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A Decomposition Analysis of Fertility: Evidence from DKI Jakarta and East Nusa Tenggara

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79

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Abstract

Fertility control has been one of the priorities of development in Indonesia. However, the 2000 and 2010 population censuses showed an increase in fertility indicators. To identify the sources of increased fertility in developed and less developed areas, DKI Jakarta and East Nusa Tenggara Provinces were selected for comparison. Using 2000 and 2010 census data, the decomposition analysis shows that the increase in Total Fertility Rate (TFR) of DKI Jakarta was dominated by the increase in nuptiality rate, while the increase in TFR of East Nusa Tenggara was mainly caused by the increase in Marital Fertility Rate (MFR). The highest increase in the proportion of married women in DKI Jakarta occurs in the age group of 15-19 years old, followed by the age group of 20–24 years old. The increase in MFR in East Nusa Tenggara occurs in nearly all age groups, particularly in the age groups of 30–34 and 35–39 years old. Identifying the sources of the increase in TFR is important for population policy to support population growth control, fertility reduction, and human resource quality improvement. The main suggestions based on the findings are the promotion of higher educational level and the benefits of postponing marriage among the younger age groups in DKI Jakarta as well as the use of contraceptive methods to control birth rate in East Nusa Tenggara.

Keywords: nuptiality; marriage; marital fertility; reproductive age

JEL classifications: J12; J13; O10; R23

1. Introduction

Controlling population growth has been an issue inherent with the changes in socioeconomic conditions of the society. Even though fertility, mortality, and migration are the factors determining population growth, the nature of the discussion has varied along with different socioeconomic situations. In less developed societies, the discussion regarding reducing birth rate and mortality rate is common (Amalba et al. 2014; Atif et al. 2016; Beson, Appiah & Adomah-Afari 2018). Meanwhile, low birth rate, openness for young migrant workers, and increased life expectancy are familiar topics in more developed societies (Djundeva, Dykstra & Emery 2019; Wan Ahmad, Astina & Budijanto 2015).

Previous studies show that a decrease in the birth rate, accompanied by low mortality rate, is an indication of development. As a society experiences a shift from traditional to modern, fertility rate becomes lower (Djundeva, Dykstra & Emery 2019). The modernization, characterized by industrialization, the creation of urban area, better income, and gender equality, offers a wider opportunity for women to participate in work and education, creates higher opportunity costs of bearing children, and creates households with fewer children (Shi 2017). Western countries, such as countries in the northern and western part of Europe, have experienced the modernization earlier than eastern countries, such as many Asian countries (Thornton 2001). Thus, controlling fertility is important for socioeconomic development.

To control population growth, Indonesia attempts to curb fertility rate by setting a target of reducing TFR from 2.26 in 2020 to 2.1 in 2024, as written in the 2020–2024 National Medium-Term Development Plan (*RPJMN 2020–2024*). The plan is legalized by the Presidential Decree No 18 of 2020. To support this population policy, there are several prioritized programs such as improving modern contraceptive prevalence rate (mCPR) from 61.8% in 2020 to 63.4% in 2024 and reducing unmet need of mCPR from 8.6% in 2020 to 7.4% in 2024. The targeted percentage of mCPR represents the percentage of married women of reproductive age (15–49 years old) or their partners who use any modern contraceptive methods. Meanwhile, the targeted percentage of unmet need shows the percentage of married women aged 15–49 years who want to stop or delay childbearing.

Many previous studies discuss modern contraceptive methods as clinically effective and safe to prevent unintended pregnancy (Beson, Appiah & Adomah-Afari 2018; Chamratrithirong, Kamnuansilpa & Knodel 1986). WHO defines modern contraceptive methods or supplies ranging from male and female condom, pill, jelly, injection, implant, IUD, to male and female sterilization. In contrast, traditional or non-supply methods include rhythm, withdrawal, abstinence, and lactational amenorrhea.

The program in RPJMN is important since the 2000 and 2010 Population Censuses showed an increase in TFR. TFR shows the average number of live births born to women of reproductive age (15–49 years old) in one period. Women aged 15–49 years old are considered as those having high probability to conceive because they are in fertile period. TFR of Indonesia was 2.34 in 2000 and 2.41 in 2010 (BPS-Statistics Indonesia 2001,2012). It means that, on average, there were 2.34 live births in 2000 and 2.41 live births in 2010 born to women of reproductive age (15–49 years old). Rather than experiencing a decline, Indonesia showed an increase in fertility rate during the period. However, several provinces experienced a decrease in TFR

in 2010, such as West Java, Banten, and West Kalimantan.

The last census in 2010 showed that TFR of DKI Jakarta is the lowest while TFR of East Nusa Tenggara is the highest among provinces in Indonesia. According to the Statistics Indonesia, TFR of DKI Jakarta has increased from 1.6 in 2000 to 1.8 in 2010. It means, on average, there were about 1.6 or one up to two live births per woman of reproductive age in DKI Jakarta in 2000 and 1.8 or one up to two live births per woman of reproductive age in DKI Jakarta in 2010. Meanwhile, there has been an increase in TFR of East Nusa Tenggara from 3.4 in 2000 to 3.8 in 2010. The figure shows that, on average, there were 3.4 or three up to four live births per woman of reproductive age in East Nusa Tenggara in 2000 and 3.8 or three up to four live births per woman of reproductive age in East Nusa Tenggara in 2010. The TFR indicates significant differences in the fertility profile between those two provinces.

Similar to the findings from previous studies, socioeconomic indicators can reflect fertility (Haque, Das & Patel 2019; Morgan, Zhigang & Hayford 2009). Several other indicators between the two censuses showed that DKI Jakarta has better socioeconomic conditions than East Nusa Tenggara. DKI Jakarta is the capital city of Indonesia and located on the island of Java in the western part of Indonesia, while East Nusa Tenggara is located in the central part of Indonesia and a less developed area in terms of socioeconomic conditions compared to the western part.

DKI Jakarta generally has a higher economic status compared to East Nusa Tenggara. Income per capita per year, represented by Gross Regional Domestic Product (GRDP) per capita per year, of DKI Jakarta was 27.3 million in 2000 and 41.2 million in 2010. Meanwhile, income per capita per year of East Nusa Tenggara was only 2.1 million in 2000 and 2.7 million in 2010.

DKI Jakarta had better educational profile for women aged 15 years and above than East Nusa

Tenggara in 2000 and 2010. East Nusa Tenggara was dominated by women with less than primary education (approximately 73% in 2000 and 53% in 2010), while DKI Jakarta was dominated by women with senior secondary education or higher (approximately 69% in 2000 and 77% in 2010). The common aspects are the two provinces experienced a decrease in the percentage of women with primary education and an increase in the percentage of women with senior secondary education or higher.

Even though DKI Jakarta had higher per capita income and better education level, the age at which a woman enters her first marriage (SMAM) in either 2000 or 2010 in Jakarta was younger than in East Nusa Tenggara. In 2000, SMAM of Jakarta was 25.2 while SMAM of East Nusa Tenggara was 25.3. In 2010, SMAM of DKI Jakarta and East Nusa Tenggara were 23.5 and 25.9, respectively. It is obvious that the age at marriage for women in Jakarta is younger while that in East Nusa Tenggara is older.

Only a proportion of married women of reproductive age (15–49 years old) uses modern contraceptive method. Not using contraceptive method is one of the risks causing high fertility (Bongaarts 1993). Even though the percentage of women using contraceptive method increased during the 2000–2010 period in both provinces, DKI Jakarta had a higher percentage than East Nusa Tenggara.

DKI Jakarta and East Nusa Tenggara experienced an increase in TFR even though they have different socioeconomic characteristics. The increase in fertility rates during 2000–2010 was not in line with population growth control policy. Since nearly all indicators showed that DKI Jakarta is better compared to East Nusa Tenggara in terms of per capita income, educational attainment of women, and modern contraceptive methods used by married women, the increase in the fertility rate of DKI Jakarta is intriguing. East Nusa Tenggara is a less developed area compared to DKI Jakarta, yet the increase in the fertility rate of East Nusa Tenggara seems more acceptable.

Fertility is the result of sexual activity and fecundity or the ability to conceive until the pregnancy is over (Davis & Blake 1956; Gafar et al. 2020). The age of the woman determines sexual activity and fecundity. Sexual activity and fecundity increase with age, and then decrease with age as well. Even though men play a role in childbearing, women become the central because their range of reproductive age is generally shorter than men. This study will refer to sexual relations as nuptiality (marriage) and the average number of live births born to the married women as marital fertility rate because live births are assumed to be from the married women.

Both provinces experienced higher fertility rates in 2010, but the sources of the changes in TFR, whether caused by changes in the number of marriages or marital fertility, have not been identified. In addition, there are not many studies in Indonesia comparing fertility rates between provinces. There are several studies of fertility in Indonesia, but they focus more on the effect of socioeconomic factors, such as income, educational attainment, and knowledge of contraceptive methods, on fertility (O'Donnell, Utomo & McDonald 2020; Schoemaker 2005) or discuss fertility in merely one province of Indonesia (Amran et al. 2019).

This study will provide a contribution to the studies of fertility in Indonesia by showing a comparison of the sources of changes in fertility between two areas. In detail, the objectives of this paper are:

(1) To identify whether the main sources of the increase in TFR during 2000-2010 in both provinces are caused by nuptiality or marital fertility rate.
(2) To identify at which age group the main sources of the increase in TFR during 2000–2010 occur

Identifying the sources of the increase in TFR is useful for population policy since both provinces have different socioeconomic characteristics. DKI Jakarta that represents a more developed area and East Nusa Tenggara that reflects a less developed area in Indonesia may need different

Table 1. DKI Jakarta & East Nusa Tenggara in Figures, 2000 & 2010

Characteristics	DKI Jakarta		East Nusa Tenggara	
	2000	2010	2000	2010
Number of populations (total)	8,347,080	9,607,787	3,808,267	4,683,827
GRDP (constant price in 2000, in billion IDR)	227,924.10	395,622.40	7,850.60	12,546.80
GRDP per capita (constant price in 2000, in million IDR)	27.3	41.2	2.1	2.7
Educational attainment of women aged 15 years or above (%):				
- Primary school and below	30.76	22.94	73.02	52.96
- High school	59.38	60.72	25.41	40.91
- Diploma & bachelor degree	9.75	15.58	1.57	6.01
- Postgraduate	0.11	0.76	0.00	0.12
Singulate mean age at marriage (SMAM)	25.2	23.5	25.3	25.9
Married women using modern contraceptive methods (%)	53.96	57.42	31.56	39.89
TFR	1.6	1.8	3.4	3.8

Source: The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census (BPS-Statistics Indonesia, 2012)

policy interventions. The rest of this paper consists of literature review of the factors influencing fertility, method, result, and conclusion.

2. Literature Review

Previous studies have found that socioeconomic factors determine fertility. Davis & Blake (1956) identify three main factors affecting fertility, namely intercourse, conception, and gestation. The age of entering into sexual relations is one of the intermediate variables affecting fertility in intercourse factor. The age of entering into sexual relations has a positive effect on fertility, meaning that the younger the age of women of reproductive age experiencing sexual relations, the higher the probability to conceive and complete the pregnancy. The opposite effect applies to older age because the potential for fertility cannot be restored when the age of starting sexual relations is older. Later, Bongaarts (1978) state that the proportion of women of reproductive age in a society engaged in sexual intercourse is identified as one of the factors affecting fertility. To be more convenient, either a formal marriage or consensual relationship is referred to as a marriage.

Socioeconomic development plays an important role in the fertility pattern. The Easterlin model shows that fertility changes in line with the development process (Bongaarts 1993). It is started in the first phase known as excess demand when the

desired family size in traditional society is high and the incentives for birth control are non-existent. The second phase is known as excess supply when consideration of the costs and benefits of childbearing emerges in a more modernized society, yet the costs for fertility control are still unaffordable despite the availability of contraceptive methods. The third phase is excess supply with birth control when demand for children continues to decline in modern society, fertility is determined by supply, and the benefits of having children must outweigh the costs of fertility control. Together with economic development, decreased fertility is the result of education, rationality, opportunity for individual advancement, and equality between men and women (Caldwell 1976). This idea is transformed from more developed to less developed regions and can be socially and economically accepted by people in less developed countries (Coale 1973).

A great number of studies reveal that higher educational achievement of women is related to fertility. Most of the previous studies have stated that women with higher educational level have lower fertility as occurs in China, Nigeria, and Bangladesh (Wang & Chi 2017; Alaba, Olobusaye & Olaomi 2017; Nahar & Zahangir 2019). Women with higher educational level means they are literate and informed that childbearing and big size family cost financially and emotionally.

However, the influence of higher educational achievement on the decrease in fertility is not

significant in a society with low economic status (Haque, Das & Patel 2019). In India, women with higher educational level and lower fertility are those with higher economic status. Lower socioeconomic status may associate with strong traditional culture. In some counties in China, higher education of women is associated with higher total fertility because the society still holds strong traditional social norms and does not reach certain socioeconomic level (Wang & Chi 2017). Traditional social norms in China, where a family should have many children to support farming activities of the family, cause high fertility rate. On the other hand, certain economic status may no longer be significant in affecting fertility. For example, women from poor class in Indonesia experienced a decrease in fertility during 1997–2007 while those from non-poor class did not (Majumder & Ran 2015). The use of contraception by poor women has reduced fertility.

Economic development shown by more educated people and higher economic status change the culture of marriage at young age to marriage at older age. Nowadays, work opportunity and personal advancement for women as a result of education are widening, thus more women get married at older age or delay their fertility (Morgan, Zhigang & Hayford, 2009). Marriage at young age is common in the past as it more frequently happens in rural than urban area in this current time in Bangladesh (Nahar & Zahangir 2019). Similar finding in China shows that more women in big cities, such as in Hong Kong and Shanghai, delay the age of marriage (Yip, Chen & Chan 2015). The role of cultural change is also shown in Tibet where the decrease in the religious role of Buddhist monasteries boosts fertility rate (Spoorenberg 2019).

In addition to delayed marriage, the decrease in fertility occurs in a more developed society. For example, the traditional social norms of having many children influence fertility in China even though the women have higher education level (Wang & Chi 2017). Higher fertility is needed because children are assumed to be family sup-

port system and to replace infant and child mortality (Alaba, Olobusaye & Olaomi 2017).

In the context of Indonesia, changes in fertility are in line with socioeconomic development. The high fertility rate during the 1960s to early 1980s was caused by the large number of young women born around the 1930s (Ananta & Pungut 1992). Supported by the rapid decrease in mortality rate caused by the use of medical technology and medicines, the population growth reached 2.34% during 1971–1980 (Priyono 1990). During this era, there were perceptions that having many children would attract good fortune and children were factors of production for the agricultural activities of the family since agricultural sector dominated economic activities in that era (Rajagukguk & Samosir 2015).

The introduction of family planning program into the society in early 1970s reduced the fertility rate and forced people to shift from agricultural to industrial work. Limited size of land and increasing number of populations encouraged people to find alternative work (Priyono 1990). The family planning program resulted in lower fertility, accompanied by lower mortality due to the availability of medical technology and medicines and population growth of 2.1% during 1980–1985 and 1.9% during 1985–1990. The campaign of "two is enough", acknowledgement of the use of modern contraceptives, and more job creation due to the expansion of industrialization have successfully reduced fertility rate (Ananta & Pungut 1992; Rajagukguk & Samosir 2015; Schoemaker 2005). For example, the TFR shrank from 5.6 in 1976 to 2.6 in 2002. Meanwhile, prevalence rate rose from 26% in 1976 to 60% in 2002. Along with the decline in fertility, agriculture no longer dominates economic activities (Ananta & Pungut 1992). In 1990, the proportion of industry and agriculture in GDP was 40% respectively and agriculture was only 20%.

Referring to the previous studies, we learn that socioeconomic conditions determine fertility and changes in socioeconomic condition, along with the development process, change fertility in a society. The remaining questions are to which people

the changes in fertility occur and what causes the changes. A decomposition analysis will lead to the answers.

3. Method

The data on the total female population according to the five-year age groups and age specific fertility rate (ASFR) were obtained from the Statistics Indonesia. The number of births in each age group was calculated by multiplying ASFR with the number of women in each age group.

Ideally, fertility rate is divided into two factors, namely: (1) the proportion of women who are mothers; and (2) the fertility of women who are mothers, plus interaction term (Arriaga, Johnson & Jamison 1994). Interaction is a combined effect of both that cannot be explained separately. In case the ideal data are not available, information on the proportion of married women and women's fertility of females are used as a proxy. Marriage rate is usually low at young age and increases at older age, thus the age when marriage occurs influences fertility.

However, it should be noted that not all married women have children and not all women having children are married. Since the data used in this paper were the number of married females and the number of live births, the decomposition of TFR will show the contribution of changes in the proportion of married women and changes in age specific marital fertility rate (ASMFR) to changes in TFR.

The original data on the number of women by marital status according to the five-year age groups published were categorized into five categories as follows: (1) unmarried, (2) married, (3) divorced, (4) widowed, and (5) unknown. To obtain the number of women in the category of unmarried, married, divorced, and widowed, the total population of women in the unknown category was divided according to the proportion of unmarried, married, divorced, and widowed women. Then, the number of women in each category was obtained from the

sum of the original data and distributed unknown for each marital status.

4. Results

4.1. Population Structure

DKI Jakarta has a small portion of children aged below 5 years old, but the number increases during 2000–2010 (Figure 1 & 2). The percentages of men and women in DKI Jakarta during 2000–2010 do not truly change, yet the changes in women of reproductive age are more pronounced. In 2000, the population consists of 50.6% men and 49.4% women. In 2010, the population consists of 50.7% men and 49.3% women. Meanwhile, the percentage of women of reproductive age is 66.96% in 2000 and lower in 2010, namely 63.14% of total women (Figure 5).

The highest decrease occurs at 20–24 years old (3.66%), followed by 15–19 years old (2.85%) and 25–29 years old (1.30%). There are several possible reasons for the lower percentage of those two age groups, such as the increasing number of women in those groups moving to work, study, or get married outside Jakarta. The remaining age groups, however, experience an increase, namely 45–49 years old (1.51%), 40–44 years old (1.08%), 35–39 years old (0.85%), and 30–34 years old (0.54%).

East Nusa Tenggara clearly experiences an expansive population during 2000–2010 with a large proportion of children, indicating a high birth rate and a large proportion of young age group (Figure 3 & 4). The percentages of men and women do not changed from 2000 to 2010, namely 49.7% men and 50.3% women in each respective year. The percentage of women of reproductive age is 51.21% in 2000 and 49.02% in 2010 (Figure 6).

The decrease originates from younger age group, namely 15–19 years old (1.32%), 20–24 years old (1.29%), 25–29 years old (0.66%), and 30–34 years old (0.24%). The remaining age groups experi-

ence an increase, namely 45–49 years old (0.89%), 40–44 years old (0.43%), and 35–39 years old (0.01%). Observing from the decline in age groups, the highest percentage in East Nusa Tenggara is found in the age group of 15–19 years old while the highest percentage in DKI Jakarta is found in the age group of 20–24 years old.

In 2000, the sex ratio of DKI Jakarta is less than 100 for the age groups of 15–19 years old and 20–24 years old (Figure 7). It means that the number of women at those age groups are higher than men. In 2010, the sex ratios for the age groups of 15–19 years old and 20–24 years old are also lower than 100, though higher than those in 2000. It is identified that the total population, the number of men, and the number of women at those two age groups during period of 2000–2010 has decreased. It means that there are more women than men at the age groups of 15–19 years old and 20–24 years old, though the decrease in the number of women is higher than the decrease in the number of men during 2000–2010.

Meanwhile, the sex ratio of DKI Jakarta in 2010 for older age groups is more than 100, but lower than that in 2000. It means that there are more men than women at those age groups in 2010, though the increase in the number of women is higher than the increase in the number of men during 2000–2010. The increase in total population in these age groups is likely to come from people looking for jobs in Jakarta.

The sex ratio of East Nusa Tenggara in 2000 for the age groups of 15–19 years old to 45–49 years old is less than 100, meaning that there are more women than men in each age group (Figure 8). In 2010, the sex ratio for all age groups is also lower than 100, except for the age group of 15–19 years old. It means there are more women than men for all age groups in 2010, except for the latter age groups. The sex ratio for the age groups of 15–19 years old to 25–29 years old in 2010 is higher than in 2000, meaning the increase in the number of women is lower than men during 2000–2010. Meanwhile, the sex ratio for the age groups of 30–34 years old

to 45–49 years old in 2010 is lower than in 2000, meaning the increase in the number of women is higher than men during the period.

4.2. The Pattern of the Proportion of Married Women, ASFR, and ASMFR

Both provinces have the same pattern for the proportion of married women that increases with age (Figure 9 & 10). The proportion of married women in DKI Jakarta increases during period of 2000–2010, especially in the age 15 until 39 years old. The proportion of married women in each age group, except the age group of 15–19 years old, also increases during the same period in East Nusa Tenggara, though the increase is not as high as that in DKI Jakarta.

Even though the highest ASFR in both provinces occur in the same age group (25–29 years old), ASFR in each age group in DKI Jakarta is lower than in East Nusa Tenggara in 2000 and 2010 (Figure 11 & 12). It is clear that ASFR of women from the age of 15 to 44 years old in East Nusa Tenggara in 2010 is higher than in 2000. Meanwhile, the increase in ASFR of DKI Jakarta starts after the age of 24 years old. Compared to DKI Jakarta, the rate of live births is higher in East Nusa Tenggara for women in the younger age group.

Similar to ASFR, ASMFR of each age group in East Nusa Tenggara in 2000 and 2010 is higher than in DKI Jakarta, meaning that the average number of live births by married women of reproductive age in East Nusa Tenggara is higher than in DKI Jakarta. DKI Jakarta experiences lower ASMFR in 2010 for the age groups of 15–19 years old to 25–29 years old (Figure 13). In contrast, East Nusa Tenggara experiences higher ASMFR in 2010 for the same age groups (Figure 14).
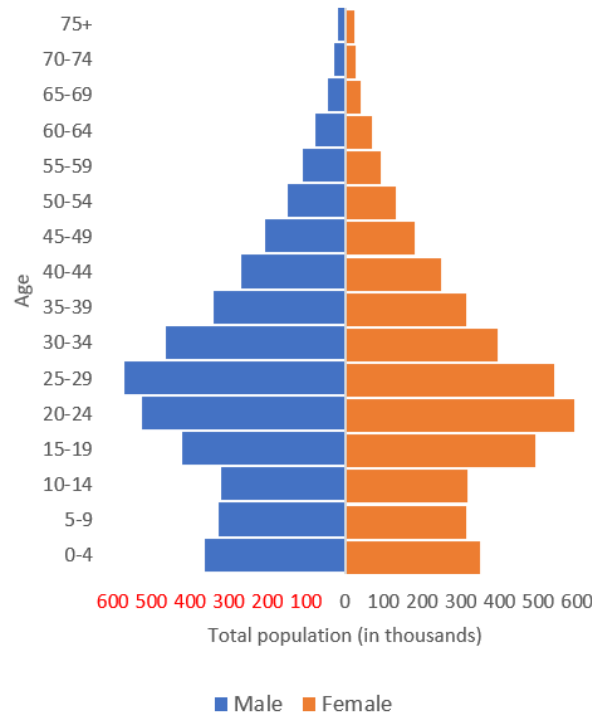
Figure 1. The Population Pyramid of DKI Jakarta, 2000 (in thousands)
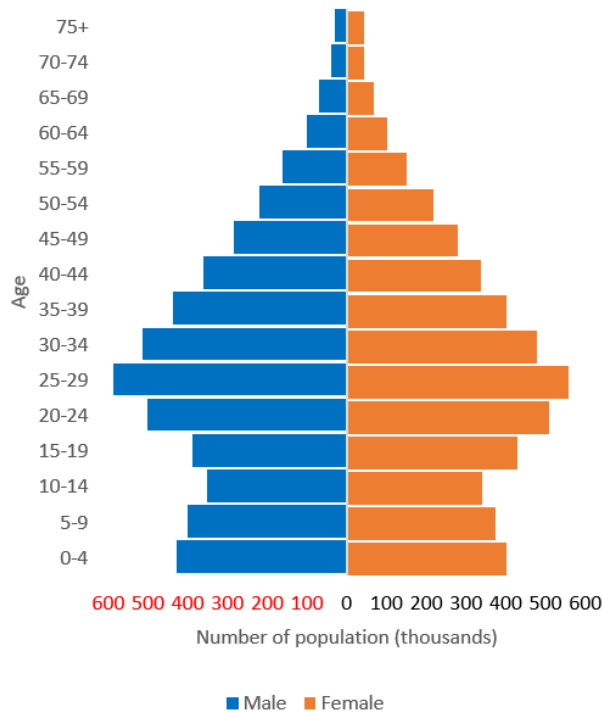Source: The 2000 Population Census (BPS-Statistics Indonesia 2001)

Figure 2. The Population Pyramid of DKI Jakarta, 2010 (in thousands)
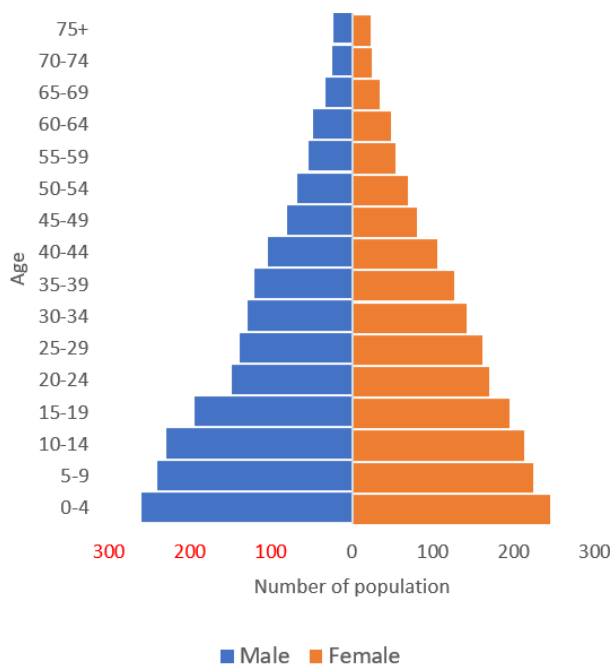Source: The 2010 Population Census (BPS-Statistics Indonesia 2012)

Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Figure 3. The Population Pyramid of East Nusa Tenggara, 2000 (in thousands)
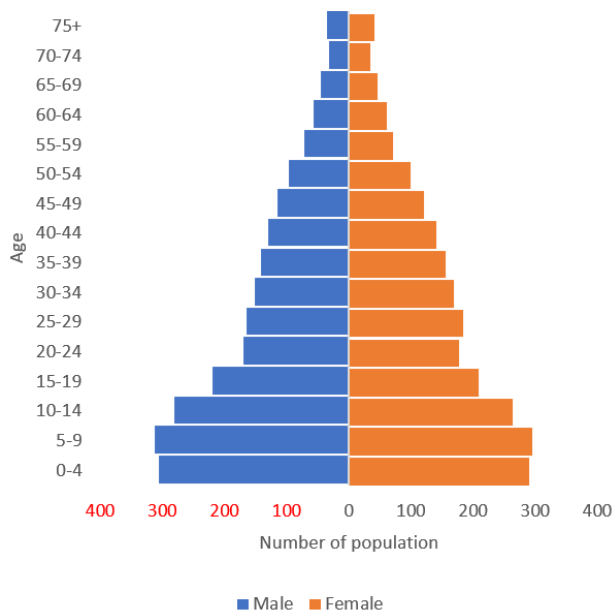Source: The 2000 Population Census (BPS-Statistics Indonesia 2001)

Figure 4. The Population Pyramid of East Nusa Tenggara, 2010 (in thousands)
Source: The 2010 Population Census (BPS-Statistics Indonesia 2012)

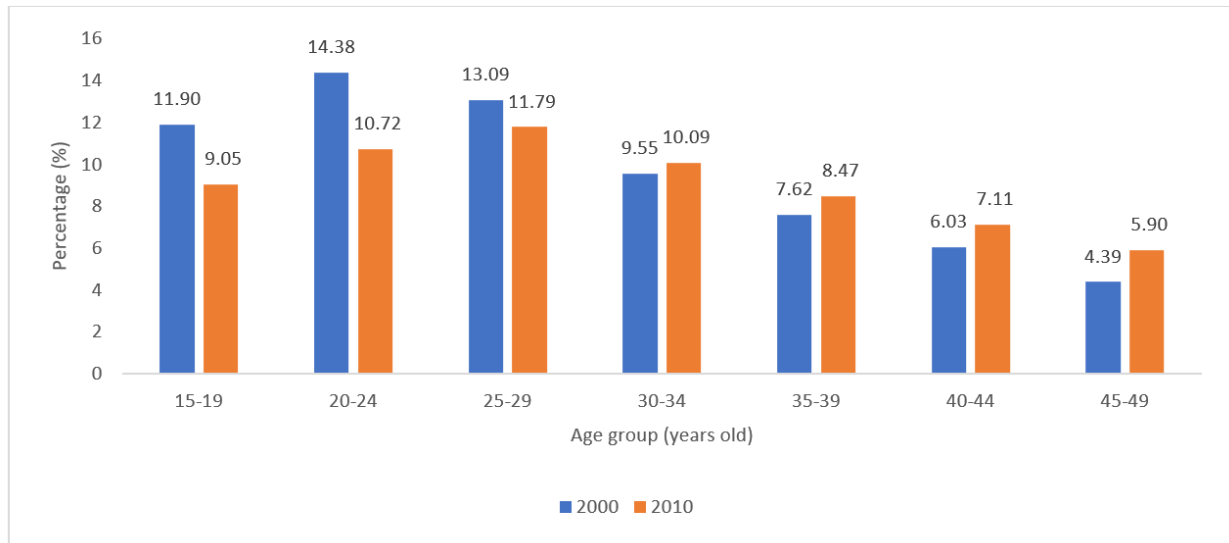*Economics and Finance in Indonesia Vol. 66 No. 2, December 2020*

Figure 5. The Percentage of Women of Reproductive Age of the Total Population of DKI Jakarta, 2000 & 2010
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
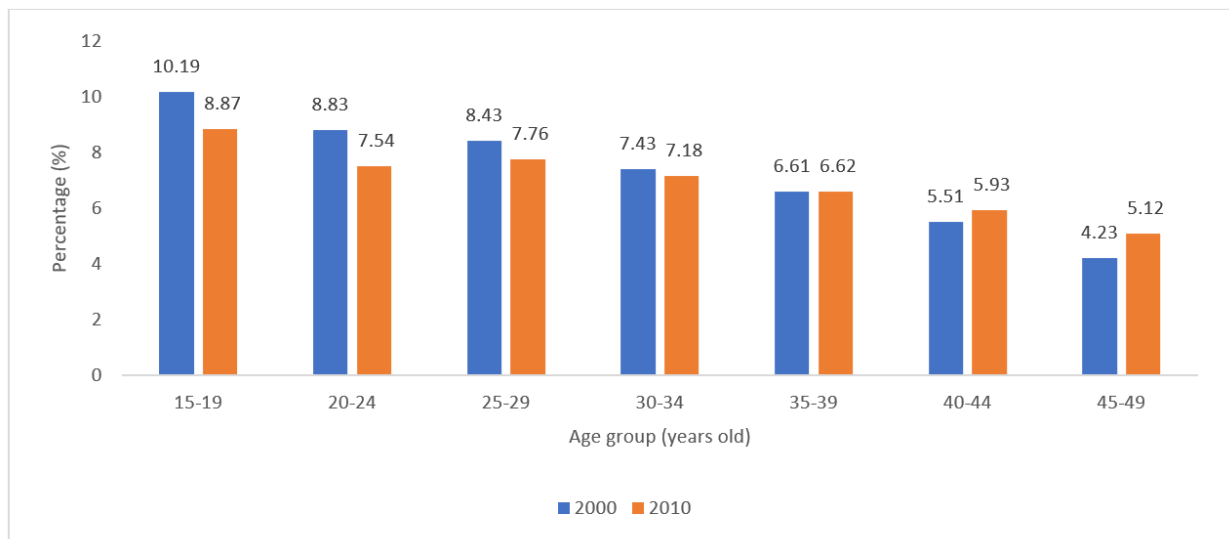(BPS-Statistics Indonesia 2012)

**Figure 6. The Percentage of Women of Reproductive Age of the Total Population of East Nusa Tenggara, 2000
& 2010**
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
(BPS-Statistics Indonesia 2012)

Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Figure 7. The Sex ratio of DKI Jakarta, 2000 & 2010
(men per 100 women)
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
(BPS-Statistics Indonesia 2012)

Figure 8. The Sex Ratio of East Nusa Tenggara, 2000 & 2010
(men per 100 women)
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
(BPS-Statistics Indonesia 2012)

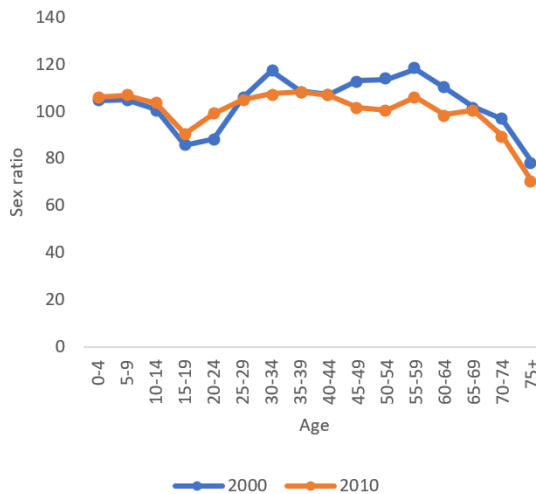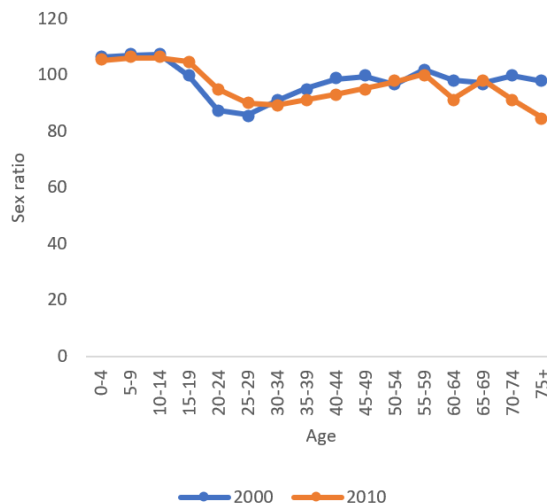## 4.3. The Sources of Changes in TFR of DKI Jakarta and East Nusa Tenggara During 2000–2010

The decomposition analysis shows that the main source of change in TFR of DKI Jakarta is the decrease in MFR. The increase in nuptiality also contributes to the increase in TFR, but the effect is offset by a higher decrease in MFR. The increase in the proportion of married women increases TFR by 0.315, but a change in MFR decreases TFR by 0.522. It means that the proportion of married women in 2010 is higher than in 2000, yet the number of average live births by married women in 2010 is lower than in 2000. The effect of the interaction between the changes in proportion of women ex-
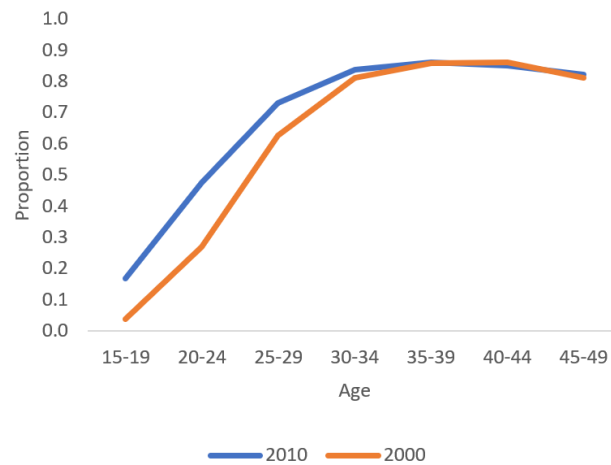
Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Figure 9. The Proportion of Married Women in DKI Jakarta, 2000 & 2010
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
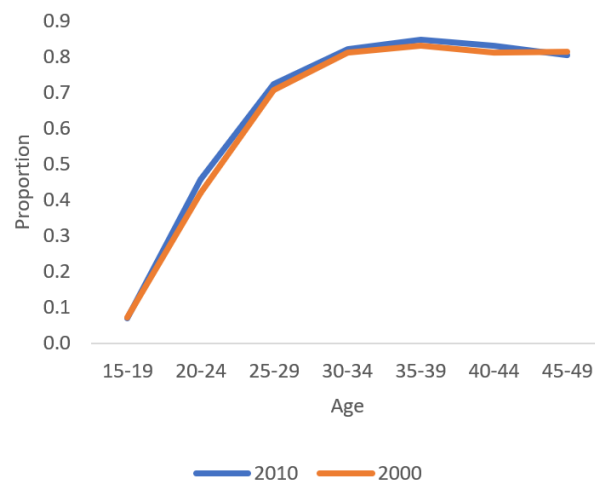(BPS-Statistics Indonesia 2012)

Figure 10. The Proportion of Married Women in East Nusa Tenggara, 2000 & 2010
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census
(BPS-Statistics Indonesia 2012)

posed to motherhood or the nuptiality and fertility rates increases TFR of DKI Jakarta.

DKI Jakarta experiences an increase in the proportion of married women during the period of 2000–2010, except for the age group of 40–44 years old. The highest effect of nuptiality on TFR originates from an increase in the proportion of married women aged 20–24 years old by 0.157, followed by those aged 25–29 years old by 0.077, and 15–19 years old by 0.066. Generally, the illustration of

the proportion of married women in Figure 9 also confirms the increase in the proportion of married women at the same age groups.

The province experiences a decrease in fertility rate at age 15 to 29 years old during the period of 2000–2010. Meanwhile, the highest effect of MFR originates from the decrease in ASMFR at the age of 15–19 years old by 0.351 and the age of 20–24 years old by 0.276. It means that compared to the 2000 period, there is an increase in the proportion
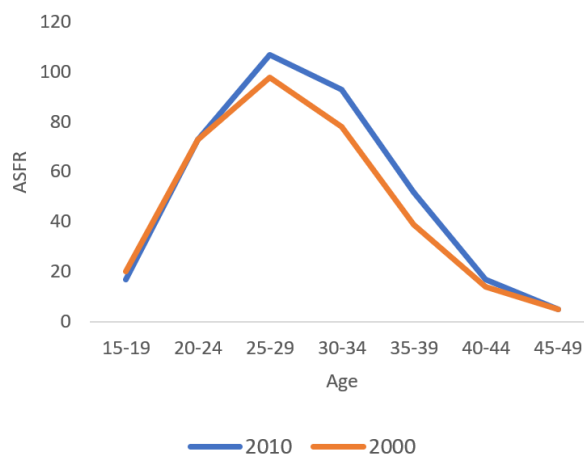
Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Figure 11. ASFR of DKI Jakarta, 2000 & 2010 (per 1,000 women)
Source: The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census (BPS-Statistics Indonesia 2012)
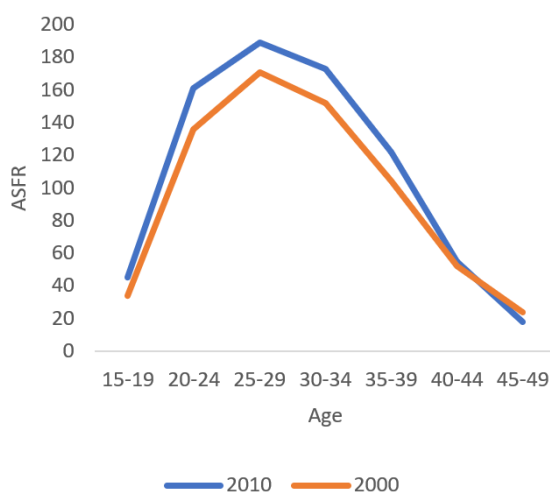

Figure 12. ASFR of East Nusa Tenggara, 2000 & 2010 (per 1,000 women)
Source: The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census (BPS-Statistics Indonesia 2012)

of married women aged 15–19 years old and 20-24 years old in 2010, though the number of live births per woman decreases.

The main source of change in TFR of East Nusa Tenggara is the increase in MFR. Nuptiality also contributes positively on the change in TFR, but the effect is smaller. MFR raises TFR by 0.342. The increase in the proportion of married women raises TFR by 0.118. It means that the proportion of married women and the number of live births in

2010 are higher than those in 2000. The interaction between changes in the proportion of married women and fertility rate suppresses TFR.

East Nusa Tenggara experiences an increase in the proportion of married women in all age groups, except for the age groups of 15–19 years old and 40–49 years old. The highest effect of nuptiality on TFR of East Nusa Tenggara originates from the increase in the proportion of married women aged 20–24 years old, raising TFR by 0.0139. It
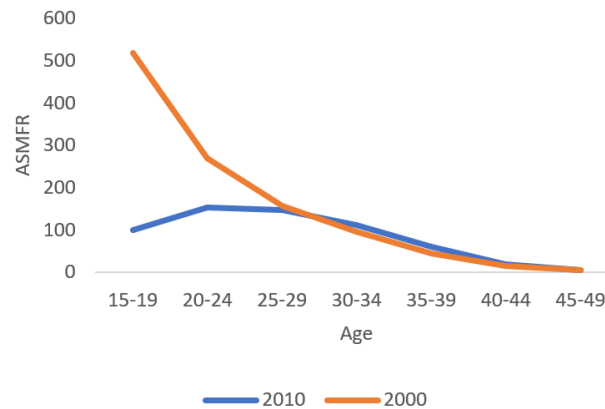
Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Figure 13. ASMFR of DKI Jakarta, 2000 & 2010 (per 1,000 women)
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census (BPS-Statistics Indonesia 2012)
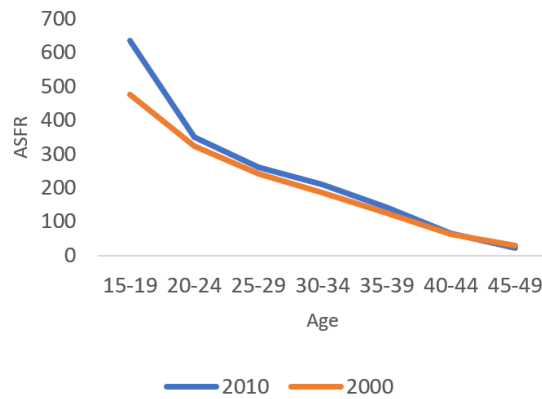

Figure 14. ASMFR of East Nusa Tenggara, 2000 & 2010 (per 1,000 women)
Source: Calculated from The 2000 Population Census (BPS-Statistics Indonesia 2001) and The 2010 Population Census (BPS-Statistics Indonesia 2012)

means that compared to the 2000 period, there is an increase in the proportion of married women at age 20–24 years old.

All age groups experienced an increase in ASMFR during the 2000–2010 period, except the oldest age group. Meanwhile, the two highest impacts of MFR originate from the increase in ASMFR at the age of 30–34 years old, followed by the age of 35–39 years old. The increase in ASMFR at the age of 30–34 years old and 35–39 years old raises TFR by 0.0191 and 0.016, respectively. The other age groups also experience increase in ASMFR, though the effects are lower.

4.4. Discussion

The decomposition analysis of TFR shows that the sources of the increase in TFR during the 2000–2010 period are different between DKI Jakarta and East Nusa Tenggara. The increase in TFR of DKI Jakarta is caused by an increase in the proportion of married women. The increase in TFR of East Nusa Tenggara is mainly caused by the increase in MFR. During the period, DKI Jakarta experiences an increase in the proportion of married women, yet a decrease in MFR. On contrary, East Nusa Tenggara experiences an increase in the proportion of married women accompanied by an increase in MFR. It means that even though the proportion of

Economics and Finance in Indonesia Vol. 66 No. 2, December 2020

Table 2. The Decomposition of Changes in TFR of DKI Jakarta During 2000–2010

Age group	The proportion of nuptiality	ASMFR	Total
15–19	0.066	-0.351	-0.286
20–24	0.157	-0.276	-0.119
25–29	0.077	-0.037	0.040
30–34	0.015	0.062	0.077
35–39	0.001	0.064	0.065
40–44	-0.001	0.016	0.015
45–49	0.000	0.000	0.000
Total	0.315	-0.522	-0.208
TFR in 2000	1.635		
TFR in 2010	1.820		
Change in TFR	0.185		
Difference due to change in the proportion of nuptiality	0.315		
Difference due to change in MFR	-0.522		
Interaction	0.393		

Source: Author's calculation

Table 3. The Decomposition of Changes in TFR of East Nusa Tenggara During 2000–2010

Age group	The proportion of nuptiality	ASMFR	Total
15–19	-0.0003	0.0112	0.0109
20–24	0.0139	0.0121	0.0260
25–29	0.0044	0.0139	0.0183
30–34	0.0021	0.0191	0.0212
35–39	0.0023	0.0160	0.0183
40–44	0.0013	0.0017	0.0030
45–49	-0.0002	-0.0057	-0.0059
Total	0.1177	0.3420	0.4597
TFR in 2000	3.365		
TFR in 2010	3.815		
Change in TFR	0.450		
Difference due to change in the proportion of nuptiality	0.118		
Difference due to change in MFR	0.342		
Interaction	-0.010		

Source: Author's calculation

married women in DKI Jakarta is higher in 2010 than in 2000, the average number of live births by married women decreases during that period. Meanwhile, East Nusa Tenggara experiences an increase in the proportion of married women in line with an increase in average number of live births by married women during the same period.

The decomposition of TFR shows the difference and similarity in nuptiality between DKI Jakarta and East Nusa Tenggara. While the increase in nuptiality starts from younger age group (15–19 years old) in DKI Jakarta, it occurs in older age group (20–24 years old) in East Nusa Tenggara. Marriage at young age contributes to the increase in TFR of DKI Jakarta, while it reduces TFR of East Nusa Tenggara. Marriage at young age occurs more frequently in DKI Jakarta during 2000–2010. However,

live births experienced more frequently by females aged 30–34 years old and 35–39 years old in both provinces show that more women delay childbearing. Even though the results of this study do not show the birth order, delaying childbearing may mean that more married women are aware of the costs of having children (Bongaarts 1993; Morgan, Zhigang & Hayford 2009).

Published secondary data show that during 2000–2010, SMAM of women in DKI Jakarta is getting younger. In more detail, the secondary data are supported by the results of decomposition of TFR. The decomposition analysis finds that the increase in nuptiality in DKI Jakarta occurs at younger ages, especially at the ages of 15–19 years old and 20–24 years old. It is also interesting that secondary data show that the percentage and number of female

population in these two age groups decrease during the period of 2000–2010. There may be some reasons for increased marriages at young ages in DKI Jakarta. They may be women of low economic status unable to continue to higher education (Nahar & Zahangir 2019; Wang & Chi 2017). Since the percentage and number of women in these two age groups decrease, they may be women with no ability to move out from DKI Jakarta, such as for working and studying.

The increasing number of marriages in young age groups in DKI Jakarta is a phenomenon while the average number of live births of young women decreases. The reasons for young marriages are pre-marital sex, pre-marital pregnancy, and school discontinuation. People aged 15–19 years old and 20–24 years old in Indonesia are usually going to senior high school or university. Considering their young age, women in those age groups may get married because they have pre-marital sex (O'Donnell, Utomo & McDonald 2020). They may become pregnant at young age and stop going to school, thus they are women with lower educational level. To provide space for next pregnancy in their early marriage, they can use contraceptive method whose knowledge comes from exposure to media such as radio, television, and internet (Gafar et al. 2020; Schoemaker 2005). Even though media have shared knowledge about contraceptive use, they have also exposed the "unprepared" young age group to a higher view of freedom in sexuality (O'Donnell, Utomo & McDonald 2020).

On the contrary, the decomposition analysis shows that the increase in the proportion of married women in East Nusa Tenggara occurs mainly at the age of 20–24 years old and all other older age groups, while the decrease in the proportion of married women occurs in younger age group (15–19 years old). It means that the increase in the proportion of married women in East Nusa Tenggara mainly occurs at older age compared to DKI Jakarta during the period of 2000–2010. This finding is in line with the published secondary data, showing that SMAM in East Nusa Tenggara is increasingly older while SMAM in DKI Jakarta is increasingly younger.

Supposing we notice the increase in sex ratio in East Nusa Tenggara at age 30 or older in 2010, there might be a possibility that the increased number of women during 2000–2010 is caused by marriage with local men. The decrease in married women in East Nusa Tenggara at age 15–19 years old may result in the increase in female population with higher educational attainment. The fact is supported by the secondary data showing that the percentage of women at age 15 years old or above attaining merely primary education or below decreases significantly from 72% in 2000 to 53% in 2010. Even though the proportion of married women at age 15–19 years old in East Nusa Tenggara decreases TFR, changes in ASMFR in this age group raises TFR.

The decomposition of TFR also shows the different patterns of ASFMR between DKI Jakarta and East Nusa Tenggara. DKI Jakarta experiences a decrease in ASFMR in young age groups, particularly at the age groups of 15–19 years old and 20–24 years old. There is an increase in the number of births at older age, for instance at the age of 30–34 years old and 35–39 years old, though the effect on TFR is smaller than births at younger age. Several women in DKI Jakarta may postpone childbearing until older age because they may wait for a stable economic status and mental readiness to ensure that they are capable of taking care children.

Meanwhile, the decomposition analysis shows that the increase in ASMFR in East Nusa Tenggara occurs in all age groups since the youngest age group (15–19 years old), although it occurs mainly at the age of 30–34 years old and 35–39 years old. The increase in ASMFR in nearly all age groups in this province may be influenced by several factors, such as low use of contraceptive methods and the traditional culture of having children in less developed area (Caldwell 1976). The increased MFR for the age of 15–19 years old should be a concern since young married women at this age may be poor, having no adequate income, lacking of knowledge

about contraceptive methods, and reluctant to have argument with their husbands (Schoemaker 2005).

Even though this study does not show birth order by age group, a notion that the live births born by women in their 30s are not surprising. They are possible since there are several women in Indonesia, such as in West Nusa Tenggara, who assume that the purpose of contraceptive use is not to limit the number of children, but to provide space for live births (Amran et al. 2109). In addition, married women in their late 30s may experience unwanted pregnancy supposing they assume that they are infertile at that age and reluctant to use any contraceptive methods (Gafar et al. 2020).

5. Conclusion

Changes in TFR of DKI Jakarta during 2000–2010 are dominated by the decrease in fertility rate. The decreased fertility rate that occurs at young age groups (15–19, 20–24, and 25–29 years old) means that more women delay childbearing, regardless the birth order. However, the proportion of married women in the young age groups increases as well. Married women in the young age groups may consist of women experiencing pre-marital sex, having low educational attainment, and coming from low economic status yet economically productive. However, they have knowledge and can access modern contraceptive methods since they live in urban area and receive information from the media. Waiting for financial stability may be the reason for the decline in fertility rates (Morgan, Zhigang & Hayford 2009). Access to pursuing and promoting the benefits of higher educational level can delay marriage in young age groups. In addition, the role of parents in assisting their teenagers is necessary.

Changes in TFR of East Nusa Tenggara in the same period are dominated by the increase in fertility rate. Even though the increase in fertility mainly occurs at ages of 30–34 years old and 35–39 years old, it also occurs in almost all age groups including younger age groups such as 15–19 years old and

20–24 years old. Meanwhile, an increase in nuptiality also occurs especially in the proportion of married women aged 20–24 years old. Increasing the importance of family planning, providing easier access, promoting the benefits of using modern contraceptive methods for women in all reproductive age groups, as well as encouraging young women to pursue higher education, can control fertility rate in this province.

This study has limitations, upon which future studies can be pursued. The study does not present the characteristics of young married women in both provinces, such as education, type of job, ethnicity, and birth order in age groups experiencing increased fertility. Further study of the socioeconomic characteristics and birth order will result in findings that lead to a refined policy. Even though the number of married women can be used as a proxy for the number of mothers, the actual number of mothers will yield more precise results. The actual number of mothers requires the number of married and unmarried women giving live births.

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