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Jacob Adetunji

Age patterns of mistimed and unwanted fertility in developing countries

Jacob Adetunji, Ph.D.
Sociology Department
Bowling Green State University
Bowling Green OH 43403

Tel. 419 372-9523; Fax: 419 372-8306; E-mail: adetunj@bgnet.bgsu.edu

Abstract

Using nationally representative data from ten African, Asian and Latin American countries, this paper assesses the age patterns of mistimed and unwanted fertility. It also investigates whether the observed age pattern is upheld after controlling for the effects of important determinants of mistimed and unwanted childbearing. The results show that mistimed fertility decreases with maternal age while unwanted fertility increases with age of the mother. Mother's age remains a statistically significant predictor of both mistimed and unwanted fertility and the age pattern did not disappear after introducing controls. A closer examination of the intersection between mistimed and unwanted fertility in the ten countries shows three broad patterns. The first pattern (Type A) is a group of countries where the intersection occurs at older ages, above 34 years. Fertility levels in these countries are usually high and mistimed fertility is much higher than unwanted fertility levels. The second group (Type B) represents countries where the intersection occurs between ages 25 and 34. These are countries where both mistimed and unwanted fertility levels are almost equal. The third category (Type C) represents countries where the intersection occurs at ages before 25 and they are those with high levels of unwanted fertility. The meanings and implications of these results are discussed.

Introduction

Mistimed and unwanted childbearing is an evidence for unfulfilled desires to rightly time pregnancies or reflects the inability to stop childbearing. Mistimed fertility occurs when women carry to term and deliver pregnancies that occurred when they were not prepared to have a child. Unwanted fertility, on the other hand, occurs among women who wanted no more children. Both issues are receiving increasing attention in the literature. However, most of the studies on the subject are based on developed countries where fertility levels are very low. Bongaart's (1997) study that focuses on several developing countries analyzed data for unwanted fertility.

A review of the literature suggests that mistimed childbearing is most common among younger women and its prevalence decreases with women's age. In contrast, unwanted fertility increases with women's age (Adetunji, 1998; Williams, 1991; Williams and Pratt, 1990; Pratt and Horn, 1985). Because the association of these two issues move in opposite along the reproductive age spectrum, studies that focus on unintended childbearing fertility -- a combination of mistimed and unwanted childbearing -- tend to find weak or no age-effects (see Henshaw, 1998; Mbizvo et al., 1997; Allaby, 1994; Forrest, 1994:1486; Cartwright, 1988:251). Since studies investigating the age pattern of mistimed and unwanted childbearing under various fertility scenarios in developing countries are rare, it is not yet clear whether the age pattern observed mainly in low fertility settings of the West will be the applicable in high and transitional fertility settings.

Moreover, since mistimed fertility levels vary inversely with maternal age while unwanted fertility levels increase with mother's age, if both variables are plotted graphically on the same plane, an intersection is likely[1]. If an intersection occurs, the point of intersection may be of substantive interest. Their intersection would occur around the ages where the proportion of births resulting from unfulfilled desires to stop childbearing exceeds the proportion resulting from a timing failure. By examining such intersections under different fertility scenarios, we might understand the important processes with potential implications for the mix of family planning methods necessary to meet the changing reproductive needs. This is especially so given that mistimed fertility is, in part, a consequence of unmet contraceptive need for spacing while unwanted fertility is a partial reflection of unmet need for stopping. The objective of this paper, therefore, is to re-examine the age pattern of mistimed and unwanted childbearing under different fertility scenarios, assess the statistical significance of the age effects and investigate the intersections between the age patterns.

The analyses reported in the paper are carried out in three stages. First, the general age patterns of mistimed and unwanted fertility are presented with the aim of checking whether countries that differ in fertility levels and socioeconomic circumstances exhibit similar age patterns of mistimed and unwanted fertility. Secondly, the logistic regression technique is used to assess the extent to which the observed age patterns would change if

[1] An intersection between both line graphs will occur before age 50 if the values of mistimed fertility in the initial age groups exceed those of unwanted fertility, and if the values of unwanted fertility exceed those of mistimed fertility at older ages. The lines will not intersect under two conditions. First, if the value of age-specific mistimed fertility does not fall below the value of unwanted fertility at any ages below 50. Second,

the effects of important demographic variables such as number of living children and interval between births are held constant. Finally, the paper presents a synthesis of the results obtained when the age patterns of both mistimed and unwanted fertility are plotted together on the same graphs for countries with different levels of fertility.

Data and Methods

The analysis is based on data from Demographic and Health Survey (DHS), which is a program that collects nationally representative population and health data in developing countries and in former socialist countries of Eastern Europe. The core funding for the DHS project was by the United States Agency for International Development (USAID). Ten African, Asian and Latin American/Caribbean countries representing divergent fertility scenarios were selected for the study. The countries are Ghana, Kenya and Senegal (relatively high fertility countries), Zimbabwe, Egypt and Morocco (with intermediate fertility levels or a total fertility rate of 3.5-4.5), and , Indonesia, Colombia, Dominican Republic, and Peru (lower fertility countries with a total fertility rate of less than 3.5). These countries cut across Africa, Asia and Latin America and the Caribbean. These countries all had the standard recode data available at the beginning of this project.

In each data set, data on mistimed and unwanted childbearing were obtained from women who had given birth to a baby in the three to five years preceding the interview date. The field procedure was as follows: all eligible women (age 15-49 years) were asked if they

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there will be no intersection if the value of unwanted fertility at its peak does not exceed the value of mistimed fertility at any age group below 50.

were currently pregnant. Those who were currently pregnant were asked, 'At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to become pregnant at all?' These responses are the basis for classifying current pregnancies as wanted then, wanted later (mistimed) or wanted no more children (unwanted). Wanted and rightly-timed pregnancies were those that occurred at the time that the respondent wanted them; mistimed pregnancies were those that occurred sooner than the respondents desired (conceptually, these would be wanted); and unwanted pregnancies were those that respondents had when they wanted no more children. Unintended pregnancy is the summation of mistimed and unwanted pregnancies.

Data and Methods

This paper presents the results of an investigation into the age pattern of mistimed and unwanted childbearing in ten developing countries. The analysis is based on data from Demographic and Health Survey (DHS), which is a program of data collection in developing countries with core funding provided by the United States Agency for International Development (USAID). Ten African, Asian and Latin American/Caribbean countries were selected for the study. The countries are Ghana, Kenya, Senegal and Zimbabwe in Sub-Saharan Africa, Egypt, Indonesia and Morocco in North Africa/Asia, and Colombia, Dominican Republic, and Peru in Latin America and the Caribbean. These countries represent various fertility scenarios in the developing world, they have

all participated at least twice on the DHS program and they all had the standard recode data available at the beginning of this project.

In each survey, data on mistimed and unwanted childbearing were obtained from women who had given birth to a baby in the three to five years preceding the interview date. The field procedure was as follows: all eligible women (age 15-49 years) were asked if they were currently pregnant. Those who were currently pregnant were asked, 'At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to become pregnant at all?' These responses are the basis for classifying current pregnancies as wanted then, wanted later (mistimed) or wanted no more children (unwanted). Wanted and rightly-timed pregnancies were those that occurred at the time that the respondent wanted them; mistimed pregnancies were those that occurred sooner than the respondents desired (conceptually, these would be wanted); and unwanted pregnancies were those that respondents had when they wanted no more children. Unintended pregnancy is the summation of mistimed and unwanted pregnancies.

Using survey data to study reproductive intentions implies a reliance on responses to questions after the fact. Therefore, responses are subject to various forms of *ex post facto* rationalization, which could produce a bias (Westoff, 1988, p. 257). However, studies from developing countries (Mensch et al., 1997; Bankole and Westoff, 1998) have found that reactions to pregnancies are more accurately reported the closer the events are to the

time of interview. This is why this analysis focuses on children born less than three years before the survey date.

The synthetic cohort approach, which is normally used to calculate the age-specific fertility rate (ASFR) and total fertility rates (TFR), is adapted to derive the age-specific mistimed fertility rates (ASMFR) and the age-specific unwanted fertility rates (ASUFR). That is

$$ASFR\ [a,t] = b\ [a,t]/e[a,t]$$

where a = five-year age groups 15-19 to 45-49, b[a,t] = births to women in age group a during the period t, and e [a,t] = woman-years of exposure among women in age group a during the period t (Arnold and Blanc, 1990, p. 2). Thus, age-specific mistimed fertility rate (ASMFR) is calculated as the number of mistimed births to women in a specified age group divided by the number of woman-years of exposure in that age group during the preceding 36 months. Similarly, the age-specific unwanted fertility rate (ASUFR) is calculated as the number of births unwanted at conception to women in a specified age group divided by the total number of years of exposure of women in that age group in the period. Mother's age at the time of conception is used in the analysis. To obtain the corresponding rate for all women in surveys that were based on ever-married samples only (Egypt and Indonesia), an adjustment factor based on the household listing was applied. This factor is a ratio of all women aged 15-49 in the household to the number of ever-married women aged 15-49; it is applied to obtain the correct denominator for

indices based on all women. These rates were then compared to the observed age-specific fertility rates for the same periods (three years before interview date). Table 1 shows some descriptive statistics of the data for the analysis.

To test the statistical significance of the age effect on mistimed and unwanted fertility in various countries, the logistic regression technique was used (model 1). Thereafter, the effects of two variables (number of living children and length of preceding birth interval) that have been found to be important determinants of mistimed and unwanted childbearing in an earlier study (Adetunji, 1998) were controlled. The objective is to assess whether the effect of both variables will disappear or whether the age patterns will change after taking the effects of these variables into account. Such an assessment is deemed necessary because of the importance attached to the age patterns later in the paper.

Results

Age patterns

The overall pattern of mistimed and unwanted childbearing is presented in Figures 1 and 2. Figure 1 shows that mistimed childbearing varied inversely as age of the woman increases, whereas Figure 2 shows that unwanted childbearing increases as age of the woman increases. This pattern of association is a confirmation of what we expected. In both figures, the general patterns of association are similar in all countries, but the levels differ. In Figure 1 for example, Egypt, Indonesia and Morocco have the lowest levels of

mistimed childbearing across the age groups while Ghana, Kenya and Zimbabwe have the highest levels. However, in Figure 2, which is about unwanted childbearing, Peru, Kenya and Colombia have the highest levels while Senegal, Ghana and Zimbabwe have the lowest.

Introducing controls

The strong association between maternal age and mistimed and unwanted fertility in Figures 1 and 2 seems consistent across the countries. However, it is still not clear whether mother's age is a statistically significant predictor of mistimed and unwanted childbearing. It is also not clear whether the age patterns will change if other relevant correlates of mistimed and unwanted childbearing are held constant. To investigate these issues, three logistic regression models are fitted. The first model tests the statistical significance of age as a predictor of mistimed childbearing (Table 2) or of unwanted childbearing (Table 3). The second model in both Tables 2 and 3 assesses the effects of age after taking into account the effects of the number of living children. The third model controls for the effects of birth intervals.

The results in model 1 in both Tables 2 and 3 show that age is a significant predictor of mistimed and unwanted childbearing in developing countries. This result confirms the age patterns shown in Figures 1 and 2. Controlling for the effects of the number of living children (model 2) and birth interval length (model 3) did not alter the general pattern of association that are already observed in the bivariate analysis. For example, the odds ratios of mistimed childbearing by age 35+, after controlling for birth intervals, is less

than half of that in age 15-19 in almost every country. In Table 2, controlling for the effect of number of living children did not change the effect of age on mistimed childbearing, neither did it alter its patterns in major ways. Although some changes were noticed after controlling for the effects of preceding birth intervals, they only serve to amplify the age effects, rather than diminish them. For example, in Egypt, Morocco and Indonesia, a clear inverse variation between maternal age and mistimed childbearing was observed especially after age 15-19. In Senegal, age effects became insignificant in model 3. Controlling for other combinations (not shown on Table) did not alter this pattern.

In Table 3, the results of models 1 and 2 are essentially the same. Unwanted childbearing varied positively with the age of mother. The same pattern was observed after taking into account the effects of preceding birth intervals. However, the gaps in the odds ratios of being an unwanted child was drastically reduced. For example in Indonesia, the odds ratio of being unwanted is 64:1 if mother is aged 35+ compared to mothers aged 15-19. However, after controlling for the effects of birth interval, the odds ratio decreased to 14:1.

In sum, the multivariate analysis shows that age is a statistically significant predictor of mistimed and unwanted childbearing in almost all the ten countries. The pattern of association was not significantly altered after controlling for the effects of birth interval and number of living children. With this confidence, I proceeded to investigate the intersections between these age pattern in the ten countries.

Analyzing the age at cross-over

As was indicated earlier in this paper, the age at which unfulfilled desires to delay of space births (represented by mistimed childbearing) are replaced by unfulfilled desires to stop childbearing (represented by unwanted childbearing) is important for programmatic purposes. In this section, I combined the line graphs representing both mistimed and unwanted childbearing for each country with the aim of examining the patterns in their intersection. The points at which these intersections occur in all ten countries fall into three categories. First are those countries where the intersection occurred at the upper end of reproductive age span -- referred to as Type A. The countries in this category are Ghana, Senegal and Zimbabwe, all of which are sub-Saharan African countries. Typically, the intersection occurs after age 35-39. Senegal is chosen to depict that type (Figure 3A). In the Type A countries, mistimed childbearing is high and did not decline below the levels of unwanted childbearing until a woman has had many births. Thus, unwanted childbearing exhibits a peak only towards the end of the reproductive age span.

In the second group of countries, referred to as Type B countries, the intersection between mistimed and unwanted fertility curves occurs between ages 25 and 34. These are prime reproductive ages in many countries. The countries that fell into this category are Kenya, Indonesia, Morocco, Colombia and Dominican Republic. The graph for Morocco is shown as an example of this (Figure 3B). One thing that apparently characterizes these Type B countries is that the proportion of mistimed births is usually close to that of unwanted births (see Table 1). Finally, Type C countries are those in

which the intersection occurs before age 25. These countries are Egypt and Peru and I use the Egyptian pattern as an example (Figure 3C). One of the characteristics of type C countries is that the level of unwanted fertility is much higher than the level of mistimed fertility .

Explaining the age at crossover

An important question emerging from the pattern of crossover between the graphs representing the age patterns of mistimed and unwanted childbearing is why an intersection occur early or late along the age spectrum. The first factor that comes to mind is the fertility level. However, looking at the levels of fertility for each country (Table 1), TFR does not seem to be a good predictor of countries where the intersection would occur at an early or later age. For example, although Kenya had a TFR of 5.3, it belonged to the same type B countries together with Indonesia and Colombia with a TFR below 3. A careful reading of the arguments by Bongaarts (1997) regarding changes in unwanted fertility in developing countries suggests that the mean desired family size would be the most logical predictor of the age at which a crossover occurs. The results are presented in Figure 4. They show that the mean ideal family size in the type A countries is between 4.7 and 6.2, while the range in type B countries is between 2.8 and 3.9 and in type C countries, between 2.6 and 2.9.

The connection between mean ideal family size and the age at which the intersection between mistimed and unwanted age-specific fertility occurs is logical. First, a woman would normally not report a recent birth as unwanted if she has not reached her desired

family size. Until her desired family size is achieved, she would be aiming to achieve a decent inter-birth spacing. That is to say that a woman is at the risk of having mistimed fertility until she reaches her desired family size. Once she achieves her desired family size, she is at the risk of having an unwanted pregnancy or birth. Therefore, where the desired family size is low, and thus could be achieved within a few years of childbearing, a woman would be a risk of unwanted childbearing for a long time. On the other hand, if the desired family size is large, a woman may spend most of her reproductive or marital year trying to achieve it. Since she could only have mistimed (not unwanted) birth before reaching her desired family size, she is at the risk of having mistimed fertility for most of her reproductive/marital years. This is why, on average, age specific mistimed fertility rates declines to low levels early in the reproductive ages in a country with low desired family size and it does not decline to low levels in a country with high mean desired family size. It is the reason why age-specific unwanted fertility rates increases rapidly in a country with low desired family size while it remains low until older ages in countries with high desired family size.

Summary and conclusion

In this paper, the age-effects and age patters of mistimed and unwanted fertility in ten less developed countries have been presented. The results show that in almost every country, mistimed fertility rates increase with maternal age while unwanted fertility rates decreases with age. Age of the mother remained a statistically significant predictor of both mistimed and unwanted fertility in almost every country. The age pattern did not

change in any major way when the effects of number of living children and length of preceding birth intervals were taken into account. Consequently, the age-specific mistimed fertility rates and those for unwanted fertility were plotted together on the same graphs for each country and their points of intersection were examined. Three patterns emerged: those countries in which the intersection occurred very late in the reproductive age span (type A), those in which the intersections occur around peak reproductive ages (type B) and those in which the intersections occur very early (type C). A further examination of the data shows that mean desired family size, rather than TFR, is the main correlate of the age at crossover of mistimed and unwanted childbearing.

In conclusion, the age of the mother is a statistically significant predictor of both mistimed and unwanted childbearing in developing countries. It varies inversely with mistimed fertility and positively with unwanted childbearing. When both age patterns are analyzed together, the point at which an intersection occurs between age specific mistimed fertility rates and age-specific unwanted fertility rates reveal important points about underlying fertility behaviors. Such information would be missed if total fertility rates alone are used to gauge fertility behavior.

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Table 1 Total fertility rates and other background information about the data used in this analysis

Country	Year of survey	No. of women	Under-three children	TFR
Sub Saharan Africa				
Ghana	1993	4562	2204	5.1
Kenya	1993	7540	3645	5.3
Senegal	1992/93	6310	3361	5.9
Zimbabwe	1994	6128	2364	4.2
North Africa/Asia				
Egypt	1992*	9864	4974	3.8
Indonesia	1994*	28168	10131	2.8
Morocco	1992	9256	3055	3.9
Latin America/Caribbean				
Colombia	1995	11140	3077	2.9
Dominican Rep	1991	7320	2397	3.3
Peru	1991/92	15882	4960	3.4

Notes: TFR is total fertility rate. An asterisk (*) indicates that fertility data were collected from ever married women only and were adjusted in order to calculate the rates used in this analysis.

Table 2 Results of multivariate regression models assessing the effects of maternal age on mistimed childbearing in developing countries

Country	**Model 1** (gross effects of maternal age)					**Model 2** (controls for no. of living children)				**Model 3** (controls for preceding birth intervals)			
	15-19	20-24	25-29	30-34	35+	20-24	25-29	30-34	35+	20-24	25-29	30-34	35+
Sub-Saharan Africa													
Ghana	1.0	0.59***	0.44***	0.37***	0.23***	0.60***	0.44***	0.37***	0.23***	0.51***	0.37***	0.33***	0.21***
Kenya	1.0	0.91	0.64***	0.41***	0.31***	0.91	0.64***	0.41***	0.31***	0.81	0.57	0.38***	0.29***
Senegal	1.0	1.24	1.03	0.95	0.67*	1.25	1.03	0.95	0.67*	1.26	1.09	1.04	0.79
Zimbabwe	1.0	0.81	0.66	0.61**	0.39***	0.82	0.65*	0.61**	0.39***	0.64*	0.50***	0.49***	0.30***
North Africa/Asia													
Egypt	1.0	1.29	1.19	0.60*	0.34***	1.28	1.19	0.60*	0.34***	0.94	0.88	0.47**	0.30***
Indonesia	1.0	1.71***	1.26*	0.96	0.49	1.72***	1.26*	0.96	0.49***	1.95	0.79	0.59***	0.29***
Morocco	1.0	1.34	1.30	0.93	0.57*	1.33	1.30	0.93	0.56*	1.04	0.91	0.64*	0.40***
Latin America/Caribbean													
Colombia	1.0	0.71**	0.59***	0.35***	0.12***	0.71**	0.59***	0.35***	0.12***	0.73*	0.64**	0.39***	0.13***
Dominican Rep.	1.0	0.86	0.60**	0.30***	0.21***	0.86	0.61**	0.30***	0.21***	0.75*	0.57**	0.30***	0.21***
Peru	1.0	0.72**	0.49***	0.26***	0.10***	0.72**	0.49***	0.26***	0.10***	0.74*	0.53***	0.29***	0.11***

Note: * indicates that $p < 0.05$; ** indicates that $p < 0.01$; *** indicates that $p < 0.001$

Table 3 Results of multivariate logistic regression models to assess the effects of maternal age on unwanted childbearing in developing countries

	Model 1 (gross effects of maternal age)					Model 2 (controls for no. of living children)					Model 3 (controls for preceding birth intervals)				
	15-19	20-24	25-29	30-34	35+	15-19	20-24	25-29	30-34	35+	15-19	20-24	25-29	30-34	35+
Sub-Saharan Africa															
Ghana	1.0	0.4**	0.9	1.2	3.6***		0.4**	0.9	1.2	3.6***		0.3**	0.7	0.8	2.5**
Kenya	1.0	1.1	3.4***	8.9***	10.9***		1.1	3.4***	8.9***	10.9***		0.9	2.4***	6.4***	7.8***
Senegal	1.0	1.2	1.4	3.3**	15.6***		1.2	1.4	3.3**	15.7***		1.5	1.8	4.4	20.5***
Zimbabwe	1.0	0.6	2.0*	3.4***	16.9***		0.6	2.0*	3.4***	16.9***		0.7	2.3*	3.9***	20.2***
North Africa/Asia															
Egypt	1.0	3.6***	9.6***	23.4***	42.0***		3.6***	9.6***	23.4***	42.1***		1.9**	4.0***	8.8***	14.9***
Indonesia	1.0	2.8**	11.7***	29.5***	64.3***		2.8***	11.7***	29.2***	64.6***		1.0	2.9**	6.3***	13.5***
Morocco	1.0	2.8**	6.1***	12.2***	29.3***		2.8**	6.1***	12.2***	29.9***		1.9	3.3**	6.3***	15.0***
Latin America /Caribbean															
Colombia	1.0	2.4***	4.1***	7.0***	17.2***		2.4	4.1***	7.0***	17.5***		1.4	2.2***	3.4***	8.5***
Dominican Rep	1.0	1.4	4.1***	5.9***	15.6***		1.4	4.2***	5.8***	15.9***		0.8	2.2***	2.7***	7.6***
Peru	1.0	2.1***	4.0***	7.0***	12.3***		2.2***	4.0***	7.0***	12.3***		1.2	1.9***	3.0***	5.4***

Note: * indicates that $p < 0.05$; ** indicates that $p < 0.01$; *** indicates that $p < 0.001$

Fig 1. Proportion of mistimed births according to mother's age at conception

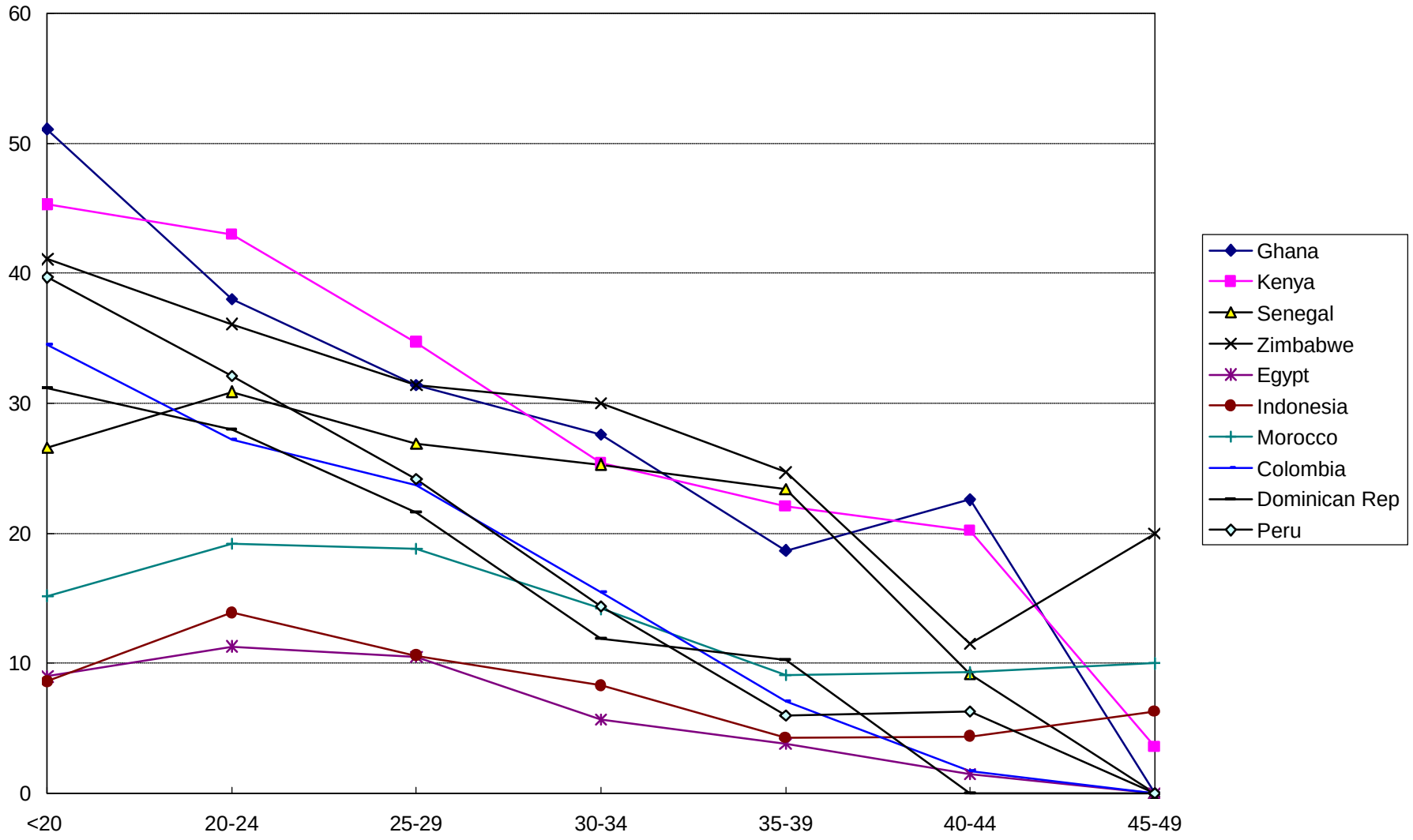

Fig 2. Proportion of unwanted births according to mother's age at conception

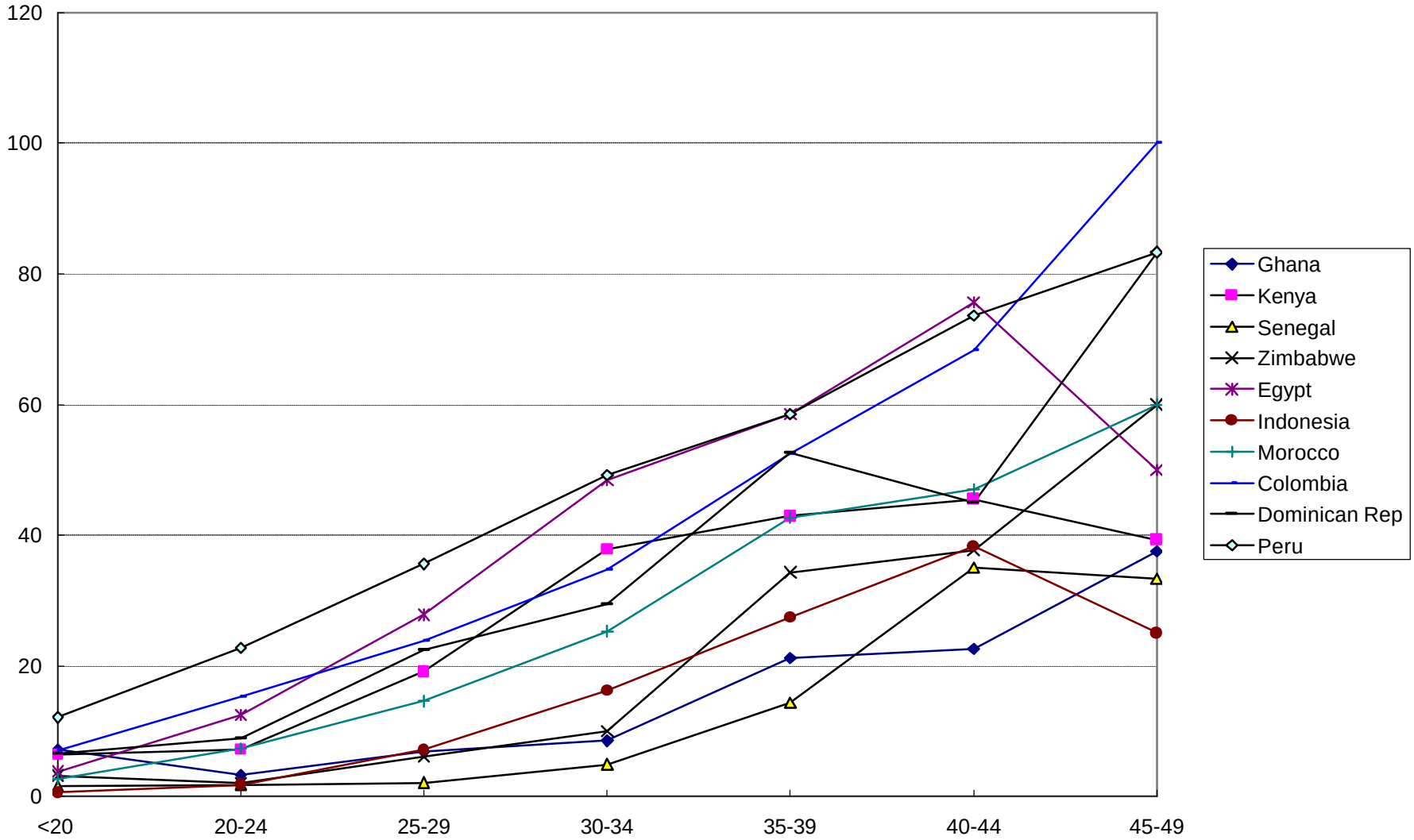

Fig 3A: Age-specific mistimed fertility rate and age specific unwanted fertility rate in Senegal

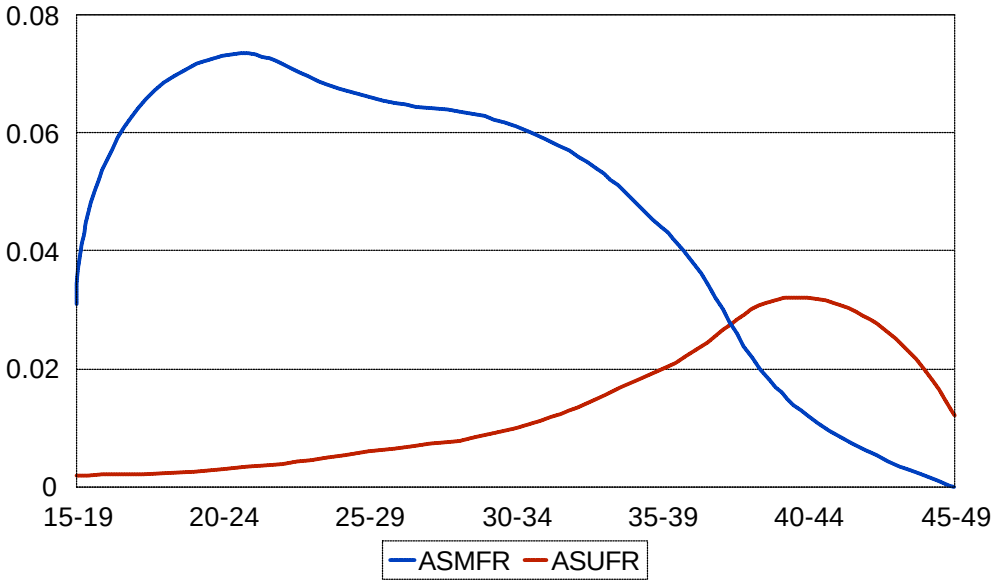

Fig 3B: Age-specific mistimed fertility rate and age specific unwanted fertility rate in Morocco

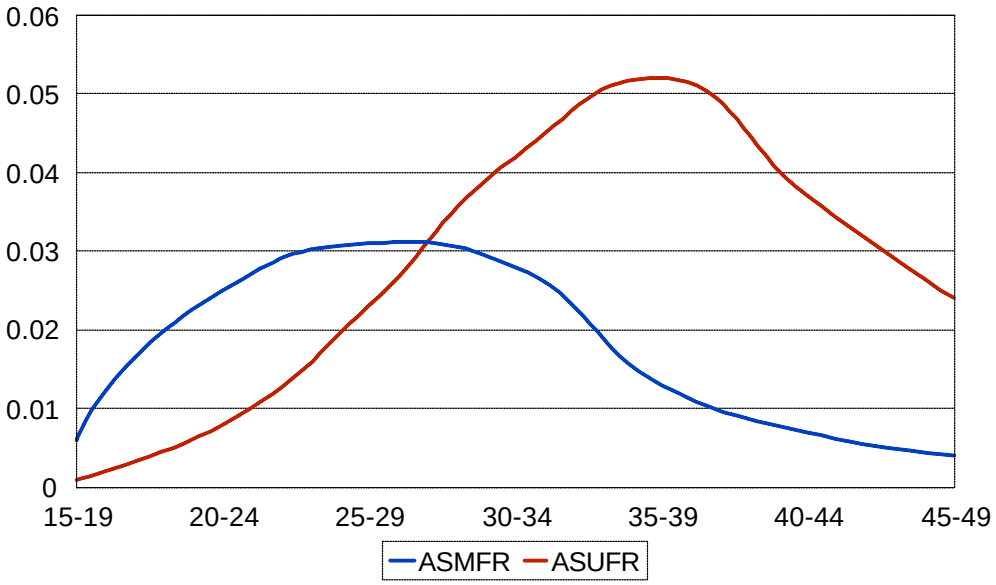

Fig 3C: Age-specific mistimed fertility rate and age specific unwanted fertility rate in Egypt

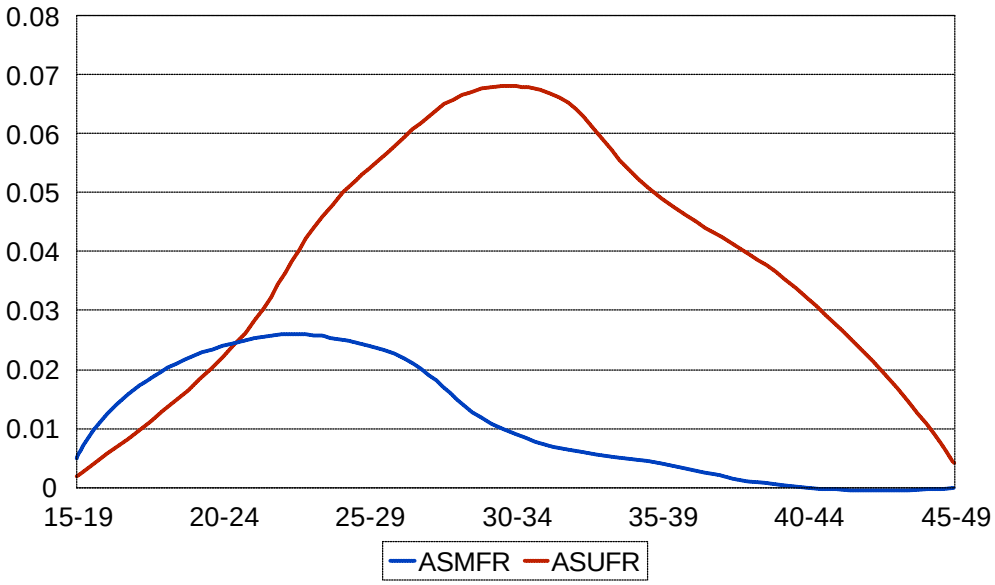

Fig. 4: Mean ideal family size of ever married women in the 10 countries