

WORLD EXPERIENCE WITH USE OF IUDs

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## Introduction:

After nearly two decades of worldwide availability and use of IUDs assessment of the future role of IUDs for family planning remains difficult. Even the casual observer will note puzzling differences in the success of IUDs in different programs. There is also wide variation among individual women in the acceptability and utility of the IUD. Apparently, successful IUD use depends upon a complex interplay of factors which include: the IUD device, i.e. the technology itself, biological variation among women, individual and cultural differences in tolerance of IUD caused side effects, and the nature and quality of the available medical care and follow-up services.

The principal advantages of IUDs are quite important. For the individual user, the IUD can serve as an interim sterilization which is relatively safe, effective, and convenient, which is not directly related to sexual activity. In theory, the IUD user may need only a single contact with a clinical service, and this, together with the fact that the IUD is an inexpensive, and effective means of fertility control suggests important advantages of this means for family planning programs compared to other fertility control methods.

Unfortunately, there are also important drawbacks to the use of current IUD technology. First, the method's acceptability to individual women is limited because of

undesirable side effects; and secondly, insertion and follow-up care require clinical procedures and continuing intervention of medical or other program personnel.

As noted above, the complex interplay of factors which determines successful IUD use has resulted in a very different experience among programs. For example, in the People's Republic of China IUD usage makes up about 40% of the four leading contraceptives modalities, IUDs, sterilization, oral contraception, and condom. Whereas, in the remainder of the world, IUD use makes up only about 10% of the mix of these four contraceptives modalities. (see table 1) Obviously the demographic impact of IUD usage varies greatly by country.

#### Clinical Aspects of IUD Usage

A decade of carefully controlled and well analyzed clinical studies has documented the performance patterns of IUD usage. (1-4) It is now also possible to know which causes of IUD side effects and discontinuation are primarily due to the device itself and which are primarily due to other factors. (5,6,) Early in the history of IUD development, it was assumed that IUD performance was mainly a function of the nature of the device. However, with growing experience investigators are increasingly aware that other factors, particularly the type of programmatic support and follow up care offered the user are often a dominant influence in IUD performance. (4,7)

It is now recognized that meticulous insertion technique by well trained personnel and conscientious and sympathetic follow up by accessible program personnel are essential to the success of IUD use in family planning programs. A number of the interrelationships between I.U.D. and programmatic factors can be seen in table 2.

The principal difficulties encountered in IUD use are discomfort and increased bleeding, both at and between the menses, spontaneous expulsions, increased frequency of uterine and pelvic infection and pregnancy failures. In addition, compared to pregnancies in non-users the pregnancies which do occur are perhaps 7 to 10 times more likely to be ectopic or 3 to 8 times more likely to result in abortion, rarely septic midtrimester abortion. (1,4,5,8) Although, ectopic pregnancies made up 1 out of every 23 pregnancies among IUD users in the Cooperative Statistical Program (9) the rate per sexually active woman is probably about the same as that of a population not using contraception. (4,10)

Perforation and imbedding of IUDs usually occurring at the time of insertion, also occurs occasionally, but the incidence varies remarkably with the clinic setting, skill of physician, type of device, and type of inserter. (1,4,8,11)

The timing of events is not evenly distributed over the duration of use of IUDs. Most events are considerably

higher in the first few weeks and months of IUD use and then decline to more-or-less stable levels, as can be seen in figure 1. The most important reason for discontinuation of IUD use is because of removal for bleeding or pain. Voluntary removals also may occur for personal reasons such as the desire of the user to plan a pregnancy or for medical indications such as a uterine perforation or the occurrence of a pregnancy. However, the rate of IUD discontinuation because of bleeding and or pain usually exceeds the combined rate of pregnancies and expulsions by a ratio of 2 to 1.

(1,4,12,14) It has been observed, both in clinical studies and in mass family planning programs that removals for bleeding and/or pain are seldom followed by reinsertion. (12,14)

#### Family Planning Program Experience with IUDs

In the early years of mass programs for family planning in developing countries the IUD was often emphasized. It was believed by many that the IUD would be a one-time inexpensive procedure that would offer a high degree of protection against pregnancy without the need for ongoing care or continuing programmatic intervention. Berlson estimated that in the five years preceding 1967, 60 to 65% of new acceptors in national programs in developing countries used IUDs. However, additional experience with IUDs in developing countries revealed that in spite of continuing high levels of programmatic effort in a number of settings the IUD now makes up a small proportion of all contraceptive users in most countries. For example, in South Asia

(India, Pakistan, Bangladesh) where more than 12 million IUDS have been inserted since 1965 less than 2 million are in use today. (4,7) However, in China and some other countries IUD use is very important. Factors which influence the utilization of IUDs in family planning programs are discussed in the following sections.

#### World Usage of IUDs

Inadequate data exists to obtain an accurate world picture of IUD usage and demographic impact. IUDs are available in most countries through a number of channels, both public and private and figures on distribution and usage through sales and service programs are incomplete. Even in countries where most family planning services are provided through public sector programs, statistical data on new acceptors gives only a rough picture of the usage of IUDs at any one time.

The best measurement of prevalence of use of IUDs, i.e. the number of users at any given point in time, comes from special surveys selected so as to provide a representative sample of the nation's (or an area's) population. Data from a number of such surveys in developed countries are available e.g. the National Fertility Survey in the United States. The World Fertility Survey has published such data for 12 developing countries. Data from these 12 countries where survey results have been adequately analyzed are presented in table 3.

These data reveal that IUD usage makes up only a few percent of all married women of reproductive age. Additional countries where IUD prevalence reaches or exceeds 5% are Egypt, Tunisia, Indonesia, Ecuador, Jamaica, Mexico, Paraguay and Taiwan.(4) Similar data from developed countries are shown in table 4. In the United States, where the IUD and the oral contraceptive were introduced in the early 1960s, the use of the pill forged far ahead. Currently about 20% of women of reproductive age use the pill and 6% the IUD (Figure 2).

#### CHINA

By far, the most extensive usage of IUDs appears to be in the People's Republic of China. While accurate national data on the prevalence of usage of various means of fertility control is not available, numerous visitors (including one of the authors, Ravenholt) have recently visited the People's Republic of China and engaged in extensive discussions relating to the Planned Birth Program. On the basis of provincial and local data and the nature of China's program we estimate that roughly 35 million women are currently using the IUD in China. Although the IUD has been the leading method of contraception in China--especially for regulating the interval between the first and a possible second child, voluntary sterilization is now moving into first place as one child only becomes the accepted mode. In China, with little premartial intercourse before late marriage (in the mid-twenties) there is much less use of oral contraceptives than in the U. S.

and many other countries.

Factors which appear important to the success of IUD use in China include strong peer group pressure and support for the use of this technology, adequate medical backup, through 750,000 Production Brigade Health Stations (Barefoot Doctors), 50,000 Commune Hospitals and 2000 County Hospitals. Another factor which may diminish side effects of IUD use in China is the extraordinarily low incidence of sexually transmitted infections due to puritanical sexual mores.

### India

The IUD program in India has proved less successful than originally anticipated. The IUD program was initiated in 1965 with the expectation that the IUD would be the main means of fertility control in India. Between 1965 and 1967 2.4 million IUDs were inserted. However, since 1968 annual insertions have averaged about 450,000 per year and we estimate that only 1.5 million women are current users. IUDs make up about 6% of the users of fertility control in India. One possible reason for the relative lack of success of the IUD in India is the relatively weak network of ongoing counselling and medical care backstop to take care of problems and side effects. In the absence of this continuing care and backstopping the IUD rapidly lost favor in the Indian setting.

A setting other than China where the IUD is the leading means of contraception is the island of Bali in Indonesia. About 70% of family planning users employ the IUD in Bali. It has been suggested that the extensive community participation and community support which fosters family planning in Bali has been responsible for the high usage of all means of fertility control and a particularly high acceptance of the IUD in that setting. The Balinese are quite candid and open about utilization of various means of fertility control, even to the extent of mapping out each house on the island and color coding which means of fertility control is employed in that household. Women's clubs and meeting groups provide mutual reinforcement and support, as does active participation by the medical community in Bali.

With current IUD technology, side effects-particularly IUD removals for bleeding and pain-demand a considerable organizational and fiscal commitment to provide backstopping services. In short, there is growing recognition that the side effects of current devices are common enough and severe enough that a continuing source of advice and care is crucial to the success of an IUD program. It should be noted that the need for trained personnel in an IUD program does not necessarily mean physicians,

nurses or other highly skilled health care personnel. Adequately trained paramedical personnel and even strong community support would appear to be able to provide much of the needed backstopping and support. (4,16,20)

Decisions by family planning administrators also have a strong impact on the pattern of usage of various means of fertility control. Even though, a program may offer several modalities, the preferences and enthusiasms of medical or other personnel offering the services are often highly determinative of which particular fertility control modality is chosen. Family planning administrators and service personnel have shown an increased interest in other methods of fertility control, especially oral contraceptives and voluntary sterilization, which is now the leading method used worldwide. In settings as those described above where the IUD is strongly emphasized a great deal more usage of this modality results, especially when a continuing source of advice and care is available through a strong follow up program.

#### Demographic Impact Of IUDs

The demographic impact of any means of fertility control relates to the proportion of fertile couples at any given time using the technique, the effectiveness of the method in preventing pregnancy, and the age, parity, and fecundity of the users of the method.

The IUD has the advantage that the use effectiveness of the method (its effectiveness under use conditions) is quite close to the theoretical effectiveness of the method.(4, In developing countries the use effectiveness of the IUD is usually similar to that of the pill. For example, in a study in the Philippines approximately 3% of the pill and IUD continuing users were pregnant at the end of a year. As noted previously, the IUD does offer the advantage of not requiring continued motivation or action to ensure its effectiveness.

Data from the United States reveals that only sterilization and oral contraceptives are more effective; and the advantage of oral contraceptives is very slight in the situation where both methods are used to prevent pregnancy. (See table 5.) In the previously mentioned Philippine study, although only 3% of the pill and IUD continuing users were pregnant at the end of a year, compared to 33% of rhythm continuing users, when one compared all initial acceptors of reversible contraceptives the IUD had the lowest pregnancy rate, 10% compared to 22% of all oral contraceptive acceptors and 43% of all rhythm acceptors at the end of a year. (21)

In addition to contraceptive effectiveness, the demographic impact of a fertility control method is related to the number of users at any point in time i.e. the prevalence of use. The proportion of those at risk of pregnancy who are contraceptive users reflects the dynamic relationship between acceptors of the method and drop-outs or discontinuators of the methods. This prevalence of use

provides a better indicator of expected demographic impact, than can the acceptance rate or the drop-out rate alone. In addition, it must be kept in mind that when comparing acceptance rates, continuation rates and drop-out rates one should compare acceptors of the same age, parity, and family size desires, as well as using life table techniques in computing rates. (23,24) For example, higher parity IUD users continuation rates should not be automatically compared with the lower parity, younger acceptors of oral contraceptives. Ross et al reviewed IUD continuation rates in 12 developing countries and noted that the 12 month continuation rates in these mass programs ranged from 62 to 77 per 100 acceptors and 24 month rates were between 49 and 56 per 100 acceptors in most countries. Continuation rates for oral contraceptives were somewhat lower, between 55 and 62 at 12 months in most of the countries with available data. However, none of this data was standardized by age or parity. (25)

Some studies using matched samples have considerably narrowed the gap in continuation rates between pill and IUD (26,27) In other standardized studies, however, this gap persists, and continuance of use among IUD users is longer than that of acceptors of oral contraceptives. (22,27)

A method may have excellent continuation rates and result in significant decline in fertility among acceptors, but still may appeal to too few women to result in adequate program coverage and therefore a significant demographic impact. There is some programmatic experience to demon-

strate this problem. Although some IUD programs have superior continuation rates, acceptance curves for intra-uterine devices in countries such as South Korea, India, and Pakistan, plateaued and then decreased during the late 1960's. Acceptance of oral contraceptives and voluntary sterilization on the other hand, has rapidly increased in countries where these methods have been made broadly available. (29,30) As judged by prevalence of use, the currently available IUDs are an important means of fertility control, but should be considered one of a number of techniques to be made available in a family planning program.

Although a method might have excellent continuation rates and very low post-acceptance fertility, it might still have limited demographic impact if it were accepted only by older, high parity women.

A survey of most family planning programs reveals that while IUD acceptors are usually older than pill users, they are a sufficiently young and fecund part of the population that a significant reduction in births will result. In Taiwan, for instance, L. P. Chow and his coworkers showed that a sample matched by age, parity, education, and year of acceptance of an IUD insertion experienced a 61% fertility decline relative to the control group. (31) Furthermore, it is the experience of most family planning clinics that the trend over time is toward decreasing age and parity of acceptors. (23) Bernard noted that not only age and parity but also family size desires of acceptors declined over time in a number of clinics in different countries. (

### Conclusion

In assessing the role of the IUD in family planning programs, one must continually be aware of the distinction between the impact on fertility of individual acceptors and the impact of an IUD program on national fertility. When fertility effects on acceptors are examined, the experience with the IUD appears to be favorable compared with other means of fertility control.

Programmatic impact of IUD use has not been so favorable, however, and many countries have either added additional means of fertility control or switched emphasis to other means of fertility control to maintain the momentum of their programs. Particularly troublesome is the probability that with current devices a significant proportion of acceptors will continue to request removals and will be unlikely to use IUDs again. Furthermore, most countries have been unable to reach a substantial proportion of their at-risk female population with this method, since it requires a clinical procedure and follow up.

This is not to say that the IUD has not had a significant impact on fertility in many countries. Numerous careful analyses provide evidence that in the past two decades millions of births have been averted by use of IUDs in developing countries. (15,23,33,35) The current generation of IUDs has posed some problems with expulsion, accidental pregnancies, perforations, and infections; but its greatest drawback has been the continuing incidence of unacceptable pelvic pain and vaginal bleeding among users.

Although improvements in safety, effectiveness, and retention rates are desirable, it would seem to be of paramount importance to develop an IUD free from the unpleasant side effects of pain and/or bleeding that so often result in the user's request that the device be removed. The development of an IUD that is comfortable and does not cause bleeding is a first priority of IUD research, and if achieved, would surely lessen the importance of the other great drawback of IUD use in developing countries, the need for clinical intervention for insertion and aftercare. A decrease in IUD-related events, particularly symptoms would surely decrease the aftercare load, including the need for providing reassurance, treatment, removals, and reinsertions.

It is unfortunate that the drawbacks of IUD technology have not yet proved highly susceptible to improvement by research--though several new and promising IUD designs are being studied. Even so we do not know enough about the relatively extreme variability of successful IUD use between women and between programs. Furthermore, we must honestly admit that supposed advances in technology have brought new problems--especially in the less developed countries. In these settings where IUD caused increases in bleeding are poorly tolerated (because of preexisting anemia, lack of bathrooms and menstrual hygiene materials, and cultural factors), rates of pelvic infections are high, and medical care facilities inadequate, development of an adequate delivery

and after care system may be considerably more important than subtle improvements in or differences between devices. Bioactive devices may be inappropriate in these settings particularly if (1) they are only effective for a few months or years, (2) they require difficult to learn insertion procedures, e.g. fittings, (3) they are costly or difficult to manufacture or sterilize or (4) they have peculiar risks e.g. the scarring caused by an unremoved copper bearing device after uterine perforation. The commonest device used so successfully in the Peoples Republic of China, a modified Ota ring, is probably not intrinsically superior to other commonly available devices. This strongly suggests the IUD program not the particular device will remain the key variable in explaining successful IUD use. Elements of a strong IUD program must include:

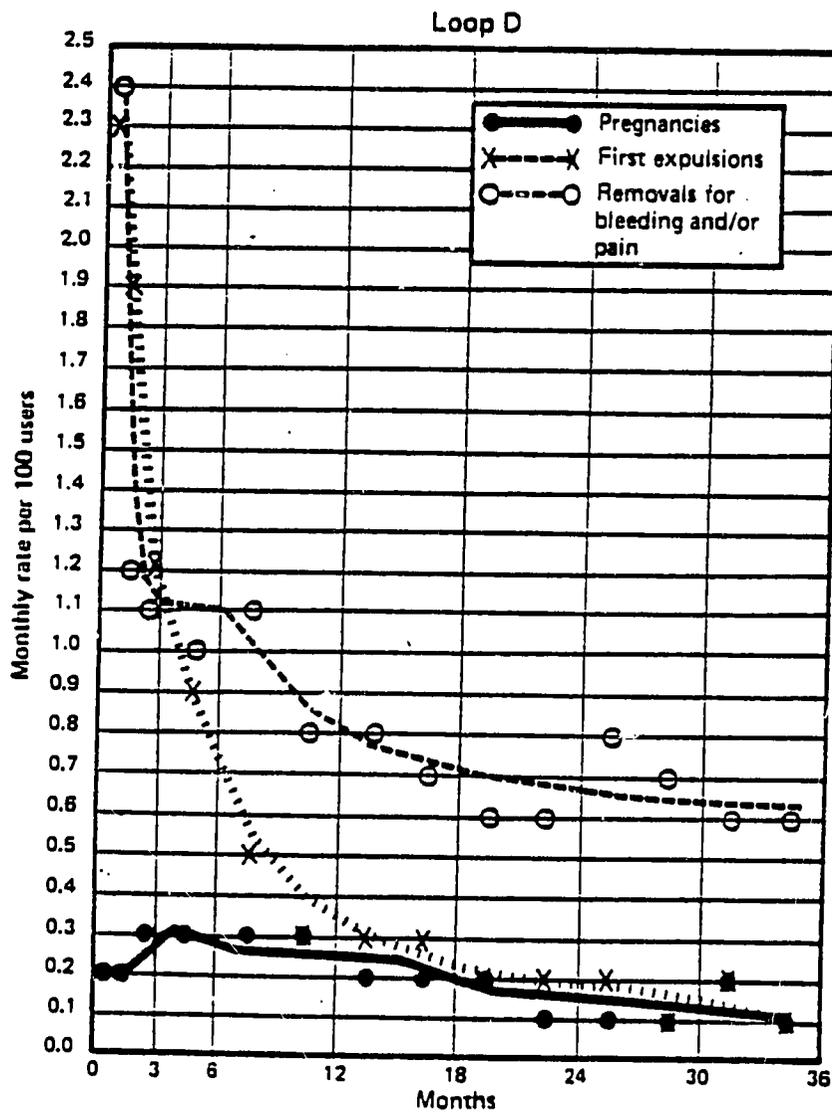
- \* Publicity and psychological support for IUD use.
- \* Adequate supplies for menstrual hygiene and bathing facilities.
- \* Trained personnel to ensure skilled IUD insertions and aftercare.
- \* Sympathetic competent and readily available medical support--the authors were vividly impressed by the tribulations of a village head man in Uttar Pradesh, India who was

left to cope with an excessive bleeding problem after a mobile IUD insertion team had departed.

\* A referral system to care for unusual but occasionally life threatening IUD side effects e.g. ectopic pregnancy.

FIGURE 1

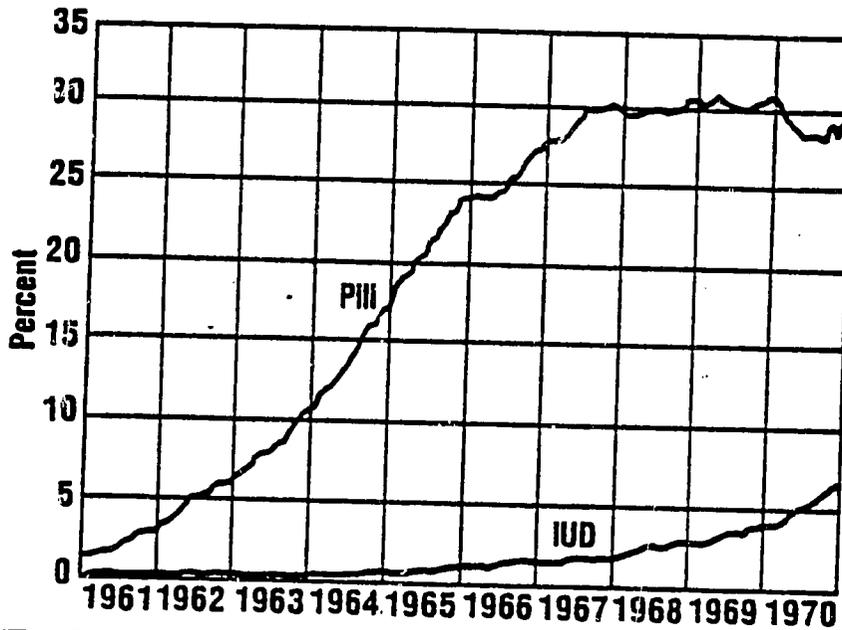
MONTHLY RATES OF PREGNANCY, EXPULSION AND REMOVAL FOR BLEEDING OR PAIN: LIPPE'S LOOP D, THREE YEARS



Source: Tietze, C., and Lewit, S., "Evaluation of Intrauterine Devices: Ninth Progress Report of the Cooperative Statistical Program", Studies in Family Planning, No. 55, July 1970, 40 p.

FIGURE 2

**Percent using the pill and the IUD, January 1961 through September 1970. (For women married, husband present, at time of interview, and less than age 35 at, and first married prior to, time of report.) 1970 National Fertility Study, United States**



Source: Ryder, N.B., "Time Series of PID and IUD Use: United States 1961-1970", Studies in Family Planning, Vol. 3, No. 10, October 1972, pp 233-240.

TABLE 1

**Estimated Prevalence of Selected Means of Fertility  
Control on 31 December 1978  
(numbers in millions)**

<u>Method</u>	<u>Users in countries other than People's Republic of China</u>	<u>Users in People's Republic of China</u>	<u>Total Users</u>
Sterilization	54	36	90
Oral Contraceptives	43	12	55
IUD	15	35	50
Condom	30	5	35
Abortion*	20	5	25

\* Annual Incidence

Source: Estimate of R. T. Ravenholt and J. Joseph Speidel,  
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International Development

TABLE 2

ASSOCIATIONS BETWEEN TYPES OF TERMINATIONS AND FACTORS RELATED TO PROGRAMMATIC USE OF INTRAUTERINE CONTRACEPTION

Factors Relating To IUD Use	Type Of Termination			
	<u>Pregnancy</u>	<u>Expulsion</u>	<u>Medical Removals (bleeding/pain/other)</u>	<u>Nonmedical Removals (planning pregnancy/other)</u>
IUD design--clinical and physical characteristics	+++	+++	++	0
Medical care--insertion	++	+	0	0
Medical care--follow-up	0	0	++	+
Demographic characteristics of acceptors--age, parity, post-partum insertion interval, etc	+	++	++	...
Cultural characteristics of acceptors	0	0	+++	...

Note: +'s indicate degree of positive association between factors and type of termination

Source: Speidel, J. J. and Ravenholt, R. T. The role of IUDs in developing countries. In: Wheeler, R.G., Duncan, G. W., and Speidel, J. J., eds. Intrauterine devices: development, evaluation, and program implementation (Proceedings of a Workshop on Advances in IUDs: Battelle Seattle Research Center, Seattle, Washington, October 18-20 1973). New York, Academic Press, 1974.p.1-31.

TABLE 3

Percentage of Married Women of Reproductive Age\* Using Intrauterine Devices in Selected Developing Countries, as Reported in World Fertility Surveys, 1974-1976

Country	Date	Percent of MWRA	
		All Methods	IUD
<b>ASIA</b>			
Fiji	1974	40	5
Korea, South	1974	35	8
Malaysia	1974	33	1
Nepal	1976	2	0
Pakistan	1975	5	1
Sri Lanka	1975	33	5
Thailand	1975	33	6
<b>WESTERN HEMISPHERE</b>			
Colombia	1976	42	8
Costa Rica*	1976	64	5
Dominican Republic	1975	31	3
Panama*	1976	54	4

\*Aged 15-44, except in Costa Rica and Panama, 20-49

Source: Adapted from Population Reports, Series A, Number 5, in Piotrow, P. T., Rinehart, W., and Schmidt, J. C., "IUDs - Update on Safety, Effectiveness and Research", Population Reports, Series B. Intrauterine Devices, No. 3., Baltimore, Md., Johns Hopkins University, Population Information Program, May 1979, 100 pp.

TABLE 4

Estimated Percentage of Married Women of  
Reproductive Age Using Intrauterine Devices in Selected  
Developed Countries,  
1974-1978

Country	Date	Percent of MWRA	
		All Methods <sup>1</sup>	IUD
Belgium <sup>2</sup>	1975-76	87	3
Denmark <sup>2</sup>	1977-78	92	8
England & Wales	1975	76	6
Finland	1975-78	NA	20
France	1978	67	9.1
Hungary	1974	75	2
Italy	1976-77	NA	3
Japan <sup>2</sup>	1977	60	7
Netherlands	1975	71	4
Sweden	1977	75	19
United States	1976	69	6.1

<sup>1</sup>Including sterilization

<sup>2</sup>Dutch-speaking population only

<sup>3</sup>Contraceptive method last used, not necessarily currently in use

Source: Piotrow, P. T., Rinehart, W., and Schmidt, J. C., "IUDs - Update on Safety, Effectiveness and Research", Population Reports, Series B Intrauterine Devices, No. 3, Baltimore, Md., Johns Hopkins University, Population Information Program, May 1979, 100 pp.

**TABLE 5**

**Effectiveness of Various Contraceptive Methods  
Used to Delay or to Prevent Pregnancy, United States,  
1970-1973**

Contraceptive Method	First Year Pregnancies per 100 Married Women Aged 15-44		
	Used to Delay Pregnancy	Used to Prevent Pregnancy	Rates Standardized for Intent
Sterilization	0.0	0.0	0.0*
Oral Contraceptives	2.0	2.0	2.0
IUD	5.6**	2.9**	4.2
Condoms	13.7	6.6	10.1
Foam, cream, or jelly	16.7	13.1	14.9
Diaphragm	15.9	10.3	13.1
Rhythm	28.8	9.5	19.1
All other	15.1	6.5	10.8

\*Tatum attributes a failure rate of about 0.4 to sterilization.

\*\*Not statistically significant difference at  $p < 0.01$

Source: Vaughan, B., Trussell, J., Menken, J., and Jones, E. F., National Center for Health Statistics, contraceptive efficiency among married women, 1970-73, (To be published in PHS 1000-Series 23) in Piotrow, P. T., Rinehart, W., and Schmidt, J. C., "IUDs - Update on Safety, Effectiveness and Research", Population Reports, Series B Intrauterine Devices, No. 3. Baltimore, Md., Johns Hopkins University, Population Information Program, May 1979, 100 pp.