Fertility Regulation in Japan:

Is a Non-cohabiting Relationship an Alternative?

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Abstract

This paper considers the applicability of the concept of the second demographic transition in Japan. In the concept of the second demographic transition in Europe, the change of the attitude toward intimate relationship and the introduction of effective means of contraception in the 1960s are considered to play important roles. Accordingly, I presented some indicators on sexual behaviour, relationships and fertility regulation in Japan, and proposed a hypothesis that could explain the very low fertility rate in Japan. The Japanese National Fertility Survey data (1987,1992, and 1997) found that the number of those who are sexually active but never have given birth is increasing during this decade. Nevertheless, the use of contraception among unmarried women and married couples is not so high (below 60%) compared to other developed countries, and one-fifth of women having sex may belong to the group of unmet need for contraception. The popular methods are also not so reliable, such as using condoms or the withdrawal method. On the other hand, induced abortion rates are decreasing and are at the low end of rates in developed countries. According to the number of unintended pregnancies and unintended births estimated by a model on reproductive process, Japanese people tend to choose unintended birth rather than termination of a pregnancy by induced abortion. The incidence of premarital conception by never married women has not decreased. These observations do not fully explain why the birth rate in Japan has become so low. As one possible explanation, I pointed out the increase in the number of non-cohabiting couples and suggested this would play an equivalent role to that of fertility regulation. In some European countries, low fertility was explained by the elimination of unintended pregnancy due to reliable contraceptives. However, in Japan, the drop in fertility rates may be caused mainly by the avoidance of living together that lessens the frequency of intercourse, with the risk of unintended pregnancy remaining unchanged. This, perhaps, also eliminates opportunities for the adjustment of lifestyle of men and women regarding preparation for rearing children, thereby leading to the further postponement of having children, and resulting in the extremely low fertility rate in Japan.

Introduction

The current low level of fertility in Japan has been reached through two distinct fertility transitions. The first decline in the 1950s was due to the decline of marital fertility, that is, married couples avoided bearing more than two or three children, whereas the decline since the late 1970s has been brought about by postponement of marriage (Ogawa and Retherford,1993). Figure1 presents the age-specific fertility rates for each year from 1970 to 1999, and shows that the fertility rates of women in their mid to late 20s have been dropping dramatically since the 1970s.

On the other hand, in Western Europe, similar trends regarding family formation have been observed throughout various countries since the late 1960s. To understand these changes, the concept of the second demographic transition was introduced by Lesthaeghe and Van de Kaa (Van de Kaa,1987). Motherhood was increasingly being postponed and the number of children that women have by the end of the reproductive period has declined.

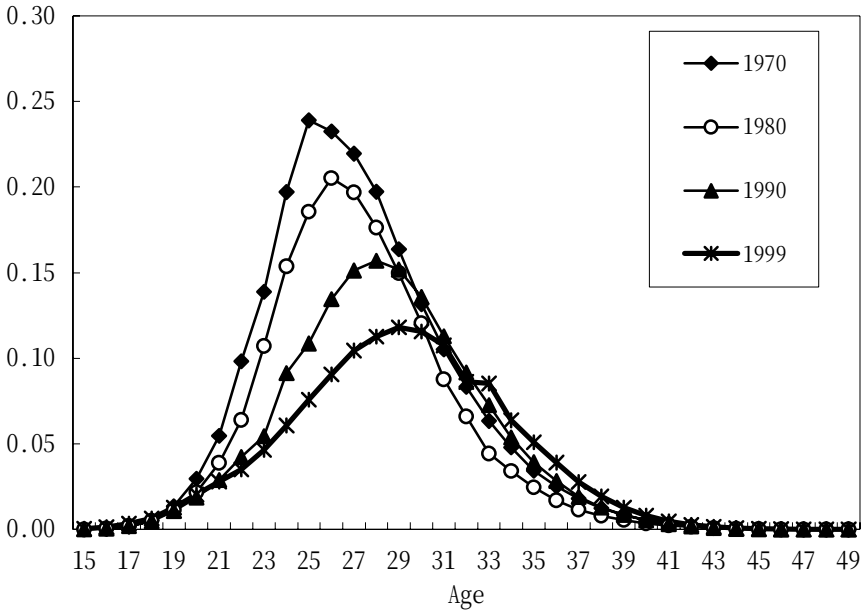
This paper considers the applicability of this concept of the second demographic transition in Japan. In this concept, observed below replacement fertility and its changing pattern in Europe were considered to be mainly the result of increased availability of modern contraceptives, enabling better planning of both the

number and timing of births (Graaf and Lodewijckx, 2000). After all, women have become able to become mothers according to their own schedule. Accordingly, in this report special attention is paid to fertility regulation in Japan.

According to the famous framework proposed by Davis and Blake (1956), the process of reproduction involves three necessary steps; (1) intercourse, (2) conception, and (3) gestation and parturition. The factors that affect the level of fertility through these steps are called intermediate variables.

I will present some indicators on sexual behaviour and fertility regulation, and propose a hypothesis that explains the very low fertility rate in Japan. Due to data limitations, all intermediate variables cannot be examined. However, since the special focus of this paper is the decline of fertility in the early stages of life (postponement of parenthood), basically the following indices will be examined; sexual experience, sexual activity (relationship), contraceptive use and methods, and induced abortions. Although it was not mentioned clearly in Davis and Blake's intermediate variables, reproductive intention is an increasingly important factor in reproductive behaviour, especially when reproductive health/rights are considered of significance. This report deals with the incidence of unintended pregnancies and births, including marriages resulting from pregnancy out of wedlock.

For Japanese reproductive behaviour, this study uses individual-level data from the three most recent Japanese National Fertility Surveys (JNFS) conducted in 1987, 1992 and 1997 by the National Institute of Population and Social Security Research (Takahashi *et al.* 1998; Takahashi *et al.* 1999). The JNFS represents a nationally representative sample comprised of two sample population segments; unmarried men and women, and married women aged 18 to 49 (for unmarried men and women in the 9th survey, up to age 35). For each survey, information was collected from approximately 15,000 individuals. In addition to this individual-level data, official statistics such as the Vital Statistics and the Abortion and Sterilization Statistics (Maternal body protection statistics) will be referenced in order to understand the macro-level trends.



Source: Vital Statistics of Japan (Ministry of health, labour & welfare)

FIG.1. Age-specific fertility rates

Detachment of sexual activities from childbearing

Postponed motherhood is showed again by the survey data in Figure 2**.** This is a year–to–year comparison by age of the proportion of women who have given birth, based on the JNFS data. There has been a significant decrease during this decade especially for those in their mid to late 20s.

First, we consider the factors regarding exposure to sexual intercourse. Single respondents were asked about their sexual experience in the JNFS. Although there were no questions regarding the sexual experience of married subjects, all married respondents were included in the category of 'sexually experienced.' According to the analysis of a comparison for each survey of the patterns of sexual experience by age, including both married and never-married respondents showed in Iwasawa (2000a), between 1987 and 1992, the younger age groups, up through the early 20s, show an increasing proportion of sexually experienced members. Between 1992 and 1997 there was a further increase in the early twenties age groups, in addition to an increase in their higher age groups. For example, in 1987, 29 percent of 20-year-old women had experienced sexual intercourse. This rose to 37 percent in 1992, and to 46 percent in 1997, showing a 17-point increase over the period of 10 years. However, in the early 30s age group, there was a slight decrease in the proportion of those with sexual experience. For the older age groups, there was no significant change observed over the same 10-year period. Other surveys on sexual behaviour among those of school age also support the fact that sexual experience (premarital intercourse) has been increasing dramatically since the 1980s (JASE,2000).

We may conclude that the total level of sexual experience among women has not changed, but rather has been increasing during the last decade and we should observe an increasing detachment of sexual experience from childbearing. However, since sexual experience does not necessarily imply current sexual activity, it is necessary to ascertain the situation by examining the current involvement in a relationship.

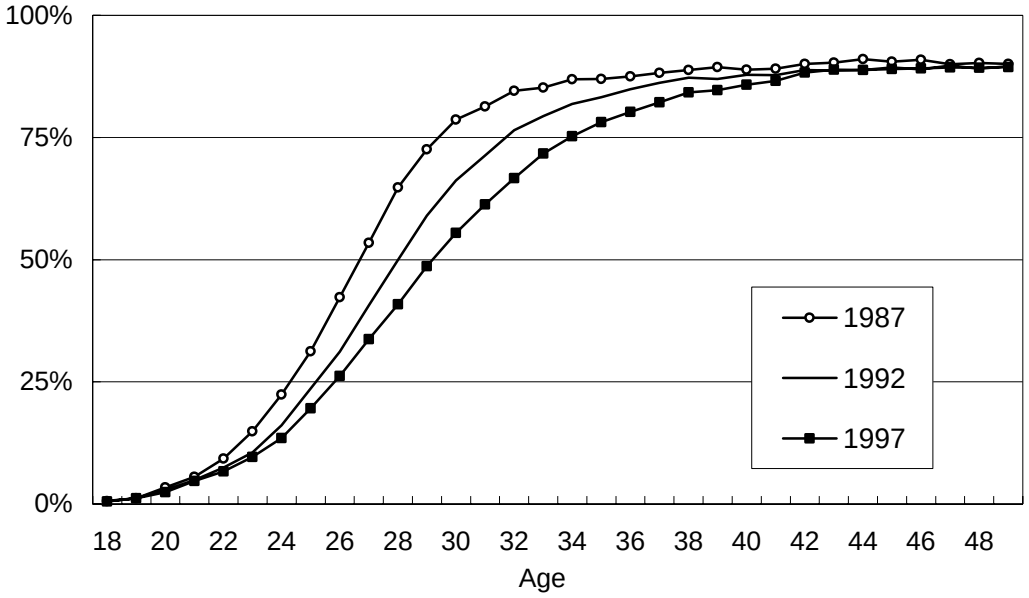
Iwasawa (2000a) also demonstrates the proportion of women who have had sexual experience and have a partner, that is those who have an intimate partner. In this case, 'sexual experience' does not necessarily mean that there is a sexual relationship with the current partner. However, since the results of the 11th survey indicate that 96.6 percent of never-married women who are dating agree that 'premarital intercourse is acceptable, if there is love', we can assume that there is a high probability of a sexual relationship with the current partner. At least, those who are dating without participating in a sexual relationship can be excluded from the group of intimate partnerships.

Although the proportion of women with a partner shows a slight decrease for the around 30 age groups, 88 percent in 1987, 84 percent in 1992 and 81 percent in 1997, this proportion shows an increase for the early 20s age groups. While there is a noticeable trend by age with regard to the presence of a partner, the changes observed were less dramatic than the changes in the proportions of those who have given birth, shown in Figure 2.

There are more factors that relate to the exposure to intercourse. While there is not a great deal of reliable data, coital frequency is one of the important intermediate variables. This will be considered later in the discussion of the living arrangements of younger generations.

Based on the above examination, we may conclude that declining fertility has not been predicated by a postponement of first intercourse or a decline in the formation of relationships. Figure 3 is overlaid with data on sexual experience, current relationship, and childbearing experience. We can see the number of those who are sexually active but never have given birth is increasing. We can assume that some types of

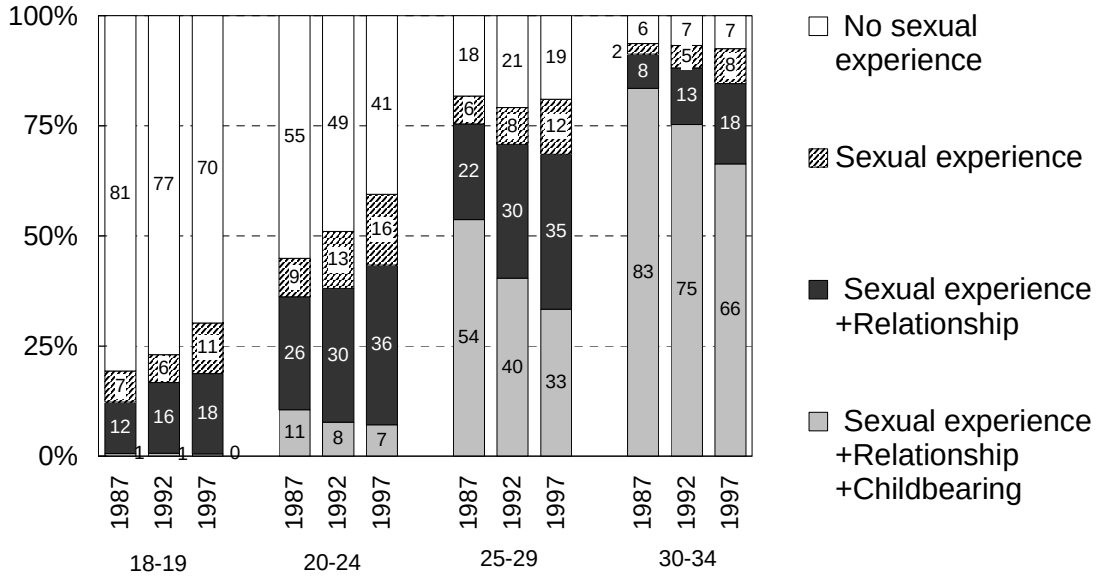
fertility regulation are being practiced in intimate relationships in Japan.



Source: Japanese National Fertility Surveys, the 9th (1987), the 10th (1992) and the 11th (1997)

Note: In order to generate a smooth graph, moving averages are calculated from the data for the three years on each side of each target age.

FIG. 2. Percentage of women who have given birth



Source: JNFS (1987,1992, and 1997)

FIG.3. Relative numbers of each reproductive stage type, by age group and year of survey

Contraceptive use in Japan

It has been pointed out that the widespread acceptance and use of highly effective, medical forms of contraception such as oral contraceptives (OCs, the Pill), played an important role in the European second demographic transition. Reliable and effective contraception makes it possible to avoid pregnancy until there is a desire to have children. In other words, it is possible to separate pregnancy from cohabitation and a sexual relationship with a partner. Let us look at how this corresponds to the situation in Japan.

With regard to Japanese contraceptive use, since 1950, the Population Problems Research Council of the Mainichi Shimbun has been conducting a biennial National KAP Survey on Family Planning targeting married women aged 16-49 as the primary sample group (recently including samples from unmarried women)(PPRC,2000).

First, let us consider the rate of contraception use. Based on the results of the time series from the Mainichi Survey, there has not been any major change in the rate of contraception use among married couples since the 1970s (Figure 4). In comparison, it is clear that in the past 10 years there has been an increasing use of contraception among unmarried women. In 1990, the rate of contraceptive use was low for all age groups, although it went up in 1994, especially among the relatively younger age groups, and has remained at the average on 50-60% (Wagatsuma, 2000a). Since there has been a large increase in the number of unmarried individuals in their 20s and 30s, it can be expected that there will be an increase in the practice of contraception among women as a whole. But the rate of those that currently use contraception is still less than 60%.

The Japanese National Fertility Survey (JNFS) also asked married couples and unmarried women about contraceptive usage. Considering the current reproductive intentions of married women, women having sex can be categorized into three gropes. The first group is those who are pregnant or want children soon. They do not need to use contraceptives (“no need for contraception” group). Those who do not want children now, including both those who want them later and those who want no more children, and currently use some form of contraception are included in the group of “contraceptive users.” Respondents who do not fit into either of these two groups, that is, those who should use contraception but do not, are called the “unmet need for contraception” group. All unmarried women are included in any of the “contraceptive users” or the “unmet need for contraception” group, because childbearing out of marriage is not common in Japan. The number of those groups by age is shown in Figure 5. In the early 20s and over 35 groups, there is a relatively large number of those in the unmet need for contraception group. Among all ages, one fifth of women surveyed fall in this group.

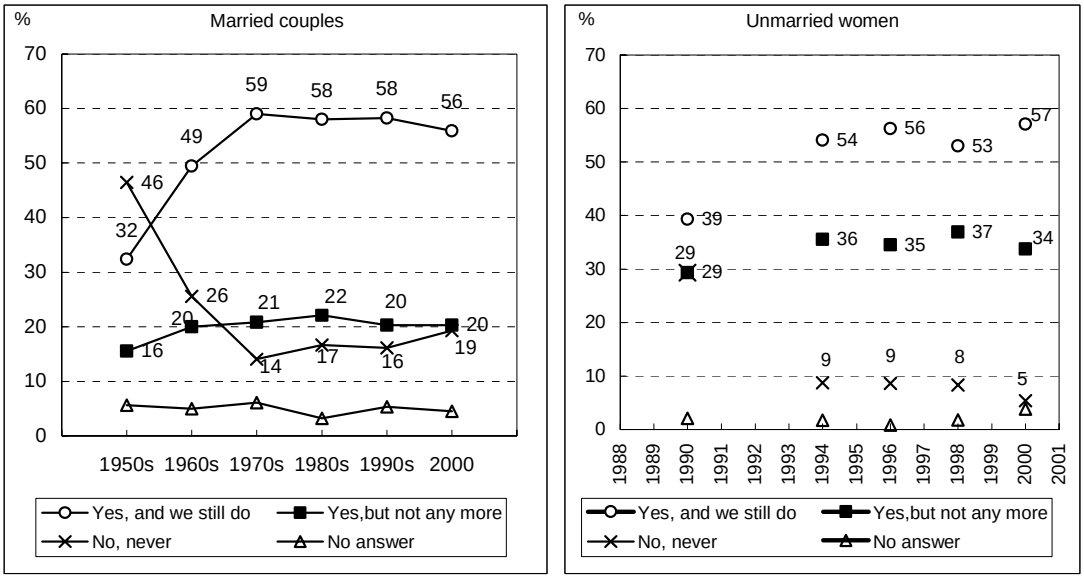
So, what kinds of methods are being used? As Table 1 shows, it has been clear that for about the last 40 years approximately 70% of all married couples use a combination of condoms and the rhythm method. The Ministry of Health and Welfare approved the manufacture, import, and sale of low-dosage OCs in June 1999. At the present time, however, obtaining the prescription is troublesome, and the cost is high, so it is difficult to claim that OCs are becoming widely used (Wagatsuma, 2000b). Attitudes play a role as well; the same study revealed that there is still a strong resistance to the Pill.

The JNFS also asked married couples about contraception methods in 1997, prior to the approval of the low-dosage Pill, and nearly the same tendencies were shown; specifically, that medical contraceptive methods and sterilization procedures are not commonly utilized (Figure 6).

The methods of contraception employed by unmarried women are the same as those used by married couples, with the overwhelming majority (over 90%) using a combination of the rhythm method and

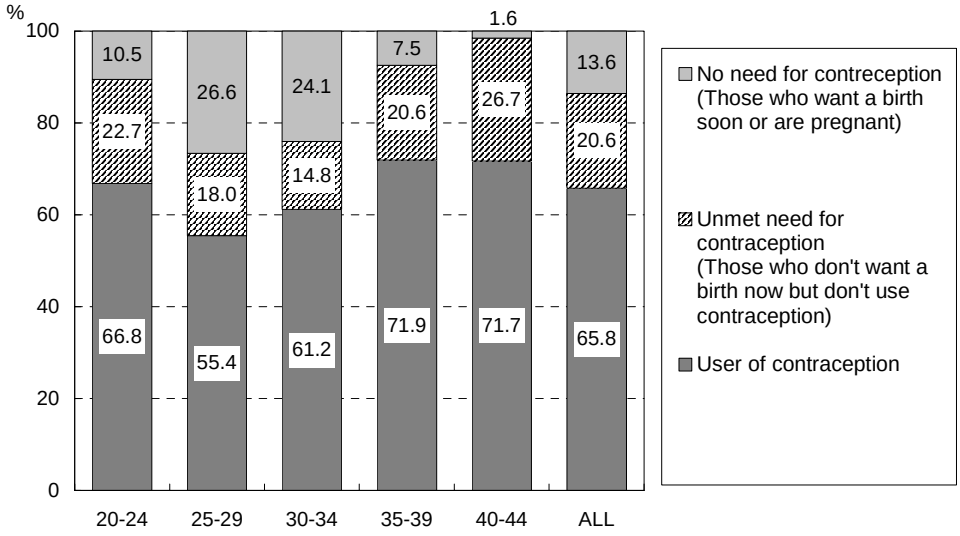
condoms, which is relatively unreliable (Table 1).

In addition to the existence of the unmet need for contraception group, since highly effective medical methods are not widely used, there is a possibility that there are many instances of unintended pregnancy. According to the studies on teenage pregnancy, among teens who became pregnant, 10% responded that they “always” practiced contraception, while 50% responded “sometimes”. Of those who did use some form of contraception, 80% indicated the use of condoms (Kitamura,1996). The effectiveness of contraception is not adequate in Japan. In other words, this suggests that there is a limit to the possibility of prevention of unintended pregnancy, regardless of how high the rate of contraception use may be.



Source: Mainichi Surveys (PPRC,2000)
Note: For unmarried women, those who have had sex.

FIG. 4. Contraceptive use among married couples and unmarried women



Source: JNFS (1997)
Note: For women having an intimate partner, including lover, cohabitant, and husband.

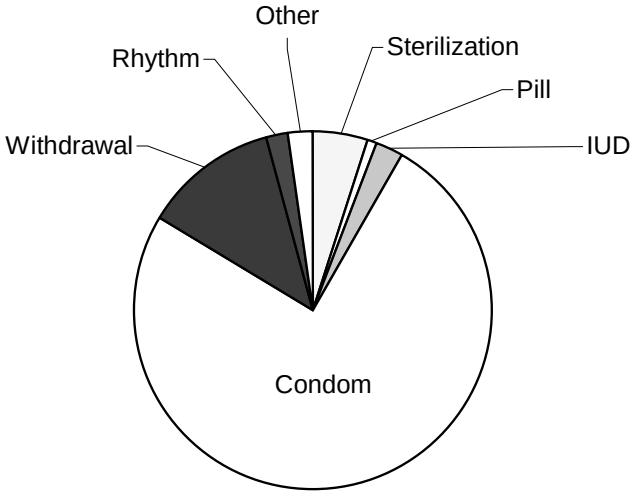
FIG. 5. Reproductive intention and contraceptive use among women in intimate relationship

TABLE 1. *Contraceptive methods used by married couples and unmarried women*

	Married couples(%)										Unmarried women(%)									
Year	Rhythm	Basal body temperature	Withdrawal	Condom	Douches	Contraceptives (tablets/jelly/film)	IUD	Pill	Sterilization	No answer	Rhythm	Basal body temperature	Withdrawal	Condom	Douches	Contraceptives (tablets/jelly/film)	IUD	Pill	Sterilization	No answer
1950	27	-	13	36	5	30	-	-		15	-	-	-	-	-	-	-	-	-	-
1952	30	-	11	56	3	25	-	-		10	-	-	-	-	-	-	-	-	-	-
1955	35	-	8	57	3	19	-	-	4	8	-	-	-	-	-	-	-	-	-	-
1957	38	-	7	57	3	20	-	-	7	7	-	-	-	-	-	-	-	-	-	-
1959	40	-	12	58	2	21	-	-	6	5	-	-	-	-	-	-	-	-	-	-
1961	43	-	12	61	2	17	-	-	8	5	-	-	-	-	-	-	-	-	-	-
1963	38	-	8	66	2	16	4	-	6	-	-	-	-	-	-	-	-	-	-	-
1965	39	-	10	66	1	15	4	-	6	-	-	-	-	-	-	-	-	-	-	-
1967	37	-	7	65	1	13	6	-	4	4	-	-	-	-	-	-	-	-	-	-
1969	34	-	7	68	1	14	7	2	5	4	-	-	-	-	-	-	-	-	-	-
1971	33	-	6	73	1	11	8	2	4	4	-	-	-	-	-	-	-	-	-	-
1973	30	-	6	75	1	8	9	2	4	5	-	-	-	-	-	-	-	-	-	-
1975	30	-	7	78	1	7	9	3	5	4	-	-	-	-	-	-	-	-	-	-
1977	27	-	5	79	2	6	9	3	5	3	-	-	-	-	-	-	-	-	-	-
1979	23	-	5	81	2	4	8	3	4	2	-	-	-	-	-	-	-	-	-	-
1984	12	8	4	80	1	1	6	2	11	6	-	-	-	-	-	-	-	-	-	-
1986	11	10	5	82	1	2	7	2	10	4	-	-	-	-	-	-	-	-	-	-
1988	7	10	5	77	1	1	5	2	7	3	-	-	-	-	-	-	-	-	-	-
1990	7	8	7	74	1	1	5	1	10	3	-	-	-	-	-	-	-	-	-	-
1992	9	7	8	75	1	1	5	1	6	2	-	-	-	-	-	-	-	-	-	-
1994	7	7	7	78	1	1	4	1	7	3	6	13	5	93	..	3	..	2	..	2
1996	8	9	10	77	1	1	4	1	7	3	4	14	7	96	1	4	..	1	..	..
1998	8	8	7	78	1	1	3	1	6	3	4	17	5	95	2	4	1	..	..	1
2000	7	10	27	75	..	1	3	2	5	2	6	14	25	93	2	1	..	3	..	..

Source: Mainichi Surveys (PPRC, 2000)

Note: The total percentage exceeds 100% because of multiple answers given by respondents(up to two answers). Two dots(..) inidicates that the amount is nil or negligible.



Source: JNFS (1997)

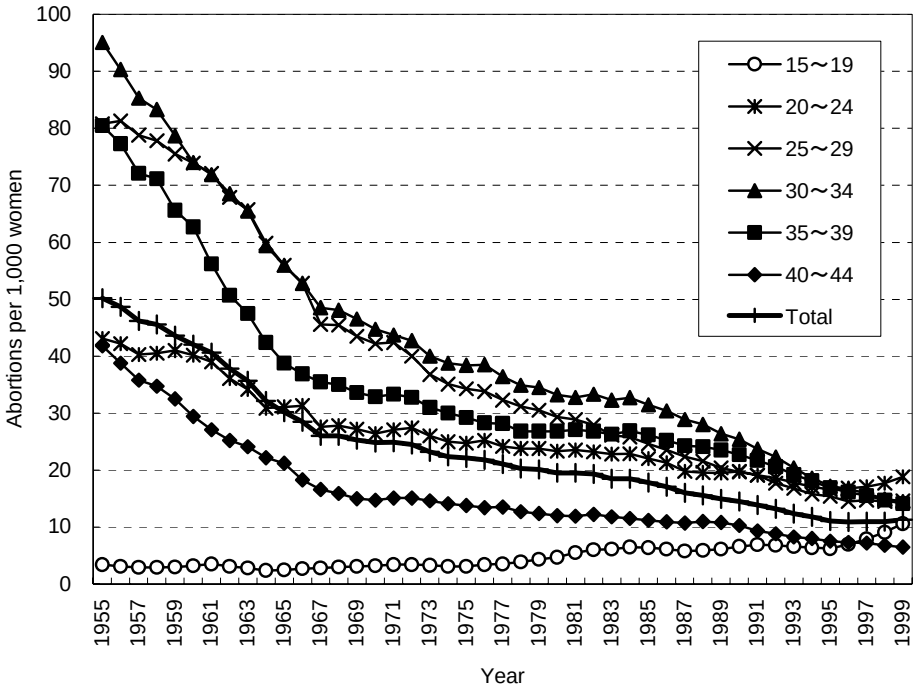
Note: If respondents use more than one method, only the most effective method is counted.

FIG. 6. The most effective method of contraception used by married women aged 15-49

Induced abortion in Japan

Now let's look at the trends for another form of fertility regulation, induced abortion. Among developed countries, Japan legalized induced abortion relatively early[1], and the previous analysis has shown that it plays an important role in fertility regulation as a means of correcting unplanned pregnancy occurring among non-contraceptive users (Atoh, 1982).

A look at the abortion rates by age shows a sharp decline in the once high rates among women in their late 20s and 30s (Figure 7). In comparison, there is an increasing trend among those in their teens. In recent years there are also indications of increases among those in their early-20s. It cannot be denied that induced abortion is used to adjust for contraception failure, particularly among the younger age groups. Nevertheless, overall the number of induced abortions in Japan is steadily decreasing.



Source: Report of statistics on induced abortions and sterilizations (Ministry of Health and Welfare,1999)

FIG.7. Induced abortion rates, by age group

Comparison with other developed countries

We will now consider the current circumstances of fertility regulation in Japan in comparison to the circumstances in other developed countries to see if we can identify characteristics that are unique to Japan.

According to recent surveys that reveal considerable differences between individual European countries in overall contraceptive use, the choice of methods and means, and the incidence of abortion, it is suggested that European countries can be roughly divided into some groups according to birth control behavior (Riphagen and Lehert,1989).

[1] In 1952, Japan's abortion law allowed abortions to be performed for socio-economic reasons.

The first group is countries with high contraceptive use, mainly medical contraceptive methods. Here, abortion rates are low and sterilization is rare. The second group comprises countries where sterilization is common, rather than the use of medical contraceptives. This group includes the Netherlands, Belgium and the UK. The third group comprises those countries where abortion replaces contraception. This last group covers mainly Eastern Europe (Graaf and Lodewijckx, 2000).

Table 2 summarizes contraceptive use, methods of contraception, incidence of induced abortions, and total fertility rates for various countries, mainly in developed countries, based on the United Nations data and the results of European Fertility and Family Surveys. Only one eastern Asian country, the Republic of Korea is also included in the table to provide some comparison to Japan. The data on contraceptive use and methods pertain to married couples, including, where possible, those in consensual unions. There is some difference in the years represented by the data, but generally, this data shows the situation in the 1990s. Since the patterns for these indicators differ according to the age group, strictly speaking, it is necessary to make the comparisons by age group. However, the regions for which comparisons can be made are limited, so for this study the comparison was made for the entire group in the reproductive age range. Furthermore, it is important to keep in mind that the range of ages of the subjects in these various countries are not necessarily same.

In terms of the overall picture, there do seem to be some patterns in the characteristics of fertility regulation. Table 2 divides each country into one of 4 groups according to these patterns, and these groups are labeled I ~ IV. Group I are the regions with a high percentage of sterilization procedures. This includes North America and the United Kingdom. The Republic of Korea matches the characteristics of this Group I. Group II includes regions with widespread use of medical contraception methods, like the Pill and IUDs. This group includes countries from northern and central Europe. There is also a comparatively high percentage of sterilization in Belgium and the Netherlands as well. Group III consists of regions in which relatively traditional methods, like periodic abstinence or rhythm and withdrawal, are commonly used. A number of the southern European countries are included in this group. Group IV are regions with comparatively low rates of contraception practice, and high abortion rates. Many eastern European countries are included in this group.

Efforts to understand the relationship of these patterns to total fertility rates (TFRs) in the latter half of the 1990s indicated an interesting tendency for higher TFRs in countries using contraceptive methods with relatively higher effectiveness (such as sterilization and medical methods), and lower fertility rates in countries where traditional methods and abortion were more common.

So let's compare Japan to other countries. First, the rate of contraceptive use is on the low side. This is consistent with earlier reports indicating that among developed nations, the rate of use of contraception is low in Japan (Sato and Iwasawa, 2000). The most popular contraception method of choice is overwhelmingly the condom. This situation is not seen in any other country. The low usage of medical methods is also remarkable. Nevertheless, the abortion rate is also comparatively low. This indicates that fertility regulation in Japan exhibits some extremely unique characteristics, with little use of sterilization or medical contraception methods, but also low abortion rates. The closest match to Japan among the previously described groups is probably Group III, containing southern European countries. Japan's low birth rate also matches the characteristics of Group III.

TABLE.2. Some indicators on fertility regulation and total fertility rate in more developed countries

		Contraceptive Use[1]							Abortion[2]		TFR[2]
		Year	Age	Use (%)	Method(Total=100%)				Year	Rates (per 1000 women)	1995-2000
					Sterilization	Pill/IUD	Condom/ supply methods[3]	Traditional methods[4]			
I	Canada	1995	15-49	75	**61**	24	14	1	1995	15.5	1.5
	USA	1990	15-44	71	**53**	22	19	6	1996	22.9	2.0
	Australia	1986	20-49	76	**50**	38	7	5	1995/96	22.2	1.8
	New Zealand	1995	20-49	75	**45**	31	20	4	1995	16.4	2.0
	UK	1993	16-49	82	**37**	34	24	5	..	..	1.7
	Rep. of Korea	1991	15-44	79	**59**	15	13	13	1996	19.6	1.6
II	Germany	1992	20-39	75	1	**87**	8	4	1996	7.6	1.3
	France	1994	20-49	75	11	**75**	8	7	1995	12.4	1.7
	Norway	1988/89	..[7]	74	19	**56**	18	7	1996	15.6	1.9
	Netherlands	1993	18-42	79	**20**	**66**	10	4	1996	6.5	1.5
	Belgium	1991	20-40	79	**24**	**65**	6	5	1996	6.8	1.5
	(Belgium	1991/92	20-40	85	..	95		5)			
	Switzerland	1980	..[8]	71	**23**	**55**	14	8	1996	8.4	1.5
	Sweden	1981	20-44	78	4	**55**	**32**	9	1996	18.7	1.6
	Denmark	1988	15-44	78	13	**47**	**32**	9	1995	16.1	1.7
III	Italy	1979	18-44	78	1	21	19	**59**	1996	11.4	1.2
	(Italy	1995/96	20-49	79	..	69		31)			
	Spain	1985	18-49	59	7	36	20	**36**	1996	5.7	1.1
	(Spain	1994/95	18-49	86	..	83		17)			
	Slovakia	1991	15-44	74	5	22	29	**44**	1996	19.7	1.3
	(Slovakia	1994/95	15-45	79		78		22)			
	Czeck Rep.	1993	15-44	69	4	33	28	**35**	1996	20.7	1.2
	(Czeck Rep.	1997	15-44	81	..	86		14)			

TABLE.2. (Continued)

		Contraceptive Use[1]							Abortion[2]		TFR[2]
		Year	Age	Use (%)	Method(Total=100%)				Year	Rates (per 1000 women)	1995-2000
					Sterilization	Pill/IUD	Condom/ supply methods[3]	Traditional methods[4]			
	Romania	1993	15-44	57	2	12	11	75	1996	**78.0**	1.2
	Belarus	1995	18-34	50	2	71	12	16	1996	**67.5**	1.4
	Estonia	1994	20-49	70	0	56	24	20	1996	**53.8**	1.3
	Bulgaria	1976	18-44	76	3	5	3	90	1996	**51.3**	1.2
	(Bulgaria	1997/98	18-40	56	..	64		36)			
IV	Latvia	1995	18-49	48	4	57	21	18	1996	**44.1**	1.3
	(Latvia	1995	18-49	68	..	85		15)			
	Rep. of Moldova	1997	15-44	74	4	55	8	33	1996	**38.8**	1.8
	Hungary	1992/93	18-41	73	6	65	10	19	1996	**34.7**	1.4
	(Hungary	1992/93	18-44	85	..	88		12)			
	Lithuania	1994/95	18-49	59	0	28	23	49	1996	**34.4**	1.4
	(Lithuania	1994/95	18-49	57	..	66		34)			
	Japan	1994	15-49	59	7	4	**79**	10	1995	13.4	1.4
	Japan	1997[5]	15-49	59	7	6	76	11	1999[6]	11.3	1.4
	Mean			71	17	42	19	22		25.5	1.5

1)World Contraceptive Use 1998 (UN,1999). Among currentry married women, including, where possible, those in consensual unions. For figures in parentheses,FFS (Klijzing,2000).
2)World Abortion Policies 1999 (UN,1999)
3)Including injectables, diaphragms, cervical caps and spermicides.
4)Including periodic abstinence or rhythm, withdrawal and douche.
5)JNFS(1997)
6)Statistics on induced abortions and sterilizations (1999) and Vital statistics (1999)
7)Women currently married or cohabiting who were born in 1945,1950,1955,1960,1965 or 1968.
8)Sample of husbands and wives married between 1970 and 1979.

Unintended pregnancies and births

So far we have seen that the characteristics of fertility regulation in Japan include the use of low-effect methods of contraception and a decreasing number of abortions. Here, let's consider the situation from the perspective of reproductive intention. Are there few unintended pregnancies and unintended births in Japan? If there is a large number of unintended pregnancies and unintended birth, this would indicate the existence of uncertainty of pregnancy, and lead to the expectation that more effective methods of contraception will become more widely used.

Iwasawa (2000b) has constructed a model based on references to the model developed by Dalla Zuanna *et al.* (1998), and has applied the model using JNFS results and official statistics in order to estimate the births in 1998 according to reproductive intention. Figure 8 shows the developed model, and the estimated results of pregnancies and births classified by reproductive intention.

The following parts will explain the specific details of the variables, the calculation methods of the parameters *pt, p, n, s, c, f, h, g, af, lf, uf, ah, lh, uh, lg,* and *wg* in Figure 8, as well as how the parameters were fixed and constrained.

The actual circumstance of reproductive behavior of females of reproductive age was obtained from the 11th JNFS conducted in June in 1997.

For (*pt)*, "have partner", it was possible to determine the proportion of the total female population because the number of women with spouses as well as the number of single women who were sexually experienced and currently had a lover (fiancé) were known.

The married women who responded "do not intend to have any more children" or "intend to have a child later" to the question about their current reproductive intentions were included in the "not now" group. There are few cases of cohabitation and childbearing outside of marriage in Japan, so it was assumed that all single women who had partners and were not currently pregnant were in the "not now" group. The "want a birth soon" group consisted of married women who answered "as soon as possible" to the question on the planned timing for the delivery of the next child.[2] In this way, *n* and *s* were determined.

With regard to the contraceptive usage, it was possible to obtain data for the married couples from the answers to direct questions about whether contraceptive methods were currently being used. For the unmarried women, contraception practices were estimated according to the answer to questioning about the use of contraception during the most recent instance of sexual intercourse. In this way, c was determined.

The JNFS, from which the data on reproductive behavior was acquired, was conducted so as to obtain the information current as of June 1st, 1997. Accordingly, the constructed model is for the pregnancies that occurred in the one year period from June 1997 through May 1998. There are three defined pregnancy outcomes; fetal loss, induced abortion, and live birth.[3]. First, for the live births, based on the fact that the

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[2] One of the response choices for the question on the planned time of delivery of the next child was "haven't thought about it". For this study, those that chose "haven't really thought about it" were placed in the "not now" group if they were currently using a form of contraception, and placed in the "want now" group if they were not practicing contraception.

[3] Actually, since there are cases of multiple births, it is estimated that the actual number of pregnancies is somewhat lower than the total number of pregnancy outcomes. This study uses a model that does not account for multiple births, although it has been pointed out that the incidence of multiple births has been increasing since the 1980s （Imaizumi, 1998）. Adjustment for multiple births is one of the important issues for future work on this model.

term of pregnancy is 40 weeks, the target group should include births between March 1998 and February 1999. It is possible to obtain the number of births from vital statistics, but due to restrictions on publicly released data, for this study, the number of births in 1998 was used.

With regard to induced abortions, we can use the number of intentionally aborted pregnancies from the vital statistics for procedures performed in and after the 12th week of pregnancy. The number of induced abortions performed through the 11th week of pregnancy can be obtained from the abortion and sterilization statistics. Based on the pregnancy history data from the JNFS, the average time at which an induced abortion is performed is 2.6 months into the pregnancy, with 90% of all induced abortions performed in the second or third month of the pregnancy. Therefore, most of the abortions for pregnancies occurring in the one year period beginning in June 1997 could be expected to occur between August 1997 and July 1998. For this study, the total number of induced abortion for pregnancies in and after the 12^{th} week for a one year period in 1998 was used. The total number of induced abortions for pregnancies through the 11^{th} week was obtained by adding half of the total number in 1997 and half of the total for 1998.

There are two main reasons that it is difficult to obtain the actual number of fetal losses. For fetal losses occurring in pregnancies of 12 weeks or longer, it is possible to use the data on spontaneous abortions in the vital statistics. For pregnancies of 11 weeks or less, however, there are no statistics of any kind on fetal losses. In addition, these are also fetal losses in early stages of pregnancies, before even the mother herself is aware of it. In other words, obtaining an accurate measure of fetal losses leads to an involvement in the issue of the definition of "pregnant." Therefore, for the purposes of this study, "pregnant" is defined as the stage at which the mother is aware of the pregnancy[4]. Accordingly, the number of fetal losses was determined as follows. It is possible to determine the breakdown of pregnancy outcomes, that is, the proportions of live births and stillbirths or miscarriages, from the pregnancy history data of the JNFS. Using these percentages, the number of fetal losses relative to the number of live births can be estimated. The pregnancy history data was only obtained in the survey of married couples, but there is probably no difference between married and unmarried women with respect to the proportions of live births, stillbirths or miscarriages. The percentages of stillbirths and miscarriages obtained from the survey data correspond to *lg* and *wg* in this model. The relationship between *lf* and *uf*、as well as between *lh* and *uh* are also based on these ratios.

In this way, it is possible to obtain the number of live births, the number of induced abortions, and the number of fetal losses for the pregnancy outcomes. Assuming that these results occurred in accordance with this model, it is possible to obtain the estimates of the number of pregnancies and numbers of each possible pregnancy outcome according to the reproductive intention. For the estimation of the parameters, the probability of an induced abortion for the group practicing contraception and for the group not practicing contraception was assumed to be the same; in other words, it was assumed that *af* and *ah* were equal. Accordingly, *lf* and *lh* are equal, and *uf* and *uh* are equal.

At this point, the parameters that have not yet been fixed are *f, h, g,* and *af.* Since *f* is the probability of becoming pregnant even though contraception is being used, it corresponds to the contraception failure rate.

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[4] Golden and Millman (1993) classified pregnancies into three categories for their measurements of fertility. (1) All pregnancies that occurred within the period of the usual menstrual cycle, including miscarriages during that cycle. (2) Pregnancies that can be recognized at the very end of a menstrual cycle because menses does not occur. (3) Pregnancies that result in births. According to these definitions, this study uses definition (2).

This value is fixed for each age group.

The rate of contraception failure for different methods of contraception has been investigated in prior studies (Bongaarts, 1978; Westoff *et al.*,1987). It has also been reported that contraceptive failure decreases as age and experience increases (Dalla Zuanna *et al.*, 1998). In Japan, the main form of contraception is the use of condoms (Figure 6). In light of this, and the fact that those practicing contraception include unmarried people who are not cohabiting with a partner, for this study the assumptions are as shown in Table 3.

There are also several constraints on the estimated parameters. Since all the parameters represent probabilities, the values must be between 0 and 1, and the sum of the parameters for all the subdivisions of a group must equal 1. In addition, it is assumed that $f < h < g$. The reason that $f < h$ is to reflect the contraceptive efficiency. $h < g$ is used because it is assumed that among those who do not use contraception there will be a difference in the frequency of intercourse according to the reproductive intention. In addition, the "want now" group is entirely composed of married women, while the "not now" group includes single women who are not cohabiting with a partner. The frequency of sexual intercourse by single women and married women has been reported to differ by a factor of 2 or more by researchers in the United States (Weinstein *et al.*, 1993). So the following constraint for g and h is specified; $(1-g)=(1-h)^{\alpha}$[5] , and estimates were made under three hypotheses of $\alpha = 1$, $\alpha = 2$, $\alpha = 4$. For $\alpha = 1$, $g = h$. This assumes that there is no difference in the frequency of intercourse and rate of pregnancy between the "not now" group that includes the single women and the "want soon" group consisting entirely of married women, but this is not actually the case. Furthermore, if h is significantly smaller than g, there is effectively no difference between f and h, indicating that contraceptive efficiency does not exist, which is also not consistent with reality. The results described below , unless stated otherwise, use $\alpha = 2$. Pregnancy outcomes can be formularized as follows using these parameters.

For a female population P , the total number of induced abortions A is,

$$A = P \times \left(pt \times n \times c \times f \times af + pt \times n \times (1-c) \times h \times ah \right), \quad (1)$$

Total number of births B is、

$$B = P \times \left(pt \times n \times c \times f \times uf + pt \times n \times (1-c) \times h \times uh + pt \times s \times g \times wg \right), \quad (2)$$

The constraints are

$$af = ah, \quad (3)$$

$$lf = lh, \quad (4)$$

$$uf = uh, \quad (5)$$

$$af + lf + uf = 1, \quad (6)$$

$$lf = \frac{lg \times uf}{wg}, \quad (7)$$

$$(1-g) = (1-h)^{\alpha}, \quad (8)$$

[5] The relationship between g and h was determined based on a suggestion provided by Hiroyuki Imai of the National Institute of Population and Social Security Research. The author would like to express appreciation for these valuable comments and discussions.

The total number of abortions, *A*, and the number of live births, *B* , was obtained from official data as described previously. Inserting the values calculated from the survey data for the fixed parameters *pt*, *p*, *n*, *s*, and *c*, as well as the hypothetical values for *f*, *lg*, and *wg*, it is possible to determine values for the unknowns *af* and *h* that satisfy the equations given above. Three values of 1, 2 and 4 were used for α, which determined the relationship between *g* and *h*.

The estimations of this model were made for each group corresponding to a 5-year range of age (20 ~ 24 years, 25 ~ 29 years, 30 ~ 34 years, 35 ~ 39 years, and 40 ~ 44 years) [6], and the overall results (20 ~ 44 years) were obtained by simply adding together the results for each age group, providing results for a model population that has the same number of people in each age group (standardized age distribution). Table 3 shows these results. For the model that adds together the results for all age groups, it is necessary to be aware of the dependence on the age distribution at the time of the survey in 1997. These results suggest that even in Japan about 50% of pregnancies and 40% of births are unintended. This means that for Japanese women, pregnancy and childbirth involve a pretty high level of uncertainty, and are not always according to their intentions.

Table 3 also lists various indices related to lifetime (period of time at reproductive age) pregnancies. When these indices are calculated, the annual rates in Table 3 which were calculated from the model with the standardized age distribution were multiplied by 25 (for the 25 years between ages 20 and 44) to obtain the values. Three types of results are shown, according to the assumption for α. Let us consider the case of $\alpha = 2$. The pregnancy index of 1.84 basically means the average number of times a woman will experience pregnancy during her lifetime. Of this number 0.89 are intended pregnancies, and 0.95 are unintended pregnancies. The lifetime childbearing is conceptually equivalent to the total fertility rate (TFR), and is 1.31, of which 0.79 are intended deliveries and 0.53 are unintended deliveries. The lifetime abortion index is 0.34, and the index for fetal loss is 0.18.

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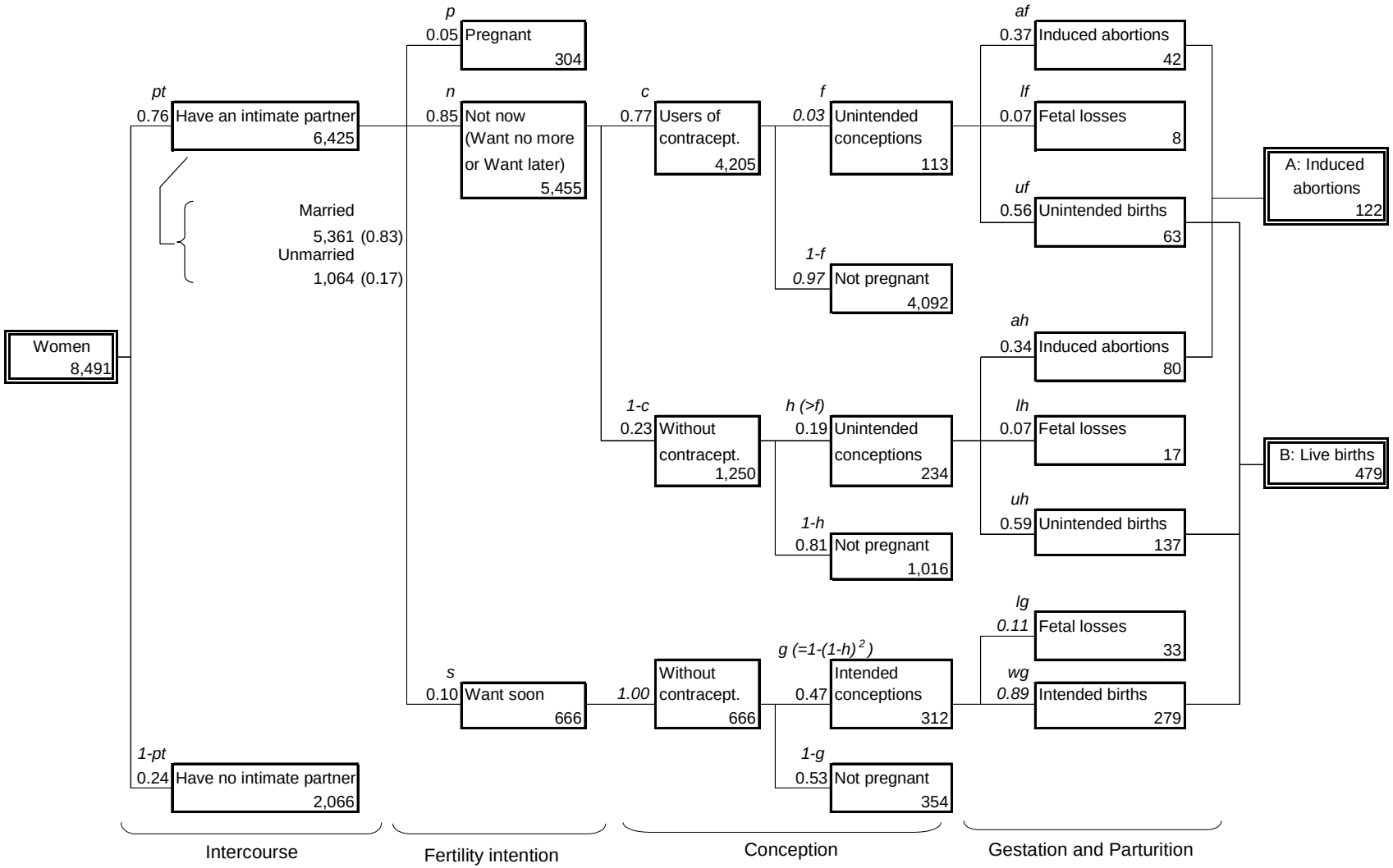
[6] Tthe group that was 20 ~ 24 years old in June 1997 became 21 ~ 25 year olds by June 1998. However, it is not always possible to separate the data used for the number of live births and estimated values according to the age group. There are many instances in which the data is only available in aggregate for 5-year age groupings starting at each multiple of 5. Therefore, this study used the data for the 20 ~ 24 year olds in 1998 as the results for the reproductive behavior of the 20 ~ 24 year olds in 1997. The same method was used for other age groups.



Note: For 8,491women aged 20 - 44 who are respondents of the JNFS conducted in June 1997. Data on partnerships, fertility intentions and contraceptive use are taken from the JNFS, and data on the number of induced abortions and live births are taken from the statistics of abortions and sterilizations (1997,1998) and vital statistics of Japan(1998), respectively.

FIG.8. Estimated number of conceptions by outcome during a year among Japanese women of reproductive ages in 1997

TABLE.3. Estimated parameters by the conception model [1] and some indicators of conceptions, births, and abortions: Japan in 1997-8 and Italy in 1994

		Japan							Italy[9]
		Age group					All		All
		20-24	25-29	30-34	35-39	40-44	20-44[7]	20-44[8]	15-44
Have a partner	*pt*	0.439	0.706	0.849	0.908	0.934	0.757	0.861	-
Pregnant	*p*	0.066	0.086	0.066	0.025	0.006	0.047	0.039	-
Want no more/later	*n*	0.876	0.726	0.756	0.908	0.979	0.849	0.864	-
Want soon	*s*	0.058	0.189	0.178	0.067	0.016	0.104	0.098	-
Users of contracept.	*c*	0.763	0.764	0.809	0.792	0.733	0.771	0.776	-
Unintended conc.	*f*	*0.050*	*0.040*	*0.030*	*0.020*	*0.010*	0.027	0.022	-
Unintended conc.	*h*	0.352	0.332	0.281	0.136	0.017	0.187	0.151	-
Intended conc.	*g*	0.580	0.554	0.483	0.254	0.033	0.469	0.424	-
Induced abortions	*af*	0.387	0.265	0.312	0.421	0.667	0.370	0.382	-
Fetal losses	*lf*	0.051	0.064	0.081	0.108	0.057	0.072	0.085	-
Unintended births	*uf*	0.562	0.671	0.607	0.471	0.276	0.558	0.533	-
Induced abortions	*ah*	0.387	0.265	0.312	0.421	0.667	0.342	0.349	-
Fetal losses	*lh*	0.051	0.064	0.081	0.108	0.057	0.071	0.085	-
Unintended births	*uh*	0.562	0.671	0.607	0.471	0.276	0.587	0.566	-
Fetal losses	*lg*	*0.083*	*0.087*	*0.118*	*0.186*	*0.171*	0.106	0.117	-
Intended births	*wg*	*0.917*	*0.914*	*0.882*	*0.814*	*0.829*	0.894	0.883	-
%Unintended conc.[2]		76.1%	43.1%	40.6%	70.3%	95.7%	52.6%	51.6%	43.2%
%Unintended births[3]		66.1%	35.7%	31.9%	57.9%	88.2%	41.8%	40.1%	20.6%
%Abortion ratio[4]		45.5%	14.1%	16.4%	51.6%	213.2%	25.4%	26.0%	38.4%
%Unmet need for contracept.[5]		20.8%	17.1%	14.4%	18.9%	26.2%	19.6%	19.3%	-
Mean number of conc.[6]		-	-	-	-	-	-	1.84	2.12
Mean number of intended conc.		-	-	-	-	-	-	0.89	1.21
Mean number of unintended conc.		-	-	-	-	-	-	0.95	0.92
Mean number of births(TFR)		-	-	-	-	-	-	1.31	1.43
Mean number of intended births		-	-	-	-	-	-	0.79	1.13
Mean number of unintended births		-	-	-	-	-	-	0.53	0.29
Mean number of abortions		-	-	-	-	-	-	0.34	0.55
Mean number of fetal losses		-	-	-	-	-	-	0.18	0.15
The estimated number of conc.		273,852	609,031	504,091	198,494	44,252	1,629,720	1,544,574	-
The number of ive births		177,195	492,692	388,293	113,728	13,255	1,185,164	1,102,561	-
The number of women		4,457,000	4,692,000	4,095,000	3,825,000	3,918,000	20,987,000	20,987,000	-

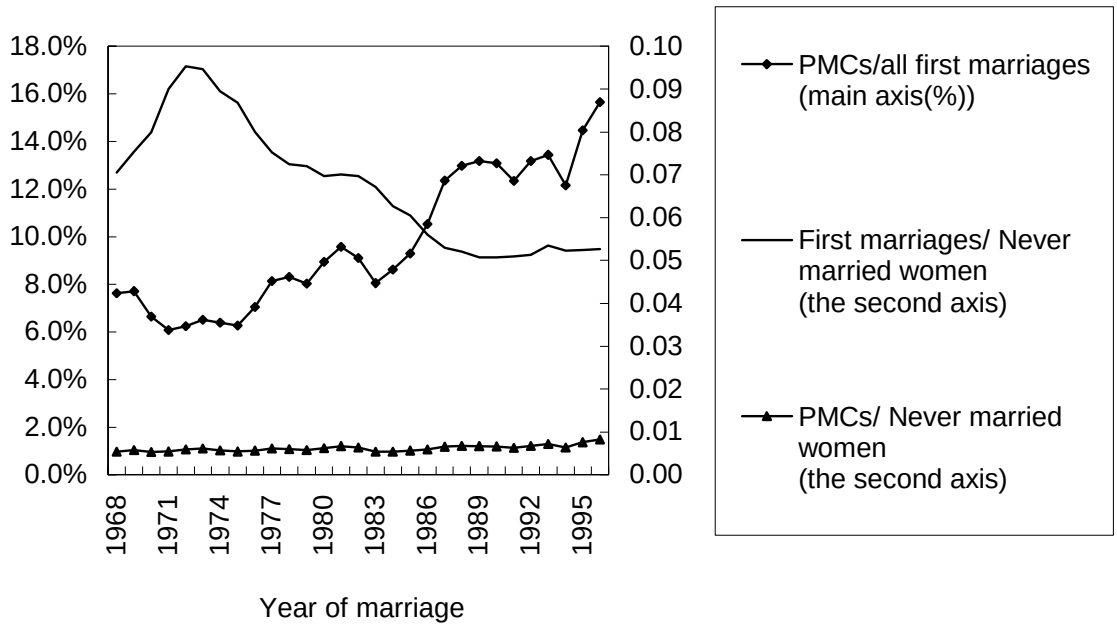
1)Results from the model using the assumption of $g=1-(1-h)^2$. Figures in Italics mean fixed parameters.
2)100×unintended conc.／all conc.
3)100×unintended births／all births
4)100×induced abortions／all births
5)100×those who don't want births soon but not using contraception/women "at risk" (currently having an intimate partner)
6)Calculated as annual rate ×25 (from 20 to 44 years old). Mean number of events per women for lifetime.
7)Figures are dependent on the age structure of 1997.
8)Age structure is standardized.
9) The model was fitted to Puglia, a Southern Italian region with a population of 4 millions(Dalla Zuanna *et al.*,1998)

Premarital conceptions

One area of special interest related to the incidence of unintended birth is the trends of the premarital conception (PMC), that is, marriages resulting from pregnancy out of wedlock, so-called "shot-gun weddings." It has been reported that PMC has decreased in Western society as the use of highly-effective forms of contraception become widespread (Bourgeois-Pichat, 1987), and also, more couples choose to have children without getting married. Let's look at the trend of premarital conceptions to see if the same situation applies in Japan. Previous research suggested the possibility that the proportion of premarital conceptions has been increasing since the 1970s (Otani, 1988). So first, let's see how many instances of PMC occur among couples married in a given year. For this purpose, we will define PMC to be the delivery of a first child occurring within 7 months of marriage. The percentages shown in Figure 9 reveal a constant increase since the 1970s. However, this period of time was also a period in which the number of marriages was decreasing. It may be that the decrease in the number of marriages accounts for the corresponding increase in the proportion of PMC. In fact, if we look at the indicator of the number of first marriages versus the number of never-married women, it is clear that it has been decreasing since the 1970s in comparison to the PMC proportion. In such a case, it is better to use indicators in which the denominator is the number of women exposed to risk (never married women from 15-39), as indicated by Castiglioni and Dalla Zuanna (1994). The indicator of PMCs relative to the number of never married women does not increase as steeply as that of PMCs out of all first marriages, but rather than decreasing, it actually shows a minor increase. Figure 10 presents a comparison of the values for Italy reported by Castiglioni and Dalla Zuanna (1994) with the values for Japan. Since the definition of premarital pregnancy is not the same between the two data sources (as for Italy's values, indicator of the delivery of a first child occurring within 8.5 months of marriage is used), we should only be concerned with the trends. Clearly, since the 1980s there has been a dramatic drop in the PMC risk in Italy, while in Japan it has increased. In Japan, extra-marital childbearing is not well accepted by society, which may be a factor in explaining why PMCs/never married women has not decreased. At the present time about 1.5% of all births in Japan are extra-marital births. If the PMCs had not resulted in shot-gun weddings in recent years, and had instead resulted in extra-marital childbirth, the percentage of extra-marital births would jump to 11%.

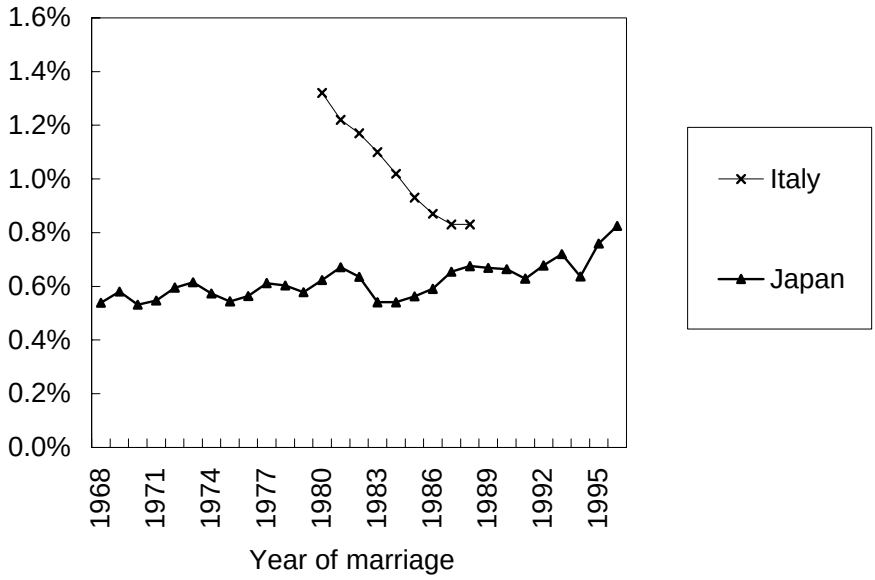
As presented above, the probability of unintended pregnancy in contemporary Japan is not low; and it is possible that about half of the unintended pregnancies that occur result in an unintended birth. What kind of effect does this uncertainty regarding pregnancy and childbearing have on the lifestyles of young men and women? Furthermore, how should we interpret the low overall fertility rate in a society with this high level of uncertainty regarding pregnancy?

In developed countries women have more control over fertility rates through the use of highly effective contraception or pregnancy termination with abortion. Whereas in Japan, there is less control of fertility rates as the prevalent use of not so reliable methods leads them to uncertainty. Considering the fact that people are engaging in intercourse as much as in the past, and that there has been no increase in use of highly effective contraception as well as no increase of induced abortion, why is the fertility rate so low in Japan? I would like to make a final observation on one more unique characteristic in Japan, related to relational behaviours.



Note : Premarital conception(PMC) is defined here as a marriage in which the delivery of a first child occurs before 7 months of the marriage. Among women aged 15-39.

FIG.9. Various indicators on premarital conception (PMC)



Note : As for Italy, among women aged 15-44. Abortion was legalized in June 1978 (Castiglioni and Dalla Zuaana, 1994). As for Japan, among women aged 15-39. As for Italy's values, indicator of the delivery of a first child occurring within 8.5 months of marriage is used

FIG..10. The ratio of premarital conceptions to never married women: Japan and Italy

Living arrangements in intimate relationships

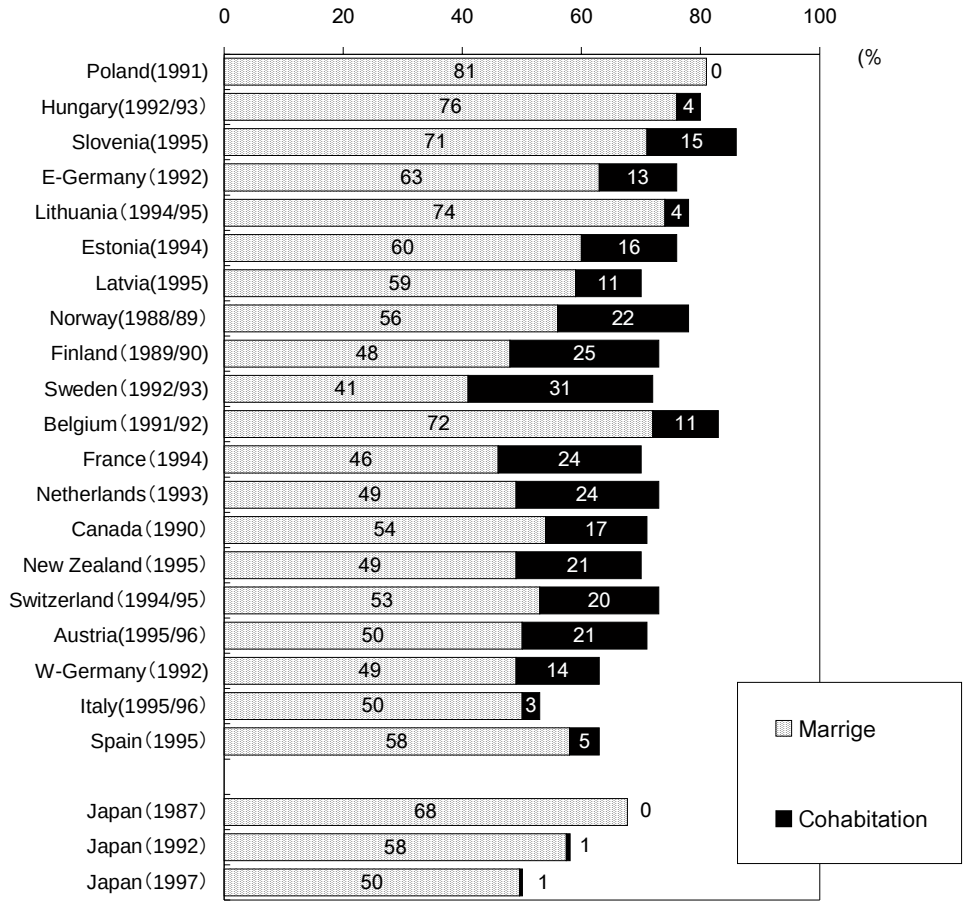
If a drastic decrease in the birth rate occurs even though there is no change in the circumstances related to exposure to intercourse, it is possible that it has become possible to avoid undesired pregnancy through effective methods, or that undesired pregnancies are being eliminated with induced abortion. However, in Japan, although there has been some increase in the rate of contraceptive use among unmarried individuals, and a slight increase in the number of induced abortions among women in their teens and early 20s, it is not possible to claim that the drop in the birth rate is mainly the result of these increases. Therefore, I would like to make a final observation on one more unique characteristic in Japan, related to exposure to intercourse.

Figure 11 shows the percentage of those women who are married or cohabiting with their partner. In countries other than Japan, there is clearly a difference in the percentage of married people, and including those who are cohabiting, it appears that about 70% of women between the ages of 25 and 29 years of age are living with a male partner. In comparison to this, in Japan, since there are very few instances of non-marital cohabitation, the percentage of those who are living with a partner among women in the same age group is only 50%. Non-marital cohabitation is rare in various southern European countries as well, and it appears that the number of couples living together is relatively lower there as well. Figure 11 also indicates that there has been a very large drop in the numbers of couples living together in Japan for a period of time, a drop of the same degree as that of the birth rate.

The circumstances of living arrangement among couples are shown in Figure 12, overlaid with the data on whether the woman has a sexual partner, as shown initially. This reveals a large decrease in the number of couples who marry and live together in Japan, and instead an increase in couples who do not marry, nor live together.

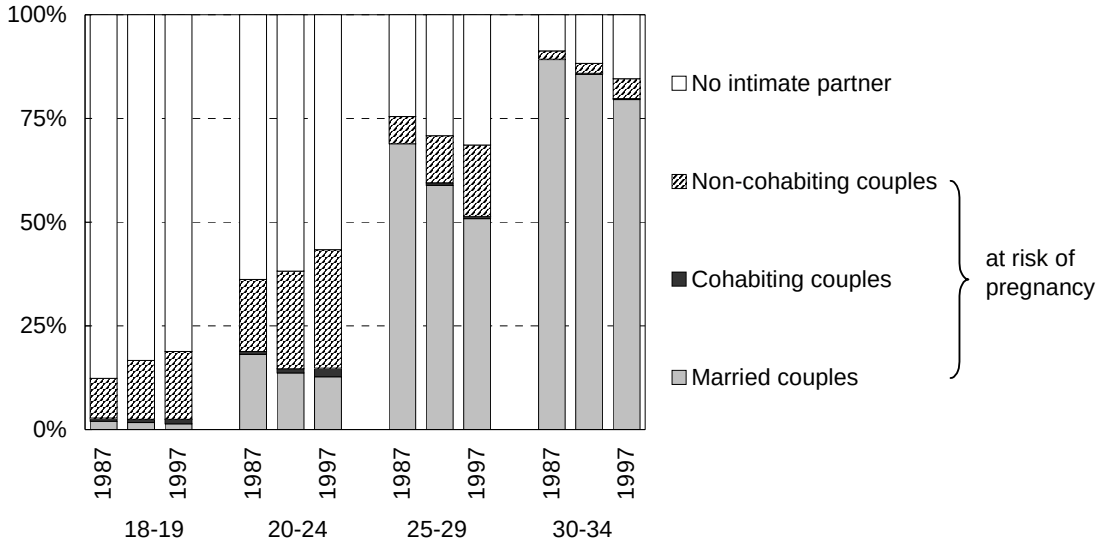
The drop in the fertility rate among Japanese women in their late-20s and early 30s has occurred even though there has been no stagnation in male/female interactions, no widespread acceptance and use of highly-effective contraceptive methods, and no regulation through the use of abortion. Instead there are many cases of unintended pregnancies leading to unintended childbirth, and even a little increase in the incidence of shot-gun weddings among never-married individuals.

Nevertheless, one of the reasons that is believed to explain the suppression of the incidence of pregnancy is the low rate of cohabitation of couples. The non-cohabitation of men and women involved in intimate relationships (approximately 70% of females in these instances live with parents) probably has the same effect as fertility regulation, because couples in the non-cohabiting relationships would have less frequencies of intercourse than cohabiting couples, so this would directly suppress the incidence of pregnancies. And I suppose there is another indirect impact on fertility. The fact that there are few opportunities for men and women to live together, means that there are fewer opportunities for men and women to interact and to fill in the gaps between different ways of thinking. Wouldn't such a situation lead to an increasing postponement of marriage and childbearing, thereby causing the extremely low birth now seen in Japan? Considering these assumptions, fertility would be limited by an increase of non-cohabiting couples directly and indirectly.



Sources: Excluding Japan, based on the results of European Fertility and Family Surveys (FFS) in Klijzing and Macura (1997) . For Japan, JNFS.
Note: The numbers in parentheses indicate the year of the survey.

FIG.11. Relative numbers of women living with an intimate partner, ages 25-29



Source : JNFS (1987,1992, and 1997)

FIG.12. Relative numbers of each partnership type, by age group and year of survey

It is not currently possible to state that there is a direct causal relationship between the lack of widespread use of highly-effective methods of contraception, and the increase of non-cohabiting couples. However, one of the Japanese prominent obstetricians and gynecologists suggests that couples living with the fear of an unintended pregnancy perhaps choose to have sexless relationships, creating a situation in which pregnancy is not possible (Kitamura, 1997). It could be said that stable sexual relationships could not be maintained without a reliable contraception.

Summary and conclusions

In a society where most members have clear intentions to limit the number of children to two or three, as well as a desired timing for these children, there should be some kind of fertility regulation performed to achieve this. In order to clarify the factors causing the low fertility in Japan this study has considered the current situation in Japan with respect to sexual experience, relationships, use and methods of contraception, induced abortion, and unintended childbearing. The results show a trend toward sexual experience at a younger age, but no major changes in the relationship between men and women. On one hand, in addition to the low use of contraception, since the most popular method of contraception are not particularly reliable, the probability of an unintended pregnancy is not low. However, in comparison to other developed countries, there isn't an especially large number of induced abortions, and it appears that some number of the unintended pregnancies result in unintended births including shot-gun weddings. Nevertheless, the characteristics and features considered here do not fully explain why the birth rate in Japan has become so low. As one possible explanation, I pointed out the decrease in male/female living together in Japan.

In Japan, highly-effective contraceptive methods are not widely used, so there continues to be a high level of uncertainty regarding pregnancy, and apparently many couples choose to avoid cohabitation itself. This, perhaps, eliminates opportunities for interaction between men and women, as well as opportunities for the adjustment of the lifestyles of the men and women in order to prepare the environment for rearing children in the future, thereby leading to the further postponement of having children.

In the latter half of the 20th century, there was a drop in the birth rate in many developed countries. This was explained in part by an elimination of unintended pregnancy in some countries, while in other cases the drop might be caused by avoidance of cohabitation of men and women, as the risk of unintended pregnancy remained unchanged. In the former case, it is possible to safely prepare for childrearing in the future due to the reliable contraception. In the latter case, the opportunities for this preparation itself are being lost. Perhaps this would explain the extremely low fertility rate in Japan.

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