Toward the Achievement of Goal 2 of SDGs: Are Indonesian Children Well Fed? The Impacts of Mother's Internet Usage and Financial Empowerment on the Infant and Young Child Feeding Practice

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Abstract

This study aims to investigate the impacts of the internet usage and bank account ownership on the IYCF practices in Indonesia. The data used was the results of the 2017 Indonesia Demographic and Health Survey. The unit of analysis was children aged 6–23 months comprising 4,880 children. The dependent variable was the IYCF practices. The main independent variables were the internet usage and bank account ownership. The control variables were the age and sex of the children, mother's education, household wealth, and place of residence. The results of the study showed that mother's internet usage and bank account ownership had significant positive impacts on the IYCF practices. Children aged 6–23 months whose mothers ever used the internet and had a bank account were more likely to be well fed. Older children, children with better educated mothers and better household wealth, and children who lived in urban areas were more likely to be well fed. Therefore, the IYCF practices improvement program in Indonesia should utilize the internet to inform, educate, and communicate full IYCF practices, empower mothers financially, and aim at younger children, children with lower educated mothers and lower household wealth, and children in rural areas.

Keywords
Sustainable Development Goals, Stunting, Feeding practice, Internet usage and financial empowerment, and Indonesia.

1. Introduction
Stunting in children under five years old is a major public health issue in many developing countries, including Indonesia (President Decree, 2020). The results of the 2018 showed that more than three in ten (30.8%) of under-five children in Indonesia were stunting (NIHRD, 2019). The stunting prevalence varied greatly across provinces, lowest (17.6%) in the capital province, DKI Jakarta, and highest (42.7%) in the geographically spread island province, Nusa Tenggara Timur. Therefore, the acceleration of stunting reduction is among the major project of the National Midterm Development Plan 2020–2024 (President Decree, 2020).

There are several derivate goals of the second goal in the sustainable development goals (SDGs) to end hunger, such as poverty alleviation, food security and nutrition improvement, and elevate sustainable agriculture (Sustainable Development Goals, 2015). One of the indicators of this Goal is the stunting prevalence among under-five years of age children where the intermediate target is a 40% decline in the stunting prevalence during 2012–2025. In accordance with this target, Indonesia even targets a higher decline in the stunting prevalence among under-five years of age children to14% by 2024 or around eight percent decline annually during 2018–2024 (President Decree, 2020).

Stunting in children can be caused by several of factors, including poor feeding practices (Steward et al. 2013). These include the inability to achieve the basic minimum in terms of food diversity, meal frequency, and the bare minimum in terms of suitable nutrition. Individual and societal health both dependent on proper nutrition during childhood (Newby et al. 2015). Infant nutrition is essential for children's health and development during childhood, and also during adolescence and adulthood. Prior to the age of two, optimal breastfeeding and sufficient

supplementary feeding habits for infants and young children are also protective factors against stunting and wasting (Puspitasari and Gayatri 2020).

Based on those factors, child feeding information searching is an essential issue of health information seeking for families, particularly women, during their first pregnancy and up to early childhood (Newby et al. 2015). Infant feeding information is sought for by first-time mothers during pregnancy and the first year of their child's life. Since the internet has become more widely available and widely used, the way community discovers health-related information has transformed. This action shows that community who used to be passive consumers of health information are now becoming active participants (McMullan 2006). Mobile phones and computers have been effectively utilized to convey health messages, offer emergency medical help, decision support, and referral to providers and services (Khan et al. 2018)

Other study found that internet-based devices are transforming breastfeeding practices. To help breastfeeding parents who are looking for advice on how to better breastfeed, they can make a significant contribution (Alomhanna et al. 2020). Web-based programs that combine knowledge with ongoing support are the most effective approach to encourage long-term breastfeeding success, according to the study. In addition, the study indicates that personalized content and online discussion forums are the two most successful strategies. However, studies on the impacts of internet usage on IYCF practices were limited.

Apart from ICTs, economic and other social science theories of sex empowerment imply that women's financial inclusion can help them gain a greater understanding for the quality of health care services, mobility to access these services, and a strong sense and self-efficacy to prioritize their healthcare (Singh et al. 2019). Women who possess a bank account are more likely to utilize contemporary contraception, have more gaps between their births, and receive Antenatal/Prenatal Care (ANC). Mothers with a minimum of 1-3 ANC clinic visits were found to be significantly less likely to meet the requirement for introduction to solid, semisolid, or soft foods than their counterparts who had a minimum of eight ANC clinic visits, indicating that an increased likelihood of practicing introduction to solid, semisolid, or soft foods was associated with more ANC clinic visits (Dhami et al. 2021). A study also found that 69% of women who hold a bank account (compared to 49% who do not) said they knew exactly a family planning technique, according to Singh et al. (2019). These studies also indicated that owning a bank account is correlated to women's empowerment and can also contribute to enhancing self-confidence and the capability of women to establish better healthcare planning for their future, including the health of their families. Other study carried out in the same setting has shown that financial inclusion for women can enhance the bargaining strength and influence of women on important topics, such as financial and health (Desai and Tarozzi 2011) However, studies on the impacts of bank account ownership on IYCF practices were also limited.

More pertinent is that the higher education leads to increased income through boosting access to better-paying occupations or making self-employment more economically effective. This increased income, in turn, facilitates access to health-promoting resources, such as enhanced access to nutritious food; better living and working environments; and preventative or even curative medical treatment (Fuchs 2010). Other study found that mothers education was associated with adequate complementary feeding practices. Mothers with secondary education or above are considerably more likely than their counterparts with lower education to fulfil the criteria for minimum dietary diversity and minimum meal frequency (Dhami et al. 2021).

The IYCF practices were also linked to the children's age and sex, household wealth, and location of residence, according to studies (Puspitasari and Gayatri 2020). It was found that older children, girls, children who came from better household wealth, and urban children were more likely to be well fed than other children. It might be because mothers of younger children were less likely to know about the minimum diet diversity, minimum meal frequency, and minimum acceptable diet for their children. Meanwhile, mothers of children who came from wealthier households and lived in urban areas were more likely to have better access to information on and financial resources for adequate IYCF practices. However, this study used two separated indicators to represent the IYCF practices.

Based on the statements above, the purpose of this study is to examine the impact of internet usage and bank account ownership on IYCF practices in Indonesia after controlling for the effects of child, mother, and household factors. IYCF was assumed to be better practiced by children whose mothers accessed the internet or had a bank account.

2. Methods

This study employed data from the results of 2017 Indonesian Demographic and Health Survey / IDHS 2017 (BKKBN et al.2018). The unit of analysis was the last-born infant or child aged 6–23 months, who was currently alive and living with the mother. The total sample was 4,880 children aged 6–23 months.

The dependent variable was the infant and young child feeding (IYCF) practices, represented by the minimum acceptable diet (MAD) indicator. This indicator was the combination of two other indicators, namely the minimum dietary diversity (MDD) and the minimum meal frequency (MMF). According to the World Health Organization (WHO), the minimum acceptable diet recommendation is different for the breastfed and non-breastfed children, as presented in Table 1. Therefore, infants and children who can meet the minimum recommendation of MDD and MMF practices are also considered to meet the MAD standard. Table 2 displays the formation and category of the minimum acceptable diet indicator (MAD) used in this study. is If infants or children only comply with one indicator, whether MDD or MMF, they only receive partially the IYCF practices. If they meet the standard of both indicators, it means they fully receive the IYCF practices. This categorization has not been used in any other studies.

Table 1. Indicators Used to Develop the Minimum Acceptable Diet (MAD) Indicator

Indicators	Category	Recommendation
Minimum Dietary Diversity (MDD)	Breastfed child	Consuming at least four food groups (out of seven food groups[a])
	Non-breastfed child	Consuming at least four food groups, except the milk feedings (out of seven food groups)
Minimum Meal Frequency (MMF)	Breastfed child	Consuming solid or semisolid food at least two times per day for 6-8 months children or four times per day for 9-23 months children.

[a] Food groups: grains, roots, and tubers; legumes and nuts; dairy products (milk, yogurt, cheese); flesh foods (meat, poultry, fish, liver/organ meat); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables

Table 2. The Categories of the Minimum Acceptable Diet (MAD) Indicator

	MDD	MMF	MAD	Description
Breastfed Children	1	1	2	Full IYCF Practice
Non-breastfed Children	1	1	2	Full IYCF Practice
Breastfed Children	1	0	1	Partial IYCF Practice
Non-breastfed Children	0	1	1	Partial IYCF Practice
Breastfed Children	0	0	0	No IYCF Practice
Non-breastfed Children	0	0	0	No IYCF Practice

The main independent variables used in this study were the mother's internet usage and mother's bank account ownership, whether from bank or other financial institution. The control variables were the child's age, child's sex, mother's education level, household's wealth index, and place of residence. These variables are selected as they represent the children's, mother's, and household' characteristics. The data was analyzed using the ordered logistic regression as the dependent variable in the study has significant order (Hosmer and Lemeshow 2020) as presented in Table 2 (full IYCF practice, partial IYCF practice, and no IYCF practice). The model is as follows.

$$log\left[\frac{P(Y \leq k)|x)}{1 - P(Y \leq k|x)}\right] = \beta_0 + \beta_1 Internet + \beta_2 Bank + \beta_{32} CAge2 + \beta_{33} CAge3 + \beta_{34} CAge4 + \beta_4 CSex + \beta_5 MEduc + \beta_{62} HHWealth2 + \beta_{63} HHWealth3 + \beta_7 Rural + \varepsilon$$

$P(Y \leq k|x)$ is the cumulative probability of children aged 6–23 months to receive IYCF practices with the category k where $k = 2$ (full IYCF practices).

3. Results and Discussion

3.1 Sample Characteristics

The sample characteristics in this study are presented in Table 3. It can be seen slightly more than half (50.2%) of mothers of infants and children in the sample ever used the internet and only 37.9% mothers have a bank account. In addition, most mothers attended secondary schools (59.1%), followed by primary level or lower (23.7%) and higher education (17.1%). According to child's characteristics, most infants and children were 12–17 months (35.3%) and 18–23 months (31.3%). The number of boys and children was slightly higher (51.9%) than girls and children. Based on household characteristics, the majority of children were from higher levels of the household wealth index (41%), followed by those from the lower wealth index households (39.4%) and middle wealth index households (19.5%). In addition, around 50.8% of the samples lived in rural areas.

Table 3. Percentage Distribution of Infants and Children Age 6-23 Months by IYCF Practices by Child's, Mother's, and Household's Background Characteristics Mother.

Variables	IYCF Practice				
	No Practice	Partial	Full	Total	
	%	%	%	Observation	%
Internet Usage					
Never used the internet	28.7	36.9	34.4	2.429	49.8
Ever used the internet	24.1	27.1	48.8	2.451	50.2
Bank account Ownership					
No	27.5	36.4	36.1	3,027	62.0
Yes	24.6	24.8	50.6	1,853	38.0
Infant/Children's Age					
6-8 months	34.2	46.9	18.9	773	15.8
9-11 months	29.6	34.5	35.9	851	17.4
12-17 months	21.5	31.3	47.2	1,726	35.4
18-23 months	26.1	23.9	50.0	1,530	31.4
Infant/Children's Sex					
Male	26.9	31.3	41.8	2,535	51.9
Female	25.8	32.8	41.4	2,345	48.1
Mother's Education					
Primary or lower	31.6	38.1	30.3	1,157	23.8
Secondary education	25.5	32.6	41.9	2,886	59.1
Higher education	22.3	21.5	56.2	837	17.1
Household Wealth Index					
Lower	29.3	39.4	31.3	1,924	39.4
Middle	25.6	31.7	42.7	952	19.5
Higher	24.0	25.0	51.0	2,004	41.1
Residence					
Urban	24.6	27.8	47.6	2,398	49.1
Rural	28.1	36	35.9	2,482	50.9
Total	26.4	32.0	41.6	4,880	100.0

3.2 The IYCF practices by child's, mother's, and household's background characteristics

The percentage distribution of IYCF practices by background characteristics of child, mother, and household is given in Table 4. It can be seen that the percentage of children aged 6–23 months who received full IYCF practices was higher among children aged 6–23 months whose mothers ever used the internet and whose mothers had a bank account. In addition, it was higher among children who were aged 18–23 months, who were boys, whose mothers had higher education, who came from wealthier households, and who lived in urban areas than among other children aged 6–23 months. In general, only 41.6% of children aged 6–23 months received full IYCF practices.

3.3 The relationship between mother's internet usage and bank account ownership and IYCF practices

The results of ordered logit regression model, i.e. the odds ratio and *p*-value, are displayed in Table 4. It can be seen that mother's internet usage and bank account ownership had significant effects IYCF practices statistically at the 10% significance level. Meanwhile, all control variables in the model also had significant effects on IYCF practices statistically, except child's sex.

After controlling for the effects of other factors, the probability of getting better IYCF practices was 15% higher among children aged 6–23 months whose mothers ever used the internet than among children aged 6–23 months whose mothers never used the internet. Similarly, it was 14% higher among children aged 6–23 months whose mothers owned a bank account than among children aged 6–23 months whose mothers did not own a bank account.

Table 4. Odds ratio (OR) of Mother's Internet Usage, Mother's Bank Account Ownership, and Selected Characteristics on IYCF Practice

Covariates		Odds Ratio [95% CI]	p-value[a]
Internet Usage (ref: never)			
	Ever used the internet	1.15 [0.99 – 1.34]	0.064*
Bank Account Ownership (ref: no)			
	Yes	1.14 [0.98– 1.32]	0.099*
Infant/Child's Age (ref: 6-8 months)			
	9-11 months	1.60 [1.31 – 1.95]	0.000***
	12-17 months	2.60 [2.18– 3.10]	0.000***
	18-23 months	2.55 [2.11 – 3.08]	0.000***
Infant/Child's Sex (ref: boy)			
	Girl	0.99 [0.87 – 1.13]	0.886
Mother's Education (ref: primary or lower)			
	Secondary education	1.27 [1.07 – 1.51]	0.006***
	Higher education	1.70 [1.32 – 2.18]	0.000***
Household Wealth Index (ref: lower)			
	Middle	1.26 [1.04 – 1.53]	0.018**
	Higher	1.35 [1.13 – 1.62]	0.001***
Residence (ref: urban)			
	Rural	0.87 [0.75 – 1.01]	0.074*
Constant 1		0.053	
Constant 2		1.490	

[a] (*) indicates the variable is significant at $p < 0.1$, (**) significant at $p < 0.05$, and (***) significant at $p < 0.01$

Ceteris paribus, children aged 9–11 months, 12–17 months, and 18–23 months were, respectively, 1.6 times, 2.6 times, and 2.6 times more likely to receive better IYCF practices than children aged 6–8 months. In addition, children aged 6–23 months whose mothers had secondary and higher education were, respectively, 1.3 times and 1.7 times more likely to receive better IYCF practices than children aged 6–23 months whose mothers had primary or lower education. Further, children aged 6–23 months who came from middle and higher wealth index households

were, respectively, 1.3 times and 1.3 times more likely to receive better IYCF practices than children aged 6–23 months who came from middle and higher wealth index households. Furthermore, children aged 6–23 months who lived in rural areas were 0.9 times less likely to receive better IYCF practices than children aged 6–23 months who lived in urban areas.

3.4 Discussion

Improved IYCF practice shows a strong correlation to internet use among mothers with infants and young children. Mothers who use Information and Communication Tools (ICT) can access health messages, assistance, support, and referral information to health services or providers (Khan et al. 2018). Mothers who have access to health services or providers have the opportunity to regular and continuous contact with health workers. It enlarges the mother's opportunity to receive interactive health information and counseling sessions, including increased mothers' knowledge in providing appropriate food for infants after childbirth, breastfeeding, and complementary feeding (MPASI) (Titaley et al. 2019). According to a study, internet-based e-technologies transform the accessibility and service of breastfeeding therapy. As a result, internet usage has a significant potential to assist breastfeeding mothers in their need for breastfeeding support and guidance (Alomhanna et al. 2020).

This study found mothers who own financial or bank account also tend to do full IYCF practice compared to mothers who do not own the account. Owning a bank account is correlated to women's empowerment and therefore can contribute to enhanced self-confidence and the women 's ability to plan better for their future, including the health of their families. Women who have a bank account are more likely to take modern contraceptives, have more gap between births, and obtain prenatal care (ANC) (Singh et al. 2019). There were substantial differences in the likelihood of mothers who had less than eight ANC visits to satisfy the criteria for introduction to solid, semisolid, or soft meals meeting the requirement compared to mothers who had at least eight ANC visits. It shows that more ANC visits were related to higher probabilities of solid, semisolid, or soft food introduction practices (Dhami et al. 2021). These findings highlight the need for accessible and affordable health workers and ANC services for IYCF practices that is mostly available for mothers that used internet and had bank account. As women's financial inclusion increases, so does their bargaining power and influence over important issues, such as their money and health (Desai and Tarozzi 2011).

According to infants and children characteristics, this study found that older infants and children tend to receive full IYCF. This happens because after the age of 6 months, infants begin to receive complementary food (MPASI) which demands an adequate daily frequency of eating according to their age. As children get older, their nutritional needs will also increase. There will be issues with infant growth and development if breastfeeding is not supported with MPASI (appropriate complementary feeding based on age). The body's nutritional needs should be increase. Therefore, linear growth retardation may develop if a kid does not consume sufficient complementary foods (Titaley et al. 2019). Regarding the children's sex, boys and children tend to receive full IYCF practice. This is associated with the notion that boys and girls in Indonesia have received an equal share of their parents' investment wealth (Kevane and Levin 2000). However, after being controlled with other variables, the order logistics regression shows that infant's and children's sex is insignificant. In other words, there is no difference in IYCF practice according to the infant's and children's sex.

The health of a new-born is hugely affected by the mother's actions and decisions. Therefore, quality education makes mothers selective and creative in providing nutritious food for their children (Budiastutik and Nugraheni 2018). This study has shown that children with better-educated mothers tend to follow full IYCF practice. The odd of practicing better IYCF for mothers who attend higher education is 70% higher and for mothers who have secondary education is 27% higher than mothers whose education is primary or lower. Mothers who had higher educational level tend to have adequate capacity for reading and able to synthesize the key messages from the various source of health information (Abuya et al 2011). Therefore, the provision of simple and effective health messages on proper feeding practices should be addressed to mothers with low levels of education. Policies that strengthen the access of women to education in Indonesia are also must be maintained and continuously improved.

According to the findings, children who had a higher household wealth index and resided in urban regions had mothers who practiced better IYCF. The ability of households to purchase good quality food and to access the adequate health services are the contributing factors) (Titaley et al. 2019).. The accesses of rural communities to mass media sources that promote appropriate feeding practices were limited. It is caused by many factors, such as: the availability of health workers or practitioners, problems with the accessibility to electricity, poor technology and

communication's infrastructures and less public transportation that support access to health facilities in the rural areas. Mothers in the rural areas have limited time to visit health facilities because they usually went to the garden from morning to evening in helping their husband who worked in agricultural sector. Therefore, rural mothers did not have large opportunity to get adequate information and sharing session between mothers in the villages (Tasnim and Dasvarma 2018). In addition, the agricultural sector is vulnerable to the weather and climate's changes. It implies that their income tends to be lower. Therefore, feeding patterns/practices of children in low socio-economic groups are limited by their capacity to meet their nutritional needs.

Children from low socioeconomic households and mothers with low education levels generally have unhealthy eating habits/patterns, which tend to consume more energy-dense foods than children from high socioeconomic groups who generally have a higher intake of fruit and vegetables (Santika et al. 2016). Meanwhile, households with a higher wealth index are more likely to have nutritious foods which meet their children's dietary needs (Titaley et al. 2019). Compared to children from other socioeconomic groups, children from high socioeconomic groups consume more legumes and nuts, dairy products and their derivatives, various types of meat, eggs, fruits, and vegetables with vitamin A. They also have a diet consuming fortified foods which contribute greatly to their overall nutritional intake, especially in the adequacy of nutritional micronutrients (Santika et al. 2016). These findings highlight that the interventions to improve feeding patterns in children must pay attention to the gradient of household socioeconomic status. Another thing that needs to be considered is the improvement of the economic status of the household to ensure that every child has access and availability to healthy food. In addition, priority for nutrition interventions, including IYCF practices, must reach all villages in Indonesia so that the reduction in the prevalence of stunting can be accelerated (Trihono 2015).

4. Conclusion

The results of this study showed that only 42% of children aged 6–23 months in Indonesia were well fed, i.e. receiving full IYCF practices. In addition, mother's internet usage and bank account ownership were found to have significant positive impacts on the IYCF practices in Indonesia. Higher odds of being well fed were associated with ever use of the internet and having a bank account among the mother's. Older children, children aged 6–23 months whose mothers had better education, who came from wealthier households, and who lived in urban areas had higher odds of being well fed. Based on these findings it is recommended that in order to improve IYCF practices in Indonesia, the internet should be utilized in the IYCF practices' information, education, and communication activities, mothers should be empowered financially, and target the program to younger children, children with lower educated mothers and lower household wealth, and children in rural areas.

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