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Abstract

Background: Caesarean section (C-section) is a life-saving obstetric procedure that reduces maternal mortality and improves reproductive health. Although, vaginal delivery is still an important safe and low-cost method of delivery, C-section is sometimes performed when it is not even required, which creates health challenges for pregnant women and their newborn infants.

Aims: To estimate the effect of a set of institutional, demographic, socioeconomic and spatial variables on C-section delivery (n = 2424) in Punjab, Pakistan.

Methods: We used data from the Multiple Indicator Cluster Survey Punjab 2014 and multiple logistic regression analysis. Analysis was carried out using STATA version 12.

Results: Higher maternal age at first marriage, higher number of antenatal care visits, and higher wealth quintiles were associated with higher risk of C-section. Women in Punjab were more likely to deliver through C-section in private health facilities and there was no significant difference between urban and rural areas. There was a significant difference in the risk of C-section in different divisions of Punjab, for example, DG Khan and Rawalpindi showed the lowest risk compared with the reference division of Bahawalpur, which is partially explained by the developmental disparities and access to public healthcare facilities.

Conclusions: The government should facilitate access to healthcare facilities in areas that are easily accessible, especially, to rural women.

Keywords: Caesarean section; institutional delivery; maternal health; Punjab; health services.

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Introduction

Pakistan is the fifth largest contributor to global maternal mortality and 6% of the world's maternal deaths occur in Pakistan (1). Maternal mortality rate in Pakistan is 276 deaths per 100 000 live births (2,3). Pregnancy-related complications are a major cause of maternal and infant morbidity and mortality (3) and in 2013, ~8000 women (age 15–45 years) died in Pakistan. The reduction in maternal mortality observed in high-income countries has been achieved by providing access to skilled care during pregnancy and childbirth, and by provision of safe interventions such as assisted vaginal delivery and caesarean section (C-section), which are also achievable in developing countries (4). C-section is a life-saving obstetric procedure that reduces maternal mortality and improves reproductive health outcomes for both mothers and newborn infants. Even though delivery by C-section has become increasingly safe in the past decade, it still cannot replace vaginal delivery in terms of low mortality, neonatal mortality and cost. However, during the last three decades this surgical intervention has been unnecessarily performed (for reasons other than obstetric complications), leading to an increase in C-section rates especially in developing countries (5). As a reference, the World Health Organization, in its 1985 report, suggested an optimal range for C-section rates of 5–15% (6).

Many studies have found that the likelihood of delivery through C-section depends on a number of institutional, demographic and socioeconomic factors. The availability of facilities, obstetricians and the place of birth, that is, private or public sector institutions, is associated with C-section rate (7,8). C-section is significantly associated with multiple conception, maternal age at birth, rise in institutional deliveries, number of previous deliveries, site of prenatal care (private or public), socioeconomic status of household and access to antenatal care (9–11). Some maternal characteristics such as education and access to antenatal care are also strongly associated with the likelihood of C-section (4,10,12).

In view of the recent understanding about the factors associated with C-section, this study identified a set of socioeconomic, demographic, spatial and institutional indicators associated with C-section delivery. We used data from the Multiple Indicator Cluster Survey (MICS) conducted in Punjab province of Pakistan during 2014. We focused on Punjab Province because it accounted for 53% of the total population of Pakistan according to the last census in 2017. The developments in Punjab are therefore expected to affect significantly national progress towards achieving the United Nations Sustainable Development Goals. We expect that our results will make a significant contribution to public health policies in Punjab.

Methods

Study design, setting and sample size

MICS is an international household survey developed by the United Nations Children's Fund (UNICEF). The Punjab Province is divided into 9 administrative divisions and 36 districts. The universal set for MICS Punjab 2014 consisted of all the households and their members in all urban and rural areas of Punjab. Fieldwork for MICS Punjab 2014 was carried out between June and September 2014. A 2-stage, stratified cluster sampling approach was used for sample selection. In urban areas, the first-stage selection unit is the enumeration block and in rural areas, it is the village. The first-stage units are selected with probability proportional to size. From each first-stage sample unit, a sample of 20 households was selected with equal probability, in both rural and urban areas, as secondary sampling units for urban and rural domains. The entire sample of households (secondary sampling units) was drawn from 2050 primary sampling units, of which, 774 were urban and 1276 were rural, according to a systematic sampling technique with a random start. The final allocation was 2050 clusters with 20 households in each, giving a total sample of 41 000 households. The response rate was almost 98% across Punjab Province. Further details on MICS Punjab 2014 are provided elsewhere (13). The present study was based on publicly available data from MICS Punjab 2014 (http://mics.unicef.org/surveys). The study was not funded research or part of any other project, and it did not involve any human or animal experiments, therefore, ethical approval was not required.

Variables

Dependent variable

The dependent variable, binary in nature, was the mode of delivery, that is, normal delivery was coded as 0 (n = 8178) and delivery through C-section was coded as 1 (n = 2424). We initially selected women who completed their interview (n = 53 668) and then selected only those women who gave birth within the last 2 years (n = 10 602) at any of the public or private healthcare facilities.

Covariates

The covariates were classified into the following categories after literature review: demographic (maternal age at first marriage, maternal age at first birth and birth order of child); socioeconomic (maternal education level and wealth quintile); institutional (place of delivery and antenatal care visits); and spatial (area and administrative divisions) (4,14–18). The demographic variables included maternal age at first marriage, maternal age at birth and birth order of the child (9,12). Maternal age at first marriage was divided into 5 categories: 15–19, 20–25, 26–30, 31–35 and ≥ 36 years. Maternal age at birth was divided into 4 categories: 10 years of education including college or university education of professional, vocational and general categories). Maternal wealth quintile was divided into 5 categories: poorest, poor, middle, rich and richest.

The institutional variables included 3 dimensions: place of delivery; number of times the mother received antenatal care; and whether or not the mother received antenatal care (8,9,12,19). The variable of place of delivery consisted of 2 outcomes: birth at a public or private health facility. The number of times a mother received antenatal care consisted of 4 categories: 1–5, 6–12, 13–18 and ≥ 18. We used 2 types of spatial variables in our analysis: area and division. Area referred to the urban and rural residence. The division variable consisted of 9 administrative divisions of Punjab: Bahawalpur, DG Khan, Faisalabad, Gujranwala, Lahore, Multan, Rawalpindi, Sahiwal and Sargodha.

Data analysis

We carried out bivariate analysis and logistic regression analysis to identify the determinants of C-section and to predict the likelihood of the delivery by C-section. The general logit model took the form:

$$yt=x't\ \beta+\mu t$$

where yt was a binary response variable of delivery through C-section:

yt= {(1 if a woman delivers through C–Section 0 otherwise)

and xt was a vector of exogenous variables. The conditional probability Pr (yt=1|xt) measured the probability that a woman would give birth through C-section. μt was the error for the tth observation and coefficient β measured the change in probability of delivery through C-section because of a unit change in xt. Assuming that the error term μt followed independent and identically distributed logistic distribution, the conditional probability was given as follows:

Pr (yt=1|xt)=exp(x_t^’ β)/(1+ exp(x_t^’ β))

This model could be estimated by the maximum likelihood estimation technique (20).

Results

Table 1 gives descriptive statistics of women who underwent C-section according to a set of demographic, socioeconomic, institutional and spatial characteristics. The proportion of women undergoing C-section monotonically increased with age at first marriage from 18.9% in the 15–19 years’ age group to 39.2% in the 31–35 years’ age group, and then decreased again for those > 36 years. When we considered maternal age at birth, the pattern of delivery through C-section was broadly similar to that for maternal age at first marriage. Less than one fifth (18.3%) of women aged

Women giving birth to their first child were most likely to undergo C-section (26.6%) compared with subsequent births. Nearly 17% of the women giving birth to fifth or subsequent children underwent C-section. Nearly 13.5% of the uneducated women compared to 44.6% of those with higher education had a C-section. Similarly, 9.4% of the women in the lowest wealth quintile and 42.4% in the highest quintile underwent C-section. The proportion of women who had a C-section at a private health facility (41.5%) was higher than that at a public health facility (32.6%). Around 20% of the women who received antenatal care between 1 and 5 times underwent C-section, but > 40% of women who had a C-section received antenatal care 6–12 times. Over 50% of the women who received antenatal care for ≥ 13 times underwent C-section.

The proportion of women undergoing C-section in urban areas (32.7%) was significantly different from that in rural areas (19.7%). According to administrative division, the smallest

proportion of women had a C-section (8.5%) in D G Khan, while the highest (30.5%) was in Sahiwal. Lack of access to C-section facilities partially explains the small percentage of women undergoing C-section, and easier access to facilities in Lahore (30%) and Rawalpindi (24.5%) explains why a larger proportion of women underwent C-section.

Table 2 gives the odds ratios (OR) from the logistic regression models that we estimated using a set of institutional, demographic, socioeconomic and spatial characteristics. Model 1 estimated OR using demographic and institutional explanatory variables. Model 2 included variables of Model 1 and additional spatial explanatory variables. Model 3 included all variables combined. The Wald $\chi 2$ test statistics showed if the parameters of all the variables in the estimated equation were simultaneously equal to 0. Based on the P value associated with the $\chi 2$ values generated by the Wald test for Models 1, 2 and 3, we rejected the null hypothesis, indicating that variables included in the estimated equation were not simultaneously 0. We also reported Hosmer–Lemeshow goodness of fit statistics and corresponding P values. $P > 0.05$ in all the estimated Models 1, 2 and 3 showed that the models fitted the data well.

Institutional factors

Model 1 in Table 2 shows the association between institutional variables (antenatal care and place of delivery) and risk of C-section after controlling for the demographic variables. Considering the place of delivery, a woman was 40% more likely to undergo C-section when she went to a private compared to public health facility. The risk, however, decreased when we controlled the institutional variables with the spatial variable (Model 2) and for demographic, spatial and socioeconomic variables combined (Model 3). The number of antenatal care visits significantly affected the risk of C-section. Women who had 6–12 antenatal visits were 57% more likely to undergo C-section, and this increased further when women made 13–18 antenatal visits compared to the reference category. This may have been due to known complications in the delivery, so the women needed more antenatal visits. Although, the category of 18+ antenatal visits was insignificant, a possible explanation is that there was a limited number of observations (i.e., 30).

Demographic factors

The risk of undergoing C-section increased with age at first marriage (Table 2). When the age at first marriage was 20–25 years, the odds of delivery through C-section were 1.26 times higher compared with those in the 15–19 years' category (reference group). When age at first marriage was 26–30 years, the odds increased further (OR 1.8). When age at first marriage was 31–35 years, women were 2.6 times more likely to deliver through C-section. There was only a small change in the odds of undergoing C-section when we included additional control variables (Models 2 and 3). The order of birth was a significant predictor of the risk of C-section. The second to fourth children were significantly less likely to be born through C-section compared with the first child (reference group).

Spatial and socioeconomic factors

There was no significant difference in the risk of C-section for women living in urban and rural areas. However, there were marked differences in the risk of C-section among the administrative divisions. The risk of C-section in Sahiwal was similar to that in Bahawalpur (reference division). Rawalpindi and DG Khan showed a significantly lower risk of C-section, around 41 and 36%, compared with the risk in Bahawalpur (reference division). Further research is called for to analyse the specific factors leading to marked disparities in different geographical administrative units in Punjab. The women in the highest wealth quintile were almost 1.6 times more likely to undergo C-section (Model 3). Similarly, the risk of C-section also increased (in this case, significantly) with the wealth status of women.

Discussion

Multivariate logistic regression analysis showed that institutional variables including place of delivery and number of antenatal care visits had a significant impact on the rate of C-section. As the number of antenatal care visits increased, the risk of C-section decreased because the women were expected to become more informed about their pregnancy-related issues and take precautionary measures to avoid complications necessitating C-section. This is contrary to the common believe that access to healthcare services increases the likelihood of C-section (4). Unlike some other studies (10), the risk of C-section was smaller in the private health facilities compared with public health facilities, possibly because fewer women could afford the high cost of C-section in the private health facilities. Maternal age was a risk factor for complications during pregnancy and it was estimated that women aged > 30 years at the time of birth were at higher risk of C-section compared with those aged

The risk of C-section decreased with an increase in maternal education. Although this effect could not be precisely estimated in this study, there was strong empirical evidence to suggest that higher education was associated with lower risk of C-section. Maternal education was expected to affect the risk of C-section directly and indirectly. More-educated mothers are more informed about hygiene and health standards (29,30). Maternal education is also assumed to indirectly affect the risk of C-section through social status (9). More-educated women are less likely to undergo C-section, possibly because they belong to social groups that can afford better nutrition and are, therefore, less likely to suffer from the complications that necessitate C-section (4). Wealthier women were more likely to opt for C-section in our study, which contrasts with previous studies (4,16). There was a significant difference in the risk of C-section among the divisions in Punjab Province. The DG Khan division has the lowest while Rawalpindi is among the highest per capita income divisions in Punjab (13). Even though Rawalpindi and DG Khan differ widely in many ways, such as the level of economic development and the rate of school enrolment, both these divisions had the lowest incidence of C-section. It is plausible to believe that better access to and provision of health services explain the low C-section rate in Rawalpindi division (0.41 times lower than the Bahawalpur reference division). However, the low proportion of women in DG Khan (0.36 times lower than Bahawalpur) undergoing C-section counters the impression that lack of access to basic health care, distance and remoteness partly

explain these findings, and this needs further investigation.

The present study had some limitations. First, it was cross-sectional, thus, we cannot draw any conclusions about causality between the factors associated with C-section. Second, this study used data from the MICS Punjab 2014, which are representative of Punjab Province; hence we cannot generalize the results at a national level. Third, it is not possible with the available data to establish whether the C-section was necessary.

In conclusion, we recommend that the Pakistani Government should facilitate access to healthcare facilities that are easily accessible, especially, to rural women. From programme and policy perspectives of healthcare interventions, it is imperative to investigate further the disparities among administrative divisions. Confronting health challenges at a microgeographic level will help develop public policy that better meets the goals of Punjab Health Sector Plan 2018, Punjab Economic Growth Strategy 2018 and Federal Government Vision 2025.

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Competing interests: None declared.

Prévalence et déterminants de la pratique de la césarienne au Pendjab, Pakistan

Résumé

Contexte : La césarienne est une intervention obstétricale pouvant sauver des vies qui permet de réduire la mortalité maternelle et d'améliorer la santé génésique. Bien que l'accouchement par voie basse demeure une méthode

d'accouchement recommandée, sûre et peu coûteuse, la césarienne est parfois pratiquée sans être pour autant nécessaire, ce qui crée des problèmes de santé pour les femmes enceintes et leurs nouveau-nés.

Objectifs : La présente étude avait pour objectif de mesurer les effets d'un ensemble de

variables institutionnelles, démographiques, socio-économiques et spatiales sur la pratique de la césarienne (n = 2424) au Pendjab (Pakistan).

Méthodes : Les données issues de l’enquête à indicateurs multiples menée au Pendjab en 2014 et une analyse de régression logistique multiple ont été utilisées. Une analyse a été menée à l’aide du logiciel STATA (version 12).

Résultats : Un âge maternel plus avancé lors du premier mariage, un nombre plus important de consultations prénatales, et des quintiles de richesse supérieurs étaient associés à un risque plus élevé de césarienne. Au Pendjab, les femmes étaient davantage susceptibles de donner naissance par césarienne dans les établissements de santé privés et aucune différence notable n’a été observée entre les zones urbaines et rurales. Une différence importante existait quant au risque de césarienne entre les différents districts du Pendjab. Par exemple, Dera Ghazi Khan et Rawalpindi affichaient le risque le plus bas en comparaison à Bahawalpur, le district de référence, ce qui s’explique en partie par des disparités de développement et la possibilité d’être pris en charge dans des établissements de soins de santé publics.

Conclusion : Le gouvernement devrait faciliter l’accès aux établissements de soins de santé dans les régions faciles d’accès, notamment pour les femmes vivant dans les zones rurales.

معدل انتشار الولادة القيصرية ومحدِّداتها في البنجاب، باكستان

فيصل عباس، رفيع أمير الدين، مقصود صادق

الخلاصة

: تنقذ الولادة القيصرية حياة الأمهات وتنقص معدلات الوفيات بينهن وتحسِّنالخلفية
الصحة الإنجابية . ورغم أن الولادة المهبلية لا تزال من طرق الولادة الآمنة والهامة
والقليلة التكاليف، فإن العملية القيصرية تُجرى أحيانًا حتى عندما لا تستدعي الحاجة
إجراؤها، مما يخلق تحديات صحية للحوامل ولأطفالهن حديثي الولادة .

: هدفت الدراسة إلى تقدير تأثير مجموعة من المتغيرات المؤسسية والسكانيةالأهداف
والاجتماعية الاقتصادية والمكانية في الولادة القيصرية، وأُجريت الدراسة على 2424
سيدة في البنجاب في باكستان .

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References

1. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. Lancet. 2010 May 8;375(9726):1609–23. https://doi.org/10.1016/S0140-6736(10)60518-1 PMID:20382417
2. Pakistan Demographic and Health Survey 2006-07. Islamabad: National Institute of Population Studies Islamabad, Pakistan and Calverton, MD: Macro International Inc.; 2007 (https://dhsprogram.com/pubs/pdf/fr200/fr200.pdf, accessed 15 August 2018).
3. Bhutta ZA, Hafeez A. What can Pakistan do to address maternal and child health over the next decade? Health Res Policy Syst. 2015 Nov 25;13(1) Suppl 1:49. https://doi.org/10.1186/s12961-015-0036-5 PMID:26792061
4. Leone T, Padmadas SS, Matthews Z. Community factors affecting rising caesarean section rates in developing countries: an analysis of six countries. Soc Sci Med. 2008 Oct;67(8):1236–46. https://doi.org/10.1016/j.socscimed.2008.06.032 PMID:18657345
5. Feng XL, Xu L, Guo Y, Ronsmans C. Factors influencing rising caesarean section rates in China between 1988 and 2008. Bull World Health Organ. 2012 Jan 1;90(1):30–9. https://doi.org/10.2471/BLT.11.090399 PMID:22271962
6. Appropriate technology for birth. Lancet. 1985 Aug 24;2(8452):436–7. PMID:2863457
7. Neuman M, Alcock G, Azad K, Kuddus A, Osrin D, More NS, et al. Prevalence and determinants of caesarean section in private and public health facilities in underserved South Asian communities: cross-sectional analysis of data from Bangladesh, India and Nepal. BMJ Open. 2014 Dec 30;4(12):e005982. https://doi.org/10.1136/bmjopen-2014-005982 PMID:25550293
8. Padmadas SS, Kumar S, Nair SB, Kumari A. Caesarean section delivery in Kerala, India:

evidence from a National Family Health Survey. Soc Sci Med. 2000 Aug;51(4):511–21. https://doi.org/10.1016/S0277-9536(99)00491-8 PMID:10868667

9. Khawaja M, Kabakian-Khasholian T, Jurdi R. Determinants of caesarean section in Egypt: evidence from the demographic and health survey. Health Policy. 2004 Sep;69(3):273–81. https://doi.org/10.1016/j.healthpol.2004.05.006 PMID:15276307

10. Khawaja NP, Yousaf T, Tayyeb R. Analysis of caesarean delivery at a tertiary care hospital in Pakistan. J Obstet Gynaecol. 2004 Feb;24(2):139–41. https://doi.org/10.1080/jog.24.2.139.141 PMID:14766448

11. Mishra US, Ramanathan M. Delivery-related complications and determinants of caesarean section rates in India. Health Policy Plan. 2002 Mar;17(1):90–8. https://doi.org/10.1093/heapol/17.1.90 PMID:11861590

12. Khawaja M, Jurdi R, Kabakian-Khasholian T. Rising trends in cesarean section rates in Egypt. Birth. 2004 Mar;31(1):12–6. https://doi.org/10.1111/j.0730-7659.2004.0269.x PMID:15015988

13. Bureau of Statistics. Planning & Development Department, Government of the Punjab and UNICEF Punjab. Multiple Indicator Cluster Survey, Punjab 2014, Final Report. Lahore: Bureau of Statistics Punjab, Planning & Development Department, Government of the Punjab and UNICEF Punjab; 2016 (https://mics-surveys-prod.s3.amazonaws.com/MICS5/South%20Asia/Pakistan%20%28Punjab%29/2014/Final/Pakistan%20%28Punjab%29%202014%20MICS_English.pdf, accessed 15 August 2018).

14. Ahmad-Nia S, Delavar B, Eini-Zinab H, Kazemipour S, Mehryar AH, Naghavi M. Caesarean section in the Islamic Republic of Iran: prevalence and some sociodemographic correlates. East Mediterr Health J. 2009 Nov–Dec;15(6):1389–98. PMID:20218129

15. Lauer JA. BetránAna P, Merialdi M, Wojdyla D. Determinants of caesarean section rates in developed countries: supply, demand and opportunities for control. World Health Report (2010) Background Paper, No 29. Geneva: World Health Organization; 2010 (http://www.who.int/healthsystems/topics/financing/healthreport/29DeterminantsC-section.pdf, accessed 15 August 2018).

16. Ronsmans C, Holtz S, Stanton C. Socioeconomic differentials in caesarean rates in developing countries: a retrospective analysis. Lancet. 2006 Oct 28;368(9546):1516–23. https://doi.org/10.1016/S0140-6736(06)69639-6 PMID:17071285

17. Stanton CK, Holtz SA. Levels and trends in cesarean birth in the developing world. Stud Fam Plann. 2006 Mar;37(1):41–8. https://doi.org/10.1111/j.1728-4465.2006.00082.x PMID:16570729

18. Abebe FE, Gebeyehu AW, Kidane AN, Eyassu GA. Factors leading to cesarean section delivery at Felegehiwot referral hospital, Northwest Ethiopia: a retrospective record review. Reprod Health. 2016 Jan 20;13(1):6. https://doi.org/10.1186/s12978-015-0114-8 PMID:26792611

19. Najmi RS, Rehan N. Prevalence and determinants of caesarean section in a teaching hospital of Pakistan. J Obstet Gynaecol. 2000 Sep;20(5):479–83. https://doi.org/10.1080/014436100434640 PMID:15512631

20. Greene WH. Econometric analysis, 5th edition. Upper Saddle River, NJ: Pearson Education; 2003.

21. Duflo E, Dupas P, Kremer M. Education, HIV, and early fertility: experimental evidence from Kenya. Am Econ Rev. 2015 Sep;105(9):2757–97. https://doi.org/10.1257/aer.20121607

PMID:26523067

22. Kamal SM. What is the association between maternal age and neonatal mortality? An analysis of the 2007 Bangladesh Demographic and Health Survey. Asia Pac J Public Health. 2015 Mar;27(2):NP1106–17. https://doi.org/10.1177/1010539511428949 PMID:22186392

23. Pandya YP, Bhanderi DJ. An epidemiological study of child marriages in a rural community of Gujarat. Indian J Community Med. 2015 Oct–Dec;40(4):246–51. https://doi.org/10.4103/0970-0218.164392 PMID:26435597

24. Cavallaro FL, Cresswell JA, França GV, Victora CG, Barros AJ, Ronsmans C. Trends in caesarean delivery by country and wealth quintile: cross-sectional surveys in southern Asia and sub-Saharan Africa. Bull World Health Organ. 2013 Dec 1;91(12):914–922D. https://doi.org/10.2471/BLT.13.117598 PMID:24347730

25. Karkee R, Lee AH, Khanal V, Pokharel PK, Binns CW. Obstetric complications and cesarean delivery in Nepal. Int J Gynaecol Obstet. 2014 Apr;125(1):33–6. https://doi.org/10.1016/j.ijgo.2013.09.033 PMID:24447414

26. Nasrullah M, Zakar R, Krämer A. Effect of child marriage on use of maternal health care services in Pakistan. Obstet Gynecol. 2013 Sep;122(3):517–24. https://doi.org/10.1097/AOG.0b013e31829b5294 PMID:23921855

27. Raj A, Boehmer U. Girl child marriage and its association with national rates of HIV, maternal health, and infant mortality across 97 countries. Violence Against Women. 2013 Apr;19(4):536–51. https://doi.org/10.1177/1077801213487747 PMID:23698937

28. Sikder SS, Labrique AB, Shamim AA, Ali H, Mehra S, Wu L, et al. Risk factors for reported obstetric complications and near misses in rural northwest Bangladesh: analysis from a prospective cohort study. BMC Pregnancy Childbirth. 2014 Oct 4;14(1):347. https://doi.org/10.1186/1471-2393-14-347 PMID:25282340

29. Greco G, Skordis-Worrall J, Mkandawire B, Mills A. What is a good life? Selecting capabilities to assess women's quality of life in rural Malawi. Soc Sci Med. 2015 Apr;130:69–78. https://doi.org/10.1016/j.socscimed.2015.01.042 PMID:25687242

30. Tsai SY, Lee CN, Wu WW, Landis CA. Sleep hygiene and sleep quality of third-trimester pregnant women. Res Nurs Health. 2016 Feb;39(1):57–65. https://doi.org/10.1002/nur.21705 PMID:26650922