+. NHH was classified into 1-4 and 5 or more. MARITAL was grouped into unmarried and married (currently married, divorced, and widowed). EDUCATION was divided into no schooling/incomplete primary school, complete primary school, complete junior secondary school, complete senior secondary school, and complete university. WORK was classified into working and not working. URBAN was grouped into urban and rural areas. ISLAND was classified into Sumatera, Java, Bali and Nusa Tenggara, Kalimantan, Sulawesi, and

Maluku and Papua. NGADGET was divided into having one type digital gadget and having two or more types digital gadget.

Data in this study were analyzed using univariate, bivariate, and multivariate analyses. Univariate analysis was carried out to evaluate the percentage distribution of respondents of the study by demographic and socioeconomic background characteristics. Bivariate analysis was used to examine the percentage of internet usage by demographic and socioeconomic background characteristics. Multivariate analysis was done to investigate the association between demographic and socioeconomic factors and internet usage employing a binary logistic regression. The model was as follows.

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 GENDER + \beta_2 AGE + \beta_3 NHH + \beta_4 MARITAL + \beta_5 EDUCATION + \beta_6 WORK + \beta_7 URBAN + \beta_8 ISLAND + \beta_9 NGADGET + \varepsilon$$

p is the probability of using the internet for four or more uses. β_0 is the model intercept. β_k is the regression coefficient for the k -th independent variable, $k = 1, 2, \dots, 8$. ε is the error term.

Multi-collinearity diagnostic test using correlation coefficient was carried out for all independent variables. In addition, to measure the overall goodness-of-fit test, Hosmer and Lemeshow test and chi-square (χ^2) test were also done [33]. Further, scalar measure of goodness of fit test of the was carried out employing the Nagelkerke determination coefficient (R^2).

3. Results

The results of univariate analysis were presented in Table 1. It can be seen that the majority of used the internet for 1-3 purposes. In term of demographic background characteristics, the majority of respondents were males, aged 25-54 years, had 1-4 household members, and married. In term of socioeconomic background characteristics, the majority of respondents had complete senior high school education, resided in urban areas, lived in Java island, worked, and had one type digital gadget.

The results of bivariate analysis were provided in Table 2. By demographic background characteristics, the percentage of gadget owners aged 15 years and above who used the internet for four or more purposes was higher among those who were females, were aged 15-24 years, were not married, and had 1-4 household members. By socioeconomic background characteristics, the percentage of gadget owners aged 15 years and above who used the internet for four or more purposes was higher among those who had complete university education, resided in urban areas, lived in Bali and Nusa Tenggara Island, did not work, and had two or more types digital gadget.

The results of multivariate analysis were displayed in Table 3. It can be seen that all demographic and socioeconomic factors in the model had significant effects on the internet use statistically, except working status. The results of multi-collinearity diagnostic test using correlation coefficient show that none of the bivariate correlation was greater than 0.7, meaning there was no multi-collinearity between independent variables in the model. The results of overall goodness-of-fit test show that the model fit at the less than 0.001 significance level. The Nagelkerke determination

coefficient was 0.201, meaning that 20.1% of variation in the use of internet was explained by the variables in the model.

Gender had a negative association with the internet use. After controlling for other factors, male gadget owners aged 15 years and above were 0.82 less likely to use the internet for four or more purposes than female gadget owners aged 15 years and above.

Age was negatively associated with the internet use. Other things being the same, the older a gadget owners aged 15 years and above, the lower the probability of using the internet for four or more purposes. The probability of using the internet for four or more purposes was 2.47 and 1.71 times higher among those who were 15-24 years and 25-54 years, respectively, compared to among those who were 55 years and above.

Marital status influenced the internet use. *Ceteris paribus*, unmarried gadget owners aged 15 years and above were 1.35 times more likely to use the internet for four or more purposes than married gadget owners aged 15 years and above.

Number of household members had a negative association with the internet use. After controlling for other factors, gadget owners aged 15 years and above who came from households with 1-4 members were 1.18 more likely to use the internet for four or more purposes than gadget owners aged 15 years and above who came from households with five or more members.

Education was the second strongest factor that influenced the internet use. It was positively associated with the internet use. Other things being the same, the higher the education of gadget owners aged 15 years and above, the higher the probability of using the internet for four or more purposes. The probability of using the internet for four or more purposes was 1.29, 1.86, 2.10, and 3.56 times higher among gadget owners aged 15 years and above who had complete primary school, complete junior secondary school, complete senior secondary school, and complete university, respectively, compared to among those who had no education or incomplete primary school.

Place of residence was the third strongest factor that affected the internet use. *Ceteris paribus*, urban gadget owners aged 15 years and above were 1.60 more likely to use the internet for four or more purposes than those who lived in rural areas.

Island of residence was an important factor of the internet use. After controlling for other factors, gadget owners aged 15 years and above who lived in Sumatera Island, Java Island, Bali and Nusa Tenggara Island, Kalimantan Island, and Sulawesi Island were, respectively, 1.54, 1.77, 1.66, 1.70, and 1.34 times more likely to use the internet for four or more purposes than those who lived in Maluku and Papua Island.

Number of digital gadget type owned was the strongest factor that was positively associated with the internet use. Other things being the same, the more the number of digital gadget type owned, the higher the probability of using the internet for four or more purposes. The probability of using the internet for four or more purposes was 3.71 times higher among gadget owners aged 15

years and above who had two or more types digital gadget than among those who has one type digital gadget.

Table 1. Percentage distribution of digital technology gadget owners aged 15 years and above by background characteristics, SUSENAS 2021.

Background characteristics		Number of observation	Percentage
Number of internet usage purposes			
	1-3	78,487,754	64.1
	4-10	43,932,193	35.9
Gender			
	Male	65,588,165	53.6
	Female	56,831,781	46.4
Age (years)			
	15-24	39,045,082	31.9
	25-54	75,609,024	61.8
	55+	7,765,840	6.3
Number of household members			
	1-4	77,450,703	63.3
	5-10	44,969,243	36.7
Marital status			
	Not yet married	43,916,293	35.9
	Married	78,503,653	64.1
Education			
	No schooling/incomplete primary school	3,459,375	2.8
	Complete primary school	18,919,342	15.5
	Complete junior secondary school	32,386,808	26.5
	Complete senior secondary school	49,206,405	40.2
	Complete university	18,448,016	15.1
Place of residence			
	Urban	81,894,942	66.9
	Rural	40,525,005	33.1
Island of residence			
	Sumatera	24,946,355	20.4
	Java	73,611,191	60.1
	Bali and Nusa Tenggara	5,878,304	4.8
	Kalimantan	7,606,755	6.2
	Sulawesi	8,172,530	6.7
	Maluku and Papua	2,204,812	1.8
Working status			
	Working	70,120,232	57.3
	Not working	52,299,715	42.7
Number of digital gadget type owned			
	One	96,293,884	78.7
	Two or more	26,126,062	21.3
Total		122,419,946	100.0

Table 2. Percentage distribution of number of internet usage purposes of digital technology gadget owners aged 15 years and above by background characteristics, SUSENAS 2021.

Background characteristics		Number of internet usage purposes		Total (%)
		1-3 (%)	4-10 (%)	
Gender				
	Male	66.0	34.0	100.0
	Female	61.9	38.1	100.0
Age (years)				
	15-24	56.3	43.7	100.0
	25-54	66.9	33.1	100.0
	55+	76.8	23.2	100.0
Number of household members				
	1-4	63.3	36.7	100.0
	5-10	65.5	34.5	100.0
Marital status				
	Not yet married	55.4	44.6	100.0
	Married	69.0	31.0	100.0
Education				
	No schooling/incomplete primary school	84.6	15.4	100.0
	Complete primary school	80.0	20.0	100.0
	Complete junior secondary school	67.6	32.4	100.0
	Complete senior secondary school	62.8	37.2	100.0
	Complete university	41.2	58.8	100.0
Place of residence				
	Urban	59.4	40.6	100.0
	Rural	73.6	26.4	100.0
Island of residence				
	Sumatera	66.3	33.7	100.0
	Java	63.1	36.9	100.0
	Bali and Nusa Tenggara	62.3	37.7	100.0
	Kalimantan	63.4	36.6	100.0
	Sulawesi	67.3	32.7	100.0
	Maluku and Papua	69.4	30.6	100.0
Working status				
	Working	64.8	35.2	100.0
	Not working	63.2	36.8	100.0
Number of digital gadget type owned				
	One	72.9	27.1	100.0
	Two or more	31.6	68.4	100.0
Total		64.1	35.9	100.0

Table 3. Odds ratio of the binary logistic regression of the determinants of the number of internet usage purposes, SUSENAS 2021.

Covariates		Odds ratio [95% CI]	p-value
Gender (ref: Female)			
	Male	0.817 [0.805–0.828]	< 0.001
Age (years) (ref: 55+)			
	15-24	2.466 [2.378–2.558]	< 0.001
	25-54	1.713 [1.660–1.767]	< 0.001
Number of household members (ref: 5-10)			
	1-4	1.179 [1.164–1.195]	< 0.001
Marital status (ref: Married)			
	Not yet married	1.348 [1.323–1.375]	< 0.001
Education (ref: No schooling/incomplete primary school)			
	Complete primary school	1.289 [1.229–1.351]	< 0.001
	Complete junior secondary school	1.857 [1.774–1.943]	< 0.001
	Complete senior secondary school	2.104 [2.012–2.200]	< 0.001
	Complete university	3.578 [3.414–3.749]	< 0.001
Place of residence (ref: Rural)			
	Urban	1.597 [1.575–1.618]	< 0.001
Island of residence (ref: Maluku and Papua)			
	Sumatera	1.539 [1.495–1.585]	< 0.001
	Java	1.766 [1.715–1.819]	< 0.001
	Bali and Nusa Tenggara	1.664 [1.606–1.725]	< 0.001
	Kalimantan	1.701 [1.645–1.758]	< 0.001
	Sulawesi	1.343 [1.300–1.386]	< 0.001
Working status (ref: Not working)			
	Working	0.989 [0.974–1.005]	0.167
Number of digital gadget type owned (ref: One)			
	Two or more	3.714 [3.655–3.774]	< 0.001
Constant		0.042	< 0.001

4. Discussion

The results of this study confirm the findings from the previous studies that demographic and socioeconomic factors influenced the internet use.

The results of the above studies show that the internet usage was higher among those were younger that might be because they understood more sophisticated technology faster than older people. Males were more likely to use the internet that might be because they were also more likely to participate in the labor market especially technology-based jobs so that they must make efforts to use the digital technology to support them in work. Married people were less likely to use the internet that can be because they had limited participation in activities outside the house so that they did not feel the need to use the internet. More educated people were more likely to use the internet that might be because they had better access to various information and wider social networks. Working people were more likely to use the internet that might be because the work demand that were becoming more digital technology-based. Urban dwellers and those who lived

development center regions were more likely to use the internet that might be because the ICT facilities were more available in more developed regions. The internet use was higher among those who had more ICT gadgets that might be because the availability of more digital gadgets could facilitate them to do more digital-based activities, such as online office meetings, reading e-books, writing papers, watching e-movies, playing games, and having conversation.

5. Conclusion

The results of the study show that digital divide was notable in Indonesia. The percentage of gadget owners aged 15 years and above who used the internet for four or more purposes was higher among those who were females, were aged 15-24 years, were not married, had 1-4 household members, had complete university education, resided in urban areas, lived in Bali and Nusa Tenggara Island, did not work, and had two or more types digital gadget.

Demographic factors that were associated with the internet use significantly and statistically in Indonesia were gender, age, marital status, and number of household members. Socioeconomic determinants of the internet use in Indonesia were education, place of residence, island of dwelling, and number of digital gadget type owned. The probability of using the internet for four or more purposes were higher among gadget owners aged 15 years and above who were females, were aged 15-24 years, were unmarried, came from households with smaller number of members, had higher education, lived in rural areas, dwelled in Java Island, and had two or more digital gadget types.

The Government of Indonesia is committed to reduce digital divide and to boost 4.0 global competitiveness in Indonesia. The findings from this study indicate that in order to achieve these goals, Indonesia needs to improve access to higher internet usage among women, older people, married individuals, rural dwellers, and Outer Java inhabitants, to promote family planning, to improve education, and to facilitate access to more digital gadgets.

CONFLICT OF INTEREST

The authors have no conflict of interest associated with the material presented in this paper.

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AUTHOR CONTRIBUTION

Conceptualization: WR. Data curation: WR. Formal analysis: WR. Funding acquisition: AH. Methodology: WR. Project administration: AH and MP, Visualization: MP. Writing – original draft: WR. Writing – review - & editing: AH and MP.

ORCID

Wilson Rajagukguk <https://orcid.org/0000-0002-5802-609X>

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