An Analysis of All Pregnancy Outcomes in a Rural Korean Community

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The purpose of this investigation was to provide an analysis of pregnancy outcomes among all married eligible women in a rural community. The target areas chosen were two townships on Kang Wha island. The study period lasted 24 months from April 1975 through March 1977. This paper presents the results of

1) a retrospective study

2) a prospective pregnancy followup study

3) a life table which provides the probabilities of pregancy termination and estimated probabilities of fetal mortality.

To obtain information on early pregnancies, all married eligible women were interviewed on their LMP at two months intervals. This enabled us to detect more pregnancies and fetal losses in earlier stages than would have been possible through customary reports from hospitals, registers of vital statistics and retrospective studies. All pregnancies reported in this study were identified through regular menstruation followup and subsequent confirmation of prenancy in all cases where there was an amenorrhea for six weeks and more after the LMP using the pregnosticon test or other methods of pregnancy verification. All pregnancy terminations, losses to follow-up and continuing pregnancies at the end of the study period were then evaluated.

Out of 1,106 pregnancies, 31 cases were lost to follow-up, 158 cases were pregnant at the end of the study period and 917 cases ended in deliveries during the study period. The estimates of the probability of normal pregnancy termination (pregnancy termination rates) are based on the number of terminations occurring in pregnancies exposed to termination risk during successive weeks of pregnancy. The pregnancy wastage rate turned out to be 23.6% in the retrospective study, 30.1% in the longitudinal study, and 34.5% in the life table. The estimated induced abortion rates were found to be negatively correlated with gestation period. The highest levels of induced abortion observed were 129 per 1,000 pregnancies under observation during the first 8 weeks of gestation and 147 induced abortions during the 9th-12th week of gestation.

It could be shown by life table methodology that 87.1% of pregnancies continued beyond the 8th week and 72.7% beyond the 12th week. There after no remarkable change occured until the 37th-40th week, at the end of which period however, only 21.4% of the pregnancies continued. The life table technique allowed us to

estimate that the cumulative rate of live births from LMP to the end of pregnancy was 65.5%, induced abortion rate 29.5%, and stillbirth(including spontaneous abortion) rate was 5.0%. Also it appeared that, pregnancies which had continued throughout 8 weeks from LMP can be expected to continue on the average for 6.8 more months.

In recent years there has been an increasing medical concern for fetal life. Growth in the fetal stage is so rapid, progressing geometrically, that even mild disturbances in the health of the pregnant mother could exert fatal influence upon the fetus or produce life long physical or mental disabilities. Most of the research on pregnancy, or pregnancy outcomes or fetal mortality has employed hospital record analysis, cross-sectional study, retrospective study or registers of vital statistics. These above studies are based on data which is so highly selected as to have very limited applicability to the whole community, Wishik said in 1961.

To know how many pregnancies occur in a whole community and at what rate and which pattern the pregnancies terminate in each gestational period, longitudinal study including early detection of all pregnancies and follow-up of all registered pregnancies to the time of termination is required.
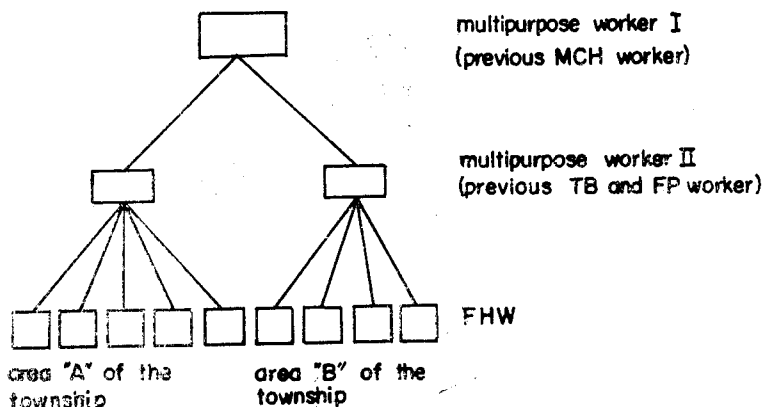
In the Kauai Pregnancy study(French *et al.*, 1958), information about early pregnancies was provided by the reports of pregnancy from the women themselves as soon as they suspected they were pregnant. This reporting system enables one to know about more pregnancies and more early fetal losses than is possible through customary reports from hospitals. Of course fetal losses that occurde before mothers suspected that they were pregnant would not have been reported.

A high detection rate of early pregnancies is hard to obtain from retrospective study because of difficulties in memory, omissions from registration and difficulties in early detection of pregnancy.

STUDY SETTING AND METHOD

In the Kang Wha Community Health Project area, health services are being delivered to the village level through the utilization of family health workers(FHW). The regionalized health manpower pyramid in a township looks as follows:

multipurpose worker I
(previous MCH worker)

multipurpose worker II
(previous TB and FP worker)

FHW

area "A" of the township

area "B" of the township

FHW ROLE AND FUNCTION

The FHWs carry out the basic program relating to maternity care, including case finding, preventive care, referral and follow-up, health education, and data collection. Their service package includes paying home visits to every married eligible women once every two month. The FHW refers the women whose menstruation does not appear for 6 weeks after last menstrual period to an MCH worker at the health subcenter, who confirms the pregnancy through pregnancy testing. The FHW also provides routine maternity care through weighing, urine examination, checking for edema, history, with referral to midwife (MCH worker) of problems and of normal cases at precisely defined stages of pregnancy.

The study area covers two townships in Kang Wha Island with a population of about 12,900, situated some 52 km northwest of Seoul. Kang Wha Island is a korean rural farming area and produces very high quality ginseng, a root vegetable claimed to have medicinal properties.

Each township is served by a health sub-center staffed by one physician, one public health nurse, one midwife and two multipurpose health workers, and 10 family health workers.

FOLLOW UP OF ELIGIBLE MARRIED WOMEN

The Target of the prospective study was 1106 pregnancies which were experienced among all eligible married women in the study area during the period April 1975-March 1977. The retrospective study examined the previous obstetric history of the women who experienced pregnancy during this period.

From these 1106 pregnancies, the 761 occuring in women who had experienced Last Menstrual Period after April 1975 were analysed using life table technique.
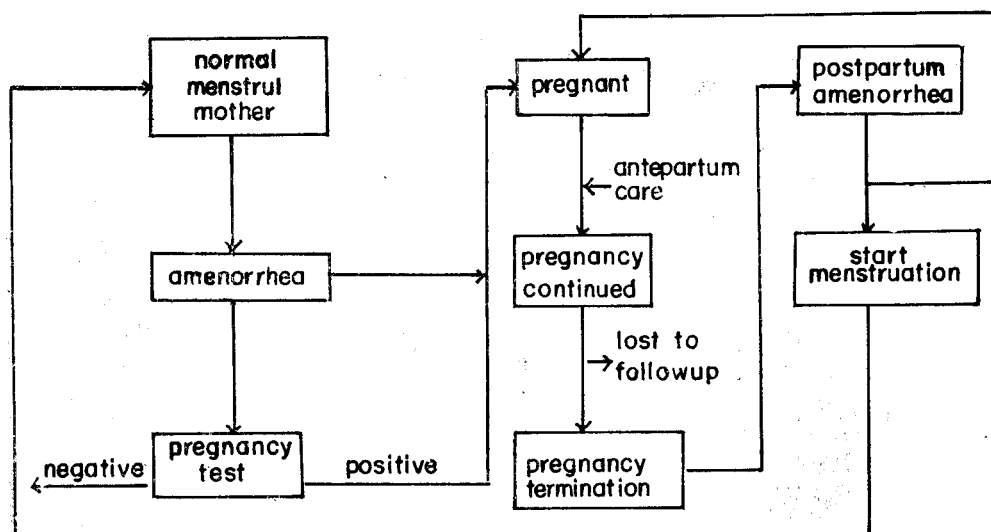
Table 1. Frequency of pregnancy, livebirth, stillbirth, spontaneous abortion and induced abortion experienced by age of mother(retrospective study)

Age of mother	No. of women	pregnancy			livebirth		stillbirth		spontaneous abortion		induced abortion	
		No.	mean	S.D.	No.	mean	No.	mean	No.	mean	No.	mean
Under 19	21	27	1.29	0.56	1	.048	1	.048	0	0	4	.19
20-24	241	384	1.59	0.88	101	.423	18	.075	0	0	24	.10
25-29	422	1044	2.47	1.29	456	1.078	68	.161	7	.02	91	.22
30-34	243	1085	4.47	2.08	631	2.560	60	.247	10	.04	141	.58
35-39	140	851	6.08	2.01	567	2.878	28	.200	2	.01	114	.83
40 & more	39	291	7.47	1.67	212	5.436	8	.205	0	0	32	.82
Total	1106	3682	3.33	2.28	1968	1.750	183	.166	19	.17	406	.37
		$F=267.62$ $P<0.001$			$F=408.39$ $P<0.001$		$F=3.16$ $P<0.01$		$F=2.47$ $P<0.05$		$F=22.00$ $P<0.001$	

RESULTS

1) Characteristics of women

Out of the 1,106 pregnancies 38.2% occured in women between the ages of 25 and 29 years, 22.0% in the 30-34 age group and 12.7% in the 35-39 year group. Surprisingly, 6.5% of women had experienced 8 or more pregnancies while 22.9% were primigravida. Previous pregnancy losses were reported in 32.6% of the women.

2) Pregnancy outcomes according to retrospective study

The women who experienced pregnancy during the study period reported a total of 2576 previous pregnancies, which terminated in 1,968 livebirths, 406 induced abortions, 19 stillbirths and 183 spontaneous abortions.

The average rate of pregnancy was 3.33, rate of livebirth was 1.75, rate of induced abortion was 0.37, rate of spontaneous abortion was 0.17 and rate of stillbirth was 0.17. Among the 20-24 age group, 70.6% of pregnancies terminated with a live birth and 16.8% were terminated by an induced abortion.

(Table 2). As can be seen from Table 1, the higher the age of the mother, the higher was the live birth termination rate. The induced abortion rate was highest in the 20-24 age group with 16.8% and this gradually decreased as the age of the mother increased. The majority of pregnancies terminated in a livebirth, but 15.8% of pregnancies were terminated by induced abortion and 7.8% were from stillbirth or spontaneous abortion.

3) Pregnancy outcomes according to prospective study

Among all 1106 pregnancies, 31 pregnancies were lost to followup and 158 pregnancies were still unterminated by the end of March 1977, the cutoff date of the present study. Out of 917 pregnancy outcomes, 641(69.9%) pregnancies terminated in a livebirth, 235 (25.6%) in induced abortion and 41(4.5%) in stillbirth or spontanous abortion(Table 3).

The live birth termination rate was highest in 25~29 age group being 80.5%. The induced abortion rate increased as the age of the mother increased. Most of the pregnancies of primi-gravida women terminated in livebirth, and only 3.9% of first pregnancies were

Table 2. **Pregnancy outcomes by age of mother(retrospective study)**

Age of mother	Total no. of pregnancy terminations	Livebirths		Stillbirths and spontaneous abortions		Induced abortions	
		No.	%	No.	%	No.	%
Under 19	6	1	16.7	1	16.7	4	66.7
20~24	143	101	70.6	18	12.6	24	16.8
25~29	622	456	73.1	75	12.1	91	14.6
30~34	842	631	74.9	70	8.3	141	16.7
35~39	711	567	79.7	30	4.2	114	16.0
40 and over	252	212	84.1	8	3.2	32	12.7
Total	2,576	1,968	76.4	202	7.8	406	15.8

Table 3. **Pregnancy outcomes by age of mother(longitudinal study)**

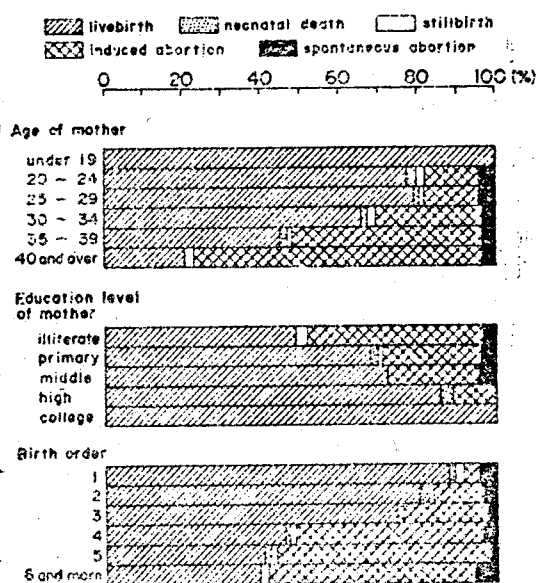| Age of mother	Total no. of pregnancy	Livebirths		Stillbirth and spontaneous abortions		Induced abortions	
		No.	%	No.	%	No	%
Under 19	13	13	100.0	0	0	0	0
20~24	186	148	79.6	11	5.9	27	14.5
25~29	28	264	80.5	13	4.0	51	15.5
30~34	218	146	67.0	10	4.6	62	28.4
35~39	133	62	46.6	5	3.8	66	49.6
40 and over	39	8	20.5	2	5.1	29	74.4
Total	917	641	69.9	41	4.5	235	25.6

Fig. 1. Outcome of pregnancy by age, educational level of mother and birth order.

terminated by induced abortion. Livebirth termination rate gradually decreased as the number of previous pregnancies increased (Fig. 1).

Livebirth termination rate gradually decreased as the number of parity increased, but, induced abortion termination rate increased conversely(Table 4).

4) Fetal life table

The classification of terminal outcome reduces to four possibilities; livebirth, stillbirth(including spontaneous abortion), induced abortion and continuing pregnancy. Length is measured in terms of ordinal gestation weeks. The first segment is eight weeks or less, and other segments are composed of four weeks each. Each segment may be as short as the first day of that segment

Table 4. Pregnancy outcomes by age and educational level of mother, pregnancy order, birth order and number of previous induced abortions and pregnancy losses

Variables		No. of mother	Livebirth		Neonatal death		Stillbirth		Spontaneous abortion		Induced abortion		X^2
			row %	col. %	row %	col. %	row %	col. %	row %	col. %	row %	col. %	
Age	Under 19	13	100.0	2.1	0	0	0	0	0	0	0	0	131.40
	20~24	186	77.4	22.9	2.2	30.8	2.2	28.6	3.8	25.9	14.5	11.5	
	25~29	328	79.3	41.4	1.2	30.8	0.9	21.4	3.0	37.0	15.5	21.7	
	30~34	218	65.6	22.8	1.4	23.1	2.3	35.7	2.3	18.5	28.4	26.4	$p<0.001$
	35~39	133	45.1	9.6	1.5	15.4	0.8	7.1	3.0	14.8	49.6	28.1	
	40 and over	39	20.5	1.3	0	0	2.6	7.1	2.6	3.7	74.4	12.3	
Educational level	Illiterate	35	48.6	2.7	0	0	2.9	7.1	2.9	3.7	45.7	6.8	
	primary	726	67.9	78.5	1.7	92.3	1.8	92.9	2.9	77.8	25.8	79.9	21.582
	middle	117	72.6	13.5	0	0	0	0	4.3	18.5	23.1	11.5	
	high	35	85.7	4.8	2.9	7.7	0	0	0	0	11.4	1.7	$p<0.5$
	college	3	100.0	0.5	0	0	0	0	0	0	0	0	
Pregnancy order	1	181	90.6	26.1	1.7	23.1	1.1	14.3	2.8	18.5	3.9	3.0	
	2	196	77.6	24.2	2.0	30.8	1.5	21.4	4.6	33.3	14.3	11.9	220.585
	3	171	80.7	22.0	1.8	23.1	1.2	14.3	1.8	11.1	14.6	10.6	
	4	111	62.2	11.0	1.8	15.4	1.8	14.3	3.6	14.8	30.6	14.5	$p<0.001$
	5	82	48.8	6.4	1.2	7.7	2.4	14.3	0	0	47.6	16.6	
	6	54	48.1	4.1	0	0	1.9	7.1	3.7	7.4	46.3	10.6	
	7	49	38.8	3.0	0	0	4.1	14.3	0	0	57.1	11.9	
	8	37	27.0	1.6	0	0	0	0	10.8	14.8	62.2	9.8	
	9	18	27.8	0.8	0	0	0	0	0	0	72.2	5.5	
	10 and over	18	27.8	0.8	0	0	0	0	0	0	72.2	5.5	
birth order	1	217	87.6	30.3	1.8	30.8	2.3	35.7	4.1	33.3	4.1	3.8	
	2	211	80.6	27.1	2.4	38.5	0.9	14.3	2.4	18.5	13.7	12.3	188.690
	3	186	74.2	22.0	1.1	15.4	0	0	2.2	14.8	22.6	17.9	
	4	132	46.2	9.7	0.8	7.7	2.3	21.4	3.0	14.8	47.7	26.8	$p<0.001$
	5	93	40.9	6.1	1.1	7.7	2.2	14.3	1.1	3.7	54.8	21.7	
	6 and over	78	39.7	4.9	0	0	2.6	14.3	5.1	14.8	52.6	17.4	
Frequency of Previous induced abortion	0	695	77.7	86.0	1.7	92.3	1.3	64.3	3.3	85.2	16.0	47.2	
	1	127	47.2	9.6	0	0	3.9	35.7	2.4	11.1	46.5	25.1	168.218
	2	51	27.5	2.2	2.0	7.7	0	0	2.0	3.7	68.6	14.9	
	3	23	39.1	1.4	0	0	0	0	0	0	60.9	6.0	$p<0.001$
	4-6	15	33.3	0.8	0	0	0	0	0	0	66.7	4.3	
	7-9	6	0	0	0	0	0	0	0	0	100.0	2.6	
Frequency of previous pregnancy wastage	0	607	77.4	74.8	1.6	76.9	0.8	35.7	3.1	70.4	17.0	43.8	
	1	180	60.0	17.2	1.1	15.4	2.8	35.7	3.3	22.2	32.8	25.1	116.190
	2	75	40.0	4.8	1.3	7.7	5.3	28.6	2.7	7.4	50.7	16.2	
	3	22	22.7	0.8	0	0	0	0	0	0	77.3	7.2	$p<0.001$
	4-6	24	50.0	1.9	0	0	0	0	0	0	50.0	5.1	
	7 and over	9	33.3	0.5	0	0	0	0	0	0	66.7	2.6	

Table 5. **Distribution of pregnancy outcomes by each gestation week**

gestation week	livebirth	induced abortion	stillbirth and spontaneous abortion	pregnancy termination	loss to follow up	continuing pregnancy	with drawal	all segments
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$X \sim X+1$	bx	ix	dx	tx	fx	cx	Wx	$tx+Wx$
0~8	0	98	0	98	0	2	2	100
9~12	0	96	12	108	2	10	12	120
13~16	0	18	6	24	2	18	20	44
17~20	0	5	6	11	2	25	27	38
21~24	0	2	2	4	7	27	34	38
25~28	0	1	1	2	6	35	41	43
29~32	1	1	1	3	2	11	13	16
33~36	13	0	2	15	0	20	20	35
37~40	212	0	2	214	2	10	12	226
41 and over	100	0	1	101	0	0	0	101
Total	326	221	33	580	23	158	181	761

and as long as the first weeks of that segment plus four or eight weeks, so is assumed to average X weeks plus two or four weeks.

A convenient notation is

Nx; number of pregnancies continuing at the beginning of the interval

X; interval between Xth segment from the first day of last menstrual period to $(X+1)$th segment

bx; number of livebirths during interval

dx; number of stillbirths (including spontaneous abortions) during interval

ix; number of induced abortions during interval

fx; number of pregnancies lost to follow-up during interval

cx; number of continuing pregnancies last observed at the cut-off date of the study

tx; total observed pregnancy terminations during interval

Wx; total pregnancies withdrawing from observation during interval cx and fx are combined into Wx.

$$Nx = Nx+1 + tx + Wx$$

The last column in Table 5, headed $tx + Wx$, gives the numbers of all segments of specified lengths within the interval.

In Table 6, $Nx^* = Nx - \frac{1}{2} Wx$

It is necessary to compute pregnancy terminations in terms of monthly probability.

Each monthly rate is a conditional probability—the probability of terminating the pregnancy during the next interval if continuing the pregnancy up to the start of the month.

The monthly probility of livebirth, for example, is estimated by bx/Nx^*, the reasoning being that Wx women withdraw from observation during the interval and therefore are individually observed on an average of only one half month. Had these Wx women remained under observation a full interval, they might have contributed $\frac{1}{2} Wx \times bx$ additional livebirths. The conditional probability of continuing pregnancy during the

Table 6. Monthly probability of pregnancy terminations by gestation week

Gestation week	No. of pregnancy at begining of period	adjusted No. of pregnancies exposed to risk of termination during period	monthly probability of pregnancy termination			
			Live births	stillbirths and spontaneous abortions	induced abortions	pregnancy termination
(1)	(2)	(3)	(4)	(5)	(6)	(7)
$X \sim X+1$	Nx	Nx^*	$\hat{r}x$	$\hat{d}x$	$\hat{S}x$	$\hat{m}x$
0~8	761	760.0	.00000	.00000	.12895	.12895
9~12	561	655.0	.00000	.01832	.14656	.15488
13~16	541	531.0	.00000	.01130	.03390	.04520
17~20	497	465.5	.00000	.01289	.01074	.02363
21~24	459	442.0	.00000	.00452	.00452	.00904
25~28	421	400.5	.00000	.00250	.00250	.00500
29~32	378	371.5	.00269	.00269	.00269	.00807
33~36	362	352.0	.03693	.00568	.00000	.04261
37~40	327	321.0	.66044	.00623	.00000	.66667
41 and over	101	101.0	.99010	.00990	.00000	1.00000

Table 7. Cumulative probability of pregnancy termination and corresponding standard error

gestation week	monthly probability of continuing pregnancy	standard error	from LMP to end of period		termination proportion during $(X, X+1)$	standard error
			Cumulative probability of continuing pregnancy	Cumulative probability of pregnancy termination		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
$X \sim x+1$	$\hat{P}_x$	$S\hat{P}_x$	$\hat{P}_{1x}$	$\hat{M}_{1x}$	D_x	$S\hat{P}_{1x}$
0~8	.87105	.0122	.87105	.12895	.12895	.0122
9~12	.83512	.0145	.72743	.27257	.14362	.0162
13~16	.95480	.0090	.69455	.30545	.03288	.0168
17~20	.97637	.0070	.67814	.32186	.01641	.0171
21~24	.99096	.0045	.67201	.32799	.00613	.0172
25~28	.99500	.0035	.66865	.33135	.00336	.0174
29~32	.99193	.0046	.66325	.33675	.00540	.0176
33~36	.95739	.0108	.63499	.36501	.02826	.0183
37~40	.33333	.0263	.21166	.78834	.42333	.0178
41 and over	.00000	.0000	.00000	1.00000	.21166	.0000

monthly interval, $(X \sim X+1)$, if continuing it up to time X, is

$$\hat{P}_x = 1 - \hat{m}x$$

The cumulative probability of continuing pregnancy from the first day of the last menstrual period to the end of period was gained by the formula

$$\hat{P}_{1x} = \hat{P}_1 \cdot \hat{P}_2 \cdot \hat{P}_3 \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \hat{P}_x$$

Multiplying together the initial 9 interval probabilities of continuous pregnancy yields the probability, $\hat{P}_{1x}(10)$ of continuous pregnancy through the 40 weeks of gestation.

Table 8. Estimated rate of pregnancy outcome by gestation weeks

(1)	(2)	monthly probability of pregnancy termination				cumulative rate from LMP				Rate from gestational age x to pregnancy termination	
		monthly rate during period									
gestation week	estimated no. of pregnancy exposed during period	livebirth	stillbirth and spontaneous abortion	induced abortion	continuing pregnancy	live birth	stillbirth and spontaneous abortion	induced abortion	continuing pregnancy	stillbirth and spontaneous abortion	induced abortion
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$X \sim X+1$	Nx^*	$\hat{r}x$	$\hat{q}x$	$\hat{S}x$	$\hat{P}x$	$\hat{r}_{1x}$	$\hat{q}_{1x}$	$\hat{S}_{1x}$	$\hat{P}_{1x}$	$\hat{q}_{10x}$	$\hat{S}_{10x}$
0~8	760.0	.00000	.00000	.12895	.87105	.00000	.00000	.12895	.87105	.04951	.29528
9~12	655.0	.00000	.01832	.14656	.83512	.00000	.01596	.25661	.72743	.05687	.19094
13~16	531.0	.00000	.01130	.03390	.95480	.00000	.02418	.28127	.69455	.04617	.05314
17~20	465.5	.00000	.01289	.01074	.97637	.00000	.03313	.28873	.67814	.03645	.02016
21~24	442.0	.00000	.00452	.00452	.99096	.00000	.03620	.29180	.67201	.02413	.00965
25~28	400.5	.00000	.00250	.00250	.99500	.00000	.03788	.29348	.66865	.01980	.00518
29~32	371.5	.00269	.00269	.00269	.99193	.00180	.03968	.29528	.66325	.01727	.00269
33~36	352.0	.03693	.00568	.00000	.95739	.02630	.04345	.29528	.63499	.01480	.00000
37~40	321.0	.66044	.00623	.00000	.33333	.44567	.04741	.29528	.21166	.00953	.00000
41 and over	101.0	.99010	.00990	.00000	.00000	.65523	.04951	.29528	.00000	.00990	.00000

Table 9. **Differences in pregnancy outcome according to retrospective and prospective study, with estimates of outcomes by life table approach**

	Livebirth	Pregnancy wastage	Total
Retrospective study	76.4%	23.6%	100%
Prospective study	69.9%	30.1%	100%
Estimated probability	65.5%	34.5%	100%
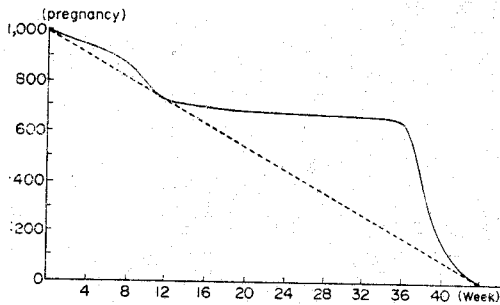
Fig. 2. proportion of continuing pregnancies at each gestation week per 1,000 pregnancies.
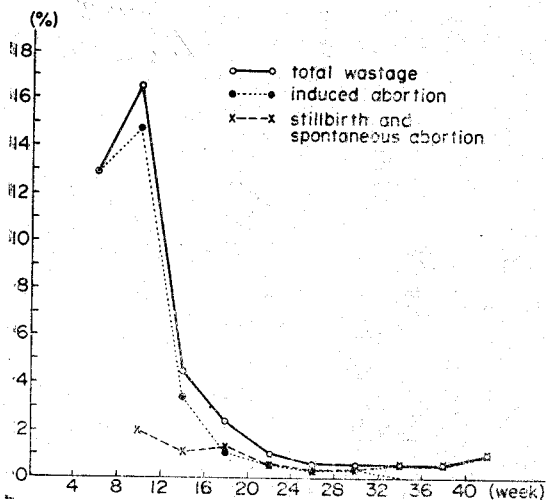
Fig. 3. Estimated rate of pregnancy wastage at each gestation week.

It can be shown by this life table approach that 87.1% of pregnancies continued beyond the 8th week and 72.7% beyond the 12th week. Thereafter no remarkable change occurred unil the 37th~40th week, at the end of which period, however, only 21.4% of the pregnancies continued(Fig. 2).

Table 8 covers monthly and cumulative probability of continuing pregnancy and cumulative probability of pregnancy termination with corresponding standard error(see also Fig. 3).

Using the life table technique it was estimated that the cumulative rate of livebirth from the first day of last menstrual period to the end of pregnancy was 65.5%, induced abortion rate 29.5% and stillbirth (including spontaneous abortion) rate was 5.0%.

Subsequently, pregnancies which had continued throughout 8 weeks from the last menstrual period can be expected to continue on the average for 6.8 more months. Table 9 compares the live birth and pregnancy wastage rates determined by the retrospective, prospective and life table approaches.

DISCUSSION

Married eligible women were diagnosed as pregnant in any of the following cases,

1) positive pregnosticon test

2) clinically confirmed case

3) pregnancy confirmed through visual observation or interview at the time of home visiting

4) pregnancies confirmed at other clinics in Kang Wha Island

5) pregnancies confirmed through the termination of pregnancy.

The biggest barriers to follow-up of the menstrual periods of all married eligible women were not only technical problems of interview but also socio-cultural aspects. An accurate history of the last menstrual period is the most important problem. This must always be gathered in a retrospective way. Some women are more impressed by the date

Table 10. Fetal life table

Gestation week	Estimated probability of termination per 1000 pregnancies from X to X+1			Continuing pregnancy at period X	Per 1000 pregnancies from LMP, From X to X+1			Week of follow up on cohort		Complete expectation month of pregnancy
	Live birth	Stillbirth and spontaneous abortion	Induced abortion		Live birth	Stillbirth and spontaneous abortion	Induced abortion	Period X~X+1	From X to pregnancy termination	
$X \sim X+1$	r_x	q_x	S_x	l_x	b_x	d_x	i_x	L_x	T_x	e°_x
0~8	0.00	0.00	128.95	1000.00	0.00	0.00	128.95	935.525	6321.730	6.757
9~12	0.00	18.32	146.56	871.05	0.00	15.96	127.66	799.240	5366.205	6.739
13~16	0.00	11.30	33.90	727.43	0.00	8.22	24.66	710.990	4586.965	6.452
17~20	0.00	12.89	10.74	694.55	0.00	8.95	7.46	686.345	3875.975	5.647
21~24	0.00	4.52	4.52	678.14	0.00	3.07	3.07	675.075	3189.630	4.725
25~28	0.00	2.50	2.50	672.01	0.00	1.68	1.68	670.330	2514.555	3.751
29~32	2.69	2.69	2.69	668.65	1.80	1.80	1.80	665.950	1844.225	2.769
33~36	36.93	5.68	0.00	663.25	24.50	3.77	0.00	649.120	1178.275	1.815
37~40	660.44	6.23	0.00	634.99	419.37	3.96	0.00	423.325	529.155	1.250
41 and over	990.10	9.90	0.00	211.66	209.66	2.10	0.00	105.830	105.830	1.000

of the first missed period than they are by the date of the last regular menstrual period. With repeated interviewing we can increase the reliability of reporting. On the other hand, listing the reported dates of the first day of the last menstrual period, many women show digit preference; they tended to report the days 1, 10, 15, 20, 28 and 30 more frequently.

Even if they reported the date of the last menstrual period accurately, there can be biological variations. The period from the first day of the last menstrual period to the date of conception may vary individually (Mellin, 1962). Fetal life begins at conception. Since the ability to determine the date of conception is crude, it is valuable to establish the fetal life table rate for a total community population and to utilize this technique to evaluate the monthly probability of early fetal losses and cumulative pregnancy wastage rate from the time of conception to each month after that.

In the Kauai Pregnancy Study(KPS), the information about early pregnancies, from 4 week's gestation on was reported from the women themselves as soon as they suspected they were pregnant. But the present study enabled us to detect more early pregnancies and early fetal losses than is possible through early self-reporting of pregnancies as in the Kauai Pregnancy Study. Family Health Workers were very convenient mediatiors and performed successful home visiting because they were local married housewives in the same age group with the mothers.

All pregnancies of married eligible women in the period April 1975- March 1977 were analysed. To identify pregnancies at the starting point of the study period, the last mensturation dates before the study starting

point had to be checked. Home visiting to mothers had been started from September 1974 to establish the mensturation dates from July 1974.

Application of life table technique for analysis of pregnancy outcomes enables us to know monthly probabilities of pregnancy termination at each gestation periods and to include all the experiences of continued pregnancy and subjects lost to follow up.

The observational status at the cutoff date, admits of three categories. Some pregnancies are known to have terminated on or before the cutoff date; some are known to have been continuing at the cutoff date; and for some pregnancies the status at the cutoff date is unknown when the analysis was undertaken. We shall use the term "complete observation" for pregnancies whose status at the cutoff date is known, and "incomplete observation" for those whose status at the cutoff date is unknown. In this longitudinal study women are scheduled to meet the Family Health Workers once a month. Thus, at the cutoff date, and for some weeks thereafter, the status at the cutoff date for those who were continuing pregnancies at an earlier date is not known. These pregnancies have incomplete observations. In general, the longer the interval between scheduled interviews, the greater is the length of the unobserved experience, and the greater is the proportion of continuing pregnancies where observations are incomplete at the cutoff date. Potter and Tietze do not handle incomplete observations in the same way. When the incomplete observations overdue by less than 3 months and at least one contact, duration from insertion to cutoff date is an incomplete observation according to Tietze's method while duration from insertion to

last contact is an incomplete observation according to Potter's method(Jain and Sivin, 1977). In this study, Potter's method was applied to calculate incomplete observation.

The basic assumptions underlying life table analysis are:

(1) That the studied population is homogeneous, in that there are only trivial differences between cohorts of pregnant mothers;

(2) that the great bulk of the observations are carried through to the"study" or "cutoff" date, so that incomplete observations occur only to a limited extent; and (3) that there are no essential differences between those individuals with incomplete observations, including those lost to follow-up, and those available for study, that is, the experience of those with incomplete observations during their observed segment is basically similar to the experience of those with complete observations during the corresponding segment.

Pregnant women first reported in an interval from X to $X+1$ are assumed to have been under observation one half of the interval on the average. A similar assumption is made for those who moved out during the study period.

The differences between the fetal death ratios established by the prospective, retrospective study and estimated probabilities of loss are illustrated in Table 9. The fetal loss rates from the retrospective studies were the number of fetal losses during each month of pregnancy related to all births. But life table analysis relates the number of fetal losses to "exposed to risk" group by removing those terminating earlier. Life table probabilities of loss are based on pregnancies under observation during each interval of study.

In Kauai Pregnancy Study, of the pregnancies reaching 4 week's gestation an estimated 237 per 1000 ended in fetal loss, with the monthly rates of loss forming a decreasing curve from a high of 108 per 1000 women under observation in the 4 to 7 weeks period, 70 for 8 to 11 weeks, and 45 for 12 to 15 weeks to a low of 3 in the period 32 to 35 weeks of gestation(Bierman *et al*, 1965).

Potter reported that the monthly rates of loss were 11% among the less than 30 age group and 16% among 30 years old or more age group. In the investigation reported here, the rate of fetal loss determined by prospective study was 30.1% throughout the whole gestation period. The cumulative monthly probability of pregnancy wastage from the last menstrual period to the end of the gestation period was 34.5% in prospective study, as compared with 23.6% of pregnancy wastage rate according to retrospective study.

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