Maternal socio-demographic and economic factors of preterm babies born in Teaching Hospital, Jaffna, Sri Lanka

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Abstract
Background: Several maternal, socio-demographic and economic characteristics are associated with preterm birth.

Objectives: To assess the influence of maternal socio-demographic and economic factors on preterm deliveries in Jaffna, Sri Lanka.

Method: This is an institutional based prospective descriptive study conducted at the Teaching Hospital, Jaffna, Sri Lanka, from October 2015 to February 2017. A pre-tested questionnaire was used to study the association of maternal socio-demographic factors such as age, religion, marital status, education, and economic factors, such as employment, monthly income per person, and family type, to preterm deliveries. Preterm birth was categorized based on gestational age as very preterm (28 to <32 weeks) and moderate to late preterm (32 to <37 weeks). Data were entered and analysed using SPSS version 16.0.

Results: In our study 54.3% of preterm babies were males. Mean gestational age of the preterm babies was 35.0 ±1.9 weeks. Frequency of moderate to late preterm delivery was 91.9% (n=159). Mean birth weight of the preterm babies was 2.2 ±0.6 kg with the range from 0.8 to 4.2 kg. Of the mothers of the preterm babies 84.4% were 20- 34 years old, 72.3% were Hindus, 98.8% were legally married, 39.9% studied up to Grade 11, 86.1% were housewives, 62.4% received monthly income per person more than 4,340 Sri Lankan rupees (LKR) and 75.7% were living in extended family structure. No statistically significant association was found between maternal socio-demographic factors, economic status and gestational age of the preterm babies.

Conclusion: Maternal socio-demographic and economic factors had no significant influence on preterm deliveries in the Jaffna district of Sri Lanka.

(Key words: Socio-demographic status, Economic status, Very preterm, Moderate to late preterm)

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Introduction
Preterm birth is birth occurring before 37 completed weeks of gestation[1]. Rate of preterm birth ranges from 5 to 18% globally[2]. Furthermore, 60% of these preterm births occur in Africa and South Asia[3]. About 45–50% of preterm births are idiopathic, 30% are related to preterm rupture of membranes and 15–20% are elective[3]. Several factors are associated with preterm births, such as socio-demographic (maternal age below 16 and above 35 years, religion, ethnicity and educational level) and socioeconomic status (assessed using family income, employment and family type)[4]. Approximately 24,500 babies are born premature annually in Sri Lanka[5]. Despite advances of neonatal and obstetric care practices in Sri Lanka, the preterm birth rate in Sri Lanka still ranges from 10–15 per 1000 live births[5].

Objective
To assess the influence of maternal socio-demographic and economic factors on preterm deliveries in Jaffna, Sri Lanka.

Method
A prospective descriptive study was conducted in Teaching Hospital, Jaffna (THJ), Sri Lanka from October 2015 to February 2017 among babies born between 28[+1] and 36[+6] weeks of gestation. Preterm birth was categorized based on gestational age as very preterm (28 to <32 weeks) and moderate to late preterm (32 to <37 weeks)[3]. THJ is a tertiary care centre providing perinatal care services and special neonatal care. The government is the

principal healthcare provider and all health services are free.

Sample size was calculated by the symptom prevalence (11.5%) of Retinopathy of Prematurity (ROP) in a national study using the Daniel[6] formula and the 'p' is 11.5% according to Kiridana *et al*[7]. Level of confidence was 95% with z being 1.96 and the non- response rate was 10%. This led to a total sample size of 170. The mothers who were residing in Jaffna RDHS area, and delivered preterm babies in THJ were recruited for this study. The mothers who could be selected under inclusion criteria, and gave their consent were considered as sample of this study. The dysmorphic preterm babies were excluded from this study.

Pre-tested interviewer-administered questionnaire was used as the study instrument. Questionnaire included questions on socio-demographic (age, religion, marital status, education), and economic status of mother (employment, monthly income per person, and family type), and birth profile of preterm babies (gender, and birth weight).

Based on mother's Last Regular Menstrual Period (LRMP), the gestational age was calculated as it was on the delivery date. Birth weight of the preterm babies was categorized as extremely low

birth weight (ELBW) (<1000g), very low birth weight (VLBW) (1000-1500 g), low birth weight (LBW) (1500-2500 g) and normal birth weight (NBW) (more than 2500 g)[3].

Statistical analysis: Data were coded and entered in Statistical Package of Social Sciences (SPSS), version 16.0. The associations between categorical variables were analysed using Chi square test. In case of less number cells, Fisher Exact Test (FET) was used in place of Chi square test. $p < 0.05$ was considered statistically significant.

Ethical issues: Approval for the study was obtained from the Ethics Review Committee, Faculty of Medicine, University of Jaffna, Sri Lanka (J/ ERC/ 14/ 58/ NDR/ 0113). Informed written consent was obtained from the parents or guardians of the preterm babies. Confidentiality and anonymity of all records were ensured.

Results

A total of 7325 live births occurred during the study period in THJ. According to the convenient sampling method, out of 408 preterm babies born between 28^{+1} and 36^{+6} weeks of gestation, 173 preterm were recruited. Table 1 shows the birth profile of the preterm babies.

Table 1: *Birth profile of preterm babies (n=173)*

Variable	Very preterm babies		Moderate to late preterm babies	
	No.	%	No.	%
Gender				
Male	8	57.1	86	54.1
Female	6	42.9	73	45.9
Birth weight				
Extremely low birth weight (<1000g)	2	14.2	0	0.0
Very low birth weight (1000-1499g)	6	42.9	11	7.0
Low birth weight (1500-2500g)	6	42.9	95	59.7
Normal birth weight (>2500g)	0	0.0	53	33.3
Total	14	100.0	159	100.0

Very preterm: born from 28^{+1}-31^{+6} weeks of gestation, Moderate to late preterm: born from 32^{+0}-36^{+6} weeks of gestation

The frequency of moderate to late preterm babies in the current study was 91.9% of whom 54.1% were males. Mean gestational age of the preterm babies was 35.0 ± 1.9 weeks. Mean birth weight of the preterm babies was 2.2 ± 0.6 kg (range 0.8 to 4.2 kg), while the mean birth weight of moderate to late preterm babies was 2.3 ± 0.6 kg which was higher than the mean birth weight of the very preterm.

Table 2 shows the maternal socio-demographic and economic factors. The mean maternal age was 28.8 ± 6.4 years, ranging from 17 to 45 years. All the mothers who delivered preterm babies were Tamils and majority were Hindus, and married. All the

mothers of the preterm babies had studied at least up to grade five according to Sri Lankan curriculum. Majority were housewives, received household monthly income per person more than 4,340 Sri Lankan rupees (LKR) and were living in an extended family structure.

Table 3 shows the relationship between gestational age of the preterm babies and socio-demographic and economic factors related to the mother. Maternal socio-demographic and economic characteristics had no direct influence on the very preterm and moderate to late preterm deliveries which occurred in the Jaffna district.

Table 2: *Maternal socio-demographic and economic factors (n=173)*

Variable	Mothers n (%)
Maternal age (years)	
<20	08 (04.6)
20-34	146 (84.4)
35-49	19 (11.0)
Religion	
Hindu	125 (72.3)
Christian	48 (27.7)
Marital status	
Married	171 (98.8)
Unmarried	02 (01.2)
Education	
Grade 1- 5	11 (06.4)
Grade 6-10	58 (33.5)
Grade 11	69 (39.9)
Grade 12	19 (11.0)
Degree or above	16 (09.2)
Employment	
Employed	24 (13.9)
Housewives	149 (86.1)
Monthly total income per person (LKR)	
< 4340	65 (37.6)
≥ 4340	108 (62.4)
Family type	
Nuclear	42 (24.3)
Extended	131 (75.7)

*The minimum expenditure per person per month to fulfil the basic needs in Jaffna district of Sri Lanka in 2017 was 4340 LKR[30]. Hence, the low socio-economy was determined in the present study as 4,340 LKR

Table 3: *Relationship between gestational age of the preterm babies and socio-demographic and economic factors related to the mother*

Variable	Preterm babies *(n=173)*		Chi squared (p-value)
	Very preterm	**Moderate to late preterm**	
Maternal age (years)			
<20	02 (14.3)	06 (03.8)	20.976
≥20	12 (85.7)	153 (96.2)	(p= 0.129, FET)
Religion			
Hindu	11 (78.6)	114 (71.7)	0,303
Christian	03 (21.4)	45 (28.3)	(p=0.760, FET)
Marital status			
Married	14 (100.0)	157 (98.8)	-
Unmarried	0 (0)	02 (01.2)	
Educational level			
Below grade 12	10 (71.4)	128 (80.5)	9.488
Grade 12 and above	04 (28.6)	31 (19.5)	(p=0.486, FET)
Maternal employment			
Yes	01 (07.1)	23 (15.7)	0.742
No	13 (92.9)	134 (84.3)	(p=0.697, FET)
Monthly income per person (LKR)			
<4,340	07 (50.0)	58 (36.5)	1.003
≥4,340	07 (50.0)	101 (63.5)	(p=0.391, FET)
Family type			
Nuclear family	04 (28.6)	38 (23.9)	0.153
Extended family	10 (71.4)	121 (76.1)	(p=0.747, FET)

FET- Fisher Exact Test value

Discussion

This study aimed to find out the association of maternal socio-demographic and economic factors to very preterm deliveries and moderate to late preterm deliveries. However, paucity of data of very preterm deliveries has limited the interpretation between maternal factors and very preterm deliveries. Prevalence of moderate to late preterm babies in this current study was 91.9%, and the ratio between very preterm to moderate to late preterm was 1:11.4, while worldwide prevalence of moderate to late preterm babies was 84%[9], and the ratio between very preterm to moderate to late preterm was 1: 2.5[10]. High prevalence of moderate to late preterm deliveries recorded in our study indicate that antenatal mothers attend the improved and free obstetric care available in Jaffna district of Sri Lanka. In the current study, mean gestational age of preterm babies from Jaffna district was 35.0 ± 1.9 weeks, and it belonged to moderate to late preterm, similar to other studies[10,11].

In this study, prevalence of very preterm babies was 8.1% (n= 14). In a previous study in Jaffna district, Sri Lanka, in 2011, frequency of preterm birth was 4.9%, and preterm babies were not being categorized[12]. However, it was well observed in Gampaha district of Sri Lanka, where there was low frequency (8.6%) of very preterm babies[13]. It may be that free and good quality antenatal care at earlier gestations allowed prolongation of pregnancies in Sri Lanka. Majority (54.3%) of preterm babies in this study were male. It supported the finding that boys were more likely to be delivered preterm as illustrated by previous studies[9-11,14-16]. Several explanations have been proposed why pregnancies carrying male fetuses could have high risk of preterm birth, as boys are more likely to be conceived in the beginning of the fertile period in contrast to girls[17], even though sex differentiation begins at conception[14].

The mean birth weight of preterm babies belonged to LBW, and 59.7% of preterm babies were born with LBW. Similar to our findings, mean birth weight of preterm babies was of LBW in other countries[10,16,18]. Weight of the fetus is gained during the latter part of pregnancy[19]. In this study too, the mean birth weight of moderate to late preterm babies (2.3 ± 0.6kg) was higher than very preterm (1.4 ± 0.4kg) babies indicating that the distribution of gestational age to birth weight resulted from an increase in gestational length of preterm babies.

The mean maternal age was 28.8 ± 6.4 years, ranging from 17 to 45 years, and was similar to a previous study[18]. Mean maternal age of moderate to late preterm babies was 28.2 ± 5.6 years with a range of 17-45 years, and it differed in other studies[9,16]. Percentage of mothers aged <20 years who delivered preterm babies was 4.6% in this study and 13.2% in another study[5], while 11.0% of the mothers aged ≥35 years delivered preterm babies in current study and it was 14.4%[15] and 27.6%[20] in other studies. These findings indicate that the association between preterm babies and maternal age remains controversial. However, in the Jaffna district, 84.4% of the maternal population was between 20-34 years and only 4.6% were <20 years (Table 2), which is similar to other parts of Sri Lanka[8].

In this study all the mothers who delivered preterm babies were Tamils and majority were Hindus (72.3%) and the rest were Christians which is due to the population distribution in the Jaffna district, where the majority (83%) of people are Hindus[21]. Usually, in Jaffna, it is common to have children after the marriage, which is also common in the rest of the country as well, due to cultural and traditional values of the country. It is supported by this study as only 1.2% (n=2) of the mothers were unmarried and delivered babies. However, none of the unmarried mothers of Jaffna district delivered preterm babies in very preterm gestation (Table 4), which is similar to mothers from the rest of the country[22]. These findings lead to the conclusion that unmarried mothers do not have a positive correlation with the risk of having preterm babies. However, marital status was considered a risk factor among mothers from other countries[15,20].

Considering the educational level, all mothers of preterm babies had studied up to grade five, while among mothers who delivered very preterm babies (n=14), majority (n=10) had school education below Grade 12. However, higher educational level of mothers had no influence on preterm birth[23], while preterm births increased among highly educated mothers[24]. Further, no significant association was found between education and gestation (p=0.486) (Table 3), similar to mothers in other countries[5,15]. These findings indicate that school education is insufficient to give information on preterm delivery, while there had been great impact on mothers by advice provided by antenatal clinics conducted by the Medical Officer of Health (MOH) on healthcare during pregnancy

Majority (86.1%) of mothers were housewives in this study. Among employed mothers, 91.7% (n=22) were aged between 20-34 years, while 89.5% (n=17) of over aged mothers were housewives. Results indicate that employment was not the reason for delaying pregnancy in the Jaffna district. Maternal employment including standing, repetitive bending, climbing stairs, lifting heavy objects, etc. during pregnancy can cause placental abruption and results in preterm delivery[25]. Such

tasks are commoner among self-employed mothers and housewives. However, in the present study it was observed that maternal employment had no significant influence on gestational age of preterm birth (Table 3), similar to other studies[26,27]. However, working mothers in industrial countries[5,15,28] had increasing risk of preterm birth due to exposure of mothers to unsafe material.

Inequality of family income affects health services obtained during pregnancy from private and government sectors. The poverty line in Jaffna district for 2017 was LKR 4340 (23.54 USD)[29], while mothers with low financial status use available resources such as nutritious food, treatment, frequent visit to clinics, and maternal stress as well[30]. In this study, majority (37.6%) of the mothers received total monthly income of LKR 15,000-19,999, and lowest frequency (3.5%) of the mothers were getting LKR below 5,000, while mean monthly household income was LKR 18, 917 in 2009/ 2010 in Jaffna district of Sri Lanka[31]. Further, the range of total monthly income per person was in wide range, i.e. between 833 to 8,750 LKR. However, no significant association was found between total monthly income and gestational age, similar to other studies[5,27]. Such observations among mothers in this study could be due to the free 'Mother and Baby Care' services provided during antenatal period in Sri Lanka by the Medical Officer of Health (MOH) and Government hospitals, and family members might help the mothers not financially but also in some other ways, i.e. maintaining vegetables garden for food/ rearing household animals; that is why those mothers were able to live with such total monthly income as they reported and mentioned in Table 2.

Majority (75.7%) of mothers were living in extended families (Table 2), showing the tradition of the Jaffna district community, and the extended family had provided better pregnant care, similar to another Asian country, Pakistan[27]. Although there was a significant shift from extended families to a nuclear family system in Sri Lanka[31], this was not observed among mothers selected for this study. Interestingly, in Jaffna district, majority of teenaged (5 mothers out of 8) and over aged (15 mothers out of 19) mothers were living in extended families, may be to have better pregnancy care. Further, among employed mothers (n=24) too, 95.8% were living in extended families so as to continue the job during pregnancy. In addition, the family set up of mothers from Jaffna district did not have an impact on preterm delivery and no significant relationship (Table 3).

Among mothers receiving the lowest income (n=65), 87.7% (n=57) were attached to extended families. Total monthly household income between LKR 10,000-14,999 of mothers living in nuclear family was 11.6%, while it was between LKR 15,000- 19,999 among 40.4% of mothers attached to extended families. However, other members of those extended families might help the mothers not financially but in some other way, i.e. individual support to maintain pregnancy health/ maintaining vegetables garden for food/ rearing household animals. Besides, Ministry of Health, Sri Lanka issued nutritious foods for pregnant mothers, named "National Nutrition Program for pregnant mothers". Hence, mothers from Jaffna district were able to live with such total monthly income.

Conclusions
Maternal socio-demographic and economic factors had no significant influence on preterm deliveries in the Jaffna district of Sri Lanka.

Acknowledgements

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