# Effect of Socio-economic Factors on the Onset of Menarche in Mansoura City Girls

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**Abstract: Aim:** The aim of this study was to determine the prevalence of occurrence of menarche among Mansoura city girls, and to find out the effect of socioeconomic factors on the onset of menarche among student. **Methods:** In this prospective study, data was gathered in Mansoura city using questionnaires that were distributed on a total of 125 female pupils from primary Shagarate El-Dor and EL-Galaa schools. The questionnaire was invented and validated by the researchers and was filled by girls and their mothers, from December 1 ~ 30, 2011. A data of 125 female pupils were analyzed cross sectional. **Results**: The average age at the onset of menarche in Mansoura was 12.14 year. Also, the present study revealed that, there is a statistically significant difference was observed as regard the socio-economic classes in the positive menarche group as $X^2$ =8.69, P- value=0.01. The results of the present study revealed that there was a positive association between age of onset of menarche and proper food intake, secondary sex characteristics and anthropometric measures. This study **concluded** that, many socioeconomic factors significantly contribute in the occurrence of menarche in Mansoura population, and gives new information about the prevalence of menarche among female pupils in Mansoura city.
[Amany Hamed Gad and Gamalat Mustafa Abd El-Ghany **Effect of Socio-economic Factors on the Onset of Menarche in Mansoura City Girls]** Journal of American Science 2012; 8(3):545-550]. (ISSN: 1545-1003). http://www.americanscience.org. 73

**Key words:** menarche; socioeconomic factors; puberty

## 1. Introduction

Menarche is the onset of menstruation. It is the most striking event in the whole process of female puberty **(Atay et al., 2011 and Chumlea, Schubert & Roche, 2006).** Age at menarche reflect numerous health aspects of a population, including the timing of sexual maturation; growth and nutritional status and environmental condition **(Albright et al., 2009 and Ezem, 2006).**

The age at menarche is an important factor in health planning and it is known to be influenced by genetic factors, environmental condition, body stature, family size, body mass index (BMI) socioeconomic status and level of education. The age at menarche shows the effectiveness of the female reproductive hormones, luteinizing hormone and the follicle stimulating hormone **(Ayatallahi & Dowlatabadi, 1999 and Shama, Talwar & Sharma, 2005).**

While age at menarche has been reported in several parts of the world, including the eastern and western parts of Egypt, there is paucity of information in the Egypt delta region. The study was therefore carried out to find out the prevalence of menarche in this part of the country and also see the influence of social class on the onset of menarche.

### Aim of the study

1- Is to find out the prevalence of menarche among girls in Mansoura city.
2- And to find out the effect of socioeconomic stander on the onset of menarche.

### Research question

What is the prevalence of menarche among Mansoura girls students? and does the socio economic stander affect the age of onset of menarche?

## 2. Material and Method]

### Research design:

This study was carried out using observational cross section design.

### Setting:

The study was conducted at Shagaret El-Dor & El-Galaa primary schools in Mansoura city in Egypt.

### Sampling:

The study population included 125 pupils who were enrolled in the 2011~2012 school year. Of these, 65 were seventh grade students and 60 were eighth grade students. The researchers focused on students in these grades because they are the students most likely to experience menarche.

**The sample size** was calculated according to the assumed frequency of menarche in the recent internet research which was 75%, and the proposed size of students attending to all primary schools in Mansoura city at these grades which was 30.000 students, with a power 90 % and 95 % confidence interval.

**Multi-stages sampling technique** was used in selection of study population, first stage we select west district from east district and west district randomly, which includes 15 primary school girls,

then we pick up 2 schools from them randomly, they are Shagaret El-Dor (12 class) and El-Gala (10 classes), after that we pick 4 classes randomly from each school classes; 2 classes from each grade ($7^{th}$ & $8^{th}$ grades).

Finally the researchers picked up 15 students randomly from each class, and 20 students from the last one, until the sample size was reached.

**Tools of data collection:**

Data was collected by using a questionnaire sheet distributed to schools from December 1~ 30, 2011. The questionnaire was invented by first author (A.H.), and validated by second author (G. M.) and consisted of 4 parts:

A - First part; to be filled by pupils and consisted of data about socioeconomic stander as (age, level of education, occupation, income/month, sanitation, crowing index).

B- Second part; about meat consumption filled by the mothers.

C- Third part; observation sheet about thelarche, pubic region and axillary region.

D- Fourth part; measurement sheet to estimate the body weight, height and chest parameter.

**Procedures of data collection:**

The questionnaire was in Mansoura native language, properly translated Arabic for minority participants on the study. In all classes that took part in the study, authors in a lecture explained the goal of the study, explained the physiological changes in girls and answered on eventual questions. In the day that pupils turned back filled questionnaire, authors made body measurements and evidence of secondary sexual characteristics. The body height is measured with anthrop meter, then body weight is measured with medical weighting machine. The secondary sex characteristics are evidenced using Marshall and Tanner scale.

**Scoring:**

The socio- economic scoring in this study sample consisted of the score of occupation, education, and social class, the latter included the income, crowding index, and sanitation score. All these data were scored for a total socioeconomic score modified after **Fahmy and El Sherbini (1983)[6].**

- Total socioeconomic score = 23
- Scores $19^{+}$ are considered of high socioeconomic standard
- Scores 15-<19 are considered of middle socioeconomic standard
- Scores <15 are considered of low socioeconomic standard

The secondary sex characteristics scored from 1-5 according to the stage development in Marshall and Tanner scale.

The meat consumption scored from 1-3 by the order of the valid.

**Pilot study:**

A pilot study was carried out before starting data collection on 10% of the study sample (13 female pupils) were excluded from the main study sample to test the feasibility of the study and the clarity and applicability of the tools.

**Administrative and ethical considerations:**

The directors of chosen schools were previously informed and authors get written permission to do research. Because of an ethical board to our institution, the researchers get written permission by the dean of the faculty to search this topic. The agreement for participation of the subjects was taken orally after the aim of the study was explained to them, they were given an opportunity to refuse or participate in the study. Gathered data were confidential.

**Statistical analysis:**

For statistical analysis the SPSS 12.0 statistical package is used. From statistical parameters the following are used; mean, stander deviation, correlation and linear regression, $X^2$ test, one way ANOVA, for P- value.

**3. Result**

The study included 125 female pupils, of these pupils, 65(52%) were in the seventh grade and 60 (48%) were in the eighth grade.

Table (1) presents that, most of the surveyed girls had menarche 97(77.6%), while 28(22.4%) had no menarche. This table also showed that, the occurrence of menarche is more frequent in girls with secondary and university levels of education 45(88.2%) and 48(85.7%) respectively, and there is tendency of decrease frequency of menarche with decrease the level of education. The difference is statistically highly significant (P= $0.000^{**}$).

This table also revealed that, the occurrence of menarche is more frequent 91(82.0%) in girls with high level of sanitation (electrical supply, water supply & special water closets) than that of lower level (2 out of three), 6(42.9%). The difference is statistically highly significant (P = $0.001^{**}$).

**Table 1: Distribution of demographic characteristics among the study sample by negative and positive groups**

| Demographic Characteristics | Total 125 | Positive group 97(77.6%) No. (%) | Negative group 28(22.4%) No. (%) | Test *P* |
|---|---|---|---|---|
| Education | | | | |
| Illiterate | 8 | 1(12.5) | 7(87.5) | |
| Read &write | 5 | 1 (20.0) | 4(80.0) | $X^2$ =38.5 |
| Prim &prep | 5 | 2 (40.0) | 3(60.0) | *P =0.000*** |
| Secondary | 51 | 45(88.2) | 6(11.8) | |
| University | 56 | 48(85.7) | 8(14.3) | |
| Job status | | | | |
| House wife | 75 | 58(77.3) | 17(22.7) | $X^2$ =.008 |
| Working | 50 | 39(78.0) | 11(22.0) | *P =.930* |
| Income / month | | | | |
| < 500/mo. | 64 | 50(78.1) | 14(21.9) | $X^2$ =.183 |
| 500 - <1000 | 29 | 23(79.3) | 6(20.7) | *P =.912* |
| >1000+ | 32 | 24(75.0) | 8(25.0) | |
| Crowding-index | | | | |
| 4-5 p/r | 5 | 4(80.0) | 1(20.0) | $X^2$ =.382 |
| 2-3 p/r | 65 | 49(75.4) | 16(24.6) | *P =.826* |
| < 2 p/r | 55 | 44(80.0) | 11(20.0) | |
| Sanitation | | | | |
| 2 out of 3 | 14 | 6(42.9) | 8(57.1) | $X^2$ =10.948 |
| The 3 | 111 | 91(82.0) | 20(18.0) | *P =0.001*** |
| Social class | | | | |
| Low | 19 | 10(52.6) | 9(47.4) | |
| Middle | 63 | 50(79.3) | 13(20.7) | $X^2$ =8.69 |
| High | 43 | 37(86.0) | 6(14.0) | *P =0.01** |
| Age at menarche (mean±SD) | | 12.1392 ± .6721 | | |

There was direct proportion between the levels of social class and the percentages of pupils at menarche as percentages were (low 52.6%, middle 79.3% & high 86.0%) respectively. The difference was statistically significant (P= 0.01*).

Table (2) presents average age at menarche by food intake. Data about the pupils food intake more very subjective, so it was not possible to draw accurate conclusions. In general, we found that girls with a poor food intake had a later average onset of menarche (12.9 years) Than girls with medium food intake (11.9 years) or a good food intake (11.5 years).

Table (3) shows correlation between the onset of menarche and anthropometric measures. Correlation of body weight and chest perimeter with the age of menarche show negative correlation r= -.285 & r= -.220 respectively ; with the increase of body weight and chest perimeter the age of menarche is lower, this means the girls with increase body weight and bigger chest perimeter experience menarche earlier. The differences are statistically significant P= .005* & P= .030* respectively.

For body height and body mass index in correlation with age of menarche the differences are statistically insignificant P = .054 & P= .107 respectively and did not show tendency of increasing or decreasing.

In table 4, the secondary sex characteristics are correlated with age of onset of menarche. These characteristics are rated in stages from 1 to 5. The mean age of menarche decrease with the increase of the stage of thelarche and this tendency is statistically significant (r=-0.26, P= 0.01*).

Changes in pubic region are in correlation with age of menarche (r=-.25), with increase of the stage of secondary sexual development, the age of menarche decreases from 12.35 years for second stage, to 11.77 years for fifth stage, these changes are statistically significant (P= 0.01*). Development of axillary region shows similar values as the pubic region starting from first to fifth stage, and is also statistically significant (P=0.02*).

**Table 2: Average age at menarche by food intake**

| | N | Age (year) Mean ± SD | Test *P* |
|---|---|---|---|
| Total | 97 | | |
| Food intake (Meat consumption) | | | |
| Every day (Good) | 34 | 11.51± 0.51 | *F* = 17.1 *P* = 0.000** |
| Every week (Medium) | 56 | 11.90± 0.63 | |
| Every month (Poor) | 7 | 12.9± 0.54 | |

**Table 3: Correlation between age at menarche and anthropometric measures**

| | Age at menarche Linear correlation and regression | *P- value* |
|---|---|---|
| Body measures | | |
| Body weight | r= -.285 | *P= .005** |
| Body height | r= -.196 | *P=.054* |
| Chest perimeter | r=-.220 | *P*=.030* |
| Body mass index | r=-.165 | *P=.107* |

**Table 4: Correlation between age of onset of menarche and secondary sex characteristics**

| | N | Age (year) Mean ± SD | test *P* |
|---|---|---|---|
| Total | | | |
| Thelarche | | | |
| I. + | | | |
| II. | 10 | 12.5 ± 0.52 | r = - 0.26 |
| III. | 42 | 12.22 ± .72 | *P* = 0.01* |
| IV. | 36 | 12.0 ± 0.64 | |
| V. | 9 | 11.88 ± 0.48 | |
| Pubic region | | | |
| I. | 2 | 12.25 ± 1.0 | |
| II. | 17 | 12.35 ± .60 | r = - .25 |
| III. | 36 | 12.25 ± .71 | *P* = 0.01* |
| IV. | 33 | 12.0 ± 0.61 | |
| V. | 9 | 11.77± .66 | |
| Axillary region | | | |
| I. | 3 | 12.5 ± 50 | |
| II. | 17 | 12.26 ± .66 | r = -0.23 |
| III. | 34 | 12.26 ± .72 | *P* = 0.02* |
| IV. | 35 | 12.0 ± 0.6 | |
| V. | 8 | 11.8 ± 0.70 | |

**4. Discussion**

It is difficult to determine which factors most strongly influence the onset of menarche; all of these factors interact with each other and affect the onset of menarche **Pacarada et al. (2008).**

This study comprised 125 female students, the study was designed to determine the prevalence of menarche among girls of seventh and eighth grades at Shagaret El-dor & El-Galaa primary schools in Mansourh city, and to find out the effect of socioeconomic stander on the onset of menarche.

The present study revealed that, girls living in high and middle social classes are more likely to experience menarche (86.0% & 79.3%) respectively than girls in low social class (52.6%) this is probably associated with higher income of the parents, high level of education, proper sanitation and low family members (table, 1). These results agree with the study of **Pacarada et al. (2008)**

who found that the occurrence of menarche is more likely to be affected by human caused condition such as socioeconomic factors. Also these results come in agreement with **Ofuya (2007)** who mentioned that, the mean age at menarche for girls from middle class families was 12.22 years, while that for girls from low income families was 13.01 years.

Regarding the food intake and the onset of menarche, this study revealed that girls with a poor food intake had a later average onset of menarche (12.9years) than girls with a medium food intake (11.9 years) or a good food intake (11.5 years)( table, 2).

This result goes with **Adair (2001)** Iraqi researcher, who assessed how food affects the onset of menarche, using two groups of girls classified by socioeconomic status. The first group was composed of girls from wealthy families, who ate meats, eggs, fruits ect. on a daily basis. The second group was composed of girls from a lower socioeconomic population, who mainly consumed beans, sugar, and flour.

This result also agrees with the study of **Albright et al. (2009)** who mentioned that, some of the external factors that are known to affect the age at onset of menarche include variety of food in urban centers, socioeconomic status, education, parents′ profession, better hygienic / sanitary condition. Also the result of this study agrees with the results of **Wiley (2011)** who reported that there is some evidence that greater milk intake is associated with an increased risk of early menarche, or a lower age at menarche.

The present study showed in table (3) that with increase weight and body mass index the mean age of menarche is decrease. This result agrees with the study of **Pacarada et al. (2008)** who reported that girls with high body weight experience menarche earlier than girls with lower body weight, and the coefficient of correlation is negative and the difference is statistically significant.

The results of this study regarding to body height and body weight contradict with the results of **Shama et al. (2005)** who found that girls with early menarche having significantly smaller skeletal dimensions and subcutaneous fat. While the result of this study was similar to the findings of **Lassek and Gaulin (2007)** who reported that menarche is more related to fat distribution and skeletal maturity.

As regard to the body mass index the result of this study comes with **Sloboda et al. (2007)** who indicated that higher BMI predicted early menarche. This result also supported by **Hosny et al. (2005).**

The results of the current study showed that in table (4) with increase the development of secondary sex characteristics there is significant decrease in the mean age of onset of menarche. This results agree with the study **of Atay et al. (2011)** who stated that, the median ages at breast stages 2 through 5 are 14.17, 11.75, 10.10 and 9.65 years respectively, and at pubic-hair stages 2 through 5 are 14.68, 12.33, 11.19 and 10.09 years respectively. These results also agree with the findings of **Ghaly et al. (2008).**

## Conclusions

It can be concluded from the results of this study that, Mansoura girls experienced menarche at an average age 12.14 years. The main conclusion is that more numbers of girls experienced menarche in high and middle socioeconomic levels than that the number of girls in the low socioeconomic level, the difference is statistically significant.

Food intake has an important effect on the onset of menarche, girls with a poor food intake experienced menarche later than girls with a good food intake. Finally, there was a positive association between age onset of menarche and secondary sex characteristics also anthropometric measures.

Based on the findings of this study, the following recommendations are suggested:

1- Because age at menarche reflect numerous health aspects of population, including the timing of sexual maturation, growth and nutritional status and environmental conditions; so puberty must be studied in details as a unit in the subject of science at all primary schools.
2- There is need for free or subsidized meals by the government in this types of schools. Besides, the government should also draw up programs to improve the economic status of those from the low income class.

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3/3/2012