Birth Intervals among Multiparous Women in Indonesia

Abstract
Maternal mortality rate and infant mortality rate in Indonesia are currently high. One of factors causing the high risk of maternal and infant mortality is too short birth intervals. This study aimed to learn determinants of birth intervals among multiparous women in Indonesia. This study used data from the Indonesia Demographic and Health Survey 2012 with 9,945 multiparous women. The data was analyzed using Mann Whitney, Kruskal Wallis and logistic regression tests. Median of birth intervals was 62 months and 22.8% women had birth interval less than three years. Results showed that determinants of birth intervals included maternal education, the last age of childbirth, ideal family size, the use of contraception, infant mortality records and survival of preceding child (p value < 0.05). The age of childbirth was a major risk factor of too short birth intervals. It needs the improvement of communication, information and education regarding maturation of age for marriage, ideal number of children as well as the increase of contraceptive use in order to increase optimum birth intervals.

Keywords: Birth intervals, infant mortality, multiparous

Introduction
Infant mortality rate (IMR) and maternal mortality rate (MMR) are indicators of national health standards. MMR and IMR are also targets determined in the Millennium Development Goals (MDGs). According to World Health Organization (WHO), the IMR is the number of infants died before the age of one year per 1,000 live births. Meanwhile, MMR is maternal death that occur during pregnancy, childbirth, or within 42 days of postnatal period with causes related directly or indirectly to pregnancy per 100,000 live births. In Indonesia, maternal mortality is one of the highest in Asia. Based on the report from Indonesia Demographic and Health Survey (IDHS) in 2012, it was recorded that MMR reached up to 359 per 100,000 live births. This number increased compared to the IDHS in 2007 which recorded MMR as many as 228 per 100,000 live births. In the world, 19,000 children died every day in 2011.
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According to The United Nations Children’s Fund (UNICEF)’s report in 2012, IMR in Asia was amounted to 34 per 1,000 live births. In Indonesia, IMR was steadily declining (but the decline was insignificant). IMR decreased from 35 per 1,000 live births in 2004 to 34 per 1,000 live births in 2007 and reached 32 per 1,000 live births in 2012. When compared to other countries in Asia whose economic conditions are not too different with Indonesia, Indonesia is still lagging. In 2012, UNICEF reported that in Philippines, IMR was 20 per 1,000 live births, while in Malaysia IMR was 6 per 1,000 live births. Indonesia still needs to reduce infant mortality by 40% to achieve the MDGs 2015 that is 23 per 1,000 live births.

Efforts to reduce maternal mortality and infant mortality have been performed through family planning programs by The National Family Planning Coordinating Board (BKKBN). Through family planning programs, various programs are presented in thinning or birth control. Birth interval is useful to reduce the high risk pregnancy. By thinning the birth, the mother has a chance to regain her health before next conception. Healthy pregnancy will also have an impact on fetal development in which fetus develops healthy.

Birth intervals control action in Indonesia has not been optimal. IDHS 2012 showed the birth intervals in Indonesia in which 4.4% of births had intervals less than 18 months, less than 24 months (10.5%), less than 36 months (25%) after the previous birth. Median of birth intervals was 60.2 months in 2012 which increased compared to 54.6 months in 2007. IDHS 2012 also showed that child mortality risk is three times higher on children born with birth intervals less than two years compared to children born with intervals of four years or more. Neonat generated from the survey and not including births of the firstborn. Meanwhile, the exclusion criterion was babies born twins because twin births have 0-month birth spacing.

The minimum sample size was calculated using a formula of different proportions. The result of the calculation obtained was 5,360 respondents, meanwhile samples used from the data of IDHS were as many as 9,945 respondents. Thus, the sample examined was eligible for minimum sample size. The dependent variable was the birth intervals. While the independent variables were the maternal education, economic status, place of residence, age at the last childbirth, the number of living children, sex of the preceding birth, the ideal size of family, contraception knowledge, perspectives of husbands against contraception, the use of contraception, exclusive breastfeeding, infant mortality records, survival of the preceding birth. The data was analyzed using Mann Whitney test, Kruskal Wallis, and logistic regression test.

Results

The average birth intervals was 69.02 months with standard deviations 40.7 months. Median birth intervals in this study was 62 months with the most birth interval of 25 months. The median value of the confidence inter-
val (95% CI) indicated a value between 61 to 63 months. It could also be concluded that the birth interval data distribution was asymmetrical or did not follow normal distribution. After categorized, respondents who had short birth intervals (less than 36 months) was 22.8%.

Results showed that median birth intervals was lower among respondents with higher education (54 months). Based on the economic level, the lowest median birth intervals was found among respondents with the low economic level while the highest median birth intervals was among respondents with the fourth economic level (70 months). Median birth intervals of respondents who lived in rural and urban areas were similar, respectively 61 months and 64 months. Moreover, Table 1 showed median birth intervals increased by age that was 25 months among respondents aged less than 20 years, 59 months among respondents aged 20 to 35 years and 78 months among respondents aged over 35 years. Median birth interval was lower on respondents with the rate of live births more than two people (60 months). Median birth interval was lower on respondents with the rate of live births more than two people (60 months).

The results showed that the median birth intervals based on sex of preceding birth were same, respectively 62 months and 63 months. Median birth interval was lower on respondents with the rate of live births more than two people (60 months).

Based on knowledge level, the median birth intervals between respondents who had high and low knowledge of contraception was the same at 62 months. Median birth intervals between respondents who agreed and disagreed were similar, respectively 65 months and 62 months. The lowest median birth interval was found among respondents who used traditional contraception (50 months) (Table 2).

Results on Table 4 showed median birth intervals was lower on respondents who exclusively breastfed (57 months). Based on infant mortality records, the median birth interval was lower on respondents who had infant mortality record (47 months). Birth interval was lower on respondents with survival of preceding birth was dead (33 months).

Determinants of birth intervals included maternal education, age at the last childbirth, ideal family size, contraceptive use, infant mortality records and survival of preceding birth. Women who had the last pregnancy at the age of < 20 years had a short birth interval of less than three years of 11.1 times (1/0.09) times (OR = 11.1; 95% CI = 7.14 to 16.67) than respondents aged between 20 – 35 years old. Respondents who had the last childbirth at the age of < 20 years had the risk of having a short birth interval 20.0 (1/0.05) times (OR = 20.0; CI 95% = 14.29 -33.33) times higher than respondents aged > 35 years. Respondents who were highly educated had a risk of having a short birth interval 1.51 (1/0.66) times (OR = 1.51; 95% CI = 1.36 to 1.67) higher than respondents with the low education level. Respondents who had the ideal family size of more than two children had the risk of having a short birth interval 1.34 times (OR = 1.34; 95% CI = 1.21 to 1.48) higher than the ideal size of the respondents who had less family living with

### Table 1. Relation between Birth Intervals and Demographic Characteristics

<table>
<thead>
<tr>
<th>Demographic Characteristic Variables</th>
<th>Category</th>
<th>Median</th>
<th>95% CI</th>
<th>n</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal education</td>
<td>High (≥ SHS)</td>
<td>54</td>
<td>52.56</td>
<td>3474</td>
<td>0.0005*</td>
</tr>
<tr>
<td></td>
<td>Low (&lt; SHS)</td>
<td>68</td>
<td>64-69</td>
<td>6471</td>
<td></td>
</tr>
<tr>
<td>Economic status</td>
<td>Highest</td>
<td>62</td>
<td>60.64</td>
<td>1958</td>
<td>0.0005*</td>
</tr>
<tr>
<td></td>
<td>Fourth</td>
<td>70</td>
<td>67-72</td>
<td>1996</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Middle</td>
<td>69</td>
<td>66-71</td>
<td>1904</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Second</td>
<td>63</td>
<td>60-66</td>
<td>1828</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowest</td>
<td>50</td>
<td>48-52</td>
<td>2258</td>
<td></td>
</tr>
<tr>
<td>Residence</td>
<td>Urban</td>
<td>61</td>
<td>60-62</td>
<td>4933</td>
<td>0.133</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>64</td>
<td>62-65</td>
<td>4991</td>
<td></td>
</tr>
<tr>
<td>Age at the last childbirth</td>
<td>≤ 20 years old</td>
<td>25</td>
<td>22-32</td>
<td>82</td>
<td>0.0005*</td>
</tr>
<tr>
<td></td>
<td>20 – 35 years old</td>
<td>59</td>
<td>59-60</td>
<td>7441</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 35 years old</td>
<td>78</td>
<td>75-80</td>
<td>2421</td>
<td></td>
</tr>
<tr>
<td>Number of living children</td>
<td>≤ 2</td>
<td>64</td>
<td>62-65</td>
<td>5512</td>
<td>0.0005*</td>
</tr>
<tr>
<td></td>
<td>&gt; 2</td>
<td>60</td>
<td>59-62</td>
<td>4432</td>
<td></td>
</tr>
</tbody>
</table>

*) Significant at p value < 0.05 Mann Whitney or Kruskal Wallis test

### Table 2. Relation between Birth Intervals and Family Size and Structure

<table>
<thead>
<tr>
<th>Family Size and Structure Variables</th>
<th>Category</th>
<th>Median</th>
<th>95% CI</th>
<th>n</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex of preceding birth</td>
<td>Male</td>
<td>62</td>
<td>60-63</td>
<td>5188</td>
<td>0.775</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>63</td>
<td>62-65</td>
<td>4756</td>
<td></td>
</tr>
<tr>
<td>Ideal family size</td>
<td>≤ 2</td>
<td>67</td>
<td>66-69</td>
<td>4746</td>
<td>0.0005*</td>
</tr>
<tr>
<td></td>
<td>&gt; 2</td>
<td>58</td>
<td>57-59</td>
<td>4266</td>
<td></td>
</tr>
</tbody>
</table>

*) Significant at p value < 0.05 Mann Whitney or Kruskal Wallis test
two children. Respondents who used traditional contraceptive method were 1.47 times (OR = 1.47; 95% CI = 1.18 to 1.83) more likely to have shorter birth interval than respondents who used modern contraceptives. Respondents who did not use contraception were at risk 1.50 times (OR = 1.50; 95% CI = 1.35 to 1.69) more likely to have shorter birth intervals than respondents who used modern contraceptives. Respondents who had infant mortality records were 1.68 times (OR = 1.68; 95% CI = 1.70 to 2.73) more likely to have shorter birth interval than respondents who had never experienced the death of a child. Respondents with survival of preceding birth was dead had the risk 2.15 times (OR = 2.15; 95% CI = 1.43 to 1.97) more likely to have shorter birth interval than respondents with survival of preceding birth was still living (Tabel 5).

Discussion
Respondents who were highly educated had a higher risk of having the short birth intervals in which the risk of short birth interval on high educated respondents was 1.51 higher than the low educated respondents. These results were in contrast to studies in Ethiopia where short birth intervals were more common among women with low level of education. Respondents with higher education were more likely to use contraception to space births and extend access to information and better health awareness. The difference in results was because in this study, the group of more educated women were mostly young women. This is in line with IDHS report in 2012 that showed the median birth intervals on women graduated from high school and college was lower than women who did not complete primary school and never graduat-
ed from high school.\textsuperscript{2} Results of cross tabulation also showed that proportion of highly educated women were more at age less than 35 years old compared to the age over 35 years old.

There was a positive relation between age and birth intervals. These results were similar to studies in Spain and Iran. The older age, the higher median birth intervals. This effect was related to the process of degeneration in female fertility because of age.\textsuperscript{16,20-21} Moreover, the older age increased birth intervals due to the increasing experience and women knowledge.\textsuperscript{21} Increasing age also indicated contraceptive use as an effort to reduce the risk of pregnancy and to increase birth intervals.

Results showed the ideal proportion of children related to birth intervals. Respondents who wanted more than two children had risk of having a short birth interval 1.34 times higher than respondents who wanted a child less than or equal to two children. Studies in Iran and Tanzania showed number of children living significantly related to birth spacing.\textsuperscript{21,22} The number of children was not the desired direct variables affecting fertility, but related to the variables affecting the birth control.\textsuperscript{23}

There was a significant relation between contraceptive use and birth intervals. Respondents who used traditional contraceptives had risk 1.47 times more likely to have short birth intervals compared to respondents who used modern contraceptives. Respondents who did not use contraceptives had risk 1.50 times more likely to have short birth intervals compared to respondents who used modern contraceptives. This is in line with the prior study conducted in which contraceptive users had birth intervals longer than those who did not use contraceptives.\textsuperscript{13,24,25} This could be caused by the contraceptive effect to delay the time until the next conception.\textsuperscript{24} Bongaarts theory also stated that such contraception affected directly on fertility.\textsuperscript{26}

For respondents who had infant mortality records, the percentage of short birth intervals was higher than respondents who never had infant mortality records. Results showed that respondents who had infant mortality records had the risk 1.69 times more likely to have shorter birth intervals compared to respondents who never had infant mortality records. This is in line with study in Spain stating that there were shorter birth intervals in families who had infant mortality records.\textsuperscript{20} Lucas theory stated that if the parents experienced death of a child, then they would try to have another child. This effect is known as a substitute or replacement effect.\textsuperscript{13} The results also showed a significant relation between previous survival and the spacing between births. Median birth intervals was lower on respondents with a record of preceding survival of birth was died (33 months). Respondents with preceding survival of birth was died had the risk 2.15 times more likely to have shorter birth intervals than respondents whose preceding survival of birth was alive. This was due to the need of parents who wanted to immediately replace the dead child in a short time.\textsuperscript{7,21}

Conclusion

Median birth interval is 62 months. The percentage of respondents who have short birth interval is 22.8%. Determinants of short birth intervals include maternal education, age at the last childbirth, ideal family size, contraceptive use, infant mortality records and survival of preceding birth. Women who have the last childbirth at the age < 20 years have risk 11.1 times of having short birth interval less than three years (OR = 11.1; 95\% CI = 7.14 to 16.67). Higher education has the risk 1.51 (1 / 0.66) times (OR = 1.51; 95\% CI = 1.36 to 1.67), the ideal family size of more than two children has the risk 1.34 times (OR =1.34; 95\% CI = 1.21 to 1.48), traditional contraception has the risk 1.47 times (OR = 1.47; 95\% CI = 1.18 to 1.83), those who do not use contraceptives have the risk 1.50 times (OR = 1.50; 95\% CI = 1.35 to 1.69), infant mortality record has risk 1.68 times 1.50 times (OR = 1.68; 95\% CI = 1.70 - 2.73), preceding survival of birth died has the risk 2.15 times (OR = 2.15; 95\% CI = 1.45 to 1.97). Highly educated women should be encouraged to reduce short birth intervals. In addition, the optimum birth intervals can be enhanced by improving communication, information and education concerning the maturation of age for marriage, the ideal number of children, then by increasing contraceptive use.

References

BIRTH INTERVALS AMONG MULTIPAROUS WOMEN IN INDONESIA


