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Trends in birth weight and the prevalence of low birth weight in a tertiary care hospital,Chennai

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I. Introduction

Birth weight is an important determinant of child survival and development. It is also a subject of clinical and epidemiological investigations and a target for public health intervention. Low birth weight is an important determinant of childhood morbidity and mortality. Child's birth weight is a significant factor which determines vulnerability for risk of childhood illness and childhood survival. Children who are born with weight < 2.5 kg are vulnerable for dying during their early childhood . The immediate sequlae of low birth weight is Respiratory failure, hypoxia, Intraventricular hemorrhage . Consequences of low birth weight trek into adulthood causing a range of chronic diseases like Ischaemic heart disease, Stroke, Hypertension, Diabetes, metabolic syndrome, malignancies, dementia, osteoarthritis [1] In 2013, nearly 22 million newborns, an estimated 16 percent of all babies born globally had low birth weight [2]. Highest incidence of low birth weight occurs in the sub-region of South-Central Asia, where 27 % of infants are low birthweight and among these countries India and Bangladesh has the highest prevalence of 30% [2].Major risk factors for low birth weight is Maternal age, Poor maternal nutritional status, Non pregnant weight ,Parity , Educational status, Lack of Antenatal care , Very low socioeconomic status [3]. Assessing the trend of low birth weight will be an important key to identify the predominant risk factor and intervene .This study reveals trend in birth weight and the prevalence of low birth weight in a tertiary care hospital.

Objective
Primary Objective

1.To find the changing trend in birth weight
2.To estimate the prevalence of low birth weight

Secondary Objective:
To investigate the trend in caesarean section

II. Materials and Methods

Study population

- Retrospective analysis of deliveries from the year 2000 – 2013 in a tertiary care hospital

Study place:

- ESIC hospital, Chennai

Study design
Descriptive study design

Operational Definitions[1]
Normal Birth weight = 2.5 – 4 Kg
Low birth weight = < 2.5 kg
Very low birth weight = < 1.5 kg
Extremely low birth weight = < 1 kg
Male Female Sex ratio is defined as number of females per thousand males [4]

Inclusion Criteria
Singleton Deliveries
Exclusion Criteria

Multiple births

Sampling procedure

- Secondary Data
- Purposive sampling
- Data was collected from Parturition Registers from 1/1/2000 to 31/12/2013.

Sample size

- All singleton deliveries, details of which was obtained from Parturition Register for a period of 14 years from 1/1/2000 to 31/12/2013 .

Data collection

- This was a retrospective analysis of 19,223 deliveries from the January 2000 to December 2013 , a period of 14 years at ESIC Hospital, K.K. Nagar, Chennai, Tamilnadu, South India. This hospital caters to factory workers and families whose income is less than 15,000 per month. There are 20 Dispensaries in and around Chennai attached to ESIC Hospital. The required information related to study variable that is the age of the patient, Parity , Mode of Delivery (Normal vaginal delivery, Instrumental Delivery, Caesarean Section), Mean birth weight of the baby, Sex of the baby were entered in a pre-designed schedule.

Analysis plan

The information collected regarding all the selected cases were recorded in a Excel . Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. Using this software range, frequencies, percentages, means and standard deviations were calculated Summarize the type of analysis (e.g., descriptive, analytical, stratified, multivariate) that you plan to carry out. Mention laboratory analysis if they will be part of the study.

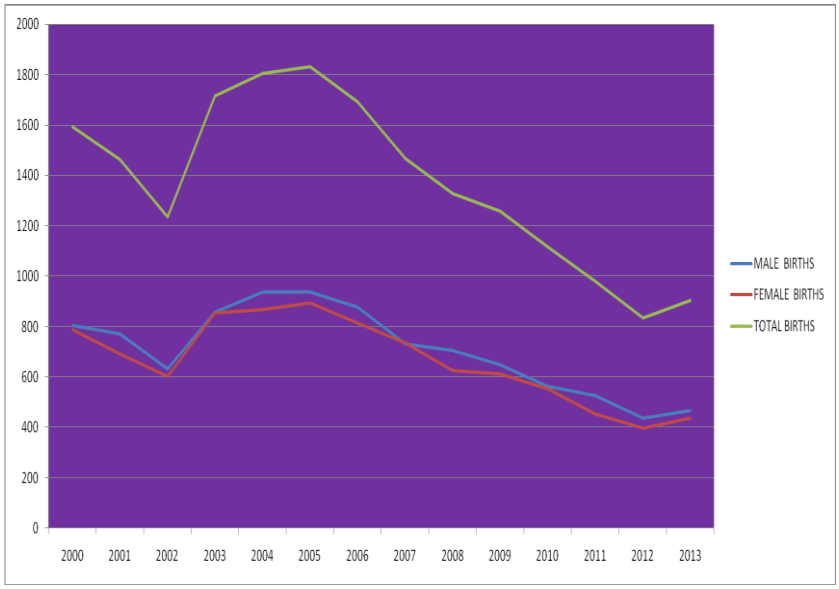
III. Results

Retrospective analysis of 19223 was included in the study.

Table 1 : Year wise delivery details

Year	Total deliveries						Primi		Multi		Mean Birth Wt. (kgs)			Low B.Wt. %	LSCS %
	Male		Female		Total	Sex ratio									
	No.	%	No.	%			No.	%	No.	%	Male	Female	Total		
2000	806	50.6	788	49.4	1594	978	685	43.0	909	57.0	2.84	2.77	2.8	31.9	36.1
2001	771	52.7	692	47.3	1464*	898	624	42.6	840	57.4	2.86	2.8	2.83	28.6	31.5
2002	633	51.3	601	48.7	1234	949	580	47.0	654	53.0	2.85	2.77	2.81	29.6	31.7
2003	859	50.1	856	49.9	1715	997	808	47.1	907	52.9	2.85	2.77	2.81	28.3	35.1
2004	936	51.9	869	48.1	1805	928	835	46.3	870	53.7	2.86	2.78	2.82	27.6	39.1
2005	937	51.1	895	48.9	1832	957	834	45.5	998	54.5	2.89	2.77	2.83	26.1	37.3
2006	876	51.8	815	48.2	1691	930	691	40.9	1000	59.1	2.82	2.77	2.8	29.9	36.9
2007	732	49.9	736	50.1	1468	1005	618	42.1	850	57.9	2.87	2.79	2.83	27.7	38.4
2008	705	53.1	624	46.9	1329	885	594	44.7	735	55.3	2.92	2.82	2.87	21.1	43.6
2009	648	51.5	611	48.5	1259	943	532	42.3	727	57.7	2.93	2.79	2.86	23.4	42.6
2010	563	50.5	553	49.5	1116	982	497	44.5	619	55.5	2.9	2.81	2.85	22.7	50.2
2011	525	53.6	454	46.4	979	868	402	41.1	577	58.9	2.94	2.89	2.92	18.0	52.9
2012	437	52.5	396	47.5	833	906	347	41.7	486	58.3	2.97	2.88	2.93	17.8	50.2
2013	468	51.8	435	48.2	904*	929	438	48.4	466	51.6	2.97	2.88	2.93	16.3	51.4
Total	9896	51.5	9325	48.5	19223 *	942	8486	44.1	10737	55.9	2.88	2.8	2.84	25.8	40.0

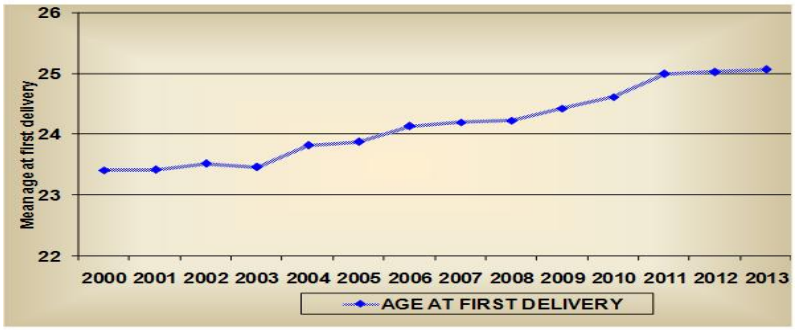
YEARWISE BIRTH GRAPH



Over the years, there is a gradual decline in the total number of births, though there is no significant difference between male and female births.

Table 2 :Age distribution of mother

Age group	Cases	
	No.	%
< 20 yrs	321	1.67
20 – 24 yrs	8238	42.85
25 – 29 yrs	8044	41.85
30 – 34 yrs	2246	11.68
35 yrs & above	374	1.95
Total	19223	100



More than 80% of the Mother's are in the age group of 20- 29 years. Less than 2% of the mother's were in the Teenage group and around 1.95% belongs to Elderly group.Mean age of first delivery has gradually increased over the years from 23 to 25 years.

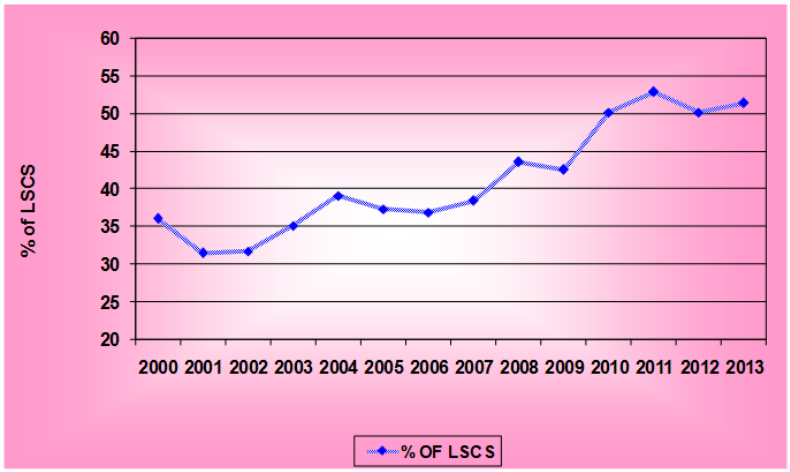
Table 3 :Parity

Parity	Cases	
	No.	%
Primi	8486	44.15
Multi	10737	55.85
Total	19223	100

Table 4 :Mode of delivery

Mode of delivery	Cases	
	No.	%
Normal vaginal delivery	11040	57.4
LSCS	7684	40.0
Instrumental	499	2.6
Total	19223	100

The normal vaginal delivery percentage in our study was found to be 57.4%, with instrumental deliveries accounting 2.6%. There is a 40% prevalence in LSCS.

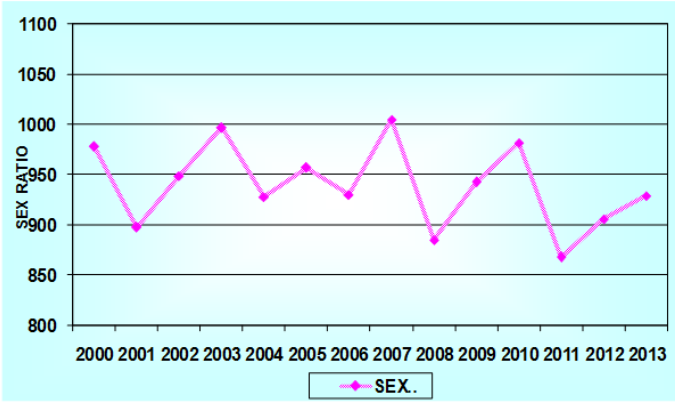


There is a gradual increase in the caesarean section rate over the past 14 years and it has stabilized around 50% for the past 4 years.

Table 5 :Sex of baby

Sex of baby	Cases	
	No.	%
Male	9896	51.5
Female	9325	48.5
Total	19221*	100

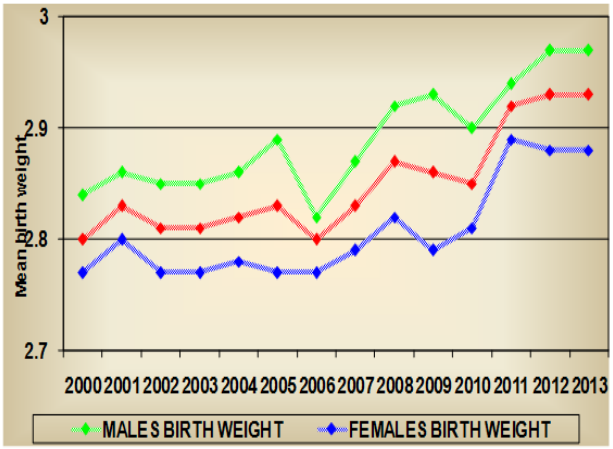
*There were 2 ambiguous cases



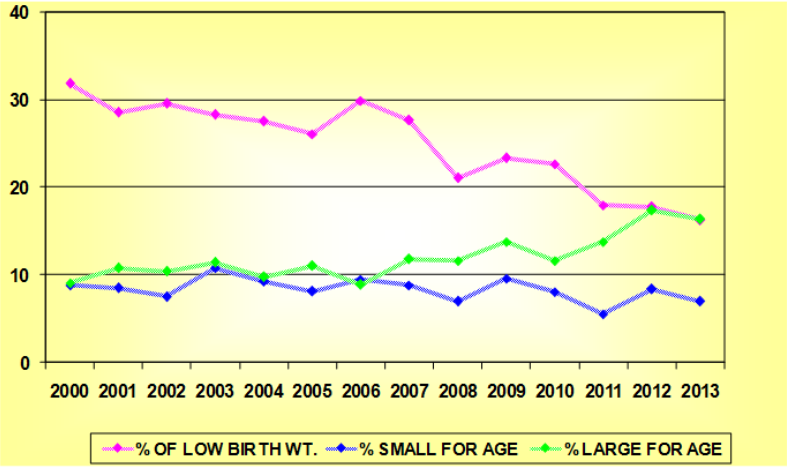
There is no significant increase or decrease in male female sex ratio

Table 6 :Birth weight

Birth weight	**Birth weight**					
	Male		**Female**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**
Extremely Low Birth Weight(< 1kg)	7	0.07	7	0.08	14	0.07
Very Low Birth Weight(1-1.5 kg)	38	0.38	35	0.38	73	0.38
Low Birth Weight (1.5 – 2.5 kgs)	2205	22.29	2670	28.63	4875	25.37
Average Birth Weight (>2.5 kgs)	7645	72.29	6613	70.92	14259	74.18
Total	9896	100	9325	100	19221	100



There is a significant increase in the male and female birth weight over the past 14 years .



There is a significant decrease in low birth weight over the years mentioned in the study .

Year	Male B.Wt(kgs)	Female B.Wt(kgs)	Total B.Wt (kgs)	Mean age at first delivery	Lbw %	Lscs %
2000	2.84	2.77	2.8	23.41	31.9	36.1
2001	2.86	2.8	2.83	23.42	28.6	31.5
2002	2.85	2.77	2.81	23.52	29.6	31.7
2003	2.85	2.77	2.81	23.46	28.3	35.1
2004	2.86	2.78	2.82	23.82	27.6	39.1
2005	2.89	2.77	2.83	23.88	26.1	37.3
2006	2.82	2.77	2.8	24.14	29.9	36.9
2007	2.87	2.79	2.83	24.2	27.7	38.4
2008	2.92	2.82	2.87	24.23	21.1	43.6
2009	2.93	2.79	2.86	24.43	23.4	42.6
2010	2.9	2.81	2.85	24.62	22.7	50.2
2011	2.94	2.89	2.92	25.0	18	52.9
2012	2.97	2.88	2.93	25.03	17.8	50.2
2013	2.97	2.88	2.93	25.07	16.3	51.4
'p'	**< 0.0001**	**< 0.0001**	**< 0.0001**	**< 0.0001**	**< 0.0001**	**< 0.0001**
Significance	**Significant**	**Significant**	**Significant**	**Significant**	**Significant**	**Significant**

IV. Discussion

In the present study of 19,223 deliveries,Mean birth weight was 2840 grams , which was similar to National Family Health Survey 3 data from 2005 – 2006 analysed by Kader *et al*, in a study population of 20,946 which showed the Mean Birth weight was 2844 +/ - 683 grams.[5]

Two South Indian studies one in Vellore, TamilNadu (March 2009 – 2010) and another in Bangalore (2003), showed that the Mean birth weight was 2900 grams and 2775 grams respectively which is almost equal to the present study.[6] [7]

Ashtekar *et al* in 2010 studies 2586 deliveries from 1989 – 2007 and found that the Mean Birth weight of Male child was 2720 grams and that of Female child was 2700 grams, whereas in our study it was 2880grams and 2800 grams respectively. [8]

Both shows a gradual increasing trend from the year 2000 to the year 2013 , almost a 100gram, and this increase is statistically significant

Percentage of Low birth weight babies in our study is 25.8%. According to UNICEF 2011 report, an estimated 20 million infants are born annually in the world with Low birth weight, with 16.5% in developing countries and 7% in developed countries.In South Central Asia the prevalence is 27% and as per 2011 NFHS3 (National Family Health Survey -3) statistics- Prevalence of Low Birth weight babies in India is 21.5%.[9]

In the year 2000 it was 31.9% which has come down to 16.3% in 2013.The 'p' value is <0.0001 which shows statistical significance.

In other studies conducted in South India like in Vellore, TamilNadu (2009 – 2010), Belgaum , Karnataka (2012 – 2013), the prevalence of Low birth weight was 17% and 22.5 % respectively. Also in a study in Kuala Lumpur, Malaysia (Jan 2012 – Jun 2012) the prevalence was 11.08 % .[6] [10] [11]

But the duration of the study period in the above mentioned references were very short when compared to our study in which data was collected for 14 years.

The significant increase in birth weight and decrease in low birth weight over the years could be attributed to the better antenantal care provided in our hospital. We have taken measures to conduct special clinics to identify high risk pregnancies like anaemia, small for gestational age, preeclampsia which has a contribution to low birth weight babies and to treat them earlier. Also provided were adequate nutrition counselling to patients with the help of dietician.

Male Female Sex Ratio

In our study, the Male Female sex ratio was found to be 942, which was comparable to our Nations average of 940 as per 2011 Population Statistics Census of India. In the same year, India had a better sex ratio when compared to neighbouring countries like China (927) and almost equal with Pakistan (942).

A study conducted in Mumbai slums by Tragler *et al* showed a better male female sex ratio of 988 but the sample size of the study was only 698, whereas in our study it was 19,223. Also another study by Brogen *et al* showed a sex ratio of 900.[12] [13]

A better male female sex ratio of 942 ratio may be due to the working population in our study group with reasonable awareness about their staus in the society,and strict adherence to PCPNDT Act in our hospital but still efforts have to be taken to improve it as it is an important social indicator of women's status in the country.

Mean Age at first delivery

Useful indicator for gauging success of family planning programs aiming to reduce maternal mortality, increase contraceptive use – particularly among married and unmarried adolescents, improve health of newborns

Mean age at first pregnancy in our study is 24.15 years

Saibal Das *et al* in April 2013 , in his study on sociodemographic profile and antenatal coverage of mothers in a Block PHC in Rural Indore showed that 60% of mothers were less than 20 years of age during first pregnancy.[14]

Samiran Bisai in his study on Effect of maternal age and parity on birth weight among Bengalese of Calcutta showed that Mean age at first birth was 21.9 years.[15]

As quoted earlier kader *et al* and Paneru et al in their studies found that Mean age of mother was 25.9 and 23.2 respectively which correlates with our study which shows the mean age as 24.15.[5] [10]

In our study the mean age at first pregnancy is around 24 years which is relatively better when compared to Census Statistics of India, 2014, which is 19.9.

Mean age is useful indicator for gauging success of family planning programs aiming to reduce maternal mortality, increase contraceptive use – particularly among married and unmarried adolescents, improve health of newborns.

Caesarean Trends:

In our study , the **Caesarean Section** rate has increased from 36.1% in 2000 to 51.4% in 2013

Average Caesarean section rate is 40% and that of instrumental deliveries is only 2.6%. There is an overall increasing trend in Caesarean section.

ICMR Statistics – TamilNadu shows almost 15 % increase in the rate of Caesarean section from 1992 to 2006.

NFHS 1 (1992-93) - 7.1%

NFHS 2 (1998-99) – 17.5%

NFHS 3 (2005-06) – 23% [16]

Instituitional Deliveries has been increased in TamilNadu from 79.3% (ICMR NFHS 2) to 90.1% (NFHS-3).[17]

The overall increase in caesarean section rates can be attributed to increased External Fetal Monitoring facilities, Multiple pregnancy due to Assisted Reproductive Technology, and decreased Assisted Breech Delivery in case of Breech presentation. Epidemiological changes have also taken place with an older age group of women giving birth, some with co-existing medical conditions and many with higher body mass indices.[16]

V. Conclusion

1. There is a significant increase in birth weight of babies and decrease in Low birth weight in the study,this may due better antenantal care provided in the hospital..

2.There is Increase in Mean age at first delivery of mothers could be due to the study group being working population

3.The increase in caesarean section rates must not be ignored or dismissed lightly. If assessed in a structured way, the negative and positive
effects that this dramatic increase in caesarean section might have in the short and long term can be elicited.
4.Vaginal delivery though perceived by many to be the best mode of delivery for both baby and mother, very little information is collected on the
events and outcome and in particular the psychological impact of labour and delivery.
5.The issue is more complicated and the economics of childbirth is a subject that needs further development. What will help is a standardized,
prospective classification system of women requiring maternal care that can be used both for clinical events and outcomes as well as cost
effectiveness.

Recommendations

Special clinics should be conducted to identify high risk pregnancies like anaemia ,hypertension and gestational diabetes Identifying and treating Small for gestational age, Preeclampsia which has a contribution to low birth weight babies should earlier.
Counseling for appropriate and adequate nutrition to patients with the help of dietician can be given

Limitations

Our study is a retrospective analysis and confounding factors for low birth weight babies such as stature,maternal smoking (active and passive) and medical disorders are not correlated.

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