

Evaluation of the Effectiveness of Various
 Contraceptive Methods*
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1. ABSTRACT

In the follow-up study of the use-effectiveness of IUD, Pill and Condom contraceptive methods among married women who were new contraceptive users in the Taiwan area, the continuation rates of IUD, Pill and Condom use were 59.81%, 34.30% and 33.72% at 12 months, and 49.64%, 26.22% and 29.39% at 18 months respectively.

During the one and a half year period of time, the average months used for the IUD were 12.83, for the Pill 8.36 and for the Condom 8.15 months.

The pregnancy rates, calculated per persons of risk, were 3.33% for the IUD, 2.47% for the Pill and 3.81% for the Condom users. However, the Pearl's Index of accidental pregnancies per hundred woman-years rated 3.17 pregnancies for the IUD, 3.63 pregnancies for the Pill and 5.82 pregnancies for the Condom users, which showed as the results of the study, the degree and the order of the use-effectiveness of the three kinds of contraceptive methods.

In summary, for improving the use-effectiveness of contraceptive methods; to emphasise the prior health education and the follow-up medical or nursing consultation for the users are needed.

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2. INTRODUCTION

In order to evaluate the use-effectiveness of IUD, Pill and Condom contraceptive methods, a sample of married women was drawn from new contraceptive users who had registered during January, 1972 at the Taiwan Provincial Committee on Family Planning and the Taipei City Family Planning Promotion Center.

The objectives of the evaluation study was to measure the use-effectiveness of contraceptive methods in terms of the ordinary rate per person, and to study the Pearl's Index (See P. 9) of the number of accidental pregnancies per hundred woman-year.

Furthermore problems related to contraceptive failures, such as keeping unwanted-pregnancies, induced abortions, spontaneous abortions and ectopic pregnancies, together with the age and educational distribution of the cases were studied.

3. MATERIALS AND METHODS

The sampling areas involved 147 out of 323 administrative districts, including Hsiang (rural), Chen (semi-urban), County city (urban) and Municipality (highly urban) on the whole island of Taiwan except the aboriginal areas and Penghu islands.

Out of 25,794 newly registered contraceptive users during the month of January, 1972, there were 13,925 cases of IUD, 6,603 cases of Pill and 5,266 cases of Condom users.

A sample of 5,111 cases was drawn, which involved 1,682 cases of IUD, 1,697 cases of Pill and 1,732 cases of Condom contraceptive users. They were subjected to the survey carried out from June to September, 1973 and interviewed by 40 trained home visitors. This follow-up study was conducted during the first one and a half year period after their beginning of contraceptive method use.

4. RESULTS AND DISCUSSION

(1) Age Distribution of Contraceptive Users and Failure Cases

Table 1 shows the general picture of age distribution of three kinds of contraceptive users and the failure cases with the frequencies and failure rates in per cent.

There were 56 (3.33%) failures among 1,682 IUD users, 42 (2.47 %) among 1,697 Pill users and 66 (3.81%) among 1,732 Condom users.

The results have to be interpreted as "method failure", because it is practically impossible to distinguish the "patient failure" from the "theoretical failure". In the latter point of view of use-effectiveness, the "patient failure" is considered to be "method failure".

For each kind of contraceptive method, the 20 to 29 years age group has a higher failure rate than the other age groups. The highest failure rate of IUD users is among the group 20 to 24 years of age (5.93%); that of Pill users is also among the group 20 to 24 years of age (3.04%) and that of Condom users among the group 25 to 29 years of age (6.14%).

Table 1. Age Distribution of Contraceptive Users and Failure Cases and Rates

Age	IUD Cases		Pill Cases		Condom Cases		Total	
	User	Failure(%)	User	Failure(%)	User	Failure(%)	User	Failure(%)
19 & less	11	0(0.00)	15	0 (0.00)	17	0 (0.00)	43	0 (0.00)
20 - 24	270	16(5.93)	263	8 (3.04)	216	9 (4.17)	749	33 (4.41)
25 - 29	566	22(3.89)	479	12 (2.51)	521	32 (6.14)	1566	66 (4.21)
30 - 34	465	12(2.58)	468	12 (2.56)	505	19 (3.67)	1438	43 (2.99)
35 - 39	251	6(2.39)	289	6 (2.08)	270	4 (1.48)	810	16 (1.98)
40 - 44	97	0(0.00)	141	4 (2.84)	148	2 (1.35)	386	6 (1.55)
45 & more	22	0(0.00)	42	0 (0.00)	55	0 (0.00)	119	0 (0.00)
Total	1682	56(3.33)	1697	42 (2.47)	1732	66 (3.81)	5111	164 (3.21)

(2) Educational Distribution of Contraceptive Users and Failure Cases

As stated above the age factor may have much influence on the failure

rate of contraceptive methods. But on the contrary, in the "total" column of Table 2 the failure rate of every level of educational group shows a range from 2 to 4%, with the group of primary school graduates being the highest. In this results, however, it is difficult to see any distinguish difference among groups of the different levels of education.

It might be considered that the knowledge from experience by the age factor had more significance in difference than that by the educational factor, or the latter had already not enough knowledge to be in difference among each other in this field of practice.

Table 2. Educational Distribution of Contraceptive Users and Failure Cases and Rates

Education	IUD Cases		Pill Cases		Condom Cases		Total	
	User	Failure(%)	User	Failure(%)	User	Failure(%)	User	Failure(%)
Illiterate	425	13 (3.06)	411	5 (1.22)	292	9 (3.08)	1128	27 (2.39)
Semi-literate	174	3 (1.72)	193	4 (2.07)	142	8 (5.63)	509	15 (2.95)
Primary	774	28 (3.62)	808	31 (3.84)	845	32 (3.79)	2427	91 (3.68)
Junior high	163	6 (3.68)	140	2 (1.43)	206	7 (3.40)	509	15 (2.95)
Senior high & over	146	6 (4.11)	145	0 (0.00)	247	10 (4.05)	538	16 (2.97)
Total	1682	56 (3.33)	1697	42 (2.47)	1732	66 (3.81)	5111	164 (3.21)

(3) Contraceptive Failure Cases: Keeping Unwanted-Pregnancies, Induced Abortions, Spontaneous Abortions and Ectopic Pregnancies

Table 3 shows the relative frequencies and proportions of keeping unwanted-pregnancies, induced abortions, spontaneous abortions and ectopic pregnancies in contraceptive failure cases. During the one and a half year period of time, among the IUD, Pill and Condom contraceptive failure cases, the proportions of keeping unwanted-pregnancies were 37.50%, 57.14% and 63.64% of unwanted pregnancies respectively, and induced abortions were 53.57%, 38.10% and 33.33%. Spontaneous abortions

were 5.36%, 2.38% and 3.03% respectively. Aside from the Condom failure cases which included no ectopic pregnancies, the IUD failures had 2 cases (3.57%) and the Pill failures had one case (2.38%) of ectopic pregnancies.

An English study of 320 unplanned pregnancies among women using different contraceptive methods found that 54% of the pregnancies among women wearing IUDs ended in spontaneous abortions, compared with 17% among women using other methods. In another similar US study, of 46 women who became pregnant with an IUD in situ, 49% experienced spontaneous abortions, compared with the general rate of about 15%⁽¹⁾. A study of the incidence of legal induced abortion in Great Britain, 1968-1973, found these range from 3.8 to 15.9 per hundred live births.⁽²⁾

Comparing the English, US and Great Britain studies with this study, the spontaneous abortion rates in this study was relatively lower than the aforementioned other studies.^{(1), (2)} On the other hand the rates of induced abortion following accidental pregnancies due to contraceptive failures were considerably higher in this study.

Table 3. Contraceptive Failure Cases: Keeping Unwanted-Pregnancies, Induced Abortions, Spontaneous Abortions and Ectopic Pregnancies

Method	Cases (%)	Keeping unwanted-pregnancies (%)	Induced abortions (%)	Spontaneous abortions (%)	Ectopic pregnancies (%)
IUD	56(100.00)	21 (37.50)	30 (53.57)	3 (5.36)	2 (3.57)
Pill	42(100.00)	24 (57.14)	16 (38.10)	1 (2.38)	1 (2.38)
Condom	66(100.00)	42 (63.64)	22 (33.33)	2 (3.03)	0 (0.00)
Total	164(100.00)	87 (53.05)	68 (41.46)	6 (3.66)	3 (1.83)

(4) Age Distribution of Contraceptive Failure Cases

Table 4 shows cases of keeping unwanted-pregnancies, induced abortions, spontaneous abortions and ectopic pregnancies as a consequence of contraceptive failure, by classifying the informants into age groups. The

highest proportion of induced abortions was from 35 to 39 years of age (87.50%) and the next was from 30 to 34 years of age (51.16%) among the contraceptive failure cases. Consequently these age groups had relatively lower rates of keeping unwanted-pregnancies, because they had more induced abortions. The younger the age groups, e.g., the groups from 20 to 24 years of age (69.70%) and from 25 to 29 years of age (62.12%) had the higher the proportions of keeping unwanted-pregnancies, and likewise lower proportions of induced abortions.

Table 4. Age Distribution of Contraceptive Failure Cases of Keeping Unwanted Pregnancies, Induced Abortions, Spontaneous Abortions and Ectopic Pregnancies

Age	Failure cases (%)	Keeping unwanted-pregnancies (%)	Induced abortions (%)	Spontaneous abortions (%)	Ectopic pregnancies (%)
19 & less	0	0	0	0	0
20 - 24	33 (100.00)	23 (69.70)	9 (27.27)	1 (3.03)	0
25 - 29	66 (100.00)	41 (62.12)	21 (31.82)	2 (3.03)	2 (3.03)
30 - 34	43 (100.00)	18 (41.86)	22 (51.16)	2 (4.65)	1 (2.33)
35 - 39	16 (100.00)	1 (6.25)	14 (87.50)	1 (6.25)	0
40 - 44	6 (100.00)	4 (66.67)	2 (33.33)	0	0
45 & over	0	0	0	0	0
Total	164 (100.00)	87 (53.05)	68 (41.46)	6 (3.66)	3 (1.83)

(5) Educational Distribution of Contraceptive Failure Cases of Keeping Unwanted-Pregnancies, Induced Abortions, Spontaneous Abortions and Ectopic Pregnancies

Table 5 shows that the illiterate group and the semi-literate group had higher proportions of induced abortions when they had contraceptive failures, that is 62.96% and 53.33% respectively. On the average 53.05% of contraceptive failure cases had kept unwanted-pregnancies, 41.46% of them induced abortions, 3.66% of them had spontaneous abortion and 1.83% of them had ectopic pregnancies,

Table 5. Educational Distribution of Contraceptive Failure Cases of Keeping Unwanted-Pregnancies, Induced Abortions, Spontaneous Abortions and Ectopic Pregnancies

Education	Failure cases(%)	Keeping unwanted-pregnancies (%)	Induced abortions (%)	Spontaneous abortions (%)	Ectopic pregnancies (%)
Illiterate	27(100.00)	8 (29.63)	17 (62.96)	1 (3.70)	1 (3.70)
Semi-literate	15(100.00)	6 (40.00)	8 (53.33)	1 (6.67)	0
Primary	91(100.00)	56 (61.54)	32 (35.16)	2 (2.20)	1 (1.10)
Junior high	15(100.00)	7 (46.67)	7 (46.67)	0	1 (6.67)
Senior high & over	16(100.00)	10 (52.50)	4 (25.00)	2 (12.50)	0
Total	164(100.00)	87 (53.05)	68 (41.46)	6 (3.66)	3 (1.83)

(6) Failure Rates of IUD, Pill and Condom Contraceptive Users

Table 6 shows the failure rates of IUD, Pill and Condom contraceptive users at the end of the period of 18 months. The failure rates of IUD, Pill and Condom contraceptive users were 3.33%, 2.47% and 3.81% respectively. The 95% confidence intervals of IUD, Pill and Condom failure rates were 4.19% to 2.47%, 3.21% to 1.73% and 4.71% to 2.91% respectively.

About the pregnancy rate of IUD at 18 months, Freedman & Takeshita's study in 1969 was 6.5%, Cernada's study in 1970 was 6.4% and Hermalin & Chow's study in 1971 was from 6.4% to 10.0%. (3), (4), (5) All of these studies were done in the Taiwan area. The result of this study of the IUD failure rate was lower than the above-cited results.

Table 6. Failure Rates of Contraceptive Users

Methods	Sample size	Failure cases	Failure rates(%)	Failure error(%)	P + 1.96 SE 95% confidence limits
IUD	1,682	56	3.33	0.44	3.33 ± 0.86
Pill	1,697	42	2.47	0.38	2.47 ± 0.74
Condom	1,732	66	3.81	0.46	3.81 ± 0.90
Total	5,111	164	3.21	0.25	3.21 ± 0.49

Significance test of Failure rates:

Difference between: IUD and Pill; $z = 1.42$, Prob. = 0.16

Condom and Pill; $z = 2.23$, Prob. = 0.03

Condom and IUD; $z = 0.80$, Prob. = 0.42

(7) Continuation Rates of Contraceptive Users and Failure Cases

Table 7 shows the continuation rates of contraceptive users of which the rates of IUD, Pill and Condom were 69.80%, 43.84% and 41.05% at 6 months, 59.81%, 34.30% and 33.72% at 12 months, and 49.64%, 26.22% and 29.39% at 18 months respectively.

As Huber et al. reported in 1975, the IUD continuation rate in the USA at 12 months was 88.1%, and that in the following country at 12 months, Hong Kong 66%, Korea 57%, Singapore 69%, Philippines 77% and Taiwan area 67%⁽¹⁾. The study in Singapore (Wan et al.) showed the Pill continuation rates were 59.1% at 6 months, 47.5% at 12 months and 39.9% at 18 months⁽⁶⁾. The study in USA (Majumdar et al.) showed the IUD continuation rates at 12 months were 61.1% (urban), 66.6% (rural) and at 18 months 54.8% (urban), 60.2% (rural). In the same study the Pill continuation rates at 12 months were 58.3-63.1% (urban), 65.6-69.5% (rural) and at 18 months 51.9-56.7% (urban), 59.3-62.9% (rural).⁽⁷⁾

The IUD continuation rate in this study was lower than the rates mentioned above in USA, Hong Kong, Singapore and Philippines, though a little higher than that of Korea. The Pill continuation rate was also lower than that of USA and Singapore.

Table 7. Continuation Rates of Contraceptive Users

At the
beginning of
n full months

<u>n</u>	<u>IUD cases (%)</u>	<u>Pill cases (%)</u>	<u>Condom cases (%)</u>
0 -	1,682 (100.00)	1,697 (100.00)	1,732 (100.00)
3 -	1,376 (81.27)	982 (57.87)	876 (50.58)
6 -	1,174 (69.80)	744 (43.84)	711 (41.05)
9 -	1,067 (63.44)	640 (37.71)	630 (36.37)
12 -	1,006 (59.81)	582 (34.30)	584 (33.72)
15 -	903 (53.69)	489 (28.82)	532 (30.72)
18 -	835 (49.64)	445 (26.22)	509 (29.39)

Table 8 shows the continuation rates of contraceptive failure cases. Half the IUD group had accidental pregnancies between 6 to 9 months, a half of the Pill group failed by 3 months and a half of the Condom group failed by between 3 to 6 months.

Table 8. Continuation Rates of Contraceptive Failure Cases

At the
beginning of
n full months

<u>n</u>	<u>IUD cases (%)</u>	<u>Pill cases (%)</u>	<u>Condom cases (%)</u>
0 -	56 (100.00)	42 (100.00)	66 (100.00)
3 -	46 (82.14)	21 (50.00)	37 (56.05)
6 -	32 (57.14)	13 (30.95)	24 (36.36)
9 -	22 (39.29)	7 (16.67)	14 (21.21)
12 -	18 (32.14)	4 (9.52)	6 (9.09)
15 -	6 (10.71)	1 (2.38)	0
18 -	1 (1.79)	0	0

(8) Determination of Use-effectiveness by Pearl's Index

Table 9 shows the average months of use of the contraceptive method during one and a half years, the number of accidental pregnancies, the abortions (which include induced abortions, spontaneous abortions, and ectopic pregnancies) and the number of full-term pregnancies.

According to the Pearl's Index the failure rates calculated per 100 woman-years exposure, ⁽¹²⁾ for IUD users was 3.17, for Pill users 3.63 and for Condom users 5.82. The average months of using the IUD was 12.83, of the Pill was 8.36 and of the Condom was 8.15. As regards to the Pearl's indices of this study, it is envisaged that the IUD was more effective than the Pill, and the Pill was more effective than the Condom in the present situation of contraceptive practice.

In Tietze's 1971 study of the evaluation of IUD use-effectiveness in the USA, there were 2.7 pregnancies per 100 woman-years exposure. ⁽⁸⁾ Diczfalusy et al. reported to the WHO Scientific Group that studies in

the USA showed that the effectiveness of the IUD ranged from 1.5 to 3.0 per 100 women during the first year of use, and in a large-scale study the Pill showed a failure rate of 2.3 pregnancies per 100 women per year (9)

According to the Potts et al. study in 1975 on the estimated "method failure" per 100 woman-years, the pregnancy rate of the IUD was 3.0, of the Pill 1.0 and of the Condom & Diaphragm was 20.0 in developed countries; and of the IUD 3.0, the Pill 2.0 and the Condom & Diaphragm 20.0 in developing countries. (10) Dumm et al. reported that the effectiveness of the Condom was very variable and the pregnancy rates reported in past studies ranged from 3 to 36 per 100 woman-years exposure. (11)

Comparing the Pearl's Indices of this study with those of the previous studies mentioned above, the use-effectiveness of three kinds of contraceptive methods used in Taiwan were within the variation ranges found in the studies in Western countries, except that the Use-effectiveness of the Pill was lower in this study. Moreover the use-effectiveness of the IUD and the Pill in this study were in the inverse order of that of the other countries.

Table 9. Average Months Used and Accidental Pregnancies during One and A Half Years, in Taiwan Area

<u>Methods</u>	<u>Cases</u>	<u>Months used</u>	<u>Average months</u>	<u>Accidental pregnancies</u>	<u>Abortions*</u>	<u>Full-term pregnancies</u>
IUD	1,682	21,580	12.83	56	35	21
Pill	1,697	14,192	8.36	42	18	24
Condom	1,732	14,124	8.15	66	24	42
Total	5,111	49,896	9.76	164	77	87

* Abortions: including induced abortions, spontaneous abortions and ectopic pregnancies

Pearl's Index:

$$\text{Failure rate per HWY**} = \frac{\text{Total accidental pregnancies}}{\text{Total months of exposure***}} \times 1,200$$

** HWY: hundred woman-years exposure

*** Total months of exposure: By convention 10 months is reduced for a full-term pregnancy and 4 months for an abortion. (12)

The failure rates per HWY: IUD = 3.17
Pill = 3.63
Condom = 5.82

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各種避孕方法效果之評價

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謝玉輝

台灣地區有偶婦女初次使用避孕方法效果上研究之結果：樂普、口服藥及保險套避孕方法之繼續使用率；使用十二個月後各為59.81%，34.30%及33.72%，使用十八個月後各為49.64%，26.22%及29.39%。

當使用一年六個月後各避孕方法之平均使用月數；樂普避孕方法者12.83，口服藥避孕方法者8.36個月及保險套避孕方法者8.15個月。

如果以人數計算避孕失敗率；樂普避孕方法之失敗率為3.33%，口服藥避孕方法之失敗率為2.47%及保險套避孕方法之失敗率為3.81%。然而，若以一百婦女之使用避孕方法在十二個月中之失敗懷孕數來計算Pearl's指數；則使用樂普避孕方法者有3.17個之失敗懷孕數，使用口服藥避孕方法者有3.63個之失敗懷孕數及使用保險套方法者有5.82個之失敗懷孕數；這些研究結果顯示著此三種避孕方法在實用上效果之差異并各種避孕方法間之效率順序。

總而言之，為要提高避孕方法使用效果，仍需給於使用者，加強預先之衛生教育及預後之醫療或護理之諮詢追蹤。

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