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Prevalence of Cesarian Delivery and Associated Factors among Mothers who Gave Birth at Public Hospitals, Jigjiga, Somali Regional State, Ethiopia

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ABSTRACT

Background: Caesarean delivery is a procedure used to save a mother's and fetus's lives when the labour situation becomes complicated. However, a wrong decision can substantially increase the rates of morbidity and mortality of the woman and the fetus. Purpose: the study aimed to assess the prevalence of cesarean delivery and associated factors.

Methods: A health facility-based cross-sectional study has been conducted. A systematic random sampling technique was used. A face-to-face interview was employed to collect data through a pre-tested and structured questionnaire. Descriptive statistics were counted on. A binary logistic regression was employed to assess factors associated with cesarean delivery. The odds ratio and corresponding 95% confidence interval 95% confidence intervals were used.

Results: The prevalence of cesarean delivery in this study is 27.4% (95% CI 23.3, 31.8%). monthly income 3,000-6,000 birr [AOR = 3.91 (95% CI: 1.50, 10.17)], previous cesarean delivery [AOR = 15.86 (95% CI: 8.01, 31.40)] and mother not directed counselling [AOR = 2.87 (95% CI: 1.46, 5.68)] are factors significantly associated. The prevalence of cesarean delivery uses is high. The obstetric factors occurring around delivery are the master ground leading cesarean delivery rather than the background characteristics. There is a low rate of pregnant mother counseling. We recommend interventions for the prevention of unnecessary primary cesarean delivery, counselling for pregnant mothers, particular emphasis on training all health care providers, and further investigation.

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Introduction

Cesarean delivery is a surgical procedure that incision is made through the mother's abdomen to deliver her baby when medically indicated Organization [1]. Cesarean delivery is an effective life-saving procedure for life-threatening complication occur, such as Ante-partum Hemorrhage (APH), fetal distress, abnormal fetal presentations and hypertensive disorders [2]. However; in the last several decades CS has inflated steadily worldwide from around 7% in 1990 to 21% at present, and continue increasing day-after-day over this decade [3].

Globally the number of mother having babies born through CS is rapidly growing in continues manner for both developed and developing countries, that currently has been estimated about twenty million CS occur yearly in the world [4]. According to global epidemiology of CS; data collected from 169 countries that stand 98.4% of worldwide births, 21.1% of all occurred by CS, that a range of 19.9-22.4% has been approximated to be unnecessary uses), or 29.7 million CS occurred in 2015, a state of doubling since 2000 [5].

However, CS dissimilarities health settings have been found. For instant; USA, an approximately, 1.2 million (29.1%) of all birth deliveries and UK, about 20% of mothers' pregnancy had been terminated were through CS [6]. The highest CS that have ever been reported is that in Brazil that revealed 55.5% of all live births were via CS [7].

A study carried out in Jordan showed that 27% of mothers were delivered by CS [8]. As shown study carried out in Kigali City, Rwanda the rate of CS significantly increased [9]. Sub-Saharan Africa (SSA); although the mean Cesarean delivery rate in SSA (5%) was shown the lowest rise, this rate is not representative of all regions [10].

Nationally; studies on cesarean delivery conducted in different settings showed substantial variations across administrative regions and places of delivery [11]. Although data from nationwide health survey in 2019 revealed that the prevalence of the CS to be 5.44% [12]. However; there are some areas that CS become a popular method preferred by mothers and husbands for example, the urbanized areas; CS rates are twice as high as the maximum level of WHO recommendation [13]. A number of studies have been conducted recently to determine CS rates and associated factors. Most of the studies have consistently found a substantial increase of the CS and most of them shown a result above the WHO recommended optimal range [14].

Complex factors contribute the rising CS rates and identifying these factors is the main challenging issue that hinders for interventions. Factors mostly associated with the increasing rates of CS deliveries are included having previous CS, Non-Reassurance Fetal Heart Rate (NRFHR), resident for urban and woman age residence and maternal age [4, 15]. other factors that have been also associated with the rise of CS are multiple pregnancy, woman's education, failed induction, weight of the baby pregnancy induced hypertension, Prolonged/obstructed labour and gestational age [16, 17].

Unprecedented rise of CS rates is a major public health concern. This seems to be a common problem in all low, middle and high-income countries. As a result; there is a growing concern about the current trends of the cesarean delivery. According to WHO resent research on CS; CS delivery uses continue rise globally continues to climb up globally, and current estimated for more than 1 in 5 (21%) of all deliveries. Conclusively; this inclination will persist over the coming decade at nearly 1 in 3 (29%) of all birth deliveries to be likely through this procedure by 2030 [18].

Recently, a more general solution has been proposed to reduce the unnecessary caesarean delivery. For instance, interventions, mostly through health education are recommended to reduce unnecessary CS, or only medically indicated with monitoring and evaluation. To be reduced unnecessary CS; WHO recommended non-clinical interventions targeted at pregnant mother, at health care givers and at health organizations, facilities or systems [1].

Most of the studies conducted health care settings in the country that aimed to determine the magnitude of CS had found above the optimal level. On the other hand, except a view national survey at community level, there was no hospital-based study conducted in this set up, as long the investigators' knowledge, and the prevalence of CS and associated factors were not clear. Therefore, the aim of this study was to assess cesarean delivery rate and to define potential factors that can contribute unnecessary CS at selected public hospitals, in order to yield evidence for health policy towards the improvements of maternal health services.

This study discoveries the rate cesarean delivery, which is the pathway to reduce unnecessary CS. In addition, this study generates new information on the gaps exist in the maternal health-care services, especially, pregnant mother counselling and health education program. It is obviously crucial for implementing WHO recommendations on non-clinical interventions targeted at pregnant mother, at health care givers and at health organizations, facilities systems to reduce cesarean births.

This study benefits primarily pregnant mothers. It also supports health policy makers and stakeholders for decision-making in planning and implementing non-clinical interventions to reduce unnecessary cesarean deliveries, and establishing interventions to improve obstetric services and create conducive environment towards mothers and the newborn babies. It will serve as a base line for other researchers who interest for the topic.

Material and Methods

This study, a health-facility based cross-sectional study design was used. It has been conducted at two public hospitals in Jigjiga city administration from September 01-30, 2022. Jigjiga is the capital city of Somali regional state, and it is located in the eastern part at 628 km away from Addis Ababa, the capital city of Ethiopia. The mothers who give birth at public hospitals were considered source population. Those mothers who have hearing ability and agreed to consent were included.

Single population proportion formula was employed for the sample size determination, taking a prevalence value of 33.1% from previous study, and the parameters bellow, 95% CI and 5% margin of error [17]. By considering non-response rate, 5% of the sample was added and the final sample size is 357. There are 3 public hospitals in Jigjiga city administration, two of them are currently providing CS services, thus they have been selected for this study.

The sample was allocated proportionally to each hospital considering the expected client size based on the previous month. Finally, a systematic random sampling technique was used to interview the participants who fulfilled the inclusion criteria. The data collection tools used for this study were structured questioner that have been developed by reviewing applicable literature [16, 19]. The data collection was carried out through a face-to-face interview by trained midwives.

This study's variables; cesarean delivery is the dependent variable, and the independent variables – socio-demographic factors (age, marital status, educational status of respondent, educational level, occupation, residence, socio-economic status. Obstetric other reproductive health related factors (gravidity, history of abortion, gestational age, ANC follow up, number of ANC visits, previous CS, mother counseling directed and onset of labor). Obstetric Complications: Complication type – (Fetal factors – male-presentation/male-position, non-reassuring fetal heart rate, Macrosomia, multiple pregnancy, and/or Maternal factors – hypertensive disorders of pregnancy, obstructed labor, PROM, CPD, ruptured uterus, prolonged labor, APH, gestational DM). The outcomes of the mother and the newborn related factors: mode of delivery, CS delivery type, decision for CS, number of newborns, maternal outcome, fetal outcome and baby weight.

In order to conserve the data quality, the collected tools had initially prepared in English, translated to local language, and re-translated again to English language to ascertain its consistent. 5% of the instruments was pre-tested in order to check whether the instrument is efficient enough to meet the objective of the study (to check for content validity). Before data collection, the data collectors and supervisors have been trained. To ensure the data quality and its completeness, daily follow up was used to carried out.

Operational Definitions

Cesarean delivery: in this study refers to an operational procedure that one or more fetus is/are delivered through mother's abdominal incisions. Elective cesarean delivery: delivering a mother through CS delivery without medical indications. Emergency cesarean delivery: in this study refers to a surgical procedure carried out because of an immediate threat to the life mother and/or fetus. Medical Complication: in this study, the mother was considered to have a medical complication if she had at least one medical problem/disease during that pregnancy. Obstetric Complication: In this study, mother was considered to have obstetric complications if she has at least one maternal or fetal complication during labor/delivery.

The data have been cleaned and coded before, and EpiData version 3.1 was employed for data entry and SPSS version 22 was used for analysis. Descriptive statistics have been computed Descriptive statistics were computed. Logistic regression was analyzed for association, Bi-variate analysis was done first to check crude odds, then variable with p-value less than 0.25 at this stage were considered as candidates and entered to multivariate analysis to check also adjusted odds. Odds ratio and accompanying 95% CIs were employed to identify the extent of associations between the explanatory variables and the outcome variable.

Resultants p-values less 0.05 have been considered as statistically significant. Multi-collinearity was checked by multi-collinearity diagnostic test for Variance Inflation Factor (VIF). The data have been described and presented using narrative text, tables, graphs and charts. Goodness of the fit of the model was checked by Homer-lemeshow goodness of test. Ethical approval was obtained. A support letter was provided to the respective organization. The data were kept confidentially.

Results

Table 1 shows participants' socio-demographic characteristics. A total of 343 women have participated this study with 96.1% response rate. The mean age of the women who participated in this study is 26.96 (+5.36 SD) with a range of 15-38 years of age. Two-third 260 (75.8%) of the participants were from urban areas. Educationally, one hundred twenty-nine (37.6%) of the mothers attended college and above. Occupationally; one hundred thirty-six (39.7%) of the respondents were Self-employed.

Variable	N	%
Age (years)		
15–19	31	9.0
20–24	63	18.4
25–29	125	36.4
>30	124	36.2
Level of Education		
Not educated	112	32.7
Basic education	102	29.7
College/above	129	37.6
Participants' Residence		
Rural	83	24.2
Urban	260	75.8
Monthly income (ETB)		
< 3,000	111	32.4
3,000-6,000	188	54.8
> 6000	44	12.8
Marital status		
Single Mother	23	6.7
Married	320	93.3
Occupational status		
Housewife	70	20.4
Self-employed	136	39.7
Government	68	19.8
GNOs	23	6.7
Student	46	13.4

Table 2 showed that the majority (81.9%) of the mothers who participated this study were multigravida. Approximately one-fourth (26.2%) of them had previous abortions. About 124 (36.2%) of the respondents had a history of previous cesarean delivery. Two hundred fourteen (62.4%) of the respondents had ANC follow up for that pregnancy. Of those who have ANC follow up; 45.8% of them had 3-4 visits. Majority of the mothers (56.0%) had Necessary information. Sixty-four (18.7%) of the mothers was less than 38 weeks. More than two-third (76.4%) of the participants' gestational age at delivery was 37-40 weeks and 5.0% of them had GA > 42 weeks.

Table 2: Obstetric and other reproductive health-related factors among mothers who gave birth at Public Hospitals, in Jigjiga city administration, eastern Ethiopia, September 2022, n=343

Variable	N	%
Gravidity		
Premi-gravida	62	18.1
Multi-gravida	281	81.9
History of abortion		
No	253	73.8
Yes	90	26.2
ANC follow up		
Yes	214	62.4
No	129	37.6
Number of ANC visits		
Zero visit	129	37.6
1 -2 visits	57	16.6
3 -4 visits	157	45.8
Mother directed		
Yes	192	56.0
No	151	44.0
Previous CS		
Yes	124	36.2
No	219	63.8
Gestational age		
< 37 weeks	64	18.7
37 -42 weeks	262	76.4
> 42 weeks	17	5.0
Labor onset		
Spontaneous	209	60.9
Induced	134	39.1
Baby Weight (In gram)		
< 2500 grams	74	21.6
2500-4000 gms	185	53.9
> 4000 grams	84	24.5

Table 3 describes; sixty-four (19.8%) of the study participants have experienced obstetric complications, 33.8% of the complication was obstructed labor while 26.5% of the complication was hypertensive disorders of pregnancy. How ever, majority (56.4%) CS delivery type is emergency. Regarding the decision; 80.9% of the CS decisions were physician decision, while 19.1% of the CS decisions were from the mothers' request. Of all mothers one

(0.3%) of them passed away. CS reasons; 66.0% were Maternal indication. 336 (98.8%) of the babies were alive. The mean weight of the babies was 3222.29 grams + 698.91 SD. Out of those alive new born, more than half (53.9%) of the new-born weights were between 2,500-4,000 grams of babies' Weight were between 2,500 – 4,000 grams.

Table 3: Obstetric complications and the Outcomes of the woman and the new born among mothers who gave birth at Public Hospitals, in Jigjiga city administration, eastern Ethiopia, Sept 2022

Variable	N	%
Obstetric complications		
No	275	80.2
Yes	68	19.8
Obstetric Complication type (N = 68)		
NRFHR	13	19.1
PIH	18	26.5
Multiple pregnancy	5	7.4
Obstructed labor	23	33.8
Others	9	13.2
CS (N=94) indication		
Maternal	62	66.0
Fetal	32	34.0
CS type (N = 94)		
Planned	41	43.6
Emergency	53	56.4
CS (N=94) Decision		
mother	18	19.1
Physician	76	80.9
No; of newborn		
Single	334	97.4
Twins	9	2.6
Maternal outcome		
Alive	342	99.7
Dead	1	0.3
Fetal outcome		
Alive	339	98.0
Dead	7	2.0

Figure 1 shows the common indications of Cesarean Delivery. This data analysis; previous history of cesarean delivery (27.7%), obstructed labor (24.5%) pregnancy induced hypertension (19.1%) and none reassuring fetal heart pattern were leading indications of cesarean delivery.

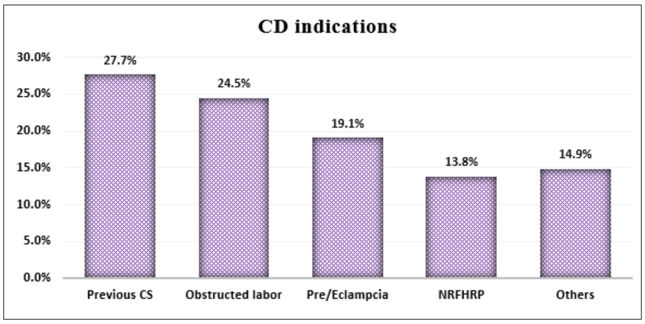

Figure 1: the leading indications of CS among mothers who gave birth at Public Hospitals, in Jigjiga city administration, eastern Ethiopia, September 2022, n=343

Figure 2 expresses; the current prevalence of Caesarean delivery is 27.4% (95%CI 23.3, 31.8%).

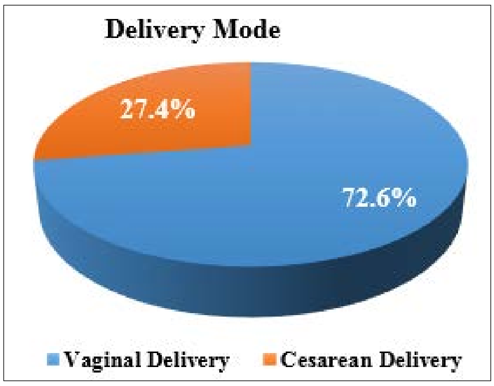

Figure 2: Prevalence of cesarean delivery among mothers who gave birth at Public Hospitals, in Jigjiga city administration, eastern Ethiopia, Sept 2022, n=343

Table 4 details explanatory factors that shown p-value <0.25 in the bi-variate analysis, that have been considered as candidates to multivariate analysis. Based on this, the identified variables are the participants' residents, educational status, socio-economics status, history of previous CS, mothers counseling and the baby weights. However, the final model analysis, monthly income, previous CS and mothers' counselling have been found to have significant associations with CS uses.

Those respondents who had monthly income 3,000-6,000 birr had three times [AOR=3.91 (95% CI: 1.50,10.17)] higher Odds ratio of CS delivery when compared to those who had monthly income <3,000. The mothers who had a history of CS delivery had about fifteen times [AOR=15.86 (95% CI: 8.01, 31.40)] higher Odds ratio of CS delivery as compared to those mothers who had not history of CS. Those participants who had not been directed counselling during their antenatal care flow up had two times [AOR=2.87(95% CI: 1.46, 5.68)] more Odds when compared to those mothers who had been directed counseling during their antenatal care flow up.

Table 4: Explanatory factors with CS among mothers who gave birth at Public Hospitals, in Jigjiga city administration, eastern Ethiopia, Sept 2022, n=343

Variable	Type of delivery		P-value	COR (95% CI)	AOR (95% CI)
Residence					
Rural	76 (91.6)	7(8.4)		1	1
Urban	173(66.5)	87(33.5)	0.00	5.46 (2.42, 12.35)*	2.72 (0.99, 7.51)
Education					
Not educated	95 (84.8)	17 (15.2)		1	1
Basic education	76 (74.5)	26 (25.5)	0.06	1.91 (0.97, 3.78)	1.39 (0.56, 3.42)
College/above	78 (60.5)	51 (39.5)	0.00	3.65 (1.96, 6.83)*	1.95 (0.66, 5.77)
Occupation					
Housewife	58 (82.9)	12 (17.1)		1	1
Self-employed	101 (74.3)	35 (25.7)	0.17	1.68 (0.81, 3.48)	0.94 (0.37, 2.36)
Government	42 (61.8)	26 (38.2)	0.00	2.99 (1.36, 6.60)	0.34 (0.10, 1.17)
GNOs	15 (65.2)	8 (34.8)	0.08	2.58 (0.89, 7.44)	0.57 (0.12, 2.61)
Student	33 (71.7)	13 (28.3)	0.16	1.90 (0.78, 4.65)	0.33 (0.10, 1.14)
Monthly income (ETB)					
< 3,000	99 (89.2)	12 (10.8)		1	1
> 3,000-6,000	124 (66.0)	64 (34.0)	0.00	4.26 (2.18, 8.33)	3.91 (1.50, 10.17)*
> 6000	26 (59.1)	18 (40.9)	0.00	5.71 (2.45, 13.34)	3.35 (0.92, 12.20)

Table 4: Explanatory factors with CS among mothers who gave birth at Public Hospitals, in Jigjiga city administration, Cont'd

Variable	Type of delivery		P-value	COR (95% CI)	AOR (95% CI)
	VD n(%)	CS n(%)			
History of CS					
Yes	53 (42.7)	71 (57.3)	0.00	11.42 (6.52, 19.98)*	15.86 (8.01, 31.40)*
No	196 (89.5)	23 (10.5)		1	1
Mother counselling directed					
Yes	130 (86.1)	21 (13.9)		1	1
No	119 (62.0)	73 (38.0)	0.00	3.80 (2.20, 6.55)*	2.87 (1.46, 5.68)*
Baby Weight (In gram)					
< 2500	61 (82.4)	13 (17.6)		1	1
2500-4000	133 (71.9)	52 (28.1)	0.08	1.84 (0.93, 3.62)	0.77 (0.32, 1.88)
> 4000	55 (65.5)	29 (34.5)	0.02	2.47 (1.17, 5.23)*	0.97 (0.37, 2.56)

Note: 1 stands the reference category, *shows significant variable at p-value <0.05

Discussion

Caesarean delivery is a life-saving surgical procedure when medically indicated. However, medically not indicated may substantially rise the rates of maternal as well as the fetal mortality and morbidity. The aim of this study was to assess the rates of cesarean delivery and to determine associated factors at selected public hospitals.

According to our data analysis, the prevalence of CS delivery uses is 27.4% (95%CI 23.3, 31.8%). The result is comparable other studies at Attat Hospital, systematic review and meta-analysis, that study carried out at public hospitals in Wollo Zone, and a prospective study conducted in Jordan that [4, 20-22]. This similarity might be due to the similarity of the study participants' characteristics such as socioeconomic characteristics, age group, etc. However; this result has gone beyond the optimal range 5-15% that is recommended by WHO [1]. and comparing a national review of CS that revealed the lowest rate (5.7%) of CS occurred in this region [23].

On the other hand, our finding is also higher than that study done in Misan Province [24]. This discrepancy may be due to the reason that one of the selected hospitals is a referral site (the only referral hospital in the region) receiving referred complicated cases from surrounding as well as all-health facilities in the region that could make the prevalence high. It could also reflect the improvement of CS related facilities, availability of fetal monitoring electronic apparatus in these selected hospitals.

On the other hand; the present study is lower than those studies done in different sets, including that conducted at Debre Tabor Specialized Hospital, that study carried out in Addis Ababa hospitals and that study done at Aira Hospital, Oromia Region. It is also lower than a study done in Greece and that CS rates reported in Brazil [2, 7, 13, 17, 25].

This variance might be due to the variations in the settings, that the possible explanation of CS incremental is associated with where there is better economic development or human development index having advanced obstetric services that the community utilizes more private health services than public health care facilities, and availability of health care facilities that have high rates of maternal health care utilization to have higher percentage of cesarean deliveries as compared to those settings with low human development index and low rates of maternal health care utilization [7].

The present study also determined the major indications of mothers undergone CS delivery. Thus, having previous CS delivery, obstructed labor, pregnancy induced hypertension and none reassuring fetal heart pattern were the dominating indicators to perform cesarean delivery. This findings are similar to other studies conducted at Aira Hospital, Oromia and Addis Ababa hospitals [13, 17].

It is possible justification due to the fact that the major CS indications mentioned above are also medically possible reasons. For example; a woman who had undergone a CS before, tends to give birth again through CS because of the risk of uterine ruptures. On the other hand, pregnancy hypertensive disorders, obstructed labour and none reassuring fetal heart pattern are also indications of cesarean delivery.

However; this finding is different from the study done at hospitals in Dessie town, Northeast Ethiopia, that revealed the most frequent indication of cesarean delivery was fetal distress, and that study conducted in Misan Province that found failure to progress in labor to be main indications for CS [15, 24].

The identified factors to have association with CS utilization by this study are income, history of CS and mother counselling. For instance, the mothers who have a monthly income 3,000-6,000 birr had higher Odds of CS when compared to those who had less monthly income. This finding is contrary to other studies conducted at Debre-Tabor and Felegehiwot hospitals that revealed mothers who had a higher monthly income had a higher chance of having a cesarean delivery than those their income was less [16, 25].

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A perspective study done in Iran also found that the women who had a higher monthly income were higher rates of CS than those their income was less [26]. From the findings, those participants who had a history of CS had higher odds to undergo CS when compared to those have no CS history. The result is comparable with studies carried out in Southwest Ethiopia, that done in North Wollo Zone public hospitals, Northeast Ethiopia and one that carried out in Addis Ababa public hospitals and study conducted in Brazil (15) [4, 13, 15, 27].

The reason could be due to the fear of uterine rupture associated with waiting longer time. The fact that a woman undergone a CS before is more likely to have CS indications [1, 28]. The present study confirmed the mothers who had not been directed counselling about avoidable CS have higher Odds to undergo CS delivery as compared those who had been directed counselling. A similar pattern of results was obtained in a current study conducted in United States and a study done in rural areas of Bangladesh [29, 30]. It is also comparable a randomized clinical trial conducted at Gonabad University of Medical Sciences, Iran that revealed shared counselling increased the rate of VBAC [31].

This is an important finding in the understanding of the CS increment and effective interventions. It is worth discussing these interesting facts shown by this analysis that at least hint that the applicability of intervention for unnecessary cesarean delivery.

Conclusion

The main conclusion that drawn from this study is that the prevalence of CS has been concluded to be higher as compared with the WHO recommendation. Our data analysis indicates that obstetric factors founding to be exist around delivery are the predominant reasons for cesarean delivery rather than background factors.

The present study agreed other studies that shown in, health education offered the pregnancy mother throughout the pregnancy time, has potential influence. However; there is low rates of pregnant mother counselling, but farther study is needed in depth analysis to identify possible modifiable factors due to the limitations of the current study.

This study; due to cross-sectional nature, has some limitations. Temporal relationship between CS and explanatory factors has not been determined. We have not looked at the postnatal outcomes following deliveries. CS overestimation can exist because of the referral cases. As a result, the use of this finding for decision-making should considered inherent limitation of the study.

Suggestion

Based on the study conclusions; the investigators suggest: to be implemented WHO recommendations, particularly emphasizing non-clinical interventions to prevent unnecessary primary CS and advocating vaginal delivery for a woman who had previous cesarean delivery if medically appropriate. To be considered the pregnant mothers counselling through purposefully designed health educations and tailored messages on the risk of unnecessary cesarean delivery and to have opportunity to attend classes on natural childbirth preparation and alternative methods during ANC. A particular focus to offer training of all health care providers. Further investigation on the reasons for increased prevalence of CS, and implementation of farther study with rough methodology to inquire the quality of care being offered for the pregnant mothers.

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Authors have no conflict of interest in this work.

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