Association between women's empowerment and contraceptive failure in Indonesia: 2017 IDHS data analysis

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Abstract

Background: Contraceptive failure has negative consequences, including unwanted pregnancies and abortions, which can cause maternal morbidity and mortality. Contraceptive failure is influenced by individual factors such as the user and the quality of the contraceptive method/device. One of the individual factors is the cultural factor which can be seen from the empowerment of women in improving the quality of health, including the use of contraception. There is no study which has discussed women's empowerment as the determination of contraceptive failure.
Purpose: Therefore, this study aims to analyze the association of women's empowerment in contraception failure in Indonesia.
Methods: The data source used is the results of the 2017 IDHS (Indonesia's Demographic and Health Survey) with the unit of analysis from the period of using contraceptives to women who get pregnant while using contraceptives. The dependent variable is the duration of contraceptive usage. The main independent variable is women's empowerment as measured by four indicators, namely asset ownership in the name of the wife, ability of decision-making in the household, ability to earn cash by working, and attending at least junior high school. Data were analyzed using the survival analysis method.
Results: The results of the analysis show that the four factors of women's empowerment have a significant negative association with contraceptive failure after controlling for socioeconomic, demographic, and environmental factors.
Conclusion: Variables that are positively associated with contraceptive failure are participation in household decisions, education, residence status, and internet usage. Variables that are negatively associated with contraceptive failure are asset ownership, working status, and number of children.

Keywords: contraceptive failure; calendar data; idhs; survival analysis; women's empowerment

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Introduction

Singh et al. (2014) explain that as many as 74 million unwanted pregnancies occur every year in developing countries, and 30 percent of the causes are due to failure of contraception in both traditional and modern devices/methods, including those related to contraceptive methods/devices (effectiveness) and contraceptive usage (incorrect or inconsistent use). Unwanted pregnancies can have negative consequences, namely the birth of unwanted children or the practice of abortion, which will increase maternal and infant mortality rates (Trussell, 2009). Unwanted births affect the quality of the mother and child in the future.

From 2012 to 2017, the unwanted birth rate in Indonesia increased from 13.6 percent to 15.2 percent (BKKBN, 2017). Some of these unwanted births are entirely undesired by the parents, and the figures remained relatively constant from 2012 to 2017. Around 7 out of 100 births are completely unwanted, as shown in Figure 1. The slight decreasing trend shows the improvement in the quality of health.

Data on abortion from Utomo's latest study in 2000 suggest there were

37 abortions for every 1,000 women who became pregnant at the age of 15-49 (Guttmacher Institute, 2008). In the report of the Indonesian Family Planning Association, there were 32,729 women in the 2010-2014 period who received safe abortion services at 13 PKBI clinics spread across Indonesia. The majority of this figure consisted of married women (83.4%), with 2.1 percent being previously married, while 16.5 percent were unmarried women. In order to prevent negatives consequences, it is imperative to improve the involvement of women in accessing appropriate healthcare services (Singh et al., 2019).

Increasing the role of women is in line with goal number five of the Sustainable Development Goals (SDGs) , which is achieving gender prosperity and empowering women; therefore, it is an issue that we should take into account in formulating women's quality of life . Women's empowerment is also recognized as a necessary element so that couples can access reproductive health services, including family planning to improve maternal and child health (Medel-anonuevo, 1997).

Indonesia's Gender Development Index (GDI) data show nearly a decade-long increase, namely 90.07 percent in 2012 and 91.27 percent in 2021. Meanwhile, Indonesia's Global Gender Inequality Index (GII) data have also increased from 2006 (0.654) up to 2021 (0.688) by 0.034 points. This indicates that gender development in Indonesia has increased, but has not necessarily reduced the gender gap that has occurred in Indonesia.

The contraceptive failure rate in Indonesia (within 12 months of use) shown a downward trend in the 1991-2012 period, but in 2017 there was slight increase of around 0.1 point compared to the previous period of the Indonesia's Demographic and Health Survey (IDHS). The number in 2017 seems small, but considering the negative consequences discussed earlier, even a small increase deserves attention.

The 2017 IDHS report does not specifically discuss contraceptive failure rates and only lists contraceptive failure as one of the reasons for discontinuing contraceptive usage based on the contraceptive method/device. The report also discusses women's empowerment but not the association with contraceptive failure.

Utilization of IDHS calendar data is not only able to see the total discontinuation of contraception, but it is also important to look at each of the reasons for discontinuing contraception, including contraceptive failure. Contraceptive failure is the only reason for involuntary discontinuation of contraception. This makes the user exposed to negative consequences unnoticed.

Research on the determinants of contraceptive failure using IDHS data is rarely conducted (Arifin, 2003; Bradley, 2009, 2016a, 2019; Curtis & Blanc, 1997; Polis, 2016a, 2016b; Rahmatiqa, 2016). However, no the research has discussed women's empowerment as a determinant of contraceptive failure. Research on the use of contraception in Indonesia generally focuses on the effectiveness of the method/device (Nurullah, 2021; Putri & Oktaria, 2016; Yenie, 2017), quality of family planning facilities (Mulyaningsih & Sariyati, 2014; Rahardja, 2011) as well as those related to the behavior of using other contraceptive methods (Indahwati et al., 2017; Samosir et al., 2019, 2020; Septalia & Puspitasari, 2017; Suwardika, 2016; Utami et al., 2020). This issue makes it is important to study the relationship between women's empowerment in terms of socioeconomic, demographic, and environmental factors

Theoretical Review

Determinant Theory Regarding Contraception

Easterline (1975) created a synthetic framework between both child supply and demand together influencing the motivation of fertility regulation. In this, married couples are confronted with a significant issue in the future due to surplus supply of children compared to the demand for them, resulting in the potential occurrence of unwanted

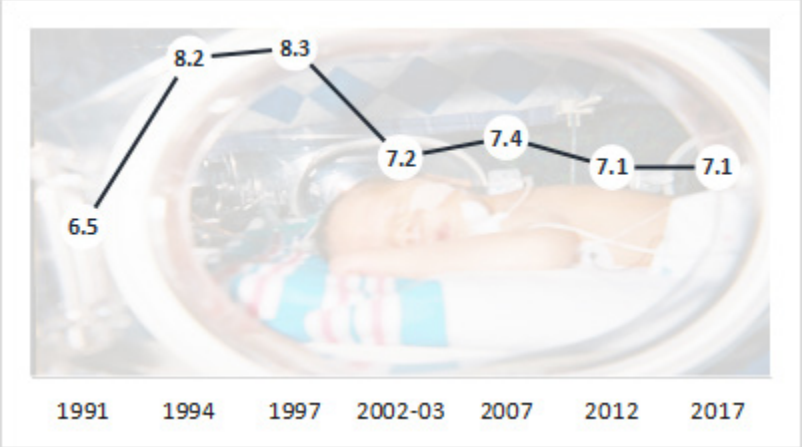

Figure 1. Percentage of Totally Unwanted Births in Indonesia, 1991-2017
Source: IDHS 1991-2017, reprocessed

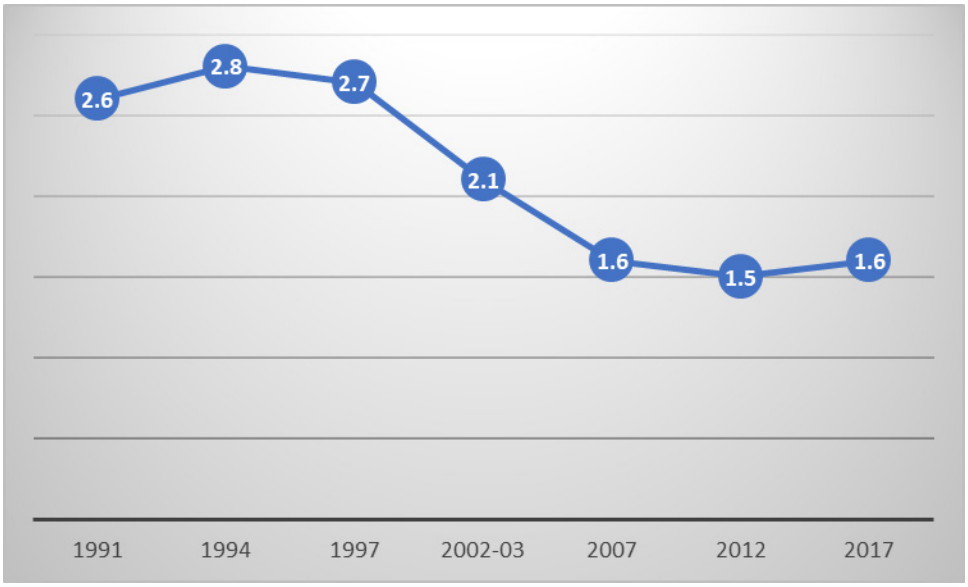

Figure 2. Failure Rate of Contraception Use for 12 Months in Indonesia, 1991-2017
Source: IDHS 1991-2017, reprocessed

children. This motivates married couples to arrange the pregnancies. The motivation to control fertility is influenced by psychological costs, which entails dissatisfaction with ideas or practices in fertility management, and market costs, which are the costs of accessing contraceptive methods. Socioeconomic, demographic and environmental factors influence motivation through supply and demand of children.

Bulatao (1984) established a conceptual framework that describes the combination of key elements and policy levers to reduce fertility. Three types of fertility behavior directly affect fertility outcomes, namely timing of marriage, duration of breastfeeding, and contraceptive and abortion practices. These behaviors can also affect directly through regulations and programs, including family planning programs. In addition, these behaviors can also indirectly influence through development policies and programs that change the socioeconomic characteristics of households. Therefore, the tendencies and decisions of each household member depend on each of these types of behavior.

Bulatao and Lee (1983) conceptualized all the determinants of the behavior of using contraceptives seen from the demand and supply of children with the factors that influence them. Cultural, anthropological, religious, institutional, economic, and gender factors are seen from the perspective of social institutions, cultural norms, economy, and environmental conditions; family structure, kinship, and intergenerational relations; socioeconomic characteristics; and reproductive history, namely marriage and childbirth experience. These will all affect demand for children, supply for children, and costs related to fertility regulation. Contraceptive failure, i.e. getting pregnant while using contraception occurs at the contraceptive usage stage. Factors that influence indirectly are the individual and social background of women and those that directly influence are the demand for children and the availability of children as well as the costs or efforts related to fertility. Contraceptive failure then affects the number of live births that will become a woman's birth experience.

Bertrand et al. (1996) stated that the demand for family planning was influenced by when a person enters childbearing age, the age of first marriage, fertility and all factors from users/acceptors. Family planning is also influenced by the provider, namely the quantity and quality as well as the acceptability of family planning services. Some of these factors will eventually reduce the number of births so that small quality families will be formed.

Health Behavior Theory

According to Karr's (1983) theory as cited in Notoatmodjo (2007), there are five determinants of health behavior, namely the existence of a person's intention to take action related to health or healthcare (behavior intention); existence of social support from the surrounding community (social support); availability or absence of information about medical treatment or medical facilities (accessibility of information); individual autonomy in making decisions or actions (personal autonomy); and situations that contribute to action or non-action (action situation).

Personal autonomy includes women in decisions regarding health, especially the use of contraceptives.

Women's Empowerment

Women's empowerment according to UNESCO (1995) can be defined as the ability of women to

Table 1. Variables used in research

Variable	Symbol	Description
Episode Length Before Fail	Conlgthc	Length of use of contraception until stopping due to pregnancy while using/failure (in months)
Women's Empowerment Index	Iwe	Women's Empowerment Index from 4 dimensions: ownership of property in the name of the wife, self-participation in all decisions in the household, paid working status, minimum education equivalent to junior high school (0=low; 1=middle; 2=high)
Asset	Asset	Property in the name of the respondent (0=no;1=yes)
Decision	Dec	Participation in decision-making index calculated from self-decision making for all decisions on women's health, spending, physical mobility/visitation (0= weak; 1= strong)
Work	Work	Working status of women (0=not working and work is not paid with cash; 1=work and paid with cash)
Education	Educ	Last education level (0=have no education and elementary school; 1=junior high school and above)
Age	Age	Age of woman at onset of episode in years (0<25; 1=25-34; 2=>35)
Territory Status	Urban	Residential area status (0=rural; 1=urban)
Number of children	Parity	Number of children alive at the start of the episode (0=0; 1=1-2; 2=3+)
Method	Method	Type of contraception used in the episode (0=traditional; 1=pill; 2=IUD & implant; 3=injection; 4=condom)
Reason	Intent	Reasons for using contraception in the episode (0=spacing ; 1=limiting)
Internet	Net	Internet usage (0=never; 1=never)
Economy	Well	Economic Status (0=low; 1=medium; 2=high)

gain power in managing all activities and decisions in all aspects of their lives. The United Nations Development Fund for Women (UNIFEM) defines women's empowerment as meaning that women have meaningful access and control in earning a sustainable and long-term livelihood, and are able to receive material reciprocity from this access and control.

The concept of women's empowerment, according to Kabeer (1999), consists of three dimensions, namely resources, i.e. the preconditions that affect a woman's ability to determine her life goals and act independently to achieve these goals. These initial conditions include women's employment status, education level, property status and social norms; Agency or autonomy is the ability of women to set goals in their lives and act independently to achieve these goals. In this dimension, there is a process of how women make decisions that have been considered and chosen; achievements are conditions that are the outcome of all of these processes, namely conditions where women are empowered, such as how to increase women's labor force participation, how to increase women's political participation, etc.

Karp et al. (2020) conceptualized the measurement of women's empowerment in women's health and reproduction. They examined how women and girls deal with external pressure or rewards to exercise and meet their reproductive needs. The proposed conceptual framework takes the basis of the empowerment framework from the World Bank and considers that empowerment involves developing from using exercise of choice to achieve achievement of choice. The structure of resources and opportunities are the factors behind the emergence of existing choices, exercise of choice, and choice of goals to be addressed (achievement of choice). Teenagers will usually use existing options, and then, as they get older, women will practice self-efficacy, will negotiate and then make decisions. Agency influences this practice and leads women to their goal of doing something of their own choosing.

From several empirical reviews of women's empowerment, researchers combined previously used variables that had proven to have a significant effect. Therefore, the factor of women's empowerment is taken from four dimensions by looking at the variables of property ownership in the name of the wife, the wife's autonomous participation in household decisions, a school diploma of minimum junior high school level, employment/working status in the last 12 months and being paid with cash.

Materials and Methods

Design and participants

The type of data used in answering the research questions is cross-sectional in nature, originating from the 2017 IDHS.

Samples

The 2017 IDHS data were chosen because IDHS has complete contraceptive usage history data in the contraceptive calendar data. The units of analysis of the study are episodes or segments of contraception use by all women in the age group 15-49 years. One episode is a period of continuous use of one type of contraceptive device or method. The number of episodes found was 25,930 episodes of contraceptive usage from 17,784 women aged 15-49 years.

Data Analysis

The discussion of this research will begin with an overview of the data that have been obtained , then it will discuss the estimated duration of using contraceptives until it stops due to pregnancy (failure). This study will also discuss the formation of the women's empowerment index using the principal component analysis (PCA) method.

This study contains temporal information with events being an important assumption on the dependent variable in the analysis of survival rates. This is in line with the purpose of this study which wants to see the risk of contraceptive failure; therefore, the analysis used in this research is survival analysis. In this case the data used are incomplete data, that is, not all observation units are observed to have failed at the end of the study period. Then with the type III censorship method, the period in when the respondent used contraception was started. The measurement scale is in months and failure occurs when a woman becomes pregnant while using contraception.

A parametric approach is used in the survival analysis of this study because the number of analysis units in the observation period is relatively large. After the distribution of lifetime data is tested with AIC values, wherein the model with the smallest AIC is considered the best model, these data will be modeled with the Gompertz Proportional Hazard Model.

Two Gompertz Proportional Hazard models are used. The first uses all independent variables except for the women's empowerment index variable. The second model uses the women's empowerment index without its constituent components. Both models are controlled for socioeconomic, demographic, and environmental factors.

Results

Sample Overview

Contraceptive usage by women of childbearing age shows differences in asset ownership, participation in household decisions, education, age group, status of residence, number of children born alive at the end of the episode, method of contraceptive usage, reasons for using contraception, internet usage, and wealth index. Of all the analysis units, the segment that uses contraception most is women that do not independently participate in all household decisions, amounting to 94.5 percent.

Figure 3 shows the percentage and the duration of failed contraceptive usage . The contraceptive usage segment that stopped due to pregnancy was 3.15 percent, which means that this segment experienced contraceptive failure. The rest, amounting to 96.85 percent of contraceptive usage, did not stop or stopped for reasons other than pregnancy. The figure also shows that the longer the use of contraception, the fewer contraceptive failures occurred. The graph shows a fairly flat shape in the first year of contraceptive usage, which means that contraceptive failure often occurs during short durations of use.

Patterns and Differences of Contraceptive Failure

Table 3 shows the percentage of contraceptive failure according to the women's empowerment factor. It can be seen that the highest percentage of contraceptive failure occurred among women who participated in household decisions themselves (3.5%), while the lowest was among women who did not attend school or attended school with an elementary school graduation/equivalent (2.2%). After being tested by Pearson correlation and likelihood-ratio , a significant difference is seen with a confidence level of 90 percent for asset ownership and above 99 percent for education, while the others are not significantly different.

The category that has the highest failure rate for each variable in Table 4 is the segment aged 25-34 years (3.9%), living in urban areas (3.7%), having 0 children (4.3%), traditional contraception method (10.5%), reasons of using contraception for spacing (3.4%), ever used the internet (3.8%), and with a high wealth index (3.6%). Pearson correlation and likelihood-ratio testings show the variables that were significantly different with a 99 percent confidence level were age group, residence status,

Gompertz Proportional Hazard Model 1

$$h(t,x) = exp(\gamma t)exp(\beta_0 + \beta_1 asset + \beta_2 dec + \beta_3 work + \beta_4 educ + \beta_5 ages_1 + \beta_6 ages_2 + \beta_7 urban + \beta_8 parity_1 + \beta_9 parity_2 + \beta_{10} method_1 + \beta_{11} method_2 + \beta_{12} method_3 + \beta_{13} intent + \beta_{14} inet + \beta_{15} wel) \quad (1)$$

Gompertz Proportional Hazard Model 2

$$h(t,x) = exp(\gamma t)exp(\beta_0 + \beta_1 iwe + \beta_2 ages_1 + \beta_3 ages_2 + \beta_4 urban + \beta_5 parity_1 + \beta_6 parity_2 + \beta_7 method_1 + \beta_8 method_2 + \beta_9 method_3 + \beta_{10} intent + \beta_{11} inet + \beta_{12} wel)$$

Table 2. Characteristics of the Sample According to Socioeconomic, Demographic, and Environmental Factors

	Characteristics	Amount	%
Ownership of assets in the name of the wife	Do not own	22989	88.7
	Own	2,940	11.3
Participation in household decisions	Not independently	24,499	94.5
	Autonomously	1,431	5.5
Working Status	Not working and working but paid not in cash	14,093	54.3
	Working and get paid in cash	11,837	45.7
Education	<Junior High School	7,410	28.6
	Junior High School minimum	18,520	71.4
Reasons for using contraception	Spacing	15,354	59.2
	limit	10,576	40.8
Age group	15-24	6,837	26.4
	25-34	11,435	44.1
	35+	7,658	29.5
Status of residence	Rural	13,496	52
	Urban	12,434	48
The amount of live born baby (ALH) at the end of the episode	0 children	1,018	3.9
	1-2 children	18,396	70.9
	3+ kids	6,516	25.1
Methods of use of contraception	Traditional	2,476	9.6
	Pills	6,056	23.4
	IUDs & Implants	3,178	12.3
	Inject	13,122	50.6
	Male condom	1,088	4.2
Reasons for using contraception	Spacing	15,354	59.2
	limit	10,576	40.8
Internet usage	Never	14,276	55.1
	At least once	11,647	44.9
Wealth index	Low	9,788	37.7
	Intermediate	5,632	21.7
	High	10,510	40.5

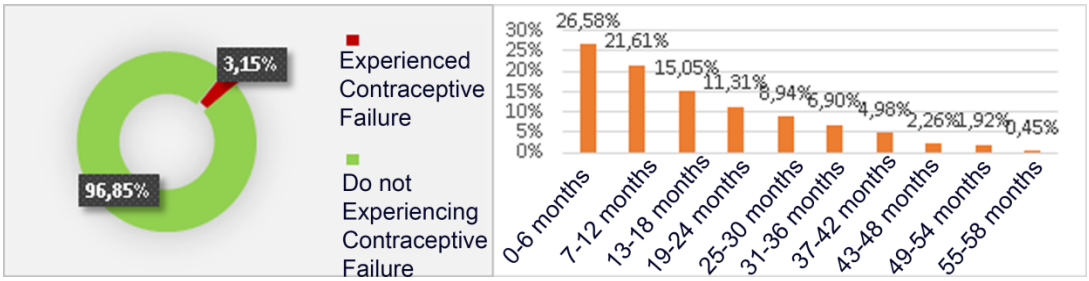

Figure 3. Percentage of Samples Experiencing Contraceptive Failure and Distribution of Duration of Use of Certain Contraceptives in Women Experiencing Failure
Source: IDHS 2017, reprocessed

Table 3 Contraception Failure according to Women's Empowerment Factors and Socioeconomic, Demographic, and Environmental Factors

Characteristics	Contraceptive Failure (%)		Total		P-values
	No	Yes	Amount	%	
Asset ownership					
Does not own property in the name of the wife	96.8	3.2	22,989	100	0.077
Owns property in the name of the wife	97.4	2.6	2,940	100	
Participation in household decisions					
Does not participate independently in household decisions	96.9	3.1	24,499	100	0.364
Participates independently in household decisions	96.5	3.5	1,431	100	
Working Status					
Not working and working but paid not in cash	96.9	3.1	14,093	100	0.69
Working and get paid in cash	96.8	3.2	11,837	100	
Education					
Not attending school & attending school with primary school graduation/equivalent	97.8	2.2	7,410	100	0.000
Go to school with a minimum graduate of junior high school/equivalent	96.5	3.5	18,520	100	
Women's Empowerment Index					
Low	96.9	3.1	12,080	100	0.338
Intermediate	96.7	3.3	11,681	100	
High	97.3	2.7	2,170	100	
Age group					
15-24 years	96.9	3.1	6,837	100	0.000
25-34 years	96.1	3.9	11,435	100	
35+ years	97.8	2.2	7,658	100	
Status of residence					
Rural	97.3	2.7	13,496	100	0.000
Urban	96.3	3.7	12,434	100	
The amount of ALH at the end of the episode					
0 children	95.7	4.3	1.018	100	0.085
1-2 children	96.9	3.1	18,396	100	
3+ kids	97	3	6,516	100	
Methods of use of contraception					
Traditional	89.5	10.5	2,476	100	0.000
Pills	94.8	5.2	6,056	100	
IUDs & Implants	99	1	3,178	100	
Inject	98.8	1.2	13,122	100	
Male condom	94.9	5.1	1,088	100	
Reasons for using contraception					
Spacing	96.6	3.4	15,354	100	0.0122
limiting	97.2	2.8	10,576	100	

Cont. Table 3 Contraception Failure according to Women's Empowerment Factors and Socioeconomic, Demographic, and Environmental Factors

Characteristics	Contraceptive Failure (%)		Total		P-values
	No	Yes	Amount	%	
Internet usage					
Never	97.4	2.6	14,276	100	0.000
At least once	96.2	3.8	11,647	100	
Wealth index					
Low	97.1	2.9	9,788	100	0.000
Intermediate	97.3	2.7	5,632	100	
HIgh	96.4	3.6	10510	100	

Source: IDHS 2017, reprocessed

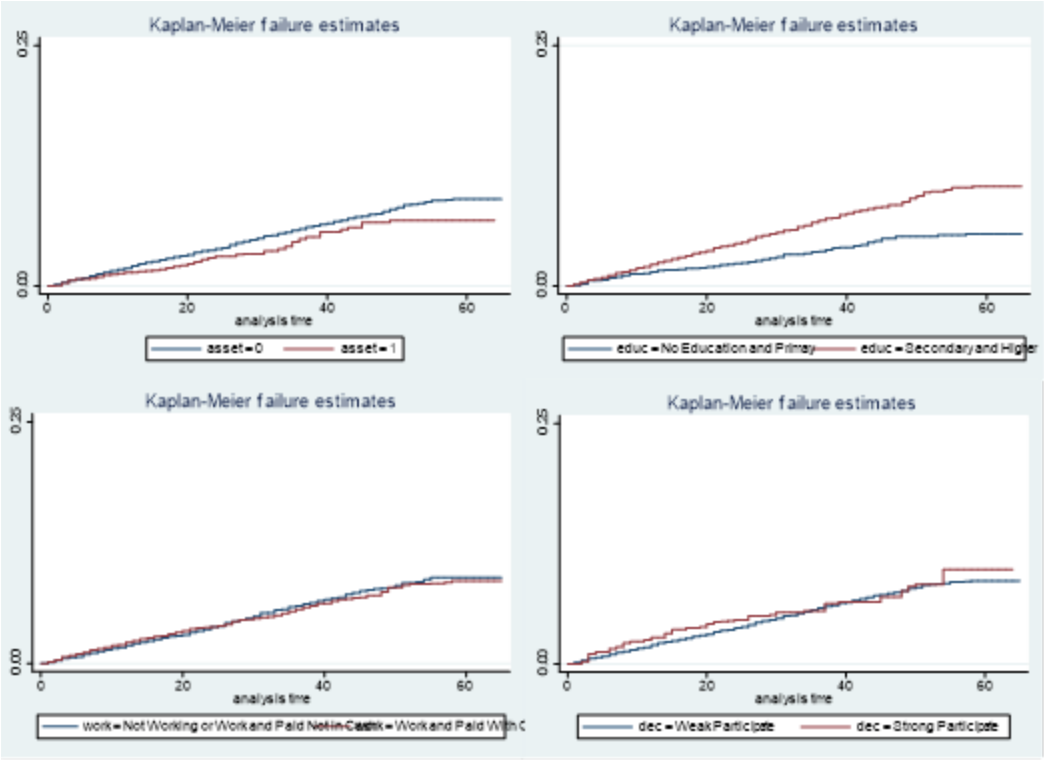

Figure 4. Differences in Contraceptive Failure Hazard Functions According to Women's Empowerment Factors
Source: IDHS 2017, reprocessed

method of contraceptive usage, internet usage, and wealth index. The reason for using contraception has a 95 percent confidence level, while the number of children has a 90 percent confidence level.

Analysis of the hazard function in this study used the Kaplan-Meier analysis method which is illustrated in graphical form as above. In Figure 4, it can be seen that, at the beginning of the observation, the hazard rates of these two groups did not have a significant difference. However, over time, the hazard rate in each category looks different. Variables that appear to have very different hazard rates between categories as time goes on are asset ownership and educational status variables.

The Relationship between Women's Empowerment, Socioeconomic, Demographics, and the Environment with Contraceptive Failure

Simultaneous test results show a significance value of 0.0011, which is smaller than , namely 0.05 (Prob > chi2 = 0.0011) which means rejecting H0. The

Table 4. Estimating Parameters and Hazard Ratio for Contraceptive Failure in Indonesia

	Model 1			Model 2		
_t	hazard Ratio	std. Error	95% Conf. Int	hazard Ratio	std. Error	95% Conf. Int
Women's Empowerment Index						
Low (Ref)						
Intermediate				0.889*	0.066	0.769,1.029
High				0.757**	0.109	0.571,1.005
Asset ownership						
Does not own property in the name of the wife(Ref)						
Owns property in the name of the wife	0.799**	0.097	0.630,1.014			
Participation in household decisions						
Does not participate independently in household decisions(Ref)						
Participates independently in household decisions	1,270*	0.185	0.954,1.690			
Working Status						
Not working and working but paid not in cash(Ref)						
Working and get paid in cash	0.868***	0.063	0.753,0.999			
Education						
Not attending school & attending school with primary school graduation/equivalent (Ref)						
Go to school with a minimum graduate of junior high school/ equivalent	1.325****	0.130	1,092,1,606			
Age group						
15-24 (Refs)						
25-34	1.176**	0.111	0.111	0.977,1.415	1.161*	0.109
35+	0.609****	0.078	0.078	0.474,0.782	0.587****	0.075
Status of residence						
Rural (Ref)						
Urban	1.115	0.088	0.088	0.955,1.300	1.130*	0.089
The amount of ALH at the end of the episode						
0 children (Ref)						
1-2 children	0.476****	0.079	0.079	0.344,0.659	0.481****	0.079
3+ kids	0.551****	0.104	0.104	0.380,0.799	0.549****	0.104
Methods of use of contraception						
Traditional (Ref)						
Pills	0.658****	0.057	0.057	0.556,0.779	0.645****	0.055
IUDs & Implants	0.077****	0.015	0.015	0.053,0.111	0.076****	0.014
Inject	0.109****	0.114	0.114	0.088,0.134	0.106****	0.011
Male condom	0.511****	0.076	0.076	0.381,0.683	0.510****	0.076

Cont. Table 4. Estimating Parameters and Hazard Ratio for Contraceptive Failure in Indonesia

	Model 1			Model 2		
_t	hazard Ratio	std. Error	95% Conf. Int	hazard Ratio	std. Error	95% Conf. Int
Reasons for using contraception						
Spacing (Ref)						
limiting	0.921	0.075	0.786,1.079	0.926	0.343	0.790,1.085
Internet usage						
Never (Ref)						
At least once	1.206***	0.105	1016,1431	1.282****	0.109	1.083,1.516

Source: IDHS 2017, reprocessed

conclusion is that there is at least one independent variable that affects the duration of contraceptive usage until stopping using it due to pregnancy, or in other words experiencing contraceptive failure. Then a partial test was carried out to see which variables had a significant effect on contraceptive failure. The test results can be seen in Table 4.

The results of the Gompertz parameter estimation in Table 3 show that the variable age group, number of children, contraceptive methods, internet usage, and the wealth index significantly influence contraceptive failure at the 99 percent, 95 percent, 90 percent and 85 percent confidence levels in both models. The women's empowerment factors in the first model are all significant, namely education at alpha 1 percent, working status at alpha 5 percent, asset ownership at alpha 10 percent, and participation in household decisions at alpha 15 percent. Meanwhile, the women's empowerment index variable is significant at the 85 percent confidence level for the medium empowerment index and for the high empowerment index at the 90 percent confidence level.

The urban status variable becomes significant with an alpha of 15 percent in the second model, which was not significant in the first model. On the other hand, the high wealth index is significant in the second model, where in the first model it is significant at the 85 percent confidence level. The reason for using contraception was not significant in either model. The baseline hazard value of the Gompertz model can be interpreted using the Gompertz parameter value in Table 4, namely the gamma value. The value of in the table is equal to 0.0025, then the hazard of contraceptive failure will increase exponentially from time to time. Table 4 contains the Gompertz model coefficients shown based on the hazard ratio (HR) value. HR in this study is the relative likelihood of someone experiencing contraceptive failure compared to the reference category.

Discussion

Overall, by looking at the women's empowerment index, it appears that women's empowerment has a negative relationship with contraceptive failure: women's empowerment will reduce the risk of contraceptive failure. This is consistent with the research hypothesis that women's empowerment will have a negative relation with contraceptive failure. Empowered women will tend to choose smaller family sizes (Bongaarts, 2003), so they will be more careful in using contraception and avoiding discontinuation, especially that causing failure(Singh et al., 2019; Tadesse et al., 2013).

Women who own a house in their own name have a small risk of experiencing contraceptive failure. Women who own or control assets are in a better position to improve their lives and survive a crisis (Singh et al., 2019). Women who work and are paid with cash have a smaller risk of experiencing contraception failure compared to women who do not work and women who work but are not paid in cash. This research is in line with Bradley (2009) who found that working women had a significantly lower tendency to fail than non-working women.

Women who make all decisions independently in matters of health, household expenses, and family visits have a higher risk than those who do not make all decisions independently. This is possible because these women will have more confidence in themselves to make decisions including regarding the use of contraception. Jejebhoy (1999) states that women's autonomy gives women the right to control and make decisions about her life, regardless of the opinion of her partner or pressure from others (All, 2016). Women with at least junior high school education have a tendency to fail compared to women who do not attend school or whose education level is less than junior high school. This research is in line with Arifin's (2003) research which found that education had a positive relationship with contraceptive failure. Bairagi and Rahman (1996) found a positive association of education with contraceptive failure, and even though only on other methods. According to Bongaarts and Potter (1983), health and nutritional status are several determinants of fertility. Educated users can have better health and nutritional status. Therefore, they may be more fertile, and, in turn, have a higher risk of failure. In addition, women with extensive knowledge will provide reporting on contraception that is more comprehensive and on target in survey interviews

so that the incidence of contraceptive failure can be recorded properly. Contrary to this study, Bonnet (2021) found that contraception failure will increase along with lower education level.

Women at the peak of childbearing age (25-34 years) are more at risk of failure due to the natural biological factors of these women. For women who are more mature (35+ years), besides biological reasons, there are also experience reasons that make these women more careful in using contraceptives thereby reducing the risk of contraceptive failure. This finding is consistent with previous studies which found that, as age increases, the contraceptive failure rate also decreases (Arifin, 2003; Bairagi & Rahman, 1996; Mulyaningsih & Sariyati, 2014).

Women who live in urban areas are more at risk of experiencing contraceptive failure than those in rural areas. This is in line with research from Moreno (1993) but different from Arifin's (2003) research which states that women who live in urban areas have a smaller possibility of experiencing contraceptive failure compared to those who live in rural areas.

Women who already have between one and two or more than three children, are less at risk of experiencing contraceptive failure compared to women who have not had any children at all. This is in accordance with Bairagi (1996), Kost (2008), Polis (2016a), and Sundaram (2017), whereas research from Bonnet (2021), explains that women with two or more children have a high chance of failing. Then there is the mediating opinion that women not having children or having too many children will tend to experience contraceptive failure compared to other women (Curtis & Blanc, 1997).

The traditional method, namely periodic abstinence and interruption of intercourse, is the method with the greatest risk because the determining factor for the success of the method is only from one party, that is the user. Meanwhile, modern methods rely on other factors, namely the efficacy of these contraceptives. The most effective modern contraception is the long-term contraceptive method (MKJP), namely the IUD and implants. This research is in line with previous studies which prove that the traditional method is the method with the highest failure rate (Arifin, 2003; Bairagi & Rahman, 1996; Bonnet et al., 2021; Curtis & Blanc, 1997; Jones & Forrest, 1992; Kost et al., 2008; Moreno, 1993; Polis et al., 2016a; Rahmatiqa et al., 2016; Sundaram et al., 2017). Contraceptive failure rates are high with condoms compared to other modern methods of contraception and injections and IUDs have low contraceptive failure rates (Arifin, 2003; Curtis & Blanc, 1997; Moreno, 1993; Polis et al., 2016b, 2016a). Implants and IUDs are the most effective methods among other modern contraceptive methods (Rahmatiqa et al., 2016).

Women who use the internet are more likely to experience contraceptive failure than women who do not use the internet. This is because the information that women receive through the internet is very diverse. Women can also access health and nutrition information along with fertility, which can lead to increased fertility which can, in turn, lead to contraceptive failure (Trussell, 2009). Women with medium and high wealth index have a negative relationship with contraceptive failure (Polis et al., 2016a; Sundaram et al., 2017).

Conclusion

The results of the analysis showed that the percentage of contraceptive usage that failed, namely getting pregnant while using contraception, was 3.15 percent of the total episodes of continuous usage of certain contraceptives for 58 months. The results of the analysis, patterns and differences in fertility show that the percentage of contraceptive failures is more common in women who do not own property in their own name, participate in household decisions themselves, do not work or work without being paid cash, attend school with the highest junior high school diploma, aged 25- 34 years old, live in an urban area, have no children, use traditional contraceptive methods, use contraception on the grounds of spacing births, have used the internet, and have a high wealth index.

The results of the analysis of the determinants of contraceptive failure show that the women's empowerment index has a negative relationship with contraceptive failure. The more empowered a woman is, the smaller the risk of failure. Each of the factors of women's empowerment, namely owning a property in her name and working paid in cash, has a negative association with contraception failure after controlling for socioeconomic, demographic, and environmental factors. The women's empowerment factor, namely their own decisions on all household decisions and a minimum education of junior high school graduates, has a positive association with contraceptive failure after controlling for socioeconomic, demographic, and environmental factors.

This study generally found that there was an association between women's empowerment and contraceptive failure. Women with low power are more at risk of failure. Therefore it is necessary to increase women's empowerment so that contraceptive failure can be suppressed. Collaboration between the Ministry of Women's Empowerment and Child Protection (PPPA) and the National Population and Family Planning Agency (BKKBN) in the Communication, Information, Education (IEC) activity program is needed to increase women's empowerment related to contraceptive usage, especially contraceptive failure.

The government, through the BKKBN, can socialize appropriate and effective contraceptive usage through social media by concentrating more on targeting women aged 25-34 years and highly educated. Through the BKKBN, the government

can also make policies and regulations to tighten contraception use for women who are fertile, so that discipline in using contraception in this group increases and in the end contraception failure can be avoided.

The government, through the BKKBN, can further improve the quality of contraceptive socialization and counseling down to the village/ward government level. Family planning village programs should be further developed and require the participation of husbands/partners in these family planning programs. The contraceptive method that has high efficacy is MKJP, which tends to require deeper digging into the pocket. These contraceptive methods can be subsidized or even free of charge to make them more accessible to potential users.

IDHS 2017 data are cross-sectional data collected at one time of enumeration, while IDHS calendar data collect information for the last five years, so the variables taken in this study (besides contraceptive methods, number of live births, and reasons for using contraception) are variables whose information is assumed to be the same as when the contraceptive failure occurred (unchanged).

It is highly recommended to improve and update the method in order to be able to see contraceptive failure with conceptual factors, for example, or by adding appropriate variables, although this is rather difficult to obtain (health facility reports). This study did not include obedience or discipline variables from the respondents, because these variables are inherent in the use of certain contraceptive methods and are limited to one point in time, namely the use of contraception only during enumeration. For this reason, it is hoped that future research can use this variable with a method that is appropriate to the nature of the data. Further research can be conducted on women who experience contraception failure, whether the pregnancy will be continued or terminated (abortion).

Declaration of Interest

There is no conflict of interest.

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