

Biosocial Determinants of Age at Menarche among Secondary School Girls in Benin City, Nigeria

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ABSTRACT

Objective: To determine the age at menarche among secondary school girls in Benin City and to establish biosocial determinants of menarcheal age.

Method: Students at Benin City's secondary schools were the focus of this descriptive study. Self-administered questionnaires that had been pretested were used to gather data. The height, weight, BMI, and mid-arm circumference of the study population were also measured. Menarchal age was compared to several measures of socioeconomic status.

Results: Of the 1830 participants, 72.2 percent had already had their first period. The population's average age at menarche was 12.72 ± 1.24 years. When looking at the period from 1979 to 2009, a decrease of 3.3–4.3 months per decade was seen. Depending on the parents' social status, women's menarcheal ages range from as young as 12.3 years old to as old as 14.09 years old (P = 0.000), with 12.3 years old being the lowest and 14.09 years old being the highest.

Conclusion: The age at menarche in Benin City school girls is 12.72 ± 1.24 years. There has been a decline in the menarcheal age compared to previous studies. The socioeconomic and nutritional status influence the age of menarche.

INTRODUCTION

The attainment of menarche is a landmark event and it signals the beginning of reproductive years in a woman. It is an objective indicator of puberty^{1, 2}. Menarche refers to the first menstrual bleeding in a girl and is the culmination of a series of endocrine changes which start about five years prior to puberty^{2,3}. The years of puberty and adolescence are characterised by the gradual attainment of psychosexual maturity as well as obvious evidence of physical growth including the development of secondary sexual characteristics. Therefore, the age of menarche is a reasonable indicator that several other features of adolescence and puberty are in progress².

Hence the critical body weight hypothesis for menarche was proposed by Frisch and Revelle in 1971¹³. A critical body weight of 48kg was said to be necessary for the attainment of menarche. This hypothesis has been extensively studied and is supported by the fact that menarche is delayed by malnutrition and that anorexia causes amenorrhoea¹⁴⁻¹⁶. Also, girls who were amenorrhoeic resume menstrual flow when they gain weight¹⁷.

Over the years, the mean age of menarche has been noted to be declining among different populations^{3,25,34-36}. The rate of decline also varies as has been reported by different studies. Tanner estimated a decline rate of 3 to 4 months per decade for European girls in 1968³⁶ while a decline of about two and a half months was noted between the period 1963 – 1970 and 1988 – 1994 among American girls³⁷. A study in Ghana showed a decline of 12.75 months (1.06 years) in the menarcheal age of girls between 1946 and 1976²⁸. In Nigeria, a rate of decline of five to six months per decade was observed³² while another study observed a decline rate of four months per decade³¹. As a result of this declining menarcheal age, it has been proposed that the age for defining precocious puberty be re-evaluated³⁸. This declining trend in age at menarche has been attributed to increasing weight and body mass index among adolescent girls^{10,39}, due to increased socioeconomic and nutritional status^{40,41}. There are however some other studies that have failed to demonstrate this declining trend in age at menarche^{42,43}.

Teenage sexuality has led to increase prevalence of unintended pregnancies and sexually transmitted infections. Adolescent pregnancies and unsafe abortions are important contributors to maternal deaths in Nigeria⁴⁵. Also, the higher the risk of human papilloma virus infection and its sequelae of cervical cancer⁴⁶.

It has also been shown that the earlier the menarche the greater the risk of developing the metabolic syndrome as well as the risk of breast cancer^{47,48}. On the other hand, increasing age at

menarche is associated with reduced fertility^{49,50}. The risk of operative delivery at first childbirth is also reduced with increasing age at menarche⁵¹.

With Westernization of lifestyle in many of our urban centres, there may be a tendency towards an increase in the mean weight of adolescents. Hence it is expected that the mean age at menarche now compared to previous studies will be lower. Knowledge of the current age at menarche will help in developing strategies targeted at perimenarcheal girls to cater for their reproductive health needs. However there is no recent study reviewing the age at menarche in our environment. This study therefore becomes imperative.

MATERIALS AND METHODS

The study was a cross – sectional descriptive study among secondary school students in May and June 2009. Students were drawn from four randomly selected secondary schools in Benin City, Edo State, Nigeria. Consent was obtained from Ministry of Education officials.

Menstrual history, biophysical factors, and sociodemographic and economic indicators were all on the list. To classify parents' socioeconomic status, the Olusanya et al scoring system⁵² was applied.

The SPSS programme was used for data entry and analysis (statistical package for social sciences, SPSS V 16.0, Chicago, IL.). ANOVA was used to evaluate the group mean, and the likelihood chi square test was used to examine the data distribution. It was judged statistically significant to have a probability level less than 0.05.

RESULTS

93.3 percent of the total questionnaires received were used in this study. Seventy-two percent (1322) of the women surveyed had menarche, while 27.8% (508) had not.

Table 1 shows the demographics of the study's participants. Participants in the study ranged in age from nine to eighteen, with a mean age of 14.00 ± 1.83. 89.6% of the participants were between 11 and 16 years old, and most were Christian (97.16 percent).

Women's menarche ages are shown in Table 2. It occurs between the ages of 9 and 17, with a mean of 12.72 years ± 1.24 years.

Table 3 shows that menarche is linked to socioeconomic factors. In terms of menarche age, the lower a child's social position, the younger they will be. This disparity is huge (P 0.000). Women in polygamous households are significantly older than those in monogamous households (P = 0.000) when it comes to

menarche. Unrelated siblings experienced the same rise in menarche age (P = 0.000).

Table 4 shows the relationship between menarche and biophysical measures. The survey participants ranged in weight from 30 to 87 kilogrammes. The average weight of post-menarcheal females was 52.57 kg, compared to 39.29 kg for pre-menarcheal girls (P = 0.000). Menarche occurred in nearly all females weighing 46 kilogrammes or more. The percentage of females who reached menarche increased with height, and by 165cm, all girls had reached menarche. Post-menarcheal females had a higher average BMI than pre-menarcheal females, with a P value of 0.000. Similarly, girls who had menstruated had a higher mid-arm circumference (24.84 2.53 vs. 20.76 1.42, P = 0.000).

Table 1: Socio-demographic Characteristic of the Study Population

Variable	n=1830	(%)
Age(Years)		
≤ 10	70	3.8
11 – 12	297	16.2
13 – 14	671	36.7
15 – 16	672	36.7
≥ 17	120	6.6
Class in school		
1	304	16.6
2	352	19.2
3	361	19.7
4	401	21.9
5	412	22.5
Religion		
Christian	1778	97.16
Islam	52	2.84

Table 2: Age at menarche and frequency.

Menarcheal Age (Years)	Number n = 1322	% (cumulative) menstruating
9	9	0.7
10	47	4.2
11	116	13.0
12	407	43.8
13	416	75.3
14	229	92.6
15	85	99.0
16	10	99.8
17	3	100.0
Mean age ± SD at menarche (years)		12.72 ± 1.24

Table 3: Women's Menarche Age and Socioeconomic Status Relationship

Variable	n = 1322 (%)	Mean Age at Menarche ± SD (years)	P Value
Social Class			0.000
1	423 (320)	12.33 ± 1.16	
2	477 (36.1)	12.51 ± 1.01	
3	212 (16.0)	13.04 ± 1.14	
4	128 (9.7)	13.70 ± 1.37	
5	82 (6.2)	14.09 ± 0.85	
Type of home			0.000
Monogamous	1129(85.4)	12.63 ± 1.22	
Polygamous	193(14.6)	13.22 ± 1.25	
Number of Siblings			0.000
1 – 3	190(14.4)	12.18 ± 1.11	
4 – 6	896(67.8)	12.63 ± 1.18	
≥ 7	236(17.9)	13.47 ± 1.24	
Total	1322(100)	12.72 ± 1.24	

Table 4: The relationship between menstruation and biophysical markers

Variable	No of girls that have attained menarche n = 1322 (%)	No of girls that have not attained menarche n = 508 (%)	P
Weight (kg)			0.000
≤ 30	0 (0.0)	45 (100.0)	
31 – 35	10 (8.4)	109 (91.6)	
36 – 40	16 (10.9)	131 (89.1)	
41 – 45	221 (58.0)	160 (42.0)	

46 – 50	373 (87.1)	55 (12.9)	0.000
51 – 55	308 (100.0)	0 (0.0)	
56 – 60	222 (96.5)	8 (3.5)	
61 – 65	100 (100.0)	0 (0.0)	
66 – 70	33 (100.0)	0 (0.0)	
71 – 75	24 (100.0)	0 (0.0)	
76 – 80	6 (100.0)	0 (0.0)	
81 – 85	6 (100.0)	0 (0.0)	
86 – 90	3 (100.0)	0 (0.0)	
Mean Weight	52.57 ± 8.03kg	39.29 ± 5.72kg	
Height (cm)			0.000
≤ 140	3 (5.8)	49 (94.2)	
141 – 145	0 (0.0)	80 (100.0)	
146 – 150	66 (70.2)	28 (29.8)	
151 – 155	243 (55.2)	197 (44.8)	
156 – 160	348 (79.8)	88 (20.2)	
161 – 165	376 (85.1)	66 (14.9)	
166 – 170	176 (100.0)	0 (0.0)	
171 – 175	69 (100.0)	0 (0.0)	
176 – 180	32 (100.0)	0 (0.0)	
181 – 185	3 (100.0)	0 (0.0)	
186 – 190	6 (100.0)	0 (0.0)	
Mean Height	160.73 ± 7.17cm	151.57 ± 7.84cm	
*BMI (kg/m ²)			0.000
<18.5	342 (44.8)	421 (55.2)	
18.5 – 24.9	908 (91.6)	83 (8.4)	
25 – 29.9	63 (94.0)	4 (6.0)	
≥30	9 (100)	0 (0.0)	
Mean BMI	20.34 ± 2.82	17.03 ± 1.58	
**MAC (cm)			0.000
16 – 20	10 (6.2)	150 (93.8)	
21 – 25	850 (70.8)	350 (29.2)	
26 – 30	435 (98.2)	8 (1.8)	
31 – 35	24 (100.0)	0 (0.0)	
36 – 40	3 (100.0)	0 (0.0)	
Mean MAC	24.84 ± 2.53	20.76 ± 1.42	

*BMI — Body mass index

**MAC — Mid arm circumference

DISCUSSION

The mean menarcheal age of the study population was 12.72 ± 1.24 years. This is lower than what has been obtained in South Western Nigeria (13.79 ± 0.03 years)³², and in South Eastern Nigeria (13.54 ± 0.07 years)³¹ in 1976 and 1979 respectively. There has been a decline of about 3.3 to 4.3 months per decade in the age at menarche in our environment. This rate of decline is comparable with the 3 to 4 months per decade estimated for European girls by Tanner in 1968³⁶ as well as the 4 months per decade estimated by Uche for South eastern Nigerian girls in 1979³¹. A decline in age at menarche may lead to increase in teenage sexuality and its attendant complications such as increase rate of sexually transmitted infections, unintended pregnancy and unsafe abortions. In the long term there may be an increased risk of cervical cancer. The declining trend in menarcheal age may also be an indication that our definition of precocious and delayed puberty be re-evaluated. It may also suggest a tendency towards improved fertility potential of our women as studies have shown^{49,50}.

This study showed that socioeconomic factors and nutrition tend to influence menarche. The social class of the parents significantly affected the age at menarche among the girls studied. Girls from social class I (highest social class) had the lowest mean menarcheal age compared to girls in social class 5. This is consistent with the findings of Makinde⁵ et al. Other studies have also reported similar observations^{7,9,10}.

People with poor socioeconomic status and low level of educational attainment tend to have larger family size. The National Demographic Health Survey of 2003 showed that the higher the educational attainment and the more economically advantaged a household is, the lower the number of children⁵⁴.

The nutritional status of an individual will ultimately affect the anthropometric indices. Menarche had occurred in the majority of the heavier females. Frisch et al. remarked in 1971 that the crucial weight concept is supported by the findings. The number of women who have reached menarche has risen in tandem with the rise in BMI. In Israel, Mandel et al³⁶ found an inverse connection between body mass index and the age at which a woman had her first period. Other investigations have shown similar results^{8,39}. It is possible that these girls' nutritional state is to blame for these results. Other variables, such as genetics and the physical changes linked with puberty, may also be to blame.

CONCLUSION

The age at menarche is a useful indicator of reproductive maturity of young girls. It may also be a good predictor of the age of initiation of sexual intercourse. Adolescent sexuality is associated with increased risk of sexually transmitted disease, unintended pregnancy and unsafe abortions.

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