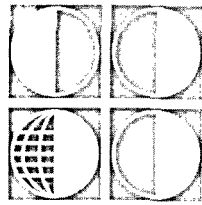


# The Pattern of Reproductive Life in a Berber Population of Morocco



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**ABSTRACT:** Reproductive patterns were studied from data collected in 1,450 Berber households in the province of Marrakesh, Morocco in 1984. Women aged 45–49 years had a mean of 8.9 pregnancies to achieve 5.7 living children. Social influences on fertility rates show the importance of tradition, particularly through time-dependent variables such as age at marriage, waiting time to first birth, interbirth intervals, and duration of breastfeeding. Birth control does not appear to affect the tempo of fertility; rather, its main use is to bring the reproductive period to a close. The comparison of two subsamples of women separated by a 25-year interval indicates an actual acceleration of the tempo of fertility by the reduction of waiting time to first birth and of interbirth intervals. The supposed ongoing process of demographic transition is not clearly observed in this population.

Nagi (1983), analyzing the numerous studies performed in Muslim countries on fertility trends and their effects upon demography and social structures, questioned whether there was any evidence of a demographic transition in these societies, since fertility rates remain high despite economic development and a drop in mortality rates. Therefore, Nagi proposed a separate concept of family—its place and significance in social life as well as its size—for Muslim countries in comparison with Western societies.

Morocco, like other Muslim nations of North Africa, has undergone economic and social changes since mid-century, which began in the main cities and their surroundings and gradually involved more remote areas. Paralleling this evolution, the crude birth rate dropped from 49 per thousand in 1965 to 35.3 per thousand in 1987 (U.N., 1990), an intermediary position compared with Algeria (50 and 47.2 per

thousand, respectively), and Tunisia (46 and 28.2 per thousand). In spite of a drop of some 28 per cent in 23 years, Moroccan fertility remains high. The mean data available for urban and rural areas in the province of Marrakesh still average 6.5 and 8.3 full-term births per woman, respectively, at the end of reproductive life (Crognier and Zarouf, 1987; Crognier, 1989).

The present work analyzes data of reproductive life collected in the southern part of the province of Marrakesh from a Berber population ranging from the piedmont of the Atlas Mountains to an altitude of about 2,500 feet. Though predominantly rural, this sample also includes the population of a small town at a primary level of urbanization.

## MATERIALS AND METHODS

General information about socio-economic conditions, cultural behav-

ior, and medical assistance was collected in 1,450 households of the "circle" of Amizmiz, an administrative subdivision of the province of Marrakesh. At the same time the reproductive history of each woman in the household was traced, including age at menarche, age at first marriage, age at menopause, waiting time to first birth, successive pregnancies with their outcomes, sex of the children, conditions of parturition, durations of lactation, and the children's vaccinations, present ages or age at death and the cause of death, and contraceptive practice during interbirth intervals.

The investigations were conducted during two successive field trips. The first, in October 1984, was part of a general fertility survey in Marrakesh. One household out of ten in areas accessible to district nurses was sampled, resulting in 843 records (618 in villages and 225 in the town of Amizmiz). This sampling covered the lowlands of the area up to an altitude of 1,500 feet. The second field trip aimed at gathering information about communities settled in mountain valleys far more difficult to access. It included nine villages scattered in the valley of Azgour (at an altitude of from 2,200 to 2,500 feet) which were exhaustively investigated during July of 1986 and of 1987 (Naber, 1989), resulting in 607 records. The overall sampling should provide a good record of living conditions and reproductive behaviors in this homogenous Berber-speaking area.

Since people in this area do not record reproductive events and birth registers are imprecise, the data are an approximation of ages or spans of time (in years or months). The resulting information, though well checked, is not

suitable for sophisticated analysis, in particular for model fitting.

## RESULTS

### MAIN REPRODUCTIVE CHARACTERISTICS

Table 1 shows the cumulated means of total births, of spontaneous abortions, of stillbirths, of live births, and of children dead and alive at the time of investigation in each female age class.

The discrepancy between fertility scores of women aged 45–49 years and those of the last age class may illustrate differential reproductive success related to the improvement of living conditions. However, it is probably a reflection of memory lapses resulting from the extensive number of reproductive events.

The high level of fertility is combined with a high rate of infant and juvenile mortality. Women aged 45–49 years have a mean of 8.9 pregnancies to achieve a mean of 5.7 living children. This profile seems close to "natural fertility" (Henry, 1961), i.e., with no contraception or induced abortion, in spite of the intense governmental policy of family planning developed from 1968–72 onward. Although 40 per cent of women in the sample declare that they are using or have used contraception, this record is a poor one if we consider that since the 70's contraceptives (the pill) have been freely distributed. The proportion of contraceptors also varies with age, ranging from 34 per cent in the women's age class 15–19 years up to 60 per cent in the age range 25–45, when women have already experienced 3 to 9 pregnancies. In its present use, contracep-

TABLE 1

## MAIN CUMULATED CHARACTERISTICS OF REPRODUCTIVE LIFE: MEANS AND STANDARD DEVIATIONS BY AGE OF WOMEN

Age	Total No. Births	No. Live Births	No. Stillbirths	No. Spont. Abort.	No. Child. Alive	No. Child. Dead
15-19.....	0.91 (0.80)	0.85 (0.75)	0.06 (0.25)	0.11 (0.32)	0.71 (0.62)	0.23 (0.48)
20-24.....	1.95 (1.22)	1.79 (1.16)	0.14 (0.42)	0.10 (0.47)	1.41 (1.03)	0.55 (0.81)
25-29.....	3.46 (1.91)	3.26 (1.81)	0.20 (0.56)	0.19 (0.59)	2.52 (1.48)	0.98 (1.20)
30-34.....	5.11 (2.11)	4.88 (2.06)	0.22 (0.61)	0.27 (0.62)	3.63 (1.55)	1.51 (1.52)
35-39.....	6.54 (2.63)	6.20 (2.62)	0.31 (0.79)	0.36 (0.79)	4.59 (2.09)	2.0 (1.71)
40-44.....	7.54 (2.88)	7.15 (2.82)	0.36 (1.02)	0.39 (0.81)	5.13 (2.22)	2.45 (2.27)
45-49.....	8.40 (2.64)	8.13 (2.66)	0.27 (0.84)	0.38 (0.76)	5.67 (2.35)	2.73 (2.10)
> 50.....	7.30 (3.55)	6.82 (3.50)	0.46 (0.97)	0.52 (1.03)	4.55 (2.62)	2.87 (2.13)

tion therefore mainly regulates the late reproductive period.

#### BIOLOGICAL AND SOCIAL DETERMINANTS OF FERTILITY

In most societies, the effective onset of reproductive life is subsequent to a social event—marriage. Age at marriage is therefore a major determinant of fertility. When identified with the function of procreation, it entails that the waiting time to first birth only expresses the latency resulting from the addition of the time to fecundation and the duration of pregnancy. In many traditional societies, moreover, the age at marriage is closely related to physical development, so that age at menarche and age at marriage are highly correlated.

Besides the age at marriage, the type of union affects reproductive life.

In particular, polygyny affects reproduction for a variety of reasons, including a different social selection of mates, a higher frequency of sterility, a higher lability of union, etc. (White, 1982; Ahmed, 1986; Bean and Mineau, 1986; Pison, 1986; Pison, 1986; Adewuyi, 1988; Johnson and Elmi, 1989). Most observations indicate a negative association of polygyny with female cumulative fertility, at the group level.

Polygyny is practiced in Morocco, and polygynous matings are 11.5 per cent of the present material. They will be considered separately in the following analysis.

The mean recollected age at menarche (14.5 years) is still late in this population (Table 2) although coherent with a previous estimate by the status-quo method for the city of Marrakesh (14.10 years, Loukid, 1989).

TABLE 2

MEANS AND STANDARD DEVIATIONS OF WOMEN'S AGE, AGE AT MENARCHE, AGE AT MARRIAGE, WAITING TIME TO FIRST BIRTH, AGE AT FIRST BIRTH, AND REPRODUCTIVE SPAN

Married Women	Age	Age at Menarche	Age at Marriage	Wait. Time 1st Birth (Months)	Age at 1st Birth (Years)	Length of Repr. Span (Years)
Total..... ( <i>n</i> = 1,450)	37.3 (13.1)	14.5 (1.3)	17.8 (2.9)	18.7 (16.5)	19.3 (3.1)	19.3 (6.8)
Monogamous..... ( <i>n</i> = 1,273)	36.7 (12.8)	14.5 (1.3)	17.1 (2.7)	18.4 (16.1)	19.2 (2.9)	19.5 (6.2)
Polygynous..... ( <i>n</i> = 146)	42.5 (13.8)	14.7 (1.4)	18.8 (4.3)	21.0 (19.0)	20.5 (4.5)	17.6 (7.4)

\*Reproductive span = interval between age at marriage and age at last birth computed from a subsample of women aged more than 45 years. Total sample *n* = 398; monogamous *n* = 330; polygynous *n* = 58).

The differences in age groups, in methods of evaluation, and the frequent discrepancies between rural and urban environments would account for the variation observed.

Still, considering the total sample, there is a significant ( $r = 0.23$ ,  $P < 0.0001$ ) but loose correlation between age at menarche and age at marriage, inconsistent with the hypothesis that marriage could be directed by physical maturation as found elsewhere (e.g.,  $r = 0.97$  in Kenya, Bogerhoff Mulder, 1989). The length of the waiting time to first birth is independent of both age at menarche ( $r = 0.02$ ) and age at marriage ( $r = -0.05$ ), thus discrediting the hypothesis of a catch-up of fertility, when either menarche or marriage occur late (as observed in Malaysia by Hirschman and Rindfuss, 1980). There is consequently a high correlation between age at marriage and age at first birth ( $r = 0.90$ ,  $P < 0.0001$ ).

Observed from a subsample of elder women, supposed to have completed fertility (i.e., aged more than 45 years), the mean reproductive span estimated as the interval of time between marriage and last birth is important. It is in the range of those found in devel-

oping countries, though greater than observed in a comparable country such as rural Egypt by Horne (1989) ( $\bar{x} = 15$  to 18 years). However, Horne estimates the span as the interval between the first and the last birth and limits the sample to women aged 45–49 years having borne at least two children. The application of her estimate of the reproductive span to our sample gives similar results ( $\bar{x} = 17.6$  years in the total sample; 17.9 years in the monogamous group and 15.6 years in the polygynous group. In the Moroccan sample as in the Egyptian one is observed an association between age at marriage and length of reproductive span ( $r = -0.22$ ,  $P < 0.0001$ ) and a high correlation between span and parity ( $r = 0.73$ ,  $P < 0.0001$ ).

These results suggest that the date of onset and the number of successive pregnancies account principally for the extent of the reproductive period, regardless of interval lengths between births. Such characteristics shape a pattern of natural fertility (Henry, 1961), which could fit the present population until the possible occurrence of birth control over late natality. This latter hypothesis is supported by the exist-

ence of a significant correlation between ages at first and last birth ( $r = 0.24$ ,  $P < 0.0001$ ), thus indicating that women who married early would complete childbearing earlier than women who married late (Trussel, 1979). According to Naber (1989) and Varea (1990), the end of childbearing could be subsequent to the women becoming grandmothers.

Polygyny in Morocco, though it can express different social and economic situations (Crognier and Zarouf, 1987; Crognier, 1990), shows the conservative aspect of local culture. In this study, it is more frequent among older people, hence the discrepancy between mean ages of monogamous and polygynous samples (difference = 5.75 years). It is associated with a mean later age at marriage and a mean greater waiting time to first birth, resulting in a mean older age at first birth (difference = 1.34 year) and a mean shorter span of reproductive life (difference = 1.9 year).

#### TIMING OF REPRODUCTION

The recollection of each woman's reproductive events, summed at sample level, expresses the collective behaviors related to fertility. The outcomes of pregnancies, the conditions of confinement, the duration of breastfeeding, and the length of interbirth intervals are successively considered according to the parity order.

The outcomes of successive pregnancies until the eleventh degree of parity are characterized by a quasi stable percentage of live births (above 90 per cent). The percentage of spontaneous abortions varies from 2 to 5 per cent, and the frequency of still-

births (considered as deaths occurring during and later than the seventh month of pregnancy) from 4 to 5 per cent. The first are obviously underreported (early miscarriages before three months are never mentioned), and the second are probably overestimated.

Intrauterine mortality, considered as a whole, would range from 7 per cent of total pregnancies for the first parities to 16 per cent and more by the twelfth. This doubling of the average rate, associated with age through increasing parities, is commonly observed (Leridon, 1977). Its level also agrees with general estimates, either in developing or developed populations (from 12 to 15 per cent, according to Leridon, 1977, and Bongaarts and Potter, 1983) and is similar to figures obtained by age classes (9 to 14 per cent) for the city of Marrakesh by Bley and Baali (1987).

The traditional home confinement, with the help of either a parent or a neighbor acting as midwife, remains the prevalent mode of delivery. Confinements in public or private maternity centers are rare and seem to be associated with difficulties in pregnancy or parturition. They correlate with a higher percentage of failures at any degree of parity.

Breastfeeding records were taken from a subsample of women selected for having undertaken lactation and maintained it until the weaning of their child. For a total of 5,681 records, the mean duration of breastfeeding was 17.58 months (SD 6.02) and breastfeeding ranged from 1 to 36 months. The customary span of breastfeeding is therefore extensive in this population. Differences appear with respect to

marital status (monogamous or polygynous), with respective means of 17.71 and 16.45 months ( $t = 4.78$ ,  $P < 0.001$ ). A difference in the duration of breastfeeding is also found between contraceptors and noncontraceptors, with respective means of 17.12 and 17.98 months ( $t = 6.946$ ,  $P < 0.001$ ).

The observations in relation to parity (Table 3) showed a moderate trend toward the increase of lactation time with parity. On the other hand, no sex differences occurred in the length of lactation whatever the parity, thus negating the hypothesis of possible discrimination between boys and girls.

The mean interbirth interval computed from the whole data (6,019 measures) is 30.06 (SD 19.9 months). Its span is longer among women of polygynous marital status than among monogamous (respectively  $x = 32.4$ ,  $SD = 21.5$ , and  $x = 29.8$ ,  $SD = 19.8$  months,  $t = 2.91$ ,  $P < 0.05$ ), a result in agreement with the general appraisal of the effects of polygyny.

On the other hand, contraceptive practices do not appear to entail significantly longer interbirth intervals as the respective means of contraceptors and noncontraceptors are 29.61 (SD 17.9) and 30.43 (SD 21.4 months) ( $t = 1.61$  ns). Insofar as birth control is effective, this result agrees with the hypothesis that contraception is implemented to end the reproductive period when family size is considered to be completed.

The interbirth interval considered in the successive parities varies between 26 and 37 months (Table 4), the largest interval being the first. When records of completed lactation and corresponding interbirth intervals are simul-

TABLE 3  
MEANS AND STANDARD DEVIATIONS OF  
BREASTFEEDING DURATION IN MONTHS  
FOR EACH PARITY LEVEL

PARITY	No.	Min.	Max.	Mean	S.D.
1.....	929	1	36	16.78	6.33
2.....	881	1	36	17.13	6.15
3.....	808	1	60	17.54	6.06
4.....	711	1	60	17.43	6.19
5.....	602	1	36	17.81	5.82
6.....	489	1	36	18.12	5.76
7.....	390	1	36	18.09	5.62
8.....	308	1	36	18.19	5.74
9.....	216	1	36	18.41	5.59
10.....	144	1	36	17.85	5.75
11.....	93	3	36	18.82	5.51
12.....	58	12	30	19.26	4.96
13.....	33	4	24	18.27	5.68
14.....	13	1	24	19.00	7.07

TABLE 4  
MEANS AND STANDARD DEVIATIONS IN MONTHS  
OF SUCCESSIVE INTERBIRTH INTERVALS

No. of Int.	No.	Mean	S.D.
1.....	1129	36.68	26.45
2.....	1021	28.89	16.29
3.....	908	28.17	15.00
4.....	757	27.62	15.95
5.....	607	28.76	17.56
6.....	483	29.00	17.21
7.....	375	29.78	19.67
8.....	269	30.24	17.67
9.....	184	30.53	19.40
10.....	104	29.00	16.16
11.....	62	26.56	13.27

taneously considered, a weak, positive and significant correlation ( $0.08 < r < 0.26$ ,  $0.05 < P < 0.0001$ ) is found between them for the first nine parity levels. This association probably expresses the well-demonstrated fact that the lengthening of breastfeeding entails a protracted amenorrhea and hence a subsequent longer interbirth interval.

TABLE 5

MEANS AND STANDARD DEVIATIONS OF AGE, AGE AT MENARCHE, AGE AT MARRIAGE, WAITING TIME TO FIRST BIRTH, AND AGE AT FIRST BIRTH

Sample	No.	Age	Age at Menarche	Age at Marriage	Wait. Time 1st Birth (Months)	Age at 1st Birth (Years)
> 40 years.....	538	51.7 (8.1)	14.59 (1.4)	18.03 (3.2)	22.49 (20.6)	19.88 (3.6)
< 30 years.....	504	23.9 (3.3)	14.42 (1.3)	17.66 (2.3)	14.92 (11.3)	18.89 (2.2)

### THE EVOLUTION OF REPRODUCTIVE BEHAVIORS

Insofar as the sample of women investigated includes persons ranging from 15 to more than 50 years old, it is possible to segregate from it two subsamples representing two generations separated by an interval of age averaging approximately 25 years. Table 5 expresses the main characteristics of these two subsamples.

The change in maturation rate during the intergeneration interval is moderate and would indicate the stability of living conditions within the area during this period. Women's age at marriage is traditionally early in Morocco and rather stable, whatever the period or the environment (Crognier, 1992). Conversely, a strong behavioral shift toward the reduction of the waiting time to first birth is noticeable: a 7.6 months drop in an interval of 25 years. Considering the stability of age at marriage, this drop leads to an earlier age at first birth.

This evolution is also perceptible in the level of association between these variables (Table 6). The younger generation appears to take a greater notice of age at puberty to set the age at marriage. It also shows a weak, negative, but significant correlation between age

at marriage and the length of the waiting time to first birth, a possible indication of a catch-up of fertility when marriage is late.

Among labile reproductive behaviors are the durations of interbirth intervals and of breastfeeding practices. The comparison of lactation spans cumulated for the first five degrees of parity in the two subsamples shows an effective shift in this 25-year interval, from a mean value of 18.26 months (> 40 years) to 14.92 months (< 30 years), i.e., a mean reduction of 3.34 months ( $t = 12.61$ ,  $P < 0.0001$ ).

Interbirth intervals show the same evolution. Computed over the first five intervals, their mean values are respectively 31.87 months (> 40 years) and 27.40 months (< 30 years), a mean drop of 4.46 months ( $t = 6.05$ ,  $P < 0.0001$ ).

### CONCLUSION

The observation of reproductive patterns in this Berber population of Morocco seems to agree with other trends in this society (Crognier, 1992), those in which individual behaviors, though molded by a still-strong traditional model, reflect influences from developed societies.

TABLE 6

INTERCORRELATIONS BETWEEN AGE AT MENARCHE, AGE AT MARRIAGE, WAITING TIME TO FIRST BIRTH, AND AGE AT FIRST BIRTH IN WOMEN OF THE TWO SUBSAMPLES

Subsamples	Menarche	Age Marr.	Wait. T. to 1st Birth
Women < 30 years			
Age at marriage.....	0.34 <sup>a</sup>	...	...
Wait. t. to 1st birth.....	0.04	-0.13 <sup>b</sup>	...
Age at 1st birth.....	0.34 <sup>a</sup>	0.91 <sup>a</sup>	0.29 <sup>a</sup>
Women > 40 years			
Age at marriage.....	0.16 <sup>a</sup>	...	...
Wait. t. to 1st birth.....	0.04	-0.03	...
Age at 1st birth.....	0.15 <sup>b</sup>	0.88 <sup>a</sup>	0.45 <sup>a</sup>

<sup>a</sup>*p* < 0.0001.

<sup>b</sup>*p* < 0.001.

This bipolarization appears in the reproductive life. The former influence, summarized by the high level of fertility, stems from traditional behaviors regarding age at marriage, waiting time to first birth, lactation duration, and above all the apparent absence of birth limitation. It results in a fertility pattern seemingly close to a natural pattern of fertility, at least until the family is considered completed.

On the other hand, the changes observed in the younger age groups would indicate an acceleration of family constitution by the shortening of behavior-dependent time intervals (either relevant to individual desires or subsequent to the improvement of fertility by medical assistance. Insofar as the reproductive period of this generation is not yet achieved, we cannot forecast whether this new pattern will lead to a shorter reproductive span and a smaller family size or not.

Following Nagi's observations in Muslim countries (1983), the Moroccan data as a whole are not demonstrative of a clear demographic transition. Even in Moroccan cities, the mean number of live-born children per completed family (women aged 45-49 years), still averaged 6.36 in 1982 (Direction de la Statistique, 1984). It seems reasonable to assume the mountain-dwelling Berbers will maintain, for some time at least, their traditional reproductive behaviors.

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