INTERNATIONAL JOURNAL NATURAL AND APPLIED SCIENCES (IJNAS) VOL. 1, No. 1, pp. 115 – 119, 3TABLES, 1 FIG.

Construction of obstetric tables for pregnancy diagnosis

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ABSTRACT

Obstetric table shows the time interval within which a pregnant woman is expected to put to birth. In this paper, we construct obsteric tables at 95% and 99% confidence levels. From our tables, we find out that one can be 95% confident that the expected date of delivery (EDD) falls between the 271th and 277th day after the first day of the last menstrual period (LMP) and 99% confident that EDD falls between the 270th and 278th day after the first day of LMP. That is, P {271 ≤ μ ≤ 277} = 0.95 and P {270 ≤ μ ≤ 278} = 0.99.

Keywords: Last menstrual period (LMP), Expected date of delivery (EDD), Confidence level, obstetric table.

INTRODUCTION

The term gestation period is the period between conception and 2 delivery of a baby. To a layman, the gestation period in human is known to be nine months. But it has been observed that gestation period in humans is a random variable. The gestation period can only be reliably estimated if the date of conception is known. According to Dewbury *et al* (1993), the gestation period is estimated by assuming that the date of conception occurs two weeks after the last date of menstrual period (LMP). This they said can only hold if, the menstrual cycle is a regular 28 days, there is no history of bleeding in early pregnancy, and the woman has not been on oral contraceptive pills for two months to the LMP.

England (1983) describes the gestation period in human to be ten lunar months or 9.2 calendar months from the LMP. Howie (1986) stated that delivery is most commonly 40 weeks or 280 days or 9 calendar months and 7 days after LMP. Rudolph (1977) stated that the exact dating of the gestation is very important in considering the proper time for indicated premature delivery of the high-risk patient. According to Llewellyn – Jones (1990), the duration of pregnancy in women averages between 260 days and 280 days from the first day of LMP for women that have 28 ±5 days cycle.

The major problem with existing estimates of gestational period is that no probabilistic statements have been made about them. In this work, we attempt to improve upon the existing estimates by constructing obstetric table at 95% and 99% confidence level. The mean gestation period in humans are $275 \leq \mu \leq 277$ and $270 \leq \mu \leq 278$ days, respectively. That is, P {271 ≤ μ ≤ 277} = 0.95 and P {270 ≤ μ ≤ 278} = 0.99.

METHODOLOGY

The data used in this work is secondary and is sourced from the record section of the maternity department of the University of Calabar Teaching Hospital (UCTH). The data collected are the dates of conception (that is the first day of LMP) and dates of delivery for 110 cases. Data covers the period of twelve calendar months (January to December 2004). Based on these, the gestation periods are calculated and presented in the form of a grouped frequency distribution and a histogram. A chi-square goodness-of-fit test is conducted to show whether the distribution is normal or not. Finally, we construct a 95% and 99% confidence intervals for the expected date of delivery (EDD).

Assuming that the distribution of gestation periods is normal or approximately normal, the 100(1- α)% confidence interval for the mean gestation period is given by $\bar{X} - \mathbf{Z}_{\alpha/2}\, \sigma/\sqrt{n} \leq \boldsymbol{\mu} \leq + \mathbf{Z}_{\alpha/2}\, \sigma/\sqrt{n}$.

Where $\bar{X}$ is the sample mean, σ is the population standard, n is the sample size and **μ** is the population mean.

RESULTS

Table 1 shows the grouped frequency distribution of gestation periods of 110 women. Figure 1 is the histogram with frequency polygon superimposed on it for the data in table 1.

Table 1. Group frequency distribution of gestation periods in humans.

Cell boundaries	Frequency
200 – 212	1
213 – 225	0
226 – 238	1
239 –251	8
252 – 264	16
265 – 277	36
278 – 290	36
291 – 303	8
304 – 316	2
317 – 329	2
TOTAL	110

The mean gestation periods and the standard deviation for the data in table 1 are $\bar{X}$ = 270 days and $\hat{S}$ = 17.34 days, respectively. The chi-square goodness-of-fit test indicates that the distribution in

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table 1 is approximately normal.

The 95% and 99% confidence intervals for the mean gestation periods are $271 \leq \mu \leq 277$ and $270 \leq \mu \leq 278$, respectively. Tables 2 and 3 are the obstetric tables constructed respectively, at 95% and 99% confidence levels.

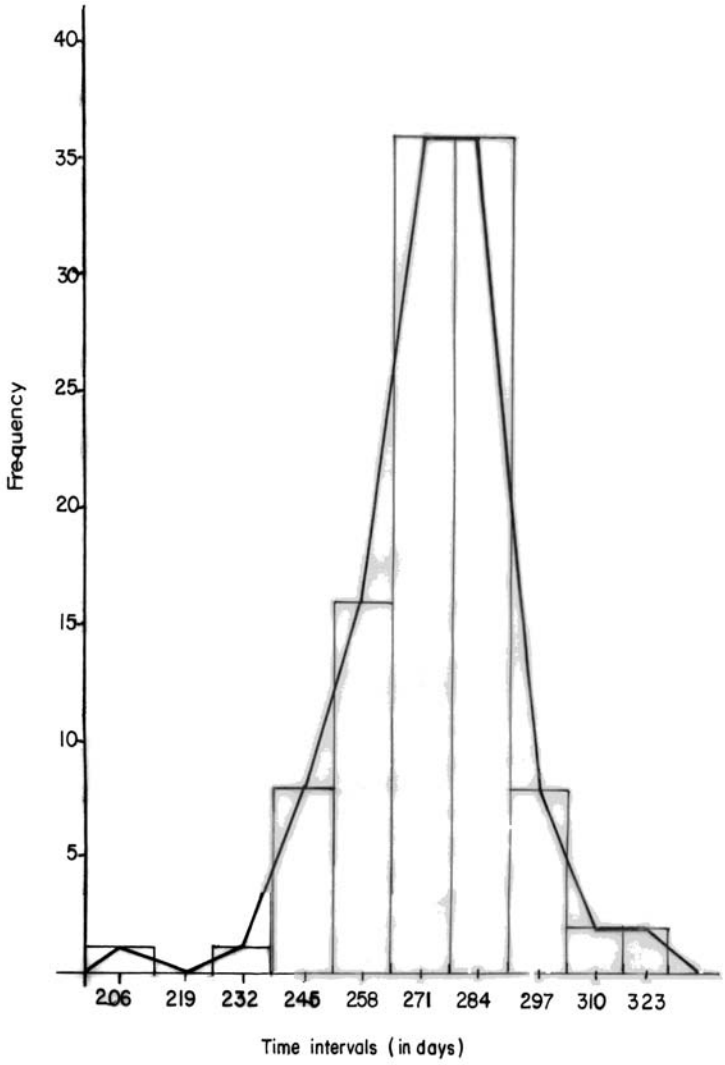

Fig. 1. Histogram of the frequency distribution of gestation period (in days) in humans

DISCUSSION

From our obstetric tables, we observed that:

a. At 95% confidence level, given the LMP, the expected date of delivery (EDD) can be estimated to fall between 9th calendar month by subtracting 3 days from the first day of LMP and adding 3 days to the first day of LMP. For instance, if the first day of LMP is 5th January 2005, then the EDD will fall between 2nd October 2005 and 8th October 2005.

b. At 99% confidence level, EDD can be estimated to fall between the 9th calendar month subtracting 4 days from the first day of LMP and adding 4 days to the first day of LMP. For instance, if the first day of LMP 5th January 2005, then EDD will fall between 1st October, 2005 and 9th October 2005.

CONCLUSION

Since the actual date of delivery cannot be determined with certainty one usually speaks of the confidence interval within which an expecting mother is expected to put to birth. This is necessary to enable the expecting mother have adequate prenatal care and preparation prior to delivery and to avoid high risk of pregnancy. The tables developed in this work are more general in the sense that they accommodate women that have regular and irregular menstrual cycles.

DATE OF CONCEPTION	EXPECTED DATE OF DELIVERY																							
	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL
1	28/9	4/10	29/10	4/11	26/11	2/12	27/12	2/1	26/1	1/2	26/2	4/3	28/3	3/4	28/4	4/5	29/5	4/6	28/6	4/7	29/7	4/8	28/8	3/9
2	29/9	5/10	30/10	5/11	27/11	3/12	28/12	3/1	27/1	2/2	27/2	5/3	29/3	4/4	29/4	5/5	30/5	5/6	29/6	5/7	30/7	5/8	29/8	4/9
3	30/9	6/10	31/10	6/11	28/11	4/12	29/12	4/1	28/1	3/2	28/2	6/3	30/3	5/4	30/4	6/5	31/5	6/6	30/6	6/7	31/7	6/8	30/8	5/9
4	1/10	7/10	1/11	7/11	29/11	5/12	30/12	5/1	29/1	4/2	1/3	7/3	31/3	6/4	1/5	7/5	1/6	7/6	1/7	7/7	1/8	7/8	31/8	6/9
5	2/10	8/10	2/11	8/11	30/11	6/12	31/12	6/1	30/1	5/2	2/3	8/3	1/4	7/4	2/5	8/5	2/6	8/6	2/7	8/7	2/8	8/8	1/9	7/9
6	3/10	9/10	3/11	9/11	1/12	7/12	1/1	7/1	31/1	6/2	3/3	9/3	2/4	8/4	3/5	9/5	3/6	9/6	3/7	9/7	3/8	9/8	2/9	8/9
7	4/10	10/10	4/11	10/11	2/12	8/12	2/1	8/1	1/2	7/2	4/3	10/3	3/4	9/4	4/5	10/5	4/6	10/6	4/7	10/7	4/8	10/8	3/9	9/9
8	5/10	11/10	5/11	11/11	3/12	9/12	3/1	9/1	2/2	8/2	5/3	11/3	4/4	10/4	5/5	11/5	5/6	11/6	5/7	11/7	5/8	11/8	4/9	10/9
9	6/10	12/10	6/11	12/11	4/12	10/12	4/1	10/1	3/2	9/2	6/3	12/3	5/4	11/4	6/5	12/5	6/6	12/6	6/7	12/7	6/8	12/8	5/9	11/9
10	7/10	13/10	7/11	13/11	5/12	11/12	5/1	11/1	4/2	10/2	7/3	13/3	6/4	12/4	7/5	13/5	7/6	13/6	7/7	13/7	7/8	13/8	6/9	12/9
11	8/10	14/10	8/11	14/11	6/12	12/12	6/1	12/1	5/2	11/2	8/3	14/3	7/4	13/4	8/5	14/5	8/6	14/6	8/7	14/7	8/8	14/8	7/9	13/9
12	9/10	15/10	9/11	15/11	7/12	13/12	7/1	13/1	6/2	12/2	9/3	15/3	8/4	14/4	9/5	15/5	9/6	15/6	9/7	15/7	9/8	15/8	8/9	14/9
13	10/10	16/10	10/11	16/11	8/12	14/12	8/1	14/1	7/2	13/2	10/3	16/3	9/4	15/4	10/5	16/5	10/6	16/6	10/7	16/7	10/8	16/8	9/9	15/9
14	11/10	17/10	11/11	17/11	9/12	15/12	9/1	15/1	8/2	14/2	11/3	17/3	10/4	16/4	11/5	17/5	11/6	17/6	11/7	17/7	11/8	17/7	10/9	16/9
15	12/10	18/10	12/11	18/11	10/12	16/12	10/1	16/1	9/2	15/2	12/3	18/3	11/4	17/4	12/5	18/5	12/6	18/6	12/7	18/7	12/8	18/8	11/9	17/9
16	13/10	19/10	13/11	19/11	11/12	17/12	11/1	17/1	10/2	16/2	13/3	19/3	12/4	18/4	13/5	19/5	13/6	19/6	13/7	19/7	13/8	19/8	12/9	18/9
17	14/10	20/10	14/11	20/11	12/12	18/12	12/1	18/1	11/2	17/2	14/3	20/3	13/4	19/4	14/5	20/5	14/6	20/6	14/7	20/7	14/8	20/8	13/9	19/9
18	15/10	21/10	15/11	21/11	13/12	19/12	13/1	19/1	12/2	18/2	15/3	21/3	14/4	20/4	15/5	21/5	15/6	21/6	15/7	21/7	15/8	21/8	14/9	20/9
19	16/10	22/10	16/11	22/11	14/12	20/12	14/1	20/1	13/2	19/2	16/3	22/3	15/4	21/4	16/5	22/5	16/6	22/6	16/7	22/7	16/8	22/8	15/9	21/9
20	17/10	23/10	17/11	23/11	15/12	21/12	15/1	21/1	14/2	20/2	17/3	23/3	16/4	22/4	17/5	23/5	17/6	23/6	17/7	23/7	17/7	23/8	16/9	22/9
21	18/10	24/10	18/11	24/11	16/12	22/12	16/1	22/1	15/2	21/2	18/3	24/3	17/4	23/4	18/5	24/5	18/6	24/6	18/7	24/7	18/8	24/8	17/9	23/9
22	19/10	25/10	19/11	25/11	17/12	23/12	17/1	23/1	16/2	22/2	19/3	25/3	18/4	24/4	19/5	25/5	19/6	25/6	19/7	25/7	19/8	25/8	18/9	24/9
23	20/10	26/10	20/11	27/11	18/12	24/12	18/1	24/1	17/2	23/2	20/3	26/3	19/4	25/4	20/5	26/5	20/6	26/6	20/7	26/7	20/8	26/8	19/9	25/9
24	21/10	27/10	21/11	26/11	19/12	25/12	19/1	25/1	18/2	24/2	21/3	27/3	20/4	26/4	21/5	27/5	21/6	27/6	21/7	27/7	21/8	27/8	20/9	26/9
25	22/10	28/10	22/11	28/11	20/12	26/12	20/1	26/1	19/2	25/2	22/3	28/3	21/4	27/4	22/5	28/5	22/6	28/6	22/7	28/7	22/8	28/8	21/9	27/9
26	23/10	29/10	23/11	29/11	21/12	27/12	21/1	27/1	20/2	26/2	23/3	29/3	22/4	28/4	23/5	29/5	23/6	29/6	23/7	29/7	23/8	29/8	22/9	28/9
27	24/10	30/10	24/11	30/11	22/12	28/12	22/1	28/1	21/2	27/2	24/3	30/3	23/4	29/4	24/5	30/5	24/6	30/6	24/7	30/7	24/8	30/8	23/9	1/29
28	25/10	31/10	25/11	1/12	23/12	29/12	23/1	29/1	22/2	28/2	25/3	31/3	24/4	30/4	25/5	31/5	25/6	1/7	25/7	31/7	25/8	31/8	24/9	39/9
29	26/10	1/11			24/12	30/12	24/1	30/1	23/2	1/3	26/3	1/4	25/4	1/5	26/5	1/6	26/6	2/7	26/7	1/8	26/8	1/9	25/9	1/10
30	27/10	2/11			25/12	31/12	25/1	31/1	24/2	2/3	27/3	2/4	26/4	2/5	27/5	2/6	27/6	3/7	27/7	2/8	27/8	2/9	26/9	2/10
31	28/10	3/11			26/12	1/1			25/2	3/3			27/4	3/5	28/5	3/6			28/7	3/8			27/9	3/10

LL: = lower limit
UR: = upper limit

Table 2. 95% Confidence level obstetric table

DATE OF CONCEPTION	EXPECTED DATE OF DELIVERY																							
	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL	LL	UL
1	27/9	5/10	28/10	5/11	25/11	3/12	26/12	3/1	25/1	2/2	25/2	5/3	27/3	4/4	27/4	5/5	28/5	5/6	27/6	5/7	28/7	5/8	27/8	4/9
2	28/8	6/10	29/10	6/11	26/11	4/12	27/12	4/1	26/1	3/2	26/2	6/3	28/3	5/4	28/4	6/5	29/5	6/6	28/6	6/7	29/7	6/8	28/8	5/9
3	29/9	7/10	30/10	7/11	27/11	5/12	28/12	5/1	27/1	4/2	27/2	7/3	29/3	6/4	29/4	7/5	30/5	7/6	29/6	7/7	30/7	7/8	29/8	6/9
4	30/9	8/10	31/10	8/11	28/11	6/12	29/12	6/1	28/1	5/2	28/2	8/3	30/3	7/4	30/4	8/5	31/5	8/6	30/6	8/7	31/7	8/8	30/8	7/9
5	1/10	9/10	1/11	9/11	29/11	7/12	30/12	7/1	29/1	6/2	1/3	9/3	31/3	8/4	1/5	9/5	1/6	9/6	1/7	9/7	1/8	9/8	31/8	8/9
6	2/10	10/10	2/11	10/11	30/11	8/12	31/12	8/1	30/1	7/2	2/3	10/3	1/4	9/4	2/5	10/5	2/6	10/6	2/7	10/7	2/8	10/8	1/9	9/9
7	3/10	11/10	3/11	11/11	1/12	9/12	1/1	9/1	31/1	8/2	3/3	11/3	2/4	10/4	3/5	11/5	3/6	11/6	3/7	11/7	3/8	11/8	2/9	10/9
8	4/10	12/10	4/11	12/11	2/12	10/12	2/1	10/1	1/2	9/2	4/3	12/3	3/4	11/4	4/5	12/5	4/6	12/6	4/7	12/7	4/8	12/8	3/9	11/9
9	5/10	13/10	5/11	13/11	3/12	11/12	3/1	11/1	2/2	10/2	5/3	13/3	4/4	12/4	5/5	13/5	5/6	13/6	5/7	13/7	5/8	13/8	4/9	12/9
10	6/10	14/10	6/11	14/11	4/12	12/12	4/1	12/1	3/2	11/2	6/3	14/3	5/4	13/4	6/5	14/5	6/6	14/6	6/7	14/7	6/8	14/8	5/9	13/9
11	7/10	15/10	7/11	15/11	5/12	13/12	5/1	13/1	4/2	12/2	7/3	15/3	6/4	14/4	7/5	15/5	7/6	15/6	7/7	15/7	7/8	15/8	6/9	14/9
12	8/10	16/10	8/11	16/11	6/12	14/12	6/1	14/1	5/2	13/2	8/3	16/3	7/4	15/4	8/5	16/5	8/6	16/6	8/7	16/7	8/8	16/8	7/9	15/9
13	9/10	17/10	9/11	17/11	7/12	15/12	7/1	15/1	6/2	14/2	9/3	17/3	8/4	16/4	9/5	17/5	9/6	17/6	9/7	17/7	9/8	17/7	8/9	16/9
14	10/10	18/10	10/11	18/11	8/12	16/12	8/1	16/1	7/2	15/2	10/3	18/3	9/4	17/4	10/5	18/5	10/6	18/6	10/7	18/7	10/8	18/8	9/9	17/9
15	11/10	19/10	11/11	19/11	9/12	17/12	9/1	17/1	8/2	16/2	11/3	19/3	10/4	18/4	11/5	19/5	11/6	19/6	11/7	19/7	11/8	19/8	10/9	18/9
16	12/10	20/10	12/11	20/11	10/12	18/12	10/1	18/1	9/2	17/2	12/3	20/3	11/4	19/4	12/5	20/5	12/6	20/6	12/7	20/7	12/8	20/8	11/9	19/9
17	13/10	21/10	13/11	21/11	11/12	19/12	11/1	19/1	10/2	18/2	13/3	21/3	12/4	20/4	13/5	21/5	13/6	21/6	13/7	21/7	13/8	21/8	12/9	20/9
18	14/10	22/10	14/11	22/11	12/12	20/12	12/1	20/1	11/2	19/2	14/3	22/3	13/4	21/4	14/5	22/5	14/6	22/6	14/7	22/7	14/8	22/8	13/9	21/9
19	15/10	23/10	15/11	23/11	13/12	21/12	13/1	21/1	12/2	20/2	15/3	23/3	14/4	22/4	15/5	23/5	15/6	23/6	15/7	23/7	15/8	23/8	14/9	22/9
20	16/10	24/10	16/11	24/11	14/12	22/12	14/1	22/1	13/2	21/2	16/3	24/3	15/4	23/4	16/5	24/5	16/6	24/6	16/7	24/7	16/8	24/8	15/9	23/9
21	17/10	25/10	17/11	25/11	15/12	23/12	15/1	23/1	14/2	22/2	17/3	25/3	16/4	24/4	17/5	25/5	17/6	25/6	17/7	25/7	17/7	25/8	16/9	24/9
22	18/10	26/10	18/11	26/11	16/12	24/12	16/1	24/1	15/2	23/2	18/3	26/3	17/4	25/4	18/5	26/5	18/6	26/6	18/7	26/7	18/8	26/8	17/9	25/9
23	19/10	27/10	19/11	27/11	17/12	25/12	17/1	25/1	16/2	24/2	19/3	27/3	18/4	26/4	19/5	27/5	19/6	27/6	19/7	27/7	19/8	27/8	18/9	26/9
24	20/10	28/10	20/11	28/11	18/12	26/12	18/1	26/1	17/2	25/2	20/3	28/3	19/4	27/4	20/5	28/5	20/6	28/6	20/7	28/7	20/8	28/8	19/9	27/9
25	21/10	29/10	21/11	29/11	19/12	27/12	19/1	27/1	18/2	26/2	21/3	29/3	20/4	28/4	21/5	29/5	21/6	29/6	21/7	29/7	21/8	29/8	20/9	28/9
26	22/10	30/10	22/11	30/11	20/12	28/12	20/1	28/1	19/2	27/2	22/3	30/3	21/4	29/4	22/5	30/5	22/6	30/6	22/7	30/7	22/8	30/8	21/9	1/29
27	23/10	31/10	23/11	1/12	21/12	29/12	21/1	29/1	20/2	28/2	23/3	31/3	22/4	30/4	23/5	31/5	23/6	1/7	23/7	31/7	23/8	31/8	22/9	39/9
28	24/10	1/11	24/11	2/12	22/12	30/12	22/1	30/1	21/2	1/3	24/3	1/4	23/4	1/5	24/5	1/6	24/6	2/7	24/7	1/8	24/8	1/9	23/9	1/10
29	25/10	2/11			23/12	31/12	23/1	31/1	22/2	2/3	25/3	2/4	24/4	2/5	25/5	2/6	25/6	3/7	25/7	2/8	25/8	2/9	24/9	2/10
30	26/10	3/11			24/12	1/1	24/1	1/2	23/2	3/3	26/3	3/4	25/4	3/5	26/5	3/6	26/6	4/7	26/7	3/8	26/8	3/9	25/9	3/10
31	27/10	4/11			25/12	2/1			24/2	4/3			26/4	4/5	27/5	4/6			27/7	4/8			26/9	4/10

LL: = lower limit
UR: = upper limit

Table 3. 99% Confidence level obstetric table

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