FWU Journal of Social Sciences, Winter 2016, Vol.10, No.2, 70-79

Maternal Factors Determining Low Birth Weight in Punjab: A Secondary Data Analysis

Aisha Jalil, Ahmed Usman and Rubeena Zakar
University of the Punjab Lahore, Pakistan

Incidence of low infant birth weight implies the poor situation of public health facilities in any country. Despite the fact that Pakistan ranks worlds second in low weight births, there is serious lack of research on the issue. The present research is based on a secondary data analysis of Multiple Indicator Cluster Survey, Punjab (MICS, 2011) to analyze the maternal risk factors associated with low infant birth weight. The intent of pregnancy, breast feeding, mode of delivery, antenatal care utilization and demographics (age, education and type of place of residence) are analyzed in association with low birth weight among mothers (N=2593) of reproductive age (15-49). The results are indicated by t test, chi square, binary logistic regression and multivariate analysis. The incidence of low birth weight is found to be 24.5% in the total sample of 2593 from Punjab province, Pakistan. Findings indicate that mother's illiteracy, lower age, rural place of residence, unintended pregnancy, not breastfeeding and non-utilization of antenatal care are significant risk factors of low birth weight. Prospective researches are needed that assess medical and social risk factors of low birth weight in other provinces of Pakistan.

Keywords: antenatal care utilization; intention of pregnancy; low birth weight; maternal factors; Pakistan.

Infant birth weight implies not only the prospects of child survival and development, but also the status of maternal nutrition and antenatal care utilization (Barker, 1992). According to World Health Organization (WHO & UNICEF, 2004), infants born under 2.5 kg are considered as having low birth weight. Low birth weight is one of the major causes of infant mortality across the globe (Assefa, Berhane, & Worku, 2012). Low birth weight infants are usually born too early (preterm delivery) or are of too small size at full term delivery due to restricted fetal growth (ACIM, 2001; Ventura, Martin, Curtin, Menacker, & Hamilton,2001). Overall, 96.5% of the low birth weight infants are born in developing countries (WHO & UNICEF, 2004). The incidence of low birth weight in Pakistan is around 32% out of total child births (Bhutta, Khan, Salat, Raza, & Ara, 2004). Despite perilous low birth weight situation in Pakistan, there is serious lack of research on the issue.

Empirical researches conducted in other developing countries revealed diverse medical and socio-cultural factors associated with birth weight. In this regard, one the most extensively studied determinant of birth weight is intention of pregnancy (Eggeston, Tsui, & Kotelchuch, 2001; Mohllajee, Curtis, Morrow, & Marchbanks, 2007). Intended pregnancy is pre-planned and desired at the time of conception. Whereas an unintended pregnancy may be classified as: mistimed (want a child after sometime but not at the time of conceiving) and unwanted (no desire for more children). Thus, an unwanted pregnancy is the conception that is not wanted at the time of conception or is not wanted at all (Barber, Axinn, & Thornton, 1999).

The incidence of unintended pregnancies indicates the unmet need of contraceptives and inability of women to abort an unwanted pregnancy due to the abortion laws in Pakistan (Vlassoff, Susheela, Gustavo, Sadiqua, Ward, & Haley, 2009). Studies have found strong relationship between child's birth weight, mother's intention of pregnancy and subsequent maternal behaviors (Santelli et al., 2003). Mothers are found providing inappropriate attention and care to their children from unintended pregnancies (Cibils, Karrison, & Brown, 1994). On the contrary, the women who became pregnant when they wanted are found to initiate prenatal care in early stage of pregnancy and gained good weight (Marsiglio & Mott, 1988). Moreover, inappropriate maternal weight

Correspondence concerning this article should be addressed to Dr. Ahmed Usman, Assistant Professor Department of Sociology, Institute of Social and Cultural Studies, University of the Punjab, Lahore, Email ahmedusmaan@hotmail.com

gain, preterm birth, not breastfeeding and non-utilization of antenatal care are significant risk factors of low infant birth weight (Iranfar, Iranfar, & Ranjbar, 2009; Shah, Balkhair, Ohlsson, Beyene, Scott, & Frick, 2011).

In addition to this, maternal exposure to stressful circumstances during pregnancy also leads to low weight births (Carmichael & Shaw, 2000; Nasreen, Kabir, Forsell, & Edhborg, 2010). Muchemi, Echoka and Makokha (2015) found preterm delivery and previous low weighted birth as associated significantly with low birth weight in Kenya. On the contrary, a study conducted in urban communities of Karachi demonstrates no association between low birth weight and antenatal depression. However, poor nutritional status and absence of adequate prenatal care are found to be the major determinants of low birth weight in Pakistan (Janjua et al., 2008).

On the other hand, many others have found that intention of pregnancy is not associated with the infant birth weight (Sable, Spencer, Stockbauer, Schramm, Howell, & Herman, 1997). This may be because most of these researches did not make distinction between mistimed and unwanted pregnancies. Perhaps the consequences of mistimed pregnancies are less severe than that of unwanted pregnancies (Sable & Wilkinson, 2000). Mode of delivery (Saeedi, Ahmadian, Ghalibaf, & Hashemian, 2013) and breastfeeding (PRAMS, 2010) are also found to be associated with low birth weight. Birth of low weight children is higher in C-section deliveries in contrast to vaginal deliveries (Malloy, Rhoads, Schramm, & Land, 1989). Mode of delivery (abdominal and vaginal delivery) is never studied in association with the infant birth weight in the context of Pakistan.

Socio-economic profile of mothers is also found to be associated with low birth weight (Theodore, Kaestner, & Korenman, 2000). Non-utilization of antenatal care (Wado, Afework, & Hindin, 2014) and low socio-economic status (Kader & Tripathi, 2013) contribute to high incidence of low birth weight. The antenatal care is the professional health care services provided during and after pregnancy to the mother and baby. It is found that the mothers with intended pregnancy start taking antenatal care in early stage of pregnancy (Rafiei, 2007). Poor access to antenatal care services also implies low infant birth weight (Assefa, Berhane, & Worku, 2012). According to World Health Organization, at least four purposive visits to antenatal care providers are essential during pregnancy.

Studies demonstrate that the situation of maternal and child health in Punjab province is poor (Majrooh, et al., 2014). Only 25% of women in Punjab use antenatal care services available in public sector (Pakistan Statistical Year Book, 2007). In addition to this, 50% of the women receiving antenatal care reported dissatisfaction with the services available in public sector. Besides inadequate health facilities women are confronting socio-economic problems like indifferent decision making, transport, attitude of staff delivering services and spiritual healers (Majrooh, et al., 2013). To fill the gaps in literature, this study finds the risk factors of infant's birth weight in Punjab province of Pakistan using primary data gathered by Government of Punjab. We conducted a secondary data analysis of child birth weight in association with maternal factors. Intention of pregnancy, breast feeding, mode of delivery, antenatal care utilization and personal characteristics of mothers (age, education and type of place of residence) are seen in association with child birth weight among mothers (N= 2593) of reproductive age (15-49) sampled in Multiple Indicator Cluster Survey (MICS, 2011).

Research objectives

In order to analyze the association of maternal factors with low weighted births, we pursued the following objectives: (i) Are the social demographic characteristics (age, education, place of residence) of mothers associated with low birth weight? (ii) Are the antenatal care utilization, C-section delivery, breastfeeding and intent of pregnancy associated with normal and above birth weight? (iii) What are the mean birth weight differences in various maternal factors?

Method

We used primary data of MICS (2011), carried out by Government of Punjab province in association with United Nations Development Program (UNDP) and United Nations International Children's Emergency Fund (UNICEF). MICS (2011) provides representative data on children and women from Punjab province in order to assess the situation of Millennium Development Goals (MDGs) in the country. It is one of the largest surveys in the history of Pakistan on the indicators of women and child's health, with large sample size of 102,545

households and a remarkable response rate of 97 percent. MICS Data is managed and stored using Software Package for Social Sciences (SPSS). We also used SPSS (Version 21.0) to clean and analyze data. Note that the data of birth weight is not provided with the detail of live or stillbirth in MICS. Also the data is largely unavailable for questions on unintended pregnancy distinguishing mistimed and unwanted pregnancies. The response categories to question: 'wanted to get pregnant at that time?' are 'yes' and 'no'.

The independent variables are categorized as: age (15-29, 30-39, 40-49), ever attended school (yes, no), place of residence (urban, rural), use of antenatal care (yes, no), number of times received antenatal care (few, several times), antenatal checks (BP, Urine sample, Blood sample, weight), delivery by C section (yes, no), breastfed (yes, no) and intention of pregnancy (wanted, unwanted). Dependent variable child's birth weight is taken as continuous for t test (N=2593, mode=3.0 kg and mean=2.9 kg). The missing data and cases are filtered before applying the test. Also the assumptions of normality are checked before test application. The selection of cases for secondary analysis is based on the availability of data in variable low birth weight.

To assess the risk factors of low birth weight, binary logistic regression analysis and multivariate analysis are applied. The maternal variables significant in bi-variate analysis are included in multivariate analysis. The continuous variable: low birth weight; provided in MICS data file is recoded in two categories: low birth weight (below 2.5 kg); and normal and above birth weight (2.5 kg and more); to be used as the dependent variable of the study. The predictive-ability of maternal factors is examined at $p < 0.05$.To demonstrate the frequency distributions in association with weight categories: low birth weight/ normal or above birth weights, we applied Chi-square test.

For mean birth weight differences across variables, independent samples t-test and ANOVA are applied. In this regard, the dependent variable birth weight is taken as continuous. It is found to be normally distributed. Results are indicated through mean, SD, t, p value and eta squared. A p value <0.05 is considered as statistically significant for all results. Eta squared is calculated so as to examine the predictive ability of variables in t-test. It is not available in SPSS, using formula: Eta squared= $t^2 / (t^2 + N1 + N2 - 2)$

Results

The mothers who have attended school and have normal and above infant birth weight are more as compare to the mothers never went to school. The number of women who received antenatal care is highest for infant birth weight normal and above. Consistent with the findings of logistic regression, low birth weight is higher among women in rural areas. Table 1 represents the distribution of maternal factors across low weighted births and normal/ above weighted births.

Overall, the incidence of low birth weight is found to be 24.5% in the total sample of 2593 from Punjab. Table 2 represents the association of various maternal factors with low birth weight. Binary logistic regression analysis revealed that the mothers who never attended school, did not use antenatal care and did not breastfeed have higher likelihood of low birth weight with OR=3.59, CI= (3.25-3.98); OR=1.46, CI= (1.99-2.13) and OR=2.20 CI= (1.58-3.07) respectively. The other significant risk factors of low birth weight are: unintended pregnancy (OR=2.83, 95% CI=1.66-4.89), rural place of residence (OR=2.55, CI=2.25-2.89). Young mothers have higher likelihood of having low birth weight in contrast to the middle aged women (See table 2).

The results of t test demonstrated that the mothers who received few antenatal checkups in pregnancy showed a lower mean birth weight (5.8 ± 3.7) in contrast to the mothers who received several antenatal checkups (6.5 ± 3.5) with p value <.001. Similarly, a high mean birth weight (2.9 ±0 .8) is depicted by the women who breastfed their children as compare to the ones who did not breastfed their children (2.5 ± 0.9) with p value .005. Similarly, the women with unintended pregnancies have lower mean birth weight in contrast to the counterpart. The results of t-test can be seen in Table 3. Mean birth weight is insignificant with age of mother and type of place of residence. In multivariate analysis, the variables are adjusted for the wealth index, education and age of mothers. We found that the rural place of residence (AOR=1.35; 95%CI=1.13-1.63) and abdominal delivery (AOR=1.24; 95%CI=1.04-1.49) are significantly associated with low birth weight.

Table 1

Factors of low weighted births among ever married women n=2593[a], aged 15-49 years, Multiple Indicator Cluster Survey Pakistan (2011)

Variables		Child Birth Weight Low [b] / Normal and above [c]
	N [d]	OR(95%CI) [p]
Ever attended school		
Yes	2177	1
No	416	3.59(3.25-3.98)***
Received antenatal care		
Yes	2484	1
No	108	1.46(.99-2.13)***
C-section deliveries		
Yes	1099	1
No	1229	3.98(3.46-4.57)
Ever breastfed		
Yes	2430	1
No	160	2.20(1.58-3.07)***
Intended pregnancy		
Yes	178	1
No	69	2.83(1.66-4.89)***
Mistimed pregnancy		
Wanted later	59	1
Did not want more	9	8.00(1.0-64.0)
Type of place of residence		
Urban	1389	1
Rural	1204	2.55(2.25-2.89)***
Age of women		
15-29	1496	3.14(2.79-3.54)***
30-39	1010	2.55(3.06-4.12)***
40-49	87	1
Number of times received ANC [e]		
≤ 4 times	539	2.50(2.07-3.14)***
5 and more times	1945	1

a Cases are selected with reference to the dependent variable (birth weight) because a lot of information is missing in most of the cases. Hence the analysis is conducted on the cases in which birth weight is available. Sample is 2593

b (<2.5 kg) n=608

c (2.5 kg or more) n=1985

d The frequencies on categories of independent variables varied to a great extent due to missing data.

e World Health Organization defined.

Abbreviations: OR= odds ratio, CI= confidence interval, 1= reference category, ANC= Antenatal care.

P value ***= <.001, **= <.01, *=<.05

Table 2

Prevalence of low birth weight and normal or above infant birth weight in association with maternal factors [a]

Variables	Low birth weight [b]	Normal and above birth weight [c]	
	N (%)	N (%)	P value
Ever attended school			<.001
Yes	474(22)	1703(78)	
No	134(32)	282(68)	
Received antenatal care			<.001
Yes	563 (23)	1921 (73)	
No	44(41)	64 (59)	
C-section deliveries			.05
Yes	274 (25)	825 (75)	
No	247 (20)	982 (80)	
Ever breastfed			<.05
Yes	557 (23)	1873 (77)	
No	50 (31)	110 (69)	
Intended pregnancy			.76
Yes	42 (24)	136 (76)	
No	18 (26)	51 (74)	
Mistimed pregnancy			.359
Wanted later	17 (29)	42 (71)	
Did not want more	1 (11)	8 (89)	
Place of residence			<.001
Urban	269 (19)	1120 (80.6)	
Rural	339 (28)	865 (72)	
Age of women			.228
15-29	361 (24)	1135 (76)	
30-39	222 (22)	788 (78)	
40-49	25 (29)	62 (71)	
Number of times received ANC			<.001
≤ 4 times	154 (29)	385 (71.4)	
5 and more times	409 (21)	1536 (79)	

a the table represents chi square results

b below 2.5 kg. (n=608)

c 2.5 and above. (n=1985)

Table 3

Comparison of mean differences in birth weight with reference to antenatal care, intention of pregnancy, breast feeding, mode of delivery and profile of mothers

Variables	Mean ± SD	p (eta-squared)
Times received antenatal care		.000 (.00003)
Few times (0-4 times)	3.8 ± 3.7	
Several times (5 or more times)	5.0 ± 3.5	
Use of antenatal care		.72
Yes	5.1 ± 3.6	
No	5.0 ± 3.8	
Tests during pregnancy		
Checked BP		.204
Yes	2.9 ± .84	
No	2.7 ± .96	
Sample of Urine taken		.001 (.0006)
Yes	2.9 ± .84	

No	2.7 ± .86	
Sample of Blood taken		.001 (.005)
Yes	2.9 ± .84	
No	2.7 ± .85	
Weight check		.000 (.013)
Yes	2.9 ± .82	
No	2.7 ± .88	
Deliveries by C-section		.003 (.002)
Yes	5.3 ± 3.6	
No	5.0 ± 3.6	
Breastfed		.005 (.003)
Yes	2.9 ±0 .8	
No	2.5 ± 0.9	
Wanted to get pregnant at that time		.000
Yes	6.1 ± 3.6	
No	5.4 ± 3.6	
Ever attended school		.000 (.0048)
Yes	4.6 ± 3.7	
No	4.1 ± 3.6	
Place of residence		.102
Urban	5.2 ± 3.6	
Rural	5.0 ± 3.7	
Age [a]		.463
15-29	2.8 ± .9	
30-39	2.9 ± .8	
40-49	2.9 ± .9	

a ANOVA is applied on age

*the table represents independent samples t-test results.

Discussion

The findings demonstrated that the profile of women (lack of education, age and place of residence) are risk factors of low birth weight (Kader & Tripathi, 2013; Kramer, Séguin, Lydon, & Goulet, 2000). This is perhaps women who are educated or are in urban localities have better access to antenatal care services. However, the poor access to antenatal care services increases the risk of low birth weight (Assefa, Berhane, & Worku, 2012). Overall, 47.4% of the women who used antenatal care sought services from nurses or midwives and 20% received services of traditional birth attendants.

Numerous studies found that women do not breastfeed the children of unintended pregnancies (PRAMS, 2010). This research demonstrated similar results. Despite World Health Organization declaration about the importance of mother feed for infants with low birth weight, our findings showed that in Pakistan children with low birth weight are rarely breastfed (Eggeston, Tsui, & Kotelchuch, 2001; Saeedi et al., 2013). Likewise, young mothers are found to have higher likelihood of having low birth weight in contrast to the middle aged women.

Although MICS data does not provide insight into preterm and term delivery, but studies in developing countries showed that most of the children are born full term but have low weight due to gestational growth retardation (Ramakrishnan, 2004). This is perhaps due to inappropriate nutrition, non-utilization of skilled antenatal care, familiarity with the risks of low birth weight and socio-economic circumstances in which women live in Pakistan. Moreover, the data used in this study is gathered from Punjab that is the most developed province of Pakistan. Hence, the findings cannot be generalized at national level.

In short, our findings support the demonstrations of empirical researches stated in this paper. We found that mother's illiteracy, lower age, rural place of residence, unintended pregnancy, not breastfeeding and non-utilization of antenatal care are significant risk factors of low birth weight in Punjab province, Pakistan. It

highlights the need of programs to provide support for pregnant women in the form of antenatal care facilities and nutrition. Unintended pregnancy is found to have significant association with low birth weight. Thus, unintended pregnancies should be controlled by interventions promoting the use of contraceptives and for reducing the fear of its side effects among common people. Improvements are needed in maternal lifestyle and preferences of using medical care. To have population level effects, demand for skilled antenatal care providers should be promoted during and after pregnancy (Boerma, Weinstein, Rutstein, & Sommerfelt, 1996; Isiugo-Abanihe & Oke, 2011). Moreover, the knowledge of infant health risk factors should be provided to women during pregnancy. National level efforts may reduce low birth weight in the country.

Multivariate analysis reveals that adjusting variables for wealth index, education and age of mothers; the rural place of residence (AOR=1.35; 95%CI=1.13-1.63) and abdominal delivery (AOR=1.24; 95%CI=1.04-1.49) are significantly associated with low birth weight (Jalil, Zakar & Zakar, 2015). However, information is unavailable for delivery status: preterm and term. Besides promoting women's health during and after gestation, it is highly important to avoid cesarean delivery until normal mode of delivery is obstructed (WHO, 2014). Preterm birth, poor gestational history and emergency C-section are perhaps common reasons behind increasing number of abdominal deliveries in Pakistan. The socio-economic problems women face during pregnancy can lead to reproductive health complications which may affect the gestational growth. However, exploring the reason behind association of abdominal delivery and low birth weight is beyond the scope of present study.

Finally, this study has certain limitations that should be considered along with low empirical research on low birth weight in Pakistan. Our secondary analysis is restricted to the variables available in MICS data. The cause and effect relationships among the variables are not assessed due to cross-sectional design. Missing information is also one of the major weaknesses. However, strengths of this study lies in the use of multiple statistical tests and representative sample. Complete demonstration of the situation of low birth weight requires that the sequential study design may be used in future researches.

Conclusion and Recommendations

Our results support the association of maternal factors with infant's birth weight. Maternal profile (illiteracy, lower age and rural place of residence), unintended pregnancy, not breastfeeding and non-utilization of antenatal care are significant risk factors of low birth weight in Punjab province, Pakistan (Jalil, Zakar & Zakar, 2015). Multivariate analyses indicate that the rural place of residence and abdominal delivery are significantly associated with low birth weight. We suggest reproductive health improvement initiatives on urgent basis. In this regard, public health programs are needed to raise awareness among women regarding birth spacing, use of contraceptives, managing problems during gestation, nutrition and antenatal care utilization. To decrease the prevalence of low birth weight in the province, culturally effectual action plan should be devised by sociologists and public health experts.

At community level, basic health education interventions for mothers to understand the risk factors of low birth weight and the need of adequate postpartum care for a low weighted infant may help reduce the low weight led infant mortality (Shams, 2012). World's highest percentage of low birth weight is found in South Asia (28%). This number could be much more as 66% of the infants are not weighted the time of birth in South Asian countries (WHO, 2014). The 2nd world ranking of Pakistan in higher percentage of low birth weights indicates poor maternal health facilities available in public health sector (SOS Children Village, 2013). Antenatal and post-partum care services available in Pakistan are inadequate and unable to save the lives of many low weight infants (Pasha et al., 2015). The public health facilities are free of cost, poor quality and are not used by people of all social classes in Pakistan. Improving the quality of public sector care services may support women with lower socio-economic status unable to afford private medical consultation and treatment (Mumbare et al., 2012).

Moreover, mothers should be educated about infant health risk factors and promote usage of family planning methods in order to reduce unintended pregnancies. A smaller family size is also associated with a better maternal health prospects. It is highly important to upgrade the level of health visitors' skill by enhanced training programs. For improving the care service of health workers, evaluation surveys are needed on how effective is the health care service delivery at community level (ACIM, 2001). Moreover, the government should

increase spending in health sector for improving the quality of public health facilities with special consideration for maternal and child health care without any geographical disparity.

To reduce the number of mistimed and unwanted pregnancies, women should be encouraged for using family planning methods for birth spacing soon after delivery of a child and prior to pregnancy (Jalil, Zakar, Usman, & Amjad, 2016). Awareness of necessary hygiene should be raised regarding the prevention of diseases and infections during and after gestation (WHO, 2014). Hence, healthy behavior should be inculcated in families by community level interventions. Maternal health risk factors like anemia, depression and poor weight gain in gestation; that contribute to low weight births should be managed timely. The married couples expecting a child should be encouraged to have medical checkup and consultation on regular basis during and after gestation. The family members attending neonate and the mother should be called for counseling by the doctors in order to ensure better care at home. Domestic violence and psychological stress is experienced by many of pregnant women in Pakistan (Zakar et al., 2012). Moreover, ensuring skilled postnatal care and hygiene aspects of breastfeeding are associated with long term health of infants (WHO, 2012).

The information on the age of mother at delivery, gestational age at first antenatal visit and delivery, presence of anemia in pregnancy and birth interval are not available in primary data of present study. Prospective researches are needed to assess all maternal risk factors of low birth weight in all parts of the country. Innovative interference at community and provincial level to improve the care for mothers during pregnancy and childbirth may improve the health status of infants. It is suggested that efforts should be directed to improve nutrition, antenatal care utilization and basic education of mothers to understand the risk factors of low infant birth weight.

Acknowledgements
The authors are thankful to Government of Punjab, Pakistan for providing access to MICS (2011) data. The authors declare that there are no conflicting interests.

References

ACIM (2001).Advisory Committee on Infant Mortality. *Low birth weight report and recommendations.* Final report to Secretary of US Department of Health and Human Services.

Assefa, N., Berhane, Y., & Worku, A. (2012). Wealth status, mid upper arm circumference (MUAC) and antenatal care (ANC) are determinants for low birth weight in Kersa, Ethiopia. *PLoS One*, 7(6), e39957. DOI: 10.1371/journal.pone.0039957.

Barber, J. S., Axinn, W. G., & Thornton, A. (1999). Unwanted Childbearing, Health, and Mother-Child Relationships.*Journal of Health and Social Behavior,* 40, 231-57.

Barker, D. J. P. (1992). *Fetal and infant origins of disease*, (ed.) London: BMJ Books.

Bhutta, Z. A., Khan, I., Salat, S., Raza, F., & Ara, H. (2004). Reducing length of stay in hospital for very low birth weight infants by involving mothers in a step down unit: an experience from Karachi (Pakistan).*British Medical Journal,* 13;329(7475), 1151-5.

Boerma, J. T., Weinstein, K. I., Rutstein, S. O., & Sommer felt, A. E. (1996). Data on birth weight in developing countries: can surveys help? *Bulletin World Health Organization*, 74(2), 209–216.

Carmichael, S. L., & Shaw, G. M. (2000). Maternal life event stress and congenital anomalies. *Epidemiology*, 11(1), 30–35.

Cibils, L. A., Karrison, T., & Brown, L. (1994).Factors influencing neonatal outcomes in the very-low-birth-weight fetus (< 1500 grams) with a breech presentation. *American Journal of Obstetrics and Gynecolog*y, 171(1), 35-42.

Eggeston, E., Tsui, A. O., & Kotelchuch, M. (2001). Unintended pregnancy and low birth weight in Ecuador. *American Journal of Public Health*, 91, 808-10.

Husain, N., Munshi, T., Jafri, F., Husain, M., Parveen, A., Saeed, Q., Tomenson, B., Naeem, F., Chaudhry,N. (2014). Antenatal Depression is Not Associated with Low-Birth Weight: A Study from Urban Pakistan. *Front Psychiatry,* 5, 175.

Iranfar, S., Iranfar, K., & Ranjbar, M. (2009). Is there any relationship between neonatal BABIES weight and unintended pregnancy? *Pakistan Journal of Medical Sciences*, 25(5), 841-844.

Isiugo-Abanihe, U. C., & Oke, O. A. (2011). Maternal and environmental factors influencing infant birth weight in Ibadan, Nigeria. *African Population Studies,* 25(2)

Jalil, A., Zakar, R., & Zakar, M. Z. (2015).A Secondary Analysis of Maternal Factors Determining Low Birth Weight in Pakistan. *Iranian Journal of Public Health*, 44(1), PMC4450002

Jalil, A., Zakar, R., Usman, A., & Amjad, A. (2016). Determinants of fertility and fertility preferences in Pakistan: Comparative Secondary Analysis of PDHS 2007-2013. *Pakistan Journal of Gender Studies,* 12: 19-38.

Janjua, N. Z., Delzell, E., Larson, R. R., Meleth, S., Kristensen, S., Kabagambe, E., & Sathiakumar, N. (2008). Determinants of low birth weight in urban Pakistan. *Public Health Nutr. 12(6), 789-98.*

Kader, M., & Tripathi N (2013). Determinants of low birth weight in rural Bangladesh, *International Journal of Reproduction, Contraceptive, Obstetrics and Gynecology,* 2(2), 130–134.

Kramer, M. S., Séguin, L., Lydon, J., & Goulet, L. (2000). Socio-economic disparities in pregnancy outcome: Why do the poor fare so poorly?. *Paediatric and Perinatal Epidemiology*, 14, 194-210.

Majrooh, M. A., Hasnain, S., Akram, J., Siddiqui, A., Shah, F., & Memon, Z. A. (2013). Accessibility of antenatal services at primary healthcare facilities in Punjab, Pakistan. *Journal of Pakistan medical association,* 4(3), S60-6.

Majrooh, M. A., Hasnain, S., Akram, J., Siddiqui, A., & Memon, Z. A. (2014).Coverage and Quality of Antenatal Care Provided at Primary Health Care Facilities in the 'Punjab' Province of 'Pakistan'. *PLoS One,* 9(11): e113390. Accessed from: http://doi.org/10.1371/journal.pone.0113390

Malloy, M. H., Rhoads, G. G., Schramm, W., &Land, G. (1989). Increasing cesarean section rates in very low-birth weight infants. *Journal of American Medical Association,* 262(11), 1475-8.

Marsiglio, W., & Mott, F. L. (1988). Does wanting to become pregnant with the first child affect subsequent maternal behaviors and infant birth weight? *Journal of Marriage and Family,* 50, 1023-1036.

MICS, Provisional Report (2011). Bureau of Statistics, Planning and Development Department, Government of the Punjab, Multiple Indicator Cluster Survey, Punjab.

Mohllajee, A. P., Curtis, M. P. H. K., Morrow, M. B., & Marchbanks, P. A. (2007). Pregnancy Intention and Its Relationship to Birth and Maternal Outcomes. *Obstetrics & Gynecology,* 109, 678-686.

Muchemi, O. M., Echoka, E., & Makokha, A. (2015). Factors associated with low birth weight among neonates born at Olkalou District Hospital, Central Region, Kenya. *The Pan African Medical Journal,* 20, 108.

Mumbare, S. S., Maindarkar, G., Darade, R., Yenge, S., Tolani, M. K., & Patole, K. (2012). Maternal Risk Factors Associated with Term Low Birth Weight Neonates: A Matched-Pair Case Control Study. *Indian Pediatrics*, 49, 25-28.

Nasreen, H. E., Kabir, Z. N., Forsell, Y., & Edhborg, M. (2010). Low birth weight in offspring of women with depressive and anxiety symptoms during pregnancy: results from a population based study in Bangladesh. *BMC Public Health*, 10, 515.

Pasha, O., Saleem, S., Ali, S., Goudar, S. S., Garces, A., Esamai, f., Patel, A. et al. (2015).Maternal and newborn outcomes in Pakistan compared to other low and middle income countries in the Global Network's Maternal Newborn Health Registry: an active, community-based, pregnancy surveillance mechanism. *Reproductive health,* 12(2:S15). DOI: 10.1186/1742-4755-12-S2-S15.

Pakistan Statistical Year Book (2007) Federal Bureau of Statistic Government of Pakistan.

PRAMS (2010). Pregnancy Risk Assessment Monitoring System. *Unintended pregnancy fact sheet.* Hawaii State Department of Health. Family Health Services Division.

Rafiei, M. (2007). Prevalence of low Birth weight and obesity and some con combatant Factors in live off spring's in 2006 and compare with 2002 result's Arak Talleghani Hospital. *Iranian Journal of Podiatrists*, 17:1.

Ramakrishnan, U., (2004). Nutrition and low birth weight: from research to practice. American *Journal of Clinical Nutrition*, 79, 17-21.

Sable, M. R., Spencer, J. C., Stockbauer, J. W., Schramm, W. F., Howell, V., & Herman, A. A. (1997). Pregnancy Wantedness and Adverse Pregnancy Outcomes: Differences by Race and Medicaid Status. *Family Planning Perspectives,* 29(2), 76-81.

Sable, M. R., & Wilkinson, D. S. (2000). Impact of Perceived Stress, Major Life Events and Pregnancy Attitudes on Low Birth Weight. *Family Planning Perspectives,* 32(6), 288-294.

Saeedi, R., Ahmadian, M., Ghalibaf, M. B., & Hashemian, M. (2013).Survey on correlation between unplanned pregnancy and low birth weight in new infants. *Iranian Journal of Neonatology,* 4(2), 26-33.

Santelli, J., Rochat, R., Hatfield-Timajchy, K., Gilbert, B. C., Curtis, K., Cabral, R., Hirsch, J. S., Schieve, L., et al. (2003). The Measurement and Meaning of Unintended Pregnancy. *Perspectives on sexual and reproductive health*, 35(2)

Shah, P. S., Balkhair, T., Ohlsson, A., Beyene, J., Scott, F., & Frick, C. (2011). Intention to become pregnant and low birth weight and preterm birth: a systematic review. *Journal of Maternal and child health*, 15(2), 205-16. DOI: 10.1007/s10995-009-0546-2.

Shams, S. (2012). Low Birth Weight: Frequency and Association of Maternal Factors. *Pakistan Pediatrics Journal*, 36(4), 192-98.

SOS Children Village (2013).Too many low-birth-weight children born in Pakistan. Sep 09, 2013. [http://www.soschildrensvillages.org.uk/] Accessed on: 22nd November 2014.

Theodore, J. J., Kaestner, R., & Korenman, S. (2000). The Effect of Pregnancy Intention on Child Development. *Demography*, 37(1), 83-94.

Ventura, S. J., Martin, J. A., Curtin, S. C., Menacker, F., & Hamilton, B. E. (2001). Births: Final Data for 1999. Nat Vital Stat Rep, 49(1). Hyattsville, Maryland: National Center for Health Statistics.

Vlassoff, M., Susheela, S., Gustavo, S., Sadiqua, N. J., Ward, R., & Haley, B. (2009). *Abortion in Pakistan*. In Brief, New York: Guttmacher Institute, No. 2.

Wado, Y. D., Afework, M. F., &Hindin, M. J. (2014). Effects of Maternal Pregnancy Intention, Depressive Symptoms and Social Support on Risk of Low Birth Weight: A Prospective Study from Southwestern Ethiopia. *PLoS ONE,* 9(5), e96304. DOI:10.1371/journal.pone.0096304

WHO, UNICEF (2004). Low birth weight: country, regional and global estimates. Geneva, UNICEF and WHO.

WHO (2012). *Born Too Soon: The global action report on preterm birth.* Report by the Partnership for Maternal, Newborn & Child Health, Save the Children, and the March of Dimes. Retrieved from: http://www.who.int/maternal_child_adolescent/topics/newborn/care_of_preterm/en/

WHO (2014). Global *nutrition targets 2025. Low birth weight policy brief*. Retrieved from: http://www.who.int/nutrition/topics/globaltargets_lowbirthweight_policybrief.pdf

Zakar, R., Zakar, M. Z., Mikolajczyk, R., & Kramer, A. (2012). Intimate partner violence and its association with women's reproductive health in Pakistan. *International Journal of Gynecology and Obstetrics,* 117, 10-14.

Received: October 19th, 2015
Revisions Received: October 30th, 2016