



Contribution of Contraception to Fertility in the Province of the Special Region of Yogyakarta

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Abstract

The condition of the total fertility rate in Yogyakarta Province has tended to increase in the last decade. But there has also been a decline in the use of modern contraception. This study aims to study the determinant trend between fertility in the Province of Special Region (DI) Yogyakarta using the 2002/03 IDHS data and the 2017 IDHS with aggregate data for women of childbearing age 15-49 years. The results show that the pattern of marriage, the use and effectiveness of contraception, and the pattern of infertility during breastfeeding are intermediate determinants of fertility in DI Yogyakarta Province. Patterns of use and effectiveness of contraception are the main determinants of fertility in the two survey periods. The increasing marital index shows that the reproductive period of women in married status is getting longer and can cause them to be exposed to the possibility of giving birth to more children. The role of the use and effectiveness of contraception is still dominant in contributing to fertility decline. Therefore the use of contraception as a birth control still needs to be strengthened either through advocacy to stake holders in the local government.

Introduction

The success of the population control program is shown by the decline in the total fertility rate (TFR) in Indonesia for three decades based on the 1987 Indonesian Prevalence Survey (SPI) and the 1991, 1994, 1997, and 2002/2003 Indonesian Demographic Health Surveys (IDHS). The total fertility rate in Indonesia had stagnated for a decade at 2.6 children per woman during her reproductive period, according to the 2007 IDHS and 2012 IDHS. However, the total fertility rate fell again to 2.4 children according to the 2017 IDHS affecting the pattern of the Indonesian population pyramid from an expansive to a constructive pattern. A constructive pyramid is a pyramid that consists of more productive young age groups than non-productive ones (BPS, BKKBN, Kemenkes 2017).

The total fertility rate for each province varies according to the 2017 IDHS. Some have TFR above and below the national figure. One

of the provinces with a TFR below the national figure is DI Yogyakarta Province is 2.2 children per woman. According to Adioetomo and Samosir (2011), varying levels of fertility can depend on several factors such as age structure, education level, age at first marriage, number of marriages, women's employment status, economic status, and use of contraceptives (Adioetomo, S. M., & Samosir 2010). This variation in fertility levels certainly requires population policies that are following the conditions of the fertility levels of each region. Several international and national articles explain that the decline in fertility can be caused by demographic variables such as education, place of residence, age at first marriage, contraceptive use, and others (Alazbih, Tewabe, and Demissie 2017)(Arsyad and Nurhayati 2017; Chola and Michelo 2016; Laelago, Habtu, and Yohannes 2019; Wicaksono and Mahendra 2016).

Several theories put forward by

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demographers explain the factors that influence (determinants) fertility either directly or indirectly (Davis and Blake 1956). Direct determinants that affect fertility, commonly known as intermediate variables or intermediate variables, are stages in the reproductive process, namely sex (intercourse), conception (conception), and pregnancy (gestation), and there are eleven variables in these stages. Bongaarts simplified the eleven variables into eight variables known as proximate determinants, namely exposure factors, fertility control factors in intentional marriages, and natural fertility factors in marriage (Samosir 2019). Bongaarts identified the eight variables into four variables. Namely, the proportion of marriages, the use of methods of contraception, infertility after giving birth or during breastfeeding (duration of postpartum amenorrhea), and experience of abortion (Chola and Michelo 2016; Bongaarts 1978, 2015). The Bongaarts model states four indices as the main determinants that directly vary the fertility rate. The conceptual framework formula developed by Bongaarts to calculate fertility rates uses four indices: $TFR = C_m \times C_c \times C_a \times C_i \times TF$. The explanations are: TFR = total fertility rate (total fertility rate); C_m = marital index; C_c = index of non-contraception; C_a = abortion index; C_i = index of infertility during breastfeeding; TF = total fecundity rate (total fecundity rate). Each index is estimated from zero (0) to 1 (one), with zero indicating a greater effect on inhibiting fertility and one indicating a lower inhibitory effect. Other variables included in the calculation are a). Total marital fertility rate (TMFR); b). Total natural marital fertility rate (TNMFR); c). Total fecundity rate (TF). If we look at the trend of the DI Yogyakarta Province TFR rate slightly increasing according to the 2017 IDHS compared to the previous IDHS period. On the other hand, modern contraceptives use decreased according to the 2017 IDHS compared to the previous IDHS. It raises a question regarding factors related to the increase in fertility rates, especially in DI Yogyakarta.

The determinants of fertility, both directly and indirectly, need to be understood and studied, especially in DI Yogyakarta Province. Studies on the direct determinants of fertility

such as marriage patterns, contraception, abortion, and breastfeeding patterns are needed to obtain information that can be used as input for program interventions. This study aims to study the contribution of contraception to fertility in the Province of D.I. Yogyakarta is based on data from the 2002/03 IDHS and the 2017 IDHS.

Method

This study is a secondary data analysis with the data source being the results of the 2002/2003 IDHS and the 2017 IDHS, especially data in the Province of D.I Yogyakarta. The unit of analysis is the aggregate data for women of childbearing age 15-49 years (WUS) in DI Yogyakarta Province. The number of samples taken is the entire sample for Province of DI Yogyakarta for the 2002/2003 IDHS was 367 women and the total sample for the 2017 IDHS was 785 women. The two periods of data used are aimed at studying trends in fertility decomposition or the proximate determinants of direct fertility determinants that occur in the Province of D.I Yogyakarta.

An overview of the determinants of fertility based on the 2017 IDHS has been processed by Samosir, Omas B (2019). The data presented is related to the intermediate determinant variables that have been processed by Samosir, Omas B (2019) based on the results of the 2017 IDHS. The variables for the intermediate determinants in this study include the total fertility rate (TFR) and the total marital birth rate (total fertility rate), marital fertility rate/TMFR, total natural marital fertility rate (TNMFR), total fecundity rate (total fecundity rate/TF), marital index (C_m), non-contraception index (C_c), abortion index (C_a), and the index of infertility during lactation (C_i). Meanwhile, the variables for the indirect factors are: age, place of residence, education, occupation, wealth quintile.

Samosir, Omas B, conducted an analysis of the fertility decomposition using the Bongaarts formula and used the 2017 IDHS data at national and provincial levels. Variables of marriage pattern, the pattern of use and effectiveness of contraception, and the pattern of infertility during breastfeeding are intermediate determinants in Indonesia. The

main determinants of fertility in Indonesia are the pattern of use and the effectiveness of contraception. The same thing was also found in the Province of DI Yogyakarta, where the use of contraception has a strong influence on limiting fertility. Meanwhile, Samosir (1994), using data from the 1991 IDHS, found that contraceptive effectiveness was the main contributor to Indonesia's low TFR.

Results And Discussions

The analysis in this study is divided into three parts. The first part focuses on trends in the fertility decomposition variables from the 2002/03 IDHS to the 2017 IDHS comparison of the fertility decomposition of DI Yogyakarta Province based on the 2002/03 IDHS and the 2017 IDHS results.

The fertility trend in DI Yogyakarta Province is increasing slowly, especially from the results of the 2007 IDHS to the 2017 IDHS. The total birth rate for the province in the 2002/03 IDHS is 1.9 children per woman. It means the average number of children a woman has at the end of her life is her reproductive rate is 1.9 children as long as the woman follows the fertility pattern in a given year. Then the number decreased to 1.8 children according to

the 2007 IDHS. Then increased to 2.1 children per woman according to the 2012 IDHS and 2.2 children per woman according to the 2017 IDHS. DI Yogyakarta Province slowly over the span of a decade.

The use of contraceptive methods is one of the intermediate determinant variables. The percentage of use of a family planning tool/method in Yogyakarta Province seems to fluctuate according to the four periods of the IDHS (SDKI). The usage percentage of a family planning method/method decreased to 67% (2007 IDHS) from 76% (02/03 IDHS). However, it increased slightly to 70% and to 76% (2017 IDHS). This picture is also found in the usage percentage of modern family planning tools/methods. From 63% (IDHS 2002/03) decreased to 55% (IDHS 2007), then increased slightly to 60% (IDHS 2012) and decreased again to 57% (IDHS 2017). It is also seen in the traditional family planning tools/methods use, whose trends fluctuate. The use percentage of traditional family planning tools/methods did not change between 2002 and 2007 at 12% (IDHS 2002/03 and IDHS 2007) and then decreased slightly to 10% (IDHS 2012). However, it increased dramatically to 19% (2017 IDHS) (Image 1).

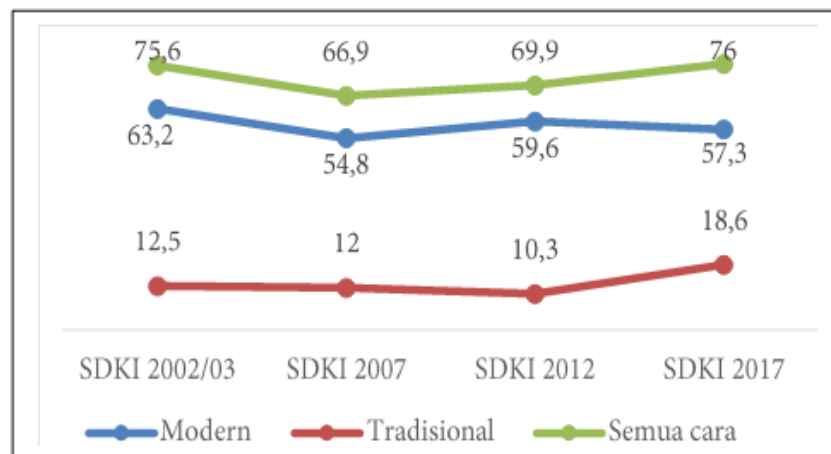


Image 1. Use of Contraceptives in DI Yogyakarta Province

The 2002/03 IDHS show that the fertility rate for Yogyakarta Province is 1.9 children per woman. The results of the calculation of the fertility decomposition (TFR, TMFR, Cm, fy, fm, e, Cc, APK 1999–2002, TNMFR, i, Ci, and TF) in DI Yogyakarta province based on the

2002/03 IDHS are presented in Table 1. The DI Yogyakarta fertility rates in the 2002/03 IDHS is included in the category of areas with low fertility rates, below the national fertility rate of 2.6 children per woman. The estimated TMFR of Yogyakarta D.I Province is 3.24 children per

married woman. This figure means that the marriage pattern in DI Yogyakarta province causes the fertility rate in marriage (TMFR) to be higher at around 1.34 children per woman compared to the overall birth rate (TFR).

The 2002/03 IDHS show that the fertility rate for Yogyakarta Province is 1.9 children per woman. The results of the calculation of the fertility decomposition (TFR, TMFR, Cm, fy, fm, e, Cc, APK 1999–2002, TNMFR, i, Ci, and TF) in DI Yogyakarta province based on the 2002/03 IDHS are presented in Table 1. The DI Yogyakarta fertility rates in the 2002/03 IDHS is an area with low fertility rates, below the national fertility rate of 2.6 children per woman. The estimated TMFR of Yogyakarta D.I Province is 3.24 children per married woman. This figure means that the marriage pattern in DI Yogyakarta province causes the fertility rate in marriage (TMFR) to be higher at around 1.34 children per woman compared to the overall birth rate (TFR). The results of the 2002/03 IDHS also show that the marital index in Yogyakarta Province is 0.59, which means that the overall fertility rate (TFR) is 59 percent lower than the marital fertility rate (TMFR). In other words, it can also be interpreted that women in Yogyakarta D.I Province spend 59 percent of their reproductive period in a marital status which exposes them to the possibility of giving birth to children. So the effect of reducing fertility from the marriage pattern in DI Yogyakarta Province is 59 percent (Table 1).

The 2017 IDHS show that the fertility rate for Yogyakarta Province is 2.19 children per woman. The results of the calculation of the fertility decomposition (TFR, TMFR, Cm, fy, fm, e, Cc, APK 2014–2017, TNMFR, i, Ci, and TF) DI Yogyakarta Province based on the 2017 IDHS results are presented in Table 1. Fertility figures for DI Yogyakarta Province based on the 2017 IDHS is included in the category of areas with low fertility rates (less than 2.3 children per woman), below the national fertility rate of 2.4 children per woman. The data processing shows that the estimated TMFR of the Province of DI Yogyakarta in 2017 was 3.54 children per married woman. It means that the pattern

of marriage in the Province of DI Yogyakarta resulted in the fertility rate in marriage (TMFR) being around 1.35 children per woman compared to the total births rate (TFR).

The 2017 IDHS showed that the marriage index in DI Yogyakarta Province is 0.62. It means that the overall fertility rate (TFR) is 62 percent lower than the marital fertility rate (TMFR). So the effect of reducing fertility from the marriage pattern in the Province of D.I Yogyakarta is 62 percent. It also means that women in Yogyakarta D.I Province spend 62 percent of their reproductive life in a marital status which exposes them to the possibility of childbearing. It means that women in Yogyakarta in 2017 married younger than in the 2002/2003 period. The phenomenon of getting married young began to appear in Yogyakarta. Research in Central Java found that women tend to be proud if they get married at a young age and worry if they don't. This condition shows that the age at first marriage is significantly vital in a woman's life (Alazbih et al., 2017; Bambang Budi Raharjo et al, 2019). It is different in Uganda, where women with higher education affect the delay in age at first marriage to be older. It has highly impacted the decline in the birth rate in Uganda (Ariho, Kabagenyi, and Nzabona 2018).

The 12-month contraceptive failure rate in DI Yogyakarta Province, based on the 2002/03 IDHS results, was 4.3. While the monthly contraceptive failure rate was 0.36. Furthermore, the contraceptive effectiveness rate in DI Yogyakarta is 96.38. Based on the contraceptive effectiveness rate, the non-contraceptive index of DI Yogyakarta is 0.16. It means the fertility rate in marriage (TMFR) is 16 percent lower than the fertility rate in marriages without contraception and intentional abortion (TNMFR). Thus, the fertility-lowering effect of the contraceptive pattern (prevalence and effectiveness of contraception) in DI Yogyakarta is 16 percent. It also means that 84 percent of women of reproductive age who are married and fertile are protected by 100 percent effective contraception.

Table 1. Fertility Decomposition Calculation Results of DI Yogyakarta Province

Variable/index	IDHS 2002/03	IDHS 2017	Unit
Total fertility rate/TFR)	1,90	2,19	child per woman
Total marital fertility rate/TMFR	3,24	3,54	child per married woman
Marital Index (C_m)	0,59	0,62	
12-month contraceptive failure rate (f_y)	4,3	2,29	percent per year
monthly contraceptive failure rate (f_m)	0,36	0,19	percent per month
Contraceptive effectiveness (e)	96,4	98,1	percent
Non-contraceptive index (C_c)	0,16	0,21	
Ccontraceptive prevalence rate/CPR	73,8	74,2	percent
(Total natural marital fertility rate/TNMFR	20,09	16,52	child per married woman
Median period of infertility after delivery (i)	2,0	4,73	month
Infertility index during breastfeeding (C_i)	0,98	0,86	
Total fecundity rate/TF	20,60	19,19	child per married woman

Source: IDHS (SDKI).

Based on the non-contraceptive index above, the natural fertility rate (fertility rate in marriages without contraception and non-intentional abortion/TNMFR) in DI Yogyakarta is 20.09 children per married woman. This means that the pattern of prevalence and effectiveness of contraception has resulted in married women in DI Yogyakarta having fewer births, namely 16.85 births (TNMFR - TMFR = 20.09 - 3.24 = 16.85). The effect of reducing fertility in DI Yogyakarta with $C_c = 0.16$, means that the prevalence and effectiveness of contraception have resulted in a large difference between TMFR and TNMFR, around 16 to 17 children per married woman. In this case, the prevalence and effectiveness of contraception in DI Yogyakarta were able to reduce the fertility rate.

Based on the 2017 IDHS, the 12-month contraceptive failure rate in DI Yogyakarta Province is 2.29, and the monthly contraceptive failure rate is 0.19. Furthermore, the contraceptive effectiveness rate in DI Yogyakarta is 98.1. Based on the contraceptive effectiveness rate, the non-contraceptive index (C_c) is 0.21. It means that the fertility rate in marriage (TMFR) in D.I Yogyakarta is 21 percent lower than the fertility rate in marriages without contraception and intentional abortion (TNMFR). So, the effect of reducing fertility from the contraceptive pattern (prevalence and effectiveness of contraception) in Yogyakarta Province is 21 percent. It also means that 79 percent of women of reproductive age who are

married and fertile are protected by 100 percent effective contraception.

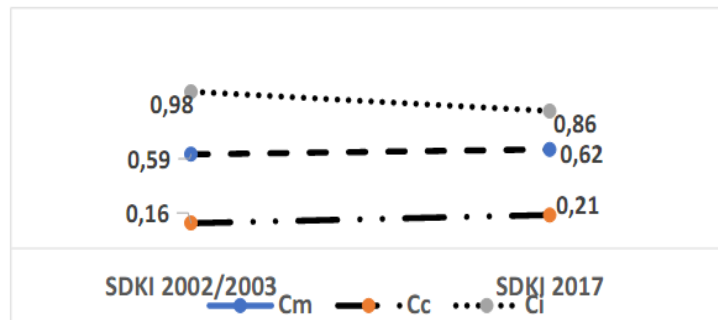
Based on the non-contraceptive index, the natural fertility rate (fertility rate in marriages without contraception and non-intentional abortion/TNMFR) in Yogyakarta Province is 16.5 children per married woman. It means that the pattern of prevalence and effectiveness of contraception has resulted in married women in DI Yogyakarta having fewer births, namely 12.96 births (TNMFR - TMFR = 16.5 - 3.54 = 12.96). The effect of reducing fertility in D.I Yogyakarta with $C_c = 0.21$ means the prevalence and effectiveness of contraception results a large difference between TMFR and TNMFR, around 12 to 13 children per married woman. In this case, the prevalence and effectiveness of contraception in DI Yogyakarta could reduce the fertility rate in the province. Using the same calculation pattern in Ethiopia, the lower the proximate determinant, the lower the fertility rate, especially long-term contraception. (Lailulo and Sathiya Susuman 2018).

Changes in the values of the marital index, non-contraception index, and breastfeeding index in DI Yogyakarta Province between 2002/2003 and 2017 are presented in Image 2. The figure shows that between 2002/2003 and 2017, the marital index (C_m) and non-contraception index (C_c) increased, while the breastfeeding index (C_i) decreased. They are the effect of limiting fertility from the pattern of marriage, use and effectiveness

of contraception decreases. While the limiting fertility effect from the pattern of infertility during breastfeeding increases. This finding is different from the conditions in Ethiopia, showing that the contribution of contraception to fertility decline increased from 2000 to

2011. Meanwhile, the marriage pattern in the country tends to remain unchanged, unlike what in Yogyakarta (Alazbih et al., 2017). In line with the conditions in Yogyakarta, the use of contraception is an significant factor affecting fertility in Asian countries (Majumder

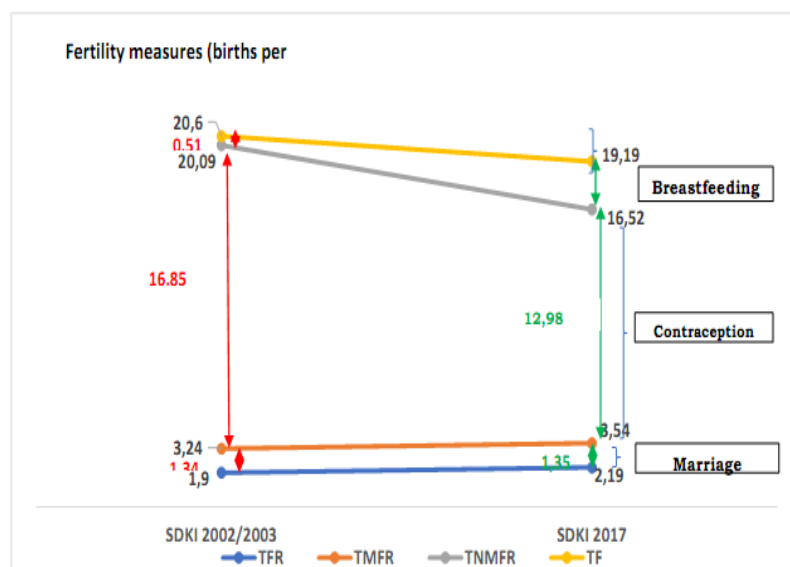
Image 2. Value of Marriage Index, Noncontraception Index, and Breastfeeding Index in DI Yogyakarta Province Based on the 2002/2003 and 2017 IDHS (SDKI)



The change in fertility measures between 2002/2003 and 2017 show that the difference between the overall fertility rate (TFR) and the fertility rate in marriage (TMFR) increased from 1.34 births according to the 2002/2003 IDHS to 1.35 births according to the 2017 IDHS. Meanwhile, the difference between marital fertility rates (TMFR) and natural fertility rates (fertility rates in marriages without

contraception and intentional abortions/ TNMFR) decreased from 16.85 births according to the 2002/2003 IDHS to 12.98 births according to the 2017 IDHS. Furthermore, the difference between the natural fertility rate (TNMFR) and the natural fertility rate without breastfeeding (TF) increased from 0.51 births according to the 2002/2003 IDHS to 2.67 according to the 2017 IDHS.

Image 3. Changes in fertility measures for DI Yogyakarta Province based on the results of the 2002/03 and the 2017 IDHS (SDKI)



Based on these figures, according to the 2002/2003 IDHS, the marriage pattern succeeded in preventing births of 1.34 births per woman (TMFR-TFR=3.24-1.9). The marriage pattern and the use and effectiveness of contraception succeeded in preventing births as many as 16.85 births per married woman (TNMFR-TMFR= 20.09-3.24). Furthermore, the pattern of marriage, use and effectiveness of contraception, and breastfeeding resulted in 0.51 prevented births (TF-TNMFR=20.6-20.09) per married woman. Meanwhile, based on the 2017 IDHS, the marriage pattern resulted in 1.35 births per woman prevented (TMFR-TFR=3.54-2.19). The marriage pattern and the use and effectiveness of contraception resulted in 12.98 preventable births per married woman (TNMFR-TMFR=16.52-3.54). Meanwhile, the marriage pattern, the use and effectiveness of contraception, and breastfeeding succeeded in preventing births of 2.67 births per married woman (TF-TNMFR = 19.19-16.52).

The following will discuss the preventable births and the relative percentages for each fertility decomposition index (Table 3). The number of prevented births, the highest contribution of the pattern of marriage, use of contraception, and breastfeeding to fertility decline. So it can be determined by calculating the relative percent of each variable. The total prevented births (TF-TFR) in 2002/2003 was 18.7 births, while in 2017 was 17 births. Based on the calculation of the relative percent, in 2002/03, the pattern of contraceptive use had the highest contribution of 90 percent to the TFR rate in the Province of D.I.Yogyakarta during that period (1.9 children). The same thing was found in the 2017 IDHS, where the pattern of contraceptive use contributed 76 percent to the TFR figure in DI Province. Yogyakarta in the same period (2.2 children). In the range of 2002/03 to 2017, the contribution of the contraceptive pattern decreased, but the breastfeeding pattern contribution increased from 3 percent (IDHS 2002/03) to 16 percent (IDHS 2017). The marriage pattern contribution did not change significantly in the period 2002/03 to 2017.

This figure shows that the contribution of the use and effectiveness of contraception is still the largest to the decline in fertility compared

to other fertility decomposition indices. The use contribution and the contribution effectiveness according to the 2002/03 IDHS had reached 90 percent providing a TFR rate of 1.9 children per woman during her reproductive period. The contribution of contraceptive use is still dominant even though the percentage has decreased according to the 2017 IDHS. It is in line with conditions in Bangladesh which show that contraceptive use also contributes the most to reducing fertility. According to Rogers and Stephenson (2018), based on the calculation of the proximate determinant of Bongarts, in the regions of Asia, South Africa, Latin America, and the Caribbean, the increase in contraceptive use and delaying the age of marriage are the most influential factors on fertility (Rogers and Stephenson 2018). The decline in fertility in Bangladesh is highly dependent on increasing contraceptive use (Haq 2018). Likewise, in Ethiopia, the contraception use also contributed significantly to the decline in fertility (Laelago et al., 2019). In Eswatini's proximate determinant analysis, the determinant of fertility decline is the use of contraception compared to other factors (Chemhaka and Odimegwu 2019). Research findings in Ethiopia based on the method of determinant analysis developed by Bongarts provide a similar picture. Contraceptive use has been an significant factor in declining fertility for a decade (Ahmed Shallo 2020). According to the Bongarts calculation model, the results of the proximate determinant in Peninsular Malaysia and Pakistan show delays in the age of marriage and the use of contraception as significant factors (Finlay, Mejía-Guevara, and Akachi 2018; Nasir, Jamal Abdul; Hinde, Andrew; Padmadas 2015; Tey NP, Ng ST 2012). Meanwhile in Uganda rural areas, the contraception use is a determining factor in decreasing fertility, in addition to age at first sexual intercourse, gender of the head of the household, and working women (Ariho and Nzabona 2019). The contraceptive use contribution among married women to fertility, was also shown in a study using a surveillance method in the Eastern Ethiopian region. Married women who use contraception are significantly associated with not wanting to have more children (Semahegn et al., 2018).

Another thing found in the countries of sub-Saharan Africa is women who come from the upper wealth index status tend to delay the age at first marriage and use contraception. This condition of women has a main role in contributing to low births (Finlay et al., 2018). Kabir et. al. analysis based on demographic data in Bangladesh strengthens the influence of the role of age at first marriage on fertility. Women who marry young, under the age of 13 years,

have many children who have never been born and are supported by not using contraception during their reproductive years. It is because the reproductive period of women is getting longer if they marry at a young age and there is no control in limiting births (Kabir et al., 2001). The decline in fertility in sub-Saharan Africa is very significant due to the use of contraception by reducing unwanted pregnancies and unplanned births (Singh et al., 2017).

Table 2. Prevented Births and Relative Percentages for Each Index in Yogyakarta Province D.I Based on the Results of the 2002/03 and the 2017 IDHS

Index	Prevented births		%relative	
	2002/03	2017	2002/03	2017
Ci, breastfeeding pattern	0,51	2,67	2,7	15,7
Cc, contraception pattern	16,85	12,98	90,1	76,4
Cm, marriage pattern	1,34	1,35	7,2	7,9
Total (TF-TFR)	18,7	17	100,0	100,0

Source: IDHS and primary data

Conclusions

The results show that the marriage pattern, the use and effectiveness of contraception, and the infertility pattern during breastfeeding are intermediate determinants of fertility in DI Yogyakarta Province. The use pattern and effectiveness of contraception is the significant determinant of fertility compared to the marriage pattern and the pattern of infertility during breastfeeding, eventhough the protection decreases against fertility (2017 IDHS period with 2002/03 IDHS). The decrease in the use and effectiveness of contraception can be explained by a decrease in the use of modern contraception and an increase in traditional contraception in the two survey periods. The marriage index increased in the 2017 IDHS compared to the 2002/03 IDHS. It indicates that their reproductive period in married status is getting longer and can cause them to be exposed to giving birth to more children. Considering the role of the use and effectiveness of contraception is still dominant in contributing to the decline in fertility and the increasing duration of the marriage, it is necessary to 1). Strengthening advocacy to stakeholders in the local government and communication, information, and education (KIE) in the field regarding the use of contraception as birth control; 2).

Empowering family planning field officers to optimally implement IEC in field lines that are in direct contact with program targets; 3). Communication, information, and education on the use and effectiveness of contraception are strengthened in the more effective long-term use of modern contraception.

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