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Low birth weightin Elbasan before and after 90s

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ABSTRACT
The aim of this study is to assess the prevalence and trend of low birth weight in Elbasan before and after 90s; to examine low birth weight rates by gender of the baby and by urban/rural area; to study risk factors that affect low birth weight rates in Elbasan ; to assess progress towards the achievement of the Global Nutrition target 2025.
It is aretrospective cohort study.Data concerning all deliveries, including weight and length at birth, date of birth and sex of the newborns, age of the mother were collected from birth records in the Regional Hospital "Xhaferr Kongoli" inElbasan starting from 1977 to 2018. The frequency of low birth weight, very low birth weight and extremely low birth weight were determined.
Data of this study show that the prevalenceof low birth weight babieswas significantly decreased in the Regional Hospital of Elbasan, since peaking in 1988.The rate increased 25% between 1977 and 1988 and fell with approximately 64 % between 1997 and 2018.The prevalence in 2018 (2.77%) has an increase with 11% from 2017(2.49%).There was a strong correlation with sex of the babies, mortality, multiple pregnancies, young age of the mother, preterm births and mother's unemployment.
There was a lot of difference between 2 periods and a good progress towards reduction of the low birth rate and its mortality after 90s.Although the prevalence of low birth weighthas significant decrease, compared to period before 90s, there was no progress towards achievement of the Global Nutrition target 2025 in low birth weight.There are a lot to do to reach the Global Nutrition target 2025.

Keywords: low birth weight, very low birth weight, low birth weight rates, teenage mothers, preterm births, multiple pregnancies.

I. INTRODUCTION

There were a lot of socio – economic changes in Albania after 90s (time when began the democratic transition period in Albania). Birth number was reduced, as well as low birth weight rates. This study was undertaken to estimate the prevalence of low birth weight in Elbasan during two different periods, before and after 90s , and to identify the associated factors, predicting occurrence of low birth weight and to measure the progress made towards achieving the Global Nutrition Target 2025 in low birth weight using average annual reduction rate.

Low birth weight continues to be a public health concern globally. According to OBSH, more than 20 million births a year are low birth weight, representing 15- 20% of all births worldwide. (1) (2)One of the global nutrition targets set at the World Health Assembly in 2012 is 30% reduction in the number of infants born with a weight lower than 2500 gr by the year 2025, namely a 2.74% reduction per year between 2012 and 2025.(1)

Low birth weight is an important public health indicator closely related with antenatal care. The consequences of low birth weight are short- and long- term. Low birth weight newborns are at elevated risk of not only infant morbidity and mortality,(2) but also chronic diseases later in the life, such as diabetes, hypertension, obesity etc. (3-8)

Low birth weight is considered as the single most important predictor of infant mortality. (9)(10)Neonates with low birth weight have a >20 times greater risk of dying than neonates with birth weight of >2500 g. (2) (11)

II. MATERIAL AND METHODS

This is a retrospective cohort study. It was conducted in the Regional Hospital" Xhaferr Kongoli" in Elbasan. Data concerning weight and length at birth, date of birth and sex of the newborns, age of the mother for live born infants delivered in 1977/1978, 1987/1988, 1997/1998, 2007/2008, 2012, 2017/2018 was extracted from the delivery registry records of the Obstetrics Departments.The gestational age and the

employment status of mother were extracted for the period between January 2017 to December 2018. The dependent variable in this study was low birth weight, defined as a birth weight of less than 2500 gram (upto and including 2499 gram) irrespective of gestational age.(12) Infants whose birth weight was less than 1500gram and 1000gram were evaluated as " very low birth weight " and " extremely low birth weight" respectively and their frequency was determined. Low birth weight babies were, further, categorized into four outcome variables: 500-999gr, 1000-1499r, 1500-1999gr and 2000-2500gr and each variable were compared for different parameters.The yearly prevalence rate of the low birth weight was calculated based on the respective number of live births. The number of live born neonates with weight less than 2500 gram at birth is expressed as a percentage of the total number of live births.The association between gestational age and low birth weight was calculated based on the number of singleton live births, excluding the influence of the multiple deliveries on the low birth weight. The stillborn births were excluded from the analyses of these cohorts.Permission to conduct the study was taken from Regional Hospital of Elbasan Directory.

Data analyses were performed by SPSS version 26. Descriptive analyses were conducted for quantitative data. To assess the factors associated with low birth weight, odd ratio and t-test were used. The significance level was established at 5%.Test results were evaluated within a 95% Confidence Interval(CI95%).

III. RESULTS

Out of 25114 total births occurred between 1977 and 2018, 24906 were live births, 24537 were total singleton births. Yearly distribution of mean birth weight and low birth weight are shown in Table 1 and their trend in Figure 2. During 1977-1988 mean low birth weight decreased each year until reaching the lowest value in 1988, 2084gr. There were a number of fluctuations during period 1997-2018. After an increase in 1998, 2083gr, the mean low birth weight decreased in 2007, reaching the lowest value for this period ,1989gr. Then it increased in 2008(2087gr) and 2017(2157.6gr), decreasing again in 2018 (2133.6gr).

Data about yearly distribution of total live and low birth weight deliveries are shown in Table 2 and their trend are shown in Figure 1.As shown in Table 2, between1977 and 1988, the prevalence fell with 19.6% from1977(7.93%) to 1978 (6.35%) ,reaching the lowest value, and in 1987 rose with 49%, peaking in 1988 (9.93%) with an increase of prevalence with 25% from 1977. This increase was found to be statistically significant (p=.007246). After 90s , between 1997 and 2018, the prevalence of low birth weight reduced constantly , reaching the lowest value in 2017, (2.49%). In 2018, the prevalence was 2.77% representing an increase with 11% from 2017(2.49%). This decrease in the low birth weight rates(≈ 64%) during the 1997-2018 period was found to be statistically significant (p=.000).The newborns with weight from 2000 – 2499gr represented 73.53% of low birth weight babies. The prevalence of newborns with very low birth weight (<1500 gr) were 0.34 % in 1977, reaching the highest value in 1997, 0.75 % and lowest value in 2017, 0.1%. The babies born with very low birth weight were 5.51% of all low birth weight infants. The prevalence of newborns with extremely low birth weight (<1000 gr) were 0% in 1977, 0.08 % in 1978, increase 0.3% in 1988, reaching the highest value, and drop to 0% in 2017-2018. (Table 3) The babies with extremely low birth weight represented 1.66% of all babies born with low birth weight.

Data about yearly distribution of low birth weight by sex and area are shown in Table 2.There was a statistically significant difference between male and female low birth weight newborns rate. (p =.000) Female babies born at low birth weight are more than male ones. The female newborns have a risk to be with low birth weight 1.31 times more than the boys.(RR=1.31) The female sex of a baby has a significant correlation with low birth weight.(OR=1.34 95%CI: 1.2087 to 1.4760P < 0.0001)The rate of low birth weight newborns was higher in urban than rural areas in 70s, and after 2007s are more babies born with low weight in rural than urban areas, reaching the highest value in 2017, 80%. However, there wasn't any significant difference between urban and rural area rates (p=0.0522)

The mortality rate for the low birth weight newborns were 4.88% in 1977, 13 % in 1978, reaching the highest value, and drop to 0% in 2018. (Table 5) The risk that a low birth weight newborn to die in the period 1977-1988 (before 90s) was 1.37 times more than in the period after 90s(1997-2018). In 1977, 66.7% of all neonatal deaths were low birth weight deaths , 74% in 1978, 83% in 1997, 100% in 2017, 0% in 2018. (Table 4) (Figure 3) Among 113 low birth weight deaths, 62 were male and 47 were female. According to our data, low birth weight male newborns was 1.63 time more likely to die than female ones.(OR= 1.68; 95%CI : 1.1385 – 2.4934 ; P=.0091) 71 % of total deaths are low birth weight infants, or 2.5 time more than normal infants deaths (28.93%).

This difference was statistically significant. (p= .000) The percentage of mortality in very low birth weight infants for period 1977-1988 and 1997-2018 was 21.05% and 29.09%, respectively. The percentage of mortality of the newborns with extremely low birth weight for period 1977-1988 was 77.78 %, for period 1997-2018 was 40%.

The prevalence of low birth weight newborns from teenage mothers from 19% in 1977, go to 36% in 1988, reaching the highest value and drop to 0% in 2017-2018.(Figure 4) There is a correlation of low birth weight with young age of mother (OR=2.28 95%CI: 1.71-3.04 P<.0001) The babies born from mothers aged < 18 years old are two times more likely to be with low birth weight than those born from mother aged >18 years old.(RR=2.08)

The prevalence of low birth weight in multiple pregnancies was 53% in 1977-78, reach the peak in 1998 with 63.6% and then drop slowly to 26% in 2017,reaching the lowest value. In 2018 rise 36%. (Figure 5) Multiple pregnancies were significantly associated with low birth weight.(OR=16.63 95%CI: 14-19.74 p =.000) The odds that babies to be low birth weight was 8 times higher in multiple pregnancies than in singleton pregnancies.(RR= 8.31)

Between 2017-2018 out of 95 low birth weight, 38 (40%) were singleton premature babies with low birth weight and 40 (42%) babies born in term with low birth weight. The preterm deliveries were significantly associated with low birth weight (OR= 38.09 95% CI: 23.04-62.96 P <.0001).The odds that babies to be with low birth weight were 25 times higher in preterm deliveries than in term ones.(RR= 25)59 (62%) babies born from unemployed mothers, 5 (5.3%) from employed ones and 19 (20 %) from mothers who had paid health insurance. There was correlation between mother's unemployment status and low birth weight. (OR= 1.74 95%CI: 1.07 - 2.81 P= 0.024) The odds that babies to be born with low birth weight was 1.71 times higher in unemployed than employed mothers. (RR= 1.71)

IV. DISCUSSION

This study was undertaken to help us to get an insight into low birth weight, to estimate low birth weight trend in Elbasan. Information on low birth weight rates can help policymakers assess the efficacy of the current strategies. There are not many studies done on Elbasan population to estimate prevalence of low birth weight. It is the first time that such a study has been conducted in a regional hospital in Albania and in Elbasan. This study examines and summarizes the changes in low birth weight rate and identifies the main risk factors predicting occurrence of low birth weight in Elbasan, Albania. There are limited evidence on factors contributing to low birthweight in Elbasan. It is important to well-known those risk factors to identify high risk mothers early.

Data of our study show that low birth weight rateincreased in 1987 -1988, reaching its high level, after declining from 1977-1978.Thesechanges in prevalence can be explained with economic recession happening in Albania after the 80s. Between 1997 and 2018 low birth weight rate reduced with 63.88%;The steady declining after 90s can be explained with socioeconomic changes and improvement in access and quality of prenatal care.

The rate of low birth weight, according to ISTAT, was 4.2% (2007) and 5.43 % (2008) in Albania , while, according to UNICEF and WHO, 4.7% (2007-2008) and 4.6% (2015).Our data show a prevalence 4.8% (2008) and 2.49% (2017). (13)(14) These discrepancies in the low birth weight rates could beexplained by : the economic status in Elbasan (according Instat, gross domestic production per capita was lower than national average)(15), the populations at greater risk of low birth weight, because of low economic level and early marriages, such as Balkan Egyptians (0.15% of resident population) and Romany (0.36% of resident population) (16) women, deliveries in University Hospital Center " Mother Tereza" and in private hospitals from women with high risk pregnancies and/or high income .The other factors decreasing the prevalence of low birth weight could be declining of the birth rate and selective abortion, which have impact in sex ratio.There was a strong positive correlation between total birth number and low birth weight number(R= 0. 9949 p=.000) and a weak negative correlation between sex ratio and low birth weight ratio (R= - 0.098 P=0.79). The number of babies with low birth weight decreased with the decrease of the births and the increase of the sex ratio. The total number of birthsdecreased with 31.59% from 1977 to 2018. Sex ratio in 1977 was 100.8% , in 1987 was 113%(the echography use in Albania began in 1984), in 2018 was 117%.Other studies should be undertaken, in order to investigate the effect of these factors on low birth weight. Compared with other countries, according to the latest available data, low birth weight rate in Regional Hospital of Elbasan (2.77% , 2018) is much more lower than rates of developed countries, such as USA (8.28%, 2018), UK(6.95%, 2018),Italy (7.25%, 2018), France(7.6%, 2018) and in Balkan such as Croatia(5.1%, 2017),Montenegro (5.5%, 2018),

Greece(9.6%, 2018), Serbia(4.5%, 2015).(17)(18)(19)Also, very low birth weight rates (0.4%, 2008 and 0.2%, 2018) were the slightly higher with the rates in Albania(0.24% ,2008)(14) and lower than some developed countries , such as USA (1.4%, 2018), Australia (0.9%, 2018).

Data of our study show that low birth weight mortality rate decreased from 4.87% in 1977 to 0% in 2018.The chance to survive before 90s in newborns with weight 500-999gr, 1000-1499gr, 1500-1999gr and 2000-2499gr was 22% , 78.95% , 86.39% and 96.72%, respectively, and after 90s was 60%,70.91%,94.07% and 98.04%, respectively.

Female babies are 1.31 times more prone to have low birth weight than male babies.This finding is similar to those reported in other studies, that have shown that prevalence of low birth weight was more among females than in male babies and that female sex of the baby is one important factor contributing to low birth weight for developed and developing country. (20) (21) Other authors have not found this correlation.(22) (23)

The strong correlation between low birth weight and infant mortality is documented from a plethora of studies.(24)(26-28) Our finding provide further evidence in this association. Mortality was significantly higher in low birth weight babies. Our data indicated a significant correlation between low birthweight and neonatal mortality.(Table 5)

The prevalence of low birth weight was high among multiple pregnancies. This finding is similar to those reported by other studies. (23) (24) (25)

The prevalence of low birth weight was high among teenage mothers.Data from our study show that there is a correlation of low birth weight with young age of mother. Teenage mothers are more prone to have low birth weight babies(p=.000) and babies born from them are 2 times more risky to have low birth weight. This finding is consistent with that reported in some studies.(22)(26)(27)Other studies show mothers younger than 20 years appear to be at greater risk of bearing small babies, but the former effect is no longer important when parity is controlled.(29) Other authors has not found this correlation.(23)(30) or have found that the independent effect of maternal age on the frequency of low birth weight could be significant as age at first childbirths falls below 16 years of age.(31) (32)

The data of our study show that gestational age less than 37 weeks was positively associated with low birth weight and infants born premature (before 37 weeks) were 25 times more likely to have low birth weight than those born in term (37-40 weeks). (p=.000) This finding is consistent with that reported in other studies.(22)(33)(34)

There was correlation between mother's unemployment status and low birth weight. This finding is consistent with that reported in some studies. (36) Other authors haven't found any correlation. (34)(35)

The findings in this study are subject to some limitations.

First, data for maternal demographic characteristics, such as live-birth order, socio-economic and marital status, maternal lifestyle and health characteristics and medical services utilization are not included.

Second, not including of the mother's race as the topics of the current study is another limitation. Data for low birth weight babies of Balkan Egyptians and Romany women are not reported separately, so the substantial differences between babies born from white women and them are not analyses.

Third , before 90s there were medical center in rural areas where the women could give birth to a child and after 90s many women prefer to give birth in public or private hospitals in Tirana, especially those with high risk pregnancies or with high income. Not including the data of these deliveries is another limitation.

Last, the time period every 10 years might not reflect the exact trend of low birth weight rates.

V. CONCLUSION

The progress in reducing low birth weight rates has been considerable, compared to period before 90s. Although significant decline, after 2012 no considerable progress has been made in reducing low birth weight prevalence and Elbasan is off- track to reach low birth weight target 2025.

There are a lot to do to reach the Global Nutrition target 2025. To meet the global nutrition target will require continuous monitoring of the data on low birth weight, identifying other factors that affect its occurrence, such as antenatal care utilization and populations at greater risk of low birth weight, especially high risk teenage mothers, planning and taking appropriate intervention in improving socio- economic status and health status of the community and in education of new mothers, especially Balkan Egyptians and Romany women and those from low income family.

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Table 1: Yearly distribution of mean birth weight and low birth weight

Years	Mean birth weight	Mean low birth weight
1977	3194	2159
1978	3225	2127.7
1987	3164	2093
1988	3151	2084
1997	3271	2016.6
1998	3258	2083
2007	3309	1989
2008	3293	2087
2017	3390	2157.6
2018	3392	2133.6

Table 2: Yearly distribution of total live and low birth weights deliveries and its distribution by sex and area.

Year	Total live births	Low birth weight No(%)	Male No(%)	Female No (%)	Urban No (%)	Rural No (%)
1977	2586	205(7.93)	88(42.92)	114(55.61)	116(56.58)	89(43.41)
1978	2362	150(6.35)	74(49.33)	68(45.33)	93(62)	57(38)
1987	3150	299(9.49)	135(45.15)	161(53.85)	139(46.49)	159(53)
1988	3415	339(9.93)	150(44.25)	176(51.92)	147(43)	180(53)
1997	2673	206(7.71)	86(41.74)	117(56.80)	109(53)	97(47)
1998	2783	208(7.47)	92(44.23)	111(53.36)	104(50)	103(49.52)
2007	2219	109(4.91)	47(43.12)	62(56.88)	40(37)	69(63)
2008	2102	100(4.76)	46(46)	54(54)	45(44)	55(56)
2017	1847	46(2.49)	16(34.78)	30(65.21)	9(19.6)	37(80)
2018	1769	49(2.77)	18(36.73)	31(63.26)	20(40.81)	29(59.18)

Table 4 : Yearly distribution of the percentage of low birth weight , very low birth weight and extremely low birth weight

YEARS	Low birth weight total	2000-2499 gr	1500-1999 gr	1000-1499 gr	500-999 gr
1977	7.93	6.1	1.4	0.34	0
1978	6.35	4.9	1.2	0.2	0.08
1987	9.49	7	1.9	0.3	0.2
1988	9.93	7.1	2	0.4	0.3
1997	7.71	5.1	1.76	0.75	0.04
1998	7.47	5.78	1.11	0.43	0.1
2007	4.91	3.20	1.13	0.45	0.13
2008	4.76	3.6	0.8	0.4	0.05
2017	2.49	1.95	0.4	0.1	0.05
2018	2.77	2.1	0.4	0.2	0

Table 5: Yearly distribution of neonatal mortality rate in low birth weight newborns and of total deaths rate that are LBW.

Year	Mortality rate in LBW	% oftotal deaths that are LBW
1977	4.88	66.7
1978	13	74
1987	5.68	65
1988	7.96	75

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1997	4.85	83
1998	6.25	65
2007	7.34	66.6
2008	7	70
2017	2.17	100
2018	0	0

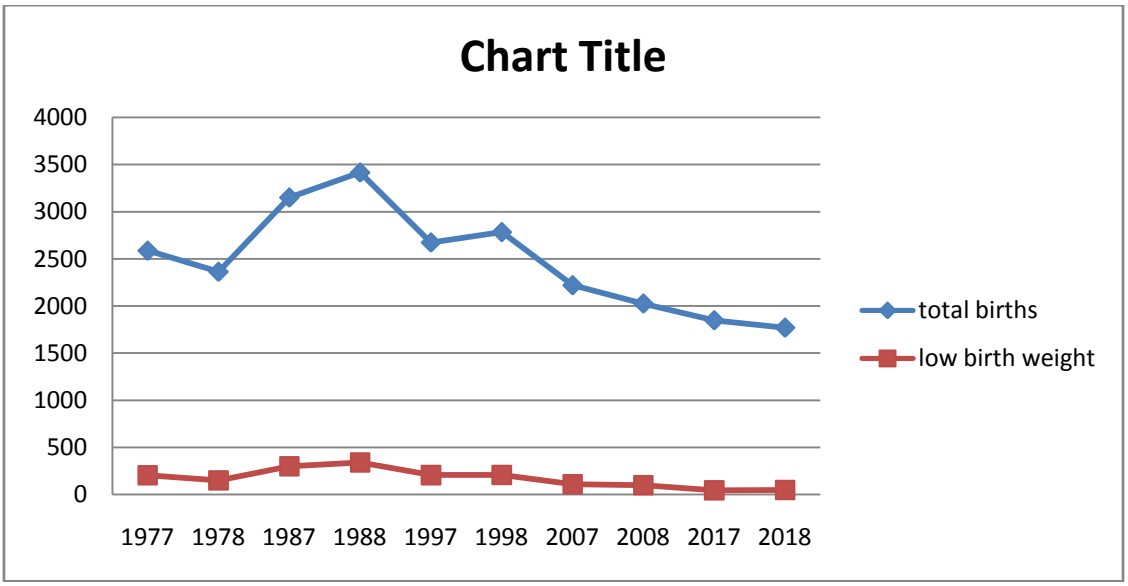

Figure 1 : Trends of total births and low birth weights rates

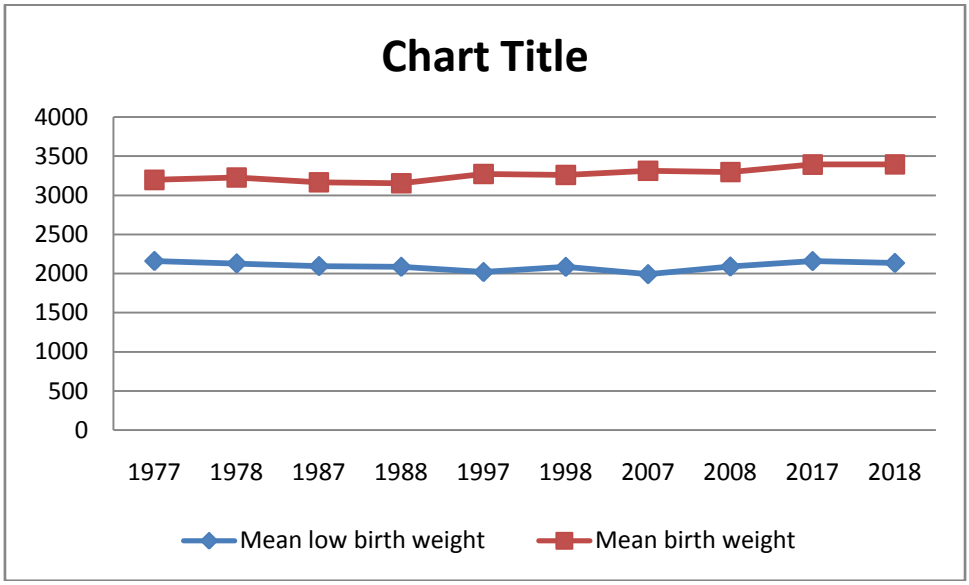

Figure 2 : Yearly distribution of mean birth weight and low birth weight

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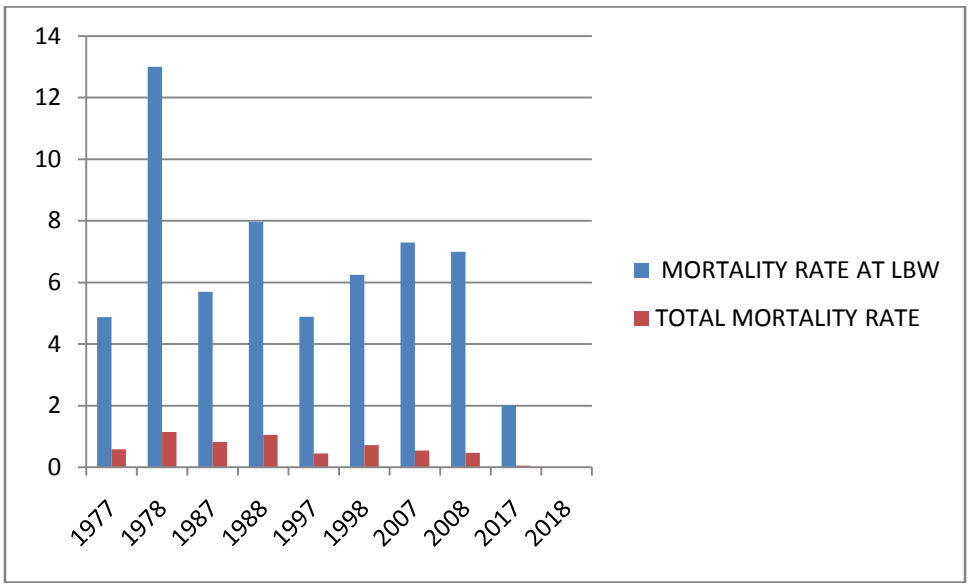

Figure 3 :The total and low birth weight mortality rate. The p-value is based on a t-test (p=.000)

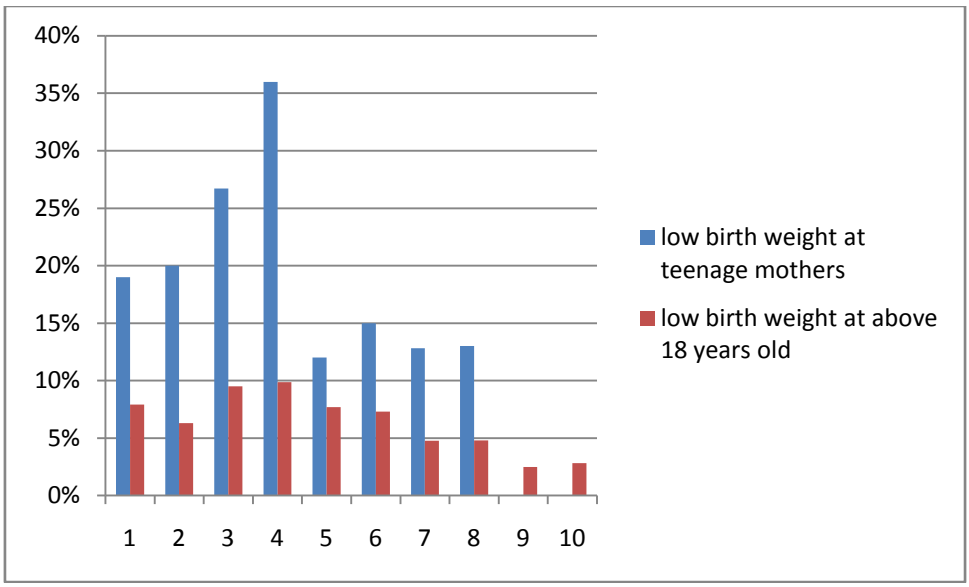

Figure 4: Low birth weights by age, at mothers < 18 and > 18 years old. The p-value is based on a t- test (p= .02)

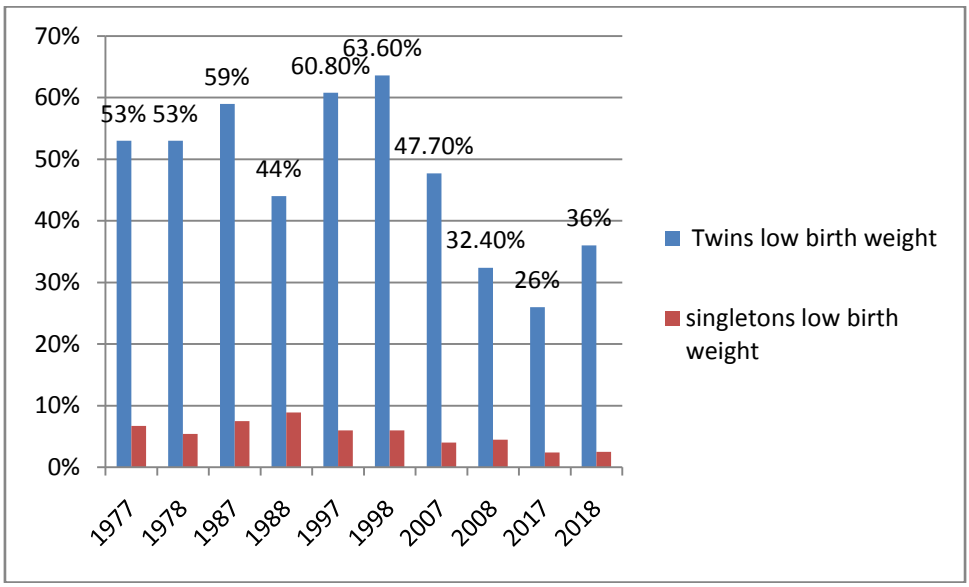

Figure 5: Low birth weight at singleton and multiple pregnancies . The p-value is based on a t-test (p=.000)

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