RESEARCH ARTICLE

Effect of antenatal care on low birth weight prevention in Lao PDR: A case control study [version 1; peer review: 1 approved with reservations, 1 not approved]

Latsamy Oulay¹, Wongs Laohasiriwong², Teerasak Phajan³, Supat Assana³, Kritkantorn Suwannaphant³

¹Faculty of Public Health, Khon Kaen University, Khon Kaen, 40002, Thailand

²Faculty of Public Health and Research and Training Center for Enhancing Quality of Life for Working Age People, Khon Kaen University, Khon Kaen, 40002, Thailand

³Sirindhorn College of Public Health, Khon Kaen, 40000, Thailand

V1 First published: 25 Jul 2018, 7:1138
<https://doi.org/10.12688/f1000research.15295.1>
 Latest published: 25 Jul 2018, 7:1138
<https://doi.org/10.12688/f1000research.15295.1>

Abstract

Background: Low Birth Weight (LBW) is a worldwide public health problem, which subsequently may affect the health status of the child. Lao PDR has high incidence of LBW. Antenatal care (ANC) is provided to improve maternal and child health outcomes. The aim of this study was to identify the effect ANC on LBW prevention in Lao PDR.

Methods: This case control study was conducted in tertiary hospitals of Lao PDR. The ratio of case: control was 1:3, of which there were 52 cases and 156 controls that passed the inclusion criteria included in the study. In our analysis information on pregnancy and ANC including height of mother, maternal weight gain during pregnancy, maternal gestational age at delivery, type of delivery, supplementary vitamins, and other covariates including age, marital status, educational attainment, occupation, family income, health insurance, family size and living condition were described and determine their association with LBW using multiple logistic regression analysis.

Results: There were only 32.69 % of complete ANC among cases and 57.69% in control. Incomplete ANC (<4 times) were significant increased the odds of having LBW (adj. OR=2.97; 95%CI: 1.48 to 5.93; p-value =0.002). Other covariates which also influenced LBW were having maternal weight gain during pregnancy less than 10 kg. (adj.OR=2.28; 95%CI: 1.16 to 4.49; p-value = 0.017), maternal gestation age at delivery less than 40 weeks (adj. OR=3.33; 95%CI: 1.52 to 7.32; p-value =0.003).

Conclusion: Complete ANC could help both mother and child in term of weight gain and full term delivery which may effect on LBW reduction.

Open Peer Review

Approval Status ? X

	1	2
version 1 25 Jul 2018	? view	X view
1. Metha Songthamwat , Udonthani Hospital, Udonthani, Thailand		
Srisuda Songthamwat , Udonthani Hospital, Udonthani, Thailand		
2. Zohra Lassi , The University of Adelaide, Adelaide, Australia		

Any reports and responses or comments on the article can be found at the end of the article.

Keywords

Infant, Low Birth Weight (LBW), Maternal Risk Factors, Case – Control Study.

Corresponding author: Wongsu Laohasiriwong (drwongsu@gmail.com)

Author roles: **Oulay L:** Conceptualization, Data Curation, Formal Analysis, Methodology; **Laohasiriwong W:** Conceptualization, Data Curation, Formal Analysis, Methodology; **Phajan T:** Conceptualization, Formal Analysis, Methodology; **Assana S:** Conceptualization, Formal Analysis, Methodology; **Suwannaphant K:** Conceptualization, Formal Analysis, Methodology

Competing interests: No competing interests were disclosed.

Grant information: This research was supported by the China Medical Board Project and the University of Health Sciences, Vientiane, Lao PDR; and the Faculty of Public Health, Khon Kaen University.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Copyright: © 2018 Oulay L *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Data associated with the article are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

How to cite this article: Oulay L, Laohasiriwong W, Phajan T *et al.* **Effect of antenatal care on low birth weight prevention in Lao PDR: A case control study [version 1; peer review: 1 approved with reservations, 1 not approved]** F1000Research 2018, 7:1138 <https://doi.org/10.12688/f1000research.15295.1>

First published: 25 Jul 2018, 7:1138 <https://doi.org/10.12688/f1000research.15295.1>

Introduction

Low birth weight (LBW) refers to a baby who has a birth weight of $\leq 2,500$ grams¹. LBW may cause birth asphyxia, amniotic fluid aspiration, hypoglycemia and hyponatremia. An infant weight of 1,500–2,500 grams has been shown to have 5–10 times higher mortality rate than normal infants². During 2005–2010, LBW incidences in countries of the Association of Southeast Asian nations ASEAN were 21.0% in Philippines, 11.0% in Malaysia, Cambodia and Lao PDR, 9.0% in Indonesia, 7.0% in Thailand and 5.0% in Vietnam³. The incidence of LBW reflects a country's socio-economic development⁴. Mortality of LBW babies is as high as 1% when compared with 0.2% among normal children⁵. At the 2005 World Summit a plan was announced to improve quality of life called Millennium Development Goals (MDGs)⁶, covered goals to be achieved worldwide by the year 2015⁵.

Maternal and child health problems have been considered as indicators of the health service performances. In Southeast Asia, 28% of all deaths of 1 month-old infants were from infection, and 20% from preterm birth and LBW⁶. LBW is commonly used as an indicator of health status and is important for national health policy development⁷. Important factors associated with LBW are maternal factors, such as socioeconomic status, food consumption behaviors, calorie intake, urinary tract infection and prenatal care, smoking, genital infections, maternal health and stress^{8,9}.

Antenatal care (ANC) is care provided to pregnant women by health personal. Care includes risk identification, prevention and management of pregnancy-related or concurrent disease, and health education and health promotion¹⁰. The World Health Organization's ANC model, also known as focused or basic ANC is a goal-orientated approach to delivering evidence-based interventions at four critical times for ANC during pregnancy¹¹; therefore completed ANC in this study is having ANC for at least 4 times.

High incidence of LBW and high mortality of both mothers and children in Lao PDR has been hypothesized as being caused by various influencing factors, such as low socio economic status and limited access to qualified health services related to pregnancy¹². However, there are limited studies identifying the role of ANC in reducing LBW incidence in Lao PDR. Therefore this study aimed to determine whether having ANC at least four times during pregnancy could help reduce LBW when controlling for other covariates related to socioeconomic and pregnancy factors. The results could be used to develop appropriate measures for prevention of LBW and obtaining better maternal and child health statuses.

Methods

Participants

Postpartum mothers who had delivered babies and came for regular checkup after delivery in four tertiary hospitals in Vientiane, Lao PDR between July and December 2016 were included in this study. The four hospitals were Mahosot Hospital, Sethathirat Hospital, Mothers and Child Center Hospital, and Mittraphab Hospital.

The sample size was calculated using the formula for the analysis of a relationship in a case-control study¹³. The formula indicated that the sample size of the study group (cases) should be 52 participants. The control group was 3 times the size of the study group (case:control ratio of 1:3). Therefore, the control group included 156 participants, which made a final total of 208 participants. Cases and controls were not matched for demographics.

Inclusion criteria were mothers who had delivered babies in the four hospitals during the study period, who were 18 – 49 years of age. This age range was chosen as the reproductive age of women is 15–49 years old. However, those aged below 18 are considered as a vulnerable group, therefore we selected 18–49 year-olds. The exclusion criteria were mothers who delivered twins, did not live in the study area and who were not willing to participate. The samples in this study were divided into two groups:

- 1) Case group: mothers of babies whose birth weight was $\leq 2,500$ grams (LBW);
- 2) Control group: mothers of babies whose birth weight was $\geq 2,500$ grams who were born during the same period as the cases.

Data collection

The tool for data collection was a structured questionnaire interview that consisted of seven parts ([Supplementary File 1](#)): Part I, general information; Part II, sociodemographic characteristics; Part III, knowledge of health care during pregnancy; Part IV, maternal factors and pregnancy status; Part V, environment factors and support for ANC; Part VI, prenatal distress (as assessed using the Edinburgh Prenatal Depression Scale); Part VII, obstetric information at delivery (gathered from the mother's medical records).

The questionnaire was content validity tested by five experts in terms of theory and understanding. Unclear questions were edited and some information that was missing was added. Reliability was tested among 30 mothers (from Xaythany and Sisattanak Hospitals), indicating the high reliability with the Cronbach's alpha coefficient of 0.84.

Data was collected by four physicians who were trained in using the questionnaire. These interviewers were blinded for the infant status of normal or LBW. The interview of the participants took place in a postpartum patient room or nursing room within 5 days of agreement to participate.

Statistical analysis

STATA version 10.0 was used to analyze data¹⁴. Descriptive statistics frequency, percentage, means, standard deviation, minimum, maximum were used to present data on the following characteristics: characteristics of mothers, knowledge on health care during pregnancy of the mother, pregnancy status, environment factors and support for ANC, prenatal distress and obstetric information at delivery.

Simple logistic regression was used to determine factors associated with LBW. The factors which had association with LBW (p-value <0.25) were analyzed using multiple logistic regression. Multiple logistic regression was applied to identify the association of ANC and LBW when controlling for other covariates, presenting adjusted OR, 95% confidence interval (95% CI) with the levels of significance at 0.05¹⁵.

Ethical statement

We submitted the proposal and questionnaire to the Ethical Committee of Khon Kaen University, Thailand (reference No. HE 592087) and the Ethical Committee of University of Health Sciences, Lao PDR (reference No.13/16) for approval. Both committees granted approval of this study, including the reliability test of the questionnaire. Written informed consent was obtained from all participants.

Results

The study involved a total of 208 mothers, of which 52 were cases and 156 were controls. There were a higher proportion of younger mothers (<20 years) among cases than controls (17.31% and 11.54%, respectively). Controls had higher educational attainment of upper secondary (43.59%) compared to cases (28.85%). More controls lived in urban areas than cases (60.26% and 51.92%, respectively), and 21.15% of cases had average monthly family income ≤1,000,000 (Kips) which was 9.62% among controls (see [Table 1](#)).

Only 32.69 % of cases completed ANC (≥ 4 times) check-ups while 57.69% controls completed these. The bivariable analysis of ANC, socioeconomic and maternal factors with LBW showed that going to ANC check-ups <4 times had higher odds of having LBW than those who went to at least 4 times (OR=2.80; 95%CI: 1.44 to 5.43; p-value = 0.002).

In the bivariate analysis, which considers the association of one independent variable with the outcome (LBW), we selected factors with a p-value <0.25 to proceed to the multivariable analysis. These factors were height of mother (cm), taking any supplementary vitamins, prenatal depression, maternal weight gain during pregnancy (kg), maternal gestational age during delivery (weeks), and type of delivery (see [Table 2](#)).

The multivariate analysis of maternal risk factors of LBW show that after adjusting for the effect of covariates there was significant association between ANC check-ups <4 times and LBW (adjusted OR = 2.97; 95% CI: 1.48 to 5.93; p-value =0.002). Other covariates that were also significantly associated with LBW were maternal weight gain during pregnancy <10 kg (adjusted OR =2.28; 95% CI: 1.16 to 4.49; p-value = 0.017), maternal gestation at delivery <40 weeks (adjusted OR= 3.33; 95% CI: 1.52 to 7.32; p-value =0.003) (see [Table 3](#)).

Dataset 1. Raw data supporting the results presented. Since this study did not analyse knowledge of health care of the mothers or environmental factors and support of ANC, answers to Parts III and V of the questionnaire have not been included in the dataset

<http://dx.doi.org/10.5256/f1000research.15295.d210148>

Discussion

Our study demonstrated that inadequate ANC, poor maternal weight gain during pregnancy and maternal gestational age at delivery were significant independent determinants of LBW in Lao PDR. Only about one third of the mothers with LBW babies (cases) had completed ANC (≥4 times), whereas about half of the mothers with normal weight babies (control) had completed ANC. This finding supports the results of other studies^{16,17}, which indicated that ANC (times) were found to be significant maternal risk factors for LBW babies. In this study, the mothers who attended ANC fewer than 4 times had almost 3 times higher odd of having LBW. Previous studies in general hospitals have indicated that ANC visits <4 times were LBW risk factors^{18–21}. Antenatal visits of the pregnant mothers are very important as they provide chances for monitoring the fetal wellbeing and allow timely intervention for feto-maternal protection. Little ANC could increase prenatal fetor-maternal complications²². In the present study, among mothers who did not receive ANC, there was 1.122 times higher changes than those who received ANC²³ and ANC < 4 visits OR was 1.41 (95% CI: 1.02 to 1.94). These are similar findings to results found in Thailand^{24–26}.

Maternal age in some studies has no significant association with LBW¹⁹; however other studies had different results^{27,28}. For example, Fariha *et al.* found that maternal age was found significantly associated with LBW infants²⁹, and some studies reported that the older the mother, the higher the risk of having LBW infants³⁰. LBW babies among older mothers, whose age is 35 years and above, was 23.89%. It was significantly higher than the percentage of LBW babies for mothers in other age categories (p = 0.004)^{16,31}. For maternal weight gain during pregnancy it was found that weight gain <10 kg were risk factors for LBW in the present study, which is similar to the result of a study in Indonesia among others^{26,32–34}. Low maternal weight gain reflects poor child growth, which puts both mother and child at risk for morbidity and mortality^{35,36}.

Maternal gestational age at delivery of <40 weeks was another associated factor for LBW in the present study, which is similar to a result found in Malaysia³⁷. Some studies showed that the risk factor of LBW infants was a gestational ages of <37 weeks^{24,38}. When the mother delivers a baby before the baby is at full term, the baby is not fully grown. Therefore the babies are more likely to be small (LBW) and have higher risk for mortality since some organs such as lung is not fully functioning.

One limitation in this case-control study could be data collection bias due to interviewer prejudices. However, we minimized this by blinding the interviewers; therefore the manner in which they asked the questions were the same in both case and control groups.

Conclusion

This hospital-based case-control study was conducted in Vientiane, Lao PDR and indicated that ANC checkups at least 4 times could help reduce LBW of babies. Consequently, policy should improve coverage and quality of ANC of at least 4 times for all pregnant women in this population.

Table 1. Demographic and socioeconomic status of mothers (n = 208).

Characteristics	Cases (n=52)		Controls (n=156)	
	N	%	N	%
Maternal age (years)				
<20	9	17.31	18	11.54
20–34	38	73.08	119	76.28
≥35	5	9.61	19	12.18
Mean (SD)	26.55 (5.97)		26.79 (5.68)	
Median (Min: Max)	26.5 (16:37)		27 (17:40)	
Living				
Urban	27	51.92	94	60.26
Suburban	25	48.08	62	39.74
Marital status				
Married	52	100.0	154	98.72
Not married	0	0	2	1.28
Education				
Primary	8	15.38	25	16.03
Lower secondary	15	28.85	38	24.36
Upper secondary	15	28.85	68	43.59
Middle diploma or greater	14	26.92	25	16.03
Occupation (mother)				
Government officer	10	19.23	21	13.46
Private/enterprise	6	11.54	17	10.90
Business	9	17.31	29	18.59
Famer	1	1.92	5	3.21
House wife	26	50.00	84	53.85
Family income (Kips)				
≤1,000,000	11	21.15	15	9.62
1,000,001-1,500,000	11	21.15	38	24.36
1,500,001-2,000,000	10	19.23	41	26.28
≥2,000,001	20	38.46	62	39.74
Mean (SD)	2,207,692 (1,140,943)		2,616,667 (1,856,978)	
Median (Min: Max)	2,000,000 (500,000:5,900,000)		2,000,000 (550,000:6,000,000)	
Health insurance				
Government	11	21.15	33	21.15
Out of pocket payment	41	78.85	123	78.85
Family size (persons)				
2 – 3	8	15.38	21	13.46
4 – 5	31	59.62	94	60.26
6 – 7	7	13.46	34	21.79
≥8	6	11.54	7	4.49
Mean (SD)	5.13(1.88)		4.89 (1.65)	
Median (Min: Max)	5 (2: 10)		5 (2: 13)	

Table 2. Bivariable analysis of factors associated with low birth weight (LBW) in Lao PDR (n = 208).

Variables	LBW				Crude OR (95%CI)	p-value
	Case (n=52)		Control (n=156)			
	N	%	N	%		
Antenatal care check-ups (number of times)						0.002
Yes (≥ 4)	17	32.69	90	57.69	1	
No (<4)	35	67.31	66	42.31	2.80 (1.44 to 5.43)	
Taking any supplementary vitamins						0.497
Yes	46	88.46	143	91.67	1	
No	6	11.54	13	8.33	1.46 (0.51 to 3.99)	
Height of mother (cm)						0.263
≥ 161	3	5.77	21	13.46	1	
156-160	19	36.54	49	31.41	2.71(0.72 to 10.17)	
≤ 155	30	57.69	86	55.13	2.44 (0.68 to 8.77)	
Prenatal depression						0.107
No depression	43	82.69	112	71.79	1	
Depression	9	17.31	44	28.21	0.52 (0.24 to 1.18)	
Maternal weight gain during pregnancy (kg)						0.005
≥10	25	48.08	109	69.87	1	
<10	27	51.92	47	30.13	2.50 (1.32 to 4.76)	
Maternal gestational age during delivery (weeks)						0.001
≥40	10	19.23	68	43.59	1	
<40	42	80.77	88	56.41	3.25 (1.5 to 6.63)	
Type of delivery						0.060
Vaginal	5	9.62	32	20.51	1	
Caesarean	47	90.38	124	79.49	2.43 (0.89 to 6.59)	

Table 3. Multivariable analysis factors associated with low birth weight (LBW) in Lao PDR (n = 208).

Variables	LBW				Crude OR (95%CI)	Adjusted OR(95%CI)	p-value
	Cases (n=52)		Controls (n=156)				
	N	%	N	%			
Antenatal care check-ups (number of times)							0.002
Yes (≥4)	17	32.69	90	57.69	1	1	
No (<4)	35	67.31	66	42.31	2.80 (1.44 to 5.43)	2.97 (1.48 to 5.93)	
Maternal weight gain during pregnancy (kg)							0.017
≥10	25	48.08	109	69.87	1	1	
<10	27	51.92	47	30.13	2.50 (1.32 to 4.76)	2.28 (1.16 to 4.49)	
Maternal gestational age at delivery (weeks)							0.003
≥40	10	19.23	68	43.59	1	1	
<40	42	80.77	88	56.41	3.25 (1.52 to 6.63)	3.33 (1.52 to 7.32)	

Data availability

Dataset 1: Raw data supporting the results presented. Since this study did not analyse knowledge of health care of the mothers or environmental factors and support of ANC, answers to Parts III and V of the questionnaire have not been included in the dataset. DOI, [10.5256/f1000research.15295.d210148](https://doi.org/10.5256/f1000research.15295.d210148)³⁹

Competing interests

No competing interests were disclosed.

Supplementary material

Supplementary File 1: Questionnaire used in the study in English.

[Click here to access the data.](#)

Grant information

This research was supported by the China Medical Board Project and the University of Health Sciences, Vientiane, Lao PDR; and the Faculty of Public Health, Khon Kaen University.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Acknowledgements

The authors are thankful to all participants, directors and heads of the Department of Obstetrics and Gynecology in participating hospitals.

References

- World Health Organization: **International statistical classification of disease and related health problems, tenth revision**. World health Organization, Geneva. 1992.
[Reference Source](#)
- Manji KP, Massawe AW, Mgone JM: **Birthweight and neonatal outcome at the Muhimbili Medical Centre, Dar es Salaam, Tanzania**. *East Afr Med J*. 1998; **75**(7): 382–7.
[PubMed Abstract](#)
- Wardlaw TM: **Low birth weight: country, regional and global estimates**. United Nations Children's Fund and World Health Organization, UNICEF, New York. 2004.
[Reference Source](#)
- World Health Organization: **Neonatal and perinatal mortality: Country, regional and global estimates 2004**. Geneva, WHO. 2004.
[Reference Source](#)
- World Health Organization: **Maternal mortality in 2005**. Estimates developed by WHO UNICEF, UNFPA and the World Bank. Geneva. 2007.
[Reference Source](#)
- OECD/WHO: **Health at a Glance: Asia/Pacific 2016: Measuring Progress towards Universal Health Coverage**. Paris. 2016.
[PubMed Abstract](#)
- United Nations: **The millennium development goals report 2015**. United Nations. 2015.
[PubMed Abstract](#)
- Deshpande JD, Phalke DB, Bangal VB, *et al.*: **Maternal risk factors for Low birth weight neonates: A hospital based case-control study in rural area of Western Maharashtra, India**. *National J Comm Med*. 2011; **2**(3): 394–8.
[Reference Source](#)
- Metgud CS, Naik VA, Mallapur MD: **Factors affecting birth weight of a newborn—a community based study in rural Karnataka, India**. *PLoS One*. 2012; **7**(7): e40040.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- World Health Organization: **WHO recommendations on antenatal care for a positive pregnancy experience**. World health Organization, Geneva. 2016.
[Reference Source](#)
- World Health Organization: **WHO antenatal care randomized trial: manual for the implementation of the new model**. World health Organization, Geneva. 2002.
[Reference Source](#)
- Lao PDR: **Lao Social Indicator Survey (LSIS) 2011-2012 (Multiple indicator cluster survey/demographics and health)**. Ministry of Health and Lao Statistics Bureau. 2010.
[Reference Source](#)
- Schlesselman JJ: **Case control studies: design, control, analysis**. Oxford University Press-Monographs in epidemiology and biostatistics. New York. 1982.
[Reference Source](#)
- Stata Corp: **Stata statistical software: Release 10**. College Station, Texas. 2007.
[Reference Source](#)
- Direk L: **Data Analysis by STATA program**. Chulalongkorn University Press (CUP). Bangkok, Thailand. 2011.
- Mumbare SS, Maindarkar G, Darade R, *et al.*: **Maternal risk factors associated with term low birth weight neonates: a matched-pair case control study**. *Indian Pediatr*. 2012; **49**(1): 25–28.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Anant P, Durgesh K: **Maternal factors associated with low birth weight: a case control study in rural Kerala**. *Int J Community Med Public Health*. 2017; **4**(10): 3793–3795.
[Publisher Full Text](#)
- Negandhi PH, Negandhi NH, Zodoey SP, *et al.*: **Risk factors for low birth weight in an Indian urban setting: a nested case control study**. *Asia Pac J Public Health*. 2014; **26**(5): 461–9.
[PubMed Abstract](#) | [Publisher Full Text](#)
- Kositkulaporn S: **Antenatal care and self-care behaviors of pregnant women who received services at health promoting hospital**. Regional Health Promotion Center 11, Nakhon Si Thammarat Province. 2014.
- Kader M, Perera NK: **Socio-economic and nutritional determinants of low birth weight in India**. *N Am J Med Sci*. 2014; **6**(7): 302–308.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Heron M, Sutton PD, Xu J, *et al.*: **Annual summary of vital statistics: 2007**. *Pediatrics*. 2010; **125**(1): 4–15.
[PubMed Abstract](#) | [Publisher Full Text](#)
- United Nations Children's Fund and World Health Organization: **Low birth weight country, regional and global estimates**. UNICEF, New York. 2004.
[Reference Source](#)
- Madiha KM, Shumaila Y, Ayesha I, *et al.*: **Maternal anemia is a risk factor for low birth weight babies at term**. *PJMHS*. 2016; **10**(3): 741–743.
[Reference Source](#)
- Phonglopisit S: **Maternal risk factors of low birth weight infant at Thoen Hospital, Lampang**. *Med J*. 2009; **30**(3): 146–153.
[Reference Source](#)
- Tewelde G, Kahsay G, Endeshaw A, *et al.*: **Determinants of low birth weight among mothers who gave birth in Debreworkos Referral Hospital, Debreworkos Town, East Gojam, Amhara Region, Ethiopia**. *Journal of Neonat Pediatr Med*. 2018; **4**(1): 145.
[Reference Source](#)
- Prakong T: **Related Factors of Low Birth Weight Infant**. *Journal of Yala Rajabhat University*. 2011; **6**(2): 113–122.
[Reference Source](#)
- Oladeinde HB, Oladeinde OB, Omoregie R, *et al.*: **Prevalence and determinants of low birth weight: the situation in a traditional birth home in Benin City, Nigeria**. *Afri Health Sci*. 2015; **15**(4): 1123–9.
[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
- Bhaskar RK, Deo KK, Neupane U, *et al.*: **A Case Control Study on Risk Factors Associated with Low Birth Weight Babies in Eastern Nepal**. *Int J Pediatr*. 2015;

2015: 807373.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

29. Fariha A, Tahir J, Muhammad FA, *et al.*: **Maternal risk factors associated with low birth weight: A case control study.** *Annals.* 2011; 17(3): 223–228.
[Reference Source](#)
30. Ganesh Kumar S, Harsha Kumar HN, Jayaram S, *et al.*: **Determinants of low birth weight: a case control study in a district hospital in Karnataka.** *Indian J Pediatr.* 2010; 77(1): 87–9.
[PubMed Abstract](#) | [Publisher Full Text](#)
31. Michael OF, Iddrisu AR, Riskatu Y: **Maternal risk factors for low birth weight in a district hospital in Ashanti Region of Ghana.** *Research in Obstetrics and Gynecology.* 2013; 2(4): 48–54.
[Reference Source](#)
32. Edi P, Sirikul I, Jiraporn C: **Maternal risk factors for low birth weight infant at Famawati General Hospital, Jakarta, INDONESIA.** *Journal of Public Health and Development.* 2008; 6(1): 123–133.
[Reference Source](#)
33. Cita YP, Resmiati N: **The relationship between demographic factors and low birth weight infants.** *Int J Res Nurs.* 2010; 1(1): 25–28.
[Publisher Full Text](#)
34. Agarwal K, Agarwal A, Agarwal VK, *et al.*: **Prevalence and determinants of “low birth weight” among institutional deliveries.** *Annals of Nigerian Medicine.* 2011; 5(2): 48–52.
[Publisher Full Text](#)
35. Usawadee J, Piyathida K, Orawun N: **Pregnancy factor affects low birth weight at Nong Bua Lum Phu Hospital, Nong Bua Lum Phu Province.** *Graduate Research Conference, Khon Kaen University.* 2014; 1791–1800.
[Reference Source](#)
36. Nahid K, Saeid S, Samira A, *et al.*: **Predictors of low birth weight infants in the North West Province of Iran: a Case-control study.** *Int J Pediatr.* 2016; 4(6): 1983–1991.
[Publisher Full Text](#)
37. Rosnah S, Mazlina M, Aimi NM, *et al.*: **Determinant of low birth weight infants: a matched case control study.** *OJPM.* 2014; 4(3): 91–99.
[Publisher Full Text](#)
38. Nittaya P: **Maternal risk factors of low birth weight infants in Khumuang District, Buriram Province.** *J Health Sci.* 2017; 26(2): 346–352.
[Reference Source](#)
39. Oulay L, Laohasiriwong W, Phajan T, *et al.*: **Dataset 1 in: Effect of antenatal care on low birth weight prevention in Lao PDR: A case control study.** *F1000Research.* 2018.
[Data Source](#)

Open Peer Review

Current Peer Review Status: ? ✗

Version 1

Reviewer Report 09 January 2019

<https://doi.org/10.5256/f1000research.16662.r42672>

© 2019 Lassi Z. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Zohra Lassi

The Robinson Research Institute, The University of Adelaide, Adelaide, SA, Australia

Major:

- Poorly written paper and needs English editing throughout. Many of the sentences are not clear and I could not follow many things because of grammatical errors.
- Abstract results need to be rewritten correctly.
- For the calculation of sample size, what indicators were used? Also provide the formula.
- Was the questionnaire by those physicians completed in the hospital premises? Although you did say those physicians were blinded but if they filled the questionnaire in health facilities then those physicians could have accessed the medical record data? This may add bias to the study.
- Facts such as women in cases who were young, lived in non urban areas, and had lower monthly family income were not discussed in the discussion section.
- Reference 2 is from 1998 and from Tanzania. Should use an updated citation and global figure.
- Reference 3 is very old (from 2004).
- Reference 5 indicates it is on maternal mortality. However, authors have used it for LBW burden. Please check if this is correctly cited?

Minor:

Several minor points has been raised in the attached.

- I would suggest changing the title to "Does antenatal care has any impact on reducing low birth weight. – a case-control study."
- Several grammatical errors, would suggest getting a good proof for language and grammar.
- Abstract: suggest changing the word "problem" to concern.
"Background: Low Birth Weight (LBW) is a worldwide public health problem.."
- Abstract: suggest changing this sentence from: Antenatal care (ANC) is provided to improve maternal and child health outcomes." to "Women are offered antenatal care (ANC) to improve maternal, pregnancy and newborn outcomes".
- Introduction: second line "le" should be "less than"

- Rewrite this sentence: "During 2005–2010, LBW incidences in countries of the Association of Southeast Asian nations ASEAN were 21.0% in Philippines, 11.0% in Malaysia, Cambodia and Lao PDR, 9.0% in Indonesia, 7.0% in Thailand and 5.0% in Vietnam ³."
- Whenever you are saying compared with normal children, it should be normal weight babies.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public Health, Perinatal Epidemiology, Adolescent Health, Global Health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 03 August 2018

<https://doi.org/10.5256/f1000research.16662.r36472>

© 2018 Songthamwat M et al. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Metha Songthamwat

Department of Obstetrics and Gynaecology, Udonthani Hospital, Udonthani, Thailand

Srisuda Songthamwat

Department of Ob-Gyn, Udonthani Hospital, Udonthani, Thailand

This article is a case control study, aims to study the association between the complete antenatal

care (ANC ≥ 4 times) and the low birth weight (LBW) in Lao PDR. It demonstrated the significance of ANC on the prevention of neonatal complication however there are a number of issues with the methods and analysis section that need to be clarified with some of the conclusion are not correspond with the results. The detail of comments by section is below:

Abstract:

The conclusion that complete ANC help mother and child in term of weight gain and full term delivery is not from the analysis of the results. The multiple logistic regression from this study only showed that antenatal care and maternal weight gain and GA at delivery had effect to the LBW.

Introduction:

- Page 3, Paragraph 1– second sentence birthweight of ≤ 2500 grams, the reference about LBW incidence in ASEAN was in 2004 that should be update. The last sentence about MDGs in 2015 is out of date and irrelevant which should be removed.
- Paragraph 2- some sentences are repeat of first paragraph
- Paragraph 3- four critical times of ANC was recommended from WHO in 2002, the update of recommendation from WHO is in 2016 which can be found in http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/, the new guideline recommend minimal 8 times of antenatal care to reduce perinatal mortality (page xvi)
- Paragraph 4- the authors mentioned there are limited studies identifying the role of ANC in reducing LBW incidence in Lao PDR, please give the detail, reference and gap of knowledge.

Methods:

The method was well described, however some points should be clarify

- The study period was 6 months in four tertiary hospitals in capital city which mean a lot of patients, with the only 52 cases of LBW and 156 control cases, the authors should mentioned about the selection method especially the control cases to avoid the selection bias.
- Some pregnancy factors that affect the LBW such as associated maternal diseases, complication during pregnancy, gravida and preterm birth should be added.

Results:

- The subjects were caesarean delivery in 90.38% of cases and 79.49% of control, 19.23% of cases and 13.46% of controls were government officer with only 1.92% of cases and 3.21% of controls were farmer. This might not be the good representative of Lao PDR pregnant women and the inferential of this study to general population might be limited.
- Paragraph 1-The control showed higher education, urban and higher income. This might cause from the convenience selection of control group and cause the better health status, more times ANC attend and higher birthweight of control group. Please clarify the method of control selection.
- Us dollar might be better than Kips for the understanding of the reader.
- Total birth, total LBW, total preterm birth and total cesarean deliveries in the study period should be added.
- Table 1- Maternal age should be 18-20 instead of <20 (<18 was excluded from this study), Famer should be changed to farmer. Only mean or median should be selected depend on the distribution of data. If median was selected, the min-max should be changed to interquartile range. Maternal medical and obstetrics complications should be added

because it was an important factor for LBW.

- Table 2-The gestational age normally divided to <37, 37-<42, $\geq$ 42 instead of 40. The BMI should be used instead of maternal height and why 10 kg was used instead of the recommended weight gain during pregnancy which depends on maternal BMI. Very high cesarean section in both groups was shown, please add the reasons or indications.
- The continuous data such as age, income should be analyzed in continuous form, especially income which was statistical difference between two groups if analyzed in continuous form and should be analyzed in multiple logistic regression analysis. The downgrade of continuous data to ordinal data should be avoided.
- Normally, the premature birth is the birth before 37 weeks GA and is the most important cause of LBW. This should be used instead of 40 weeks.

Conclusion: As mentioned above, the new WHO recommendation in 2016 recommend at least 8 times of antenatal care to reduce perinatal mortality.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Ob-Gyn

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research