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The Determinant of birth weight of newly born of Punjab , A study of punjab, Pakistan

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ABSTRACT: This study attempts to test the effect of different social-economic factors on the birth weight of newly born in rural and urban areas of the province Punjab, Pakistan, using Bivariate and multiple linear regression analysis. The present study is based on the date of PHDS (2006-07). The total sample size is 3705. The effect of type of residence, respondent's month of birth, sex of the child, respondent, age at first birth, preceding the interval and succeeding interval, educational level of respondent, and birth order number has been explored for birth weight of newly born children. The type of residence, Respondent's month of birth, Respondent's age at first birth, and birth order number have a significant effect on the birth weight of newly born but the sex of the child, respondents of education level. And succeeding and preceding birth interval have an insignificant effect on birth weight of newly born. It is recommended that Government should take a step to provide better education; more institutions should be open in rural areas, because as people become educated their behavior towards the low birth weight of newly born.

Keywords: Birth weight, IGUR, Respondent, Mother, Low birth weight, Generalized linear model, Multicollinearity, Bivariate Analysis.

I. INTRODUCTION:

Birth Weight

According to (WHO) World Health(Organization, Low birth weight is classified as weight at birth less then ,2500 g (5.5 pound).LBW continues to be a Significant Public Health Problem globaly. LBE infants are 17 times more likely to die within the fetal period than many of those weighing over 2,500 grams, or 40 times more likely to die in the neonatal period, which causes 71 percent including all neonatal deaths. This results in a subsequent decrease in maternal mortality. To affect the prevalence of LBW, maternal under-nutrition, low socioeconomic status, anima and disease, insufficient prenatal treatment, obstetric problems, maternal history of premature LBW infants were all recorded. In different cultures and environments, these variables perform to various conditions.
LBW was recommended by the World Health Organization to no longer be included in the actual definition of premature birth. In the 1970s, most scholars followed, while a book on LBW was titled "The Epidemiology of Prematurity" until late as 1977. They encountered an unpleasant new dilemma when researchers started to realize that LBW and preterm are not interchangeable. The invention of a new disorder, Intrauterine Growth Retardation, filled this space (IUGR). "(SGA) Small for gestational age", the softest 10 percent in of gestational age stratum, is the conventional definition of IUGR.
The IUGR infants closely correlate with the term collection of LBW infants and offer a "diagnosis" for these LBW infants. Therefore, as a group of infants with "preventable" ailments, the formation of an account called IUGR successfully saved LBW. "Growth retarded" is tiny infants who may not be pre-term. In certain areas of the world, low birth weight (LBW) persists as a major public health concern and is linked to both short and long toxic consequences. More than 20 million babies are born as LBW worldwide, around 15.5% of all births. Particularly in Pakistan, the prevalence is (19 percent).
In emerging countries, risk factors to LBW are distinct from others in advanced countries. The frequency of LBW is comparatively low in the United States And European countries (5-7 percent of live births) and susceptibility to environmental pollutants such as atmospheric air pollution, shortage of prenatal treatment, or low socioeconomic status are also the main elements of LBW.
In comparison, the prevalence of both LBW or maternal malnutrition and nutritional deficiency is high in many of these developing nations. It is important to assess the association between Pb exposure and the LBW. (2008: The Author). (The author 2008).

1.1 Cause of LBW

1. Preterm birth: a child born during term and gestation for far less than 37 weeks.
2. Maternal deficiency, including shortages of vitamin A, folic acid, zinc, and iron.
3. Maternal blood pressure is high.
4. Including numerous births.
5. Pregnancy of adolescents.
6. Insufficient rest through breastfeeding and continuous hard work. Stress, depression as well as other psychiatric variables.
7. Smoking throughout breastfeeding and second-hand tobacco use.
8. Acute and recurrent pregnancy diseases, including malaria and respiratory infections.

1.1 Popular assumption about LBW

There are numerous LBW assumptions.

1. LBW triggers the death of infants, LBW infants are usually 20 or even more times more vulnerable than heavy babies to death in the first year of development.
2. A measure of child risk is the proportion of LBW in a population.
3. Preventable is LBW, offers a target for measures to increase the survival of babies. LBW prevention is an important aspect of US public health strategy to minimize child mortality.

1.2 Objectives of the study

1. To observe the moderate birth weight of the children in Punjab of Pakistan.
2. To identify certain factors of birth weight.
3. To suggest policy measures to control the low birth weight of newly-born.

1.3 About Data

The research was carried out by the National Institute of Population Studies and has been based upon on Pakistan Demographic Health Survey (PDHS-2007) (NIPS). The Pakistani government supported the government's personnel time, office space, or also administrative support with financial assistance. The (UNFPA)/Pakistan United Nations Population Fund or UNICEF/Pakistan both aid financially to gather data and information. For this study, the children newly born with birth weight are selected, the total sample size in 16303, from Punjab, Pakistan. The PDHS 2006-07 is Pakistan's biggest household-based survey yet carried out.

II. REVIEW OF LITERATURE

The frequency of infants who are relatively or extremely underweight is (33.3% as well as 11.3 %,). As an infant grows older, The risk of the child becoming underweight substantially rises (such as children around 12 or 23 months are one and a half times to have been underweight, while children around 36 or 47 months seem to be two to three times further probable to have been underweight. The probability that somehow a female is underweight is much more than for an underweight boy. (Kumar, et.al, 2019)

For those mothers who ingested alcoholic drinks, someone who had eating taboos throughout pregnancy but never consuming extra meals throughout pregnancy, the likelihood of giving birth to an LBW infant was high. Maternal diet and lifestyle while pregnancy may have a positive effect on birth outcomes. (Abubakari, et.al, 2019)

Predictive variables for birth weight as well as gestational age were calculated to be maternal age, SES, higher maternal BMI, preeclampsia, ART, multiple pregnancies, parity, and male child sex after taking their correlation into account when using a combined multilevel multiple regression model. (Amini, et.al, 2018)

2.1 Birth Interval

Zhu et al. (2003) in black women an interpregnancy period of just under 9 months was linked to a higher risk of premature babies and LBW.

Low birth weight (LBW) is a significant public health issue, particularly in developed countries, but is often associated with infant mortality rates, with prolonged conception or elevated maternal age having separate influences on LBW prevalence. (Muhumud, et al, 2017).

2.2 Mother's education

To strengthening mothers' schooling and other socio-demographic factors, tailored measures should be planned to decrease the incidence of LBW. (Rahman, et al, 2016).

As with the educational level of women, the probability of lower birth weight declines for their wealth and job status. It has significant political ramifications that the mother's education should at least be a component of Pakistan's education programmer. To minimize the risk of lower birth weight as well as infant mortality, adequate medical services should also be established in rural communities. (Ghouse, et al, 2016)

2.3 Birth-Order

It is widely accepted that firstborns appear to be more intellectually active as compared to their younger siblings, are more conscious of their work patterns and research, and choice of lifestyle. These stereotypes are closely linked to observed birth order inequalities (Herrera, et al, 2003).

2.4. Factors of birth weight

The observational association among low birth weight or greater later blood pressure is influenced by both implicit maternal and explicit fetal genetic influences: maternal blood sugar levels alleles decrease offspring infant mortality, but only because the explicit fetal effects of such alleles raise later offspring blood pressure until transmitted. There was no proof that it temporally enhances the blood pressure of offspring while using maternal birth weight-lowering genotypes to proxy for an unfavorable intrauterine environment, suggesting that genetic consequences and not intrauterine processing are due to the reciprocal birth weight-blood pressure relation. (Warrington, et.al, 2019)

There is a well-established correlation between lower birth weight and adult illness. Greater birth weight, especially extremely higher birth weight, enhances the threats of type 2 diabetes among young adult males. The risk of obesity for both genders rises with rising birth weight. (Johnsson, et.al, 2015)

2.4 Sex of Child

The sustainability of neonates for smaller gestational ages or birth weights has been accomplished by advancements in neonatology. The null correlation between sex or mortality was preserved in a limited series of experiments. This suggests a greater risk of discharge mortality for male premature or LBW neonates compared to females. (Vu, et.al, 2018)

2.5 Mother's age at first birth

Several tests have found that babies born (SGA) are at high risk for adverse health issues later in life than babies born 'suitable for gestational health effects of lower birth weight 15 years' (AGA).

2.6 Type of residence

Women residing in rural communities experienced health issues while birth experience seemed to have no follow-up antenatal treatment and was reported to become more likely to provide lower birth weight infants as a source of energy using firewood. (Demelash, et.al, 2015) The persistence of a coal effect on the influence of lower birth weight indicates environmental impacts emerging from industrial exposure. (Ahern, et.al, 2011)

2.7 Respondent's Month of Birth

Lower birth weight (LBW) is strongly linked to morbidity or infant and neonatal death, delayed growth including cognitive development, as well as future chronic diseases. Fetal development and as such birth weight are affected by several factors. To overcome LBW-related complications, it is important to stress enhancing a mother's awareness and acknowledgment for a safe pregnancy. (Demelash, et.al, 2015)

Assessment hypothermia was widespread in babies of LBW and had been negatively correlated associated with birth weight or gestational age. Mild hypothermia has been correlated with greater RDS or mortality rates, multifactorial factors of neurodevelopmental deficiency may perform a significant role. (chang, et.al, 2015)

III. MATERIAL AND METHODS

In this chapter, we have described the data involved in the study, the statistical tools and method of the estimation of these parameters, and fitting in linear regression model along with the procedure for applying criteria on data and selection of appropriate models.

3.1 Multiple Linear Regressions

The general principle of a singular liner regression model seems to be that a single explanatory variable has become a straight-line component of the predictor variables. This can be formulated in its simplest form as

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_p X_p + \mu_i \quad (3.2.1.1)$$

If the random error is discrete, random variables even with a negative mean and stable variables are typically distributed.

3.2 Generalized Linear Models (GLM)

(GLM) Generalized Linear Models are a logical extension of the linear modeling method that makes it possible for models to match the data following probability distributions but other than the standard distribution along with Binomial, Multinomial, Poisson, etc.

Our OLS regression equation is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_p X_p + \mu_i$$

3.3 Multicollinearity

The theory of regression postulates that even a stochastic relationship occurs between such a dependent variable Y as well as a number of many other explanatory variables X1, X2,------, Xn. It results in multicollinearity issues where this presumption has been broken. E (X1Xj) ≠ 0. If another association of independent factors is equal to 1 or -1, we have complete multicollinearity.

For example, have

$$\lambda_1 X_1 + \lambda_2 X_2 + \ldots + \lambda_k X_k = 0$$

(3.4.1)

Where λ1, λ1…λk are constant and X1 are explanatory variables

3.3.1 Methods for Detecting Multicollinearity

By conducting a structured experiment, the issue of multicollinearity can be eliminated in regression analysis. The independent variables should have been uncorrelated in a well-designed study. Costs and time restrictions, inevitably, will prohibit researchers from gathering data in this way.

Method of detection is here

1. Higher R^2 but fewer significance ratios.
2. Eigenvalues and conditions Index
3. Tolerance and Variance inflection factor.

3.3.1.1High R^2 but few Significance Rations

If R2 is large, say beyond 0.8, the F test will deny the hypothesis in many other cases that perhaps the partial coefficient estimates are equivalent to 0 simultaneously, but the independent t-test will indicate that neither or very few of the partial slope coefficients vary statistically towards zero. R=Sq. = 99.5%

If R^2 value is greater than 0.8, so in our data multicollinearity is present.

3.3.1.2Eigenvalues and condition index

To identify multi-collinearity for all eigenvalues, we need eigenvalues and the condition index, but we can extract what is referred to as the condition numerical K classified as

$$K = \frac{\text{maximum eigenvalues}}{\text{Minimum eigenvalues}} \qquad (3.4.1.2.1)$$

And the (CI) condition index known as

$$CI = \frac{\sqrt{\text{maximum eigenvalues}}}{\text{minimum eigenvalues}} = \sqrt{K} \qquad (3.4.1.2.2)$$

3.3.1.3 Tolerance and the variance of an inflation factor

With the variance-inflating factor (VIF), which is represented as the velocity in which variance or the covariance can also be seen,

$$\text{VIF} = \frac{1}{\left(1 - r_{23}^2\right)} \qquad (3.4.2.6.1)$$

3.4 Autocorrelation

Autocorrelation can be defined as "correlation among members of period organized observation series (as in time series data) and correlation among members of period organized observation series (as in time series data)" (as in cross-sectional data). The classical linear regression model suggests there really is no such autocorrelation in the disturbances-i in the regression. In a representative way,

E $(u_i u_j)$ = 0 I ≠ j

The error duration in the autocorrelation of one term can be associated with the error duration of every other period and is correlated with the error duration in the previous period; this is known as the first-order association.

3.4.1 Methods of Detecting Autocorrelation

There are many ways for detecting the problem of autocorrelation in the variable.

3.4.1.1 Durbin-Waston d-statistic

It is generally referred to as the d-statics of Derbin-Watson. The Durbin-Watson statistics is a mathematical test used throughout the study of the residual to determine the existence of autocorrelation. The analysis is only suitable for the autoregressive first-order method.

We have to identify the null hypothesis and that is the successive observations which are no autocorrelation (p=0), against the alternative that the observations are dependent on each other (p≠0).

If e_t is the residue of the observation at time step t, then the statistics of the test are

$$d = \frac{\sum_{t=2}^{T}(e_t - e_{t-1})^2}{\sum_{t=1}^{T} e_t^2}$$

A major benefit of d-statistics is that it has been based on an interpretation of the predicted residuals that are systematically measured in regression. The expectations underlying the d-statistic are important to remember. The regression models,

1. First of all, provide the intercept concept.
2. Secondly, in repetitive sampling, the explanatory coefficients are none and set.
3. Thirdly, the disruption terms u t are developed by $u_{t=\rho\mu_{t-1}} + v_t$, the very first-order autoregressive method.
4. Fourthly, it is presumed that the standard error t m is generally distributed.
5. Fifthly, that regression model does not even have as one of the explanatory variables the stalled relationship between dependent variables.

The above formula of the d-statistic can further be simplified as:

$$d \cong 2(1 - \check{P})$$

The test statistic d is contrasted to the highest and lowest vital values (d_l, α andd_U, α).

3.5 Heteroscedasticity Test

Two checks for heteroscedasticity of the error are given by the MODEL procedure: White's as well as the modified Breusech-pagan test. The heteroscedasticity of the real disturbances is used by schemes of measurement calculations to analyze. The White alternative checks the null statement.

$$H_0 : \sigma_i^2 = \sigma^2$$

3.5.1 Detection of Heteroscedasticity

There are different methods for detecting Heteroscedasticity.

3.5.1.1 Glejser Test

The Glejser test is related to the approach of the Park Test Trial. The following measures are based on this method.

$$Y_1 = \alpha + \beta X_i + E_i$$

(i) Estimate the following regression e_i

$|e_i| = a + b\left(\frac{1}{X_i}\right) + V_i$

(3.6.2.2.2)

Where V_i is the error term Heteroscedasticity is established if it turns out that b is statistically meaningful in one of the above aggression for transformation to be used for correction of Heteroscedasticity, select the regression with the highest value of R^2 .

3.5.2 Remedial Measures of Heteroscedasticity

One Heteroscedasticity is established its remedial measure is called for as the OLS estimates are no longer efficient. Two approaches have been used by the profession to correct for Heteroscedasticity. First when (Error Term Variance) is not established. First approach:

The Heteroscedasticity may be tried to correct whilst also hypothesizing a relationship among the error variance and that one of the repressor's while variance of the error word is uncertain. A long transformation

$InY_i = \beta_0 + \beta_1 InK_i + \mu_i$ (3.6.3.1.1)

3.6 Chi-Square Test

The Chi-Square testing is used to assess if, in one or even more groups, there is significant variability between both the frequencies predicted and the frequencies measured.

3.6.1 Test Requirements of Chi-Square

$X^2 = \sum \frac{(0_i - e_i)^2}{e_i}$ (3.7.1.1)

In each group, the Observed Frequency is 0_i

e_i Is the estimated frequency in the related group is

Is the Expected Frequency in the corresponding category?

df is representatives (n-1) of the "degree of freedom".

X^2 Is known as Chi- Square.

3.7 Somers'd

In 1962, Somers's is an ordinary association test initiated by Somers'. It is possible to describe it in terms of (Kendall and Gibbons, 1990). Kendall's is known as Kendall's given a sequence of bivariate random variables (X; Y) = f (Xi; Yi) g, collected using a sampling strategy for bivariate pair sample selection pairs, and even with equivalent marginal distributions shown as

τ (X; Y) = E [[sign (Xi - Xj) sign (Yi - Yj)]

IV. RESULTS AND DISCUSSIONS

Thorough discussions of data and statistical methods are carried out in Chapter.3; here we are presenting the results obtained from the application of these statistical methods. The study focused on identifying the determinants of birth weight of newly born. The effect of different socio-economic, demographic, and cultural variables, age of respondent and Sex of child, education of respondent, respondent's month of birth, type of place of residence, proceeding birth interval, and succeeding birth interval.

4.1 Bivariate Analysis

The bivariate analysis includes the cross-tabulation of the birth weight values of newborn and independent variables by using the survey figures of Somers'd, Chi-square, as well as the total educational attainment of the units of analysis for different types of independent factors. The data were analyzed using SPSS-15.

4.1.1 Birth Weight of children

The bivariate analysis Consists of the cross-tabulation by using the statistic test of socioeconomic and culture variables to understand the trend of birth weight of children in Punjab, Pakistan.

Table 4.1: Analysis of bivariate relationship between characteristics and response variables

Characteristics		**Birth weight (grams)**				**Total**
		500-1249	**1250-2499**	**2500-4999**	**5000+**	
Sex of child	Male	8 (0.4%)	47 (2.4%)	163 (8.4%)	1719 (88.7%)	1937 (100.0%)
	Female	3 (0.2%)	36 (2.6%)	135 (7.6%)	1594 (90.2%)	1768 (100.0%)
Test Statistics	Pearson Chi-Square = 3.376 (0.337)					
Preceding birth interval	9-27	5 (0.4%)	28 (2.0%)	97 (6.8%)	1298 (90.9%)	1428 (100.0%)
	28-54	3 (0.3%)	19 (1.6%)	73 (6.3%)	1062 (91.8%)	1157 (100.0%)
	55-108	1 (0.4%)	7 (2.5%)	26 (9.4%)	243 (87.7%)	277 (100.0%)
	109+	0 (0.0%)	1 (3.6%)	6 (21.4%)	21 (75.0%)	28 (100.0%)
Test Statistics	Somers'd = -032 (0.350)					
Succeeding birth interval	9-14	1 (0.4%)	9 (3.8%)	15 (6.4%)	210 (89.4%)	235 (100.0%)
	15-28	2 (0.3%)	14 (1.9%)	45 (6.0%)	360 (92.1%)	391 (100.0%)
	29+	0 (0.0%)	6 (1.5%)	25 (6.4%)	360 (92.1%)	391 (100.0%)
Test statistical	Somers'd = - .053 (0.295)					
Respondent month of birth	<4	2 (0.2%)	23 (2.0%)	80 (7.0%)	1034 (90.8%)	1139 (100.0%)
	4-9	6 (0.4%)	39 (2.3%)	129 (7.7%)	1512 (89.7%)	1686 (100.0%)
	10+	3 (0.3%)	21 (2.4%)	89 (10.1%)	767 (87.2%)	880 (100.0%)
Test statistical	Somers'd = -.053 (0.295)					
Respondent age at first birth	<18	3 (0.3%)	11 (1.0%)	31 (2.9%)	1026 (95.8%)	1071 (100.0%)
	18-27	8 (0.3%)	61 (2.6%)	229 (9.7%)	2063 (87.9%)	2361 (100.0%)
	28+	0 (0.0%)	11 (4.0%)	38 (13.9%)	224 (82.1%)	273 (100.0%)
Test statistical	Somers'd = -.215 (0.00)					

Table 4.1: Analysis of bivariate relationship between characteristics and response variables

Characteristics		**Birth weight (grams)**				**Total**
		500-1249	**1250-2499**	**2500-4999**	**5000+**	
Respondents education level	No education	7 (0.3%)	55 (2.2%)	198 (7.9%)	2254 (89.7%)	2514 (100.0%)
	Primery	3 (0.5%)	17 (2.9%)	57 (9.6%)	59 (87.1%)	596 (100.0%)

	Middle	0 (0.0%)	4 (1.7%)	19 (9.6%)	214 (90.3%)	237 (100.0%)
	Secondary	0 (0.0%)	2 (1.2%)	8 (4.8%)	156 (94.0%)	166 (100.0%)
	higher	1 (0.5%)	5 (2.6%)	16 (8.3%)	170 (88.5%)	192 (100.0%)
Test statistical	Somers'd = -.010(0.00)					
Birth order number	<2	4 (0.3%)	48 (3.1%)	168 (11.0%)	1309 (85.6%)	1529 (100.0%)
	2-5	6 (0.4%)	26 (1.8%)	113 (7.8%)	1310 (90.0%)	1455 (100.0%)
	6-9	1 (0.2%)	9 (1.6%)	17 (3.0%)	542 (95.3%)	569 (100.0%)
	10+	0 (0.0%)	0 (0.0%)	0 (0.0%)	152 (100.0%)	152 (100.0%)
Test Statistical	Somers' d = .214 (0.00)					
Type of place of residence	Urban	6 (0.5%)	51 (4.0%)	204 (15.9%)	1018 (79.6%)	1279 (100.0%)
	Rural	5 (0.2%)	32 (1.3%)	94 (3.9%)	2295 (94.6%)	2426 (100.0%)
Test Statistical	Pearson Chi-Square = 201.486(0.00)					

4.1.2 Sex of child

Table 4.1 shows that the value of Chi-Square (3.376) is insignificant with a large p-value >0.05.

4.1.3 Preceding birth interval

Table 4.1 2nd factor shows that the value of Somers'd (-.053) is insignificant with the large p-value. Such women who became pregnant during six months of live birth were at an enhanced risk of having a baby to an LBW in (section 2.1).

4.14 succeeding birth interval

The 3rd factor was the succeeding birth interval. Those intervals were coded into four groups of succeeding intervals are 9 to 14, 15to 28, and 29 and above. Table 4.1 shows that the value of Somers'd (-.053) is insignificant with a large p-value>0.05.

4.1.5 Respondent's month of birth

The 4th factor was the respondent's month of birth are coded into three groups 4 or less, 4 to 9, and 10 or above. Table 4.1 shows that the value of Somers'd (-.071) is significant with a p-value <0.05.

4.1.6 Age of respondent at first birth

The 5th factor was Age of the respondent at first birth were coded into three groups of Age of respondents at first birth are less than 18, 18 to 27, and 28 and above. Table 4.1 shows that the value of Somers'd (-.215) is significant with a p-value <0.05.

4.1.7 Respondent educations

The 6th factor was the educational level of respondents is categorized on an ordinal scale. Table 4.1 shows that the value of Somers'd (-.010) is significant at p>0.00. The preference of health inputs is affected by parental education but has little direct influence on birth weight.

4.1.8 Birth order

The 7th factor was birth order number was coded into four groups are less than 2, 3 to 5, and 6 to 8 and greater than 10. Table 4.1 shows that the value Somers'd (.214) is significant with a p-value <0.05.

4.1.9 Type of place of residence

The 8th factor is a type of residence. That is categorized on a normal scale. The results of Table 4.1 shows that the value of Chi-Square (201.486) is highly significant with p<0.05.

4.2 Estimation of Parameters

Table 4.2: The estimated coefficient of different factors.

Variables	Parameter	B	Hypothesis Test	
			Df	sig
Intercept		10182.973	1	.000
Sex of child	Male	-120.551	1	.277
	Female	Reference		
Type of place of residence	Urban	-733.197	1	.000
	Rural	Reference		
Preceding birth interval	B11	.418	1	.919
Succeeding birth interval	B12	4.741	1	.411
Respondent's month of birth	V009	-41.704	1	.010
Age of respondent at 1st birth	V212	-25.137	1	.077
Respondent's Educational level	S113	33.711	1	.474
Birth order	BORD	69.921	1	.011
	(Scale)	2760925-304 (b)		

Table 4.2 shows the sex of the child (male/female) is (-120.551) which is significant with a p-value >0.05 and shows that the sex of the child does not affect on birth weight of children. The result shows there is a substantial difference between the child's birth weight and also the child's sexuality.

The type of place of residence shows that the birth weight of children is affected by the type of place of residence. The result indicated that there is also a significant difference in birth weight of children and also the type of residence.

The estimated coefficient of preceding birth interval is (.919) at the 5 percent mark, which is not significant and indicates that the birth weight of children is not affected by the preceding birth interval.

The respondents' month of birth is (-41.704) which is significant at a 5% level of significance and shows the birth weight of children affected by the month of birth. The estimated coefficient of the age of respondent at 1st birth is (-25.137) which is insignificant. It indicates that 'respondent's first age' does not affect the birth weight of children. The estimated coefficient of birth order number is (69-921) which is significant. It shows that the birth weight of children is affected by the birth order number.

4.3 Detection of Auto-correlation

Table 4.3: Model and the Summary for R-Square and Durban Warson test

R	R Square	Adjusted R Square	Change Statistics	Durbin Watson
			Sig F Change	
.154(a)	.024	.017	.001	2.589

The adjusted R-square value adjusted for a bias in R-square as the no of variable increase.

Table 4.3 shows the value of the Durbin-Watson statistic which is used for the detection of the autocorrelation.

The following decision rules are for testing.

$$d_L \leq d \leq d_U : 1.613 \leq 2.589 \leq 1.735$$

$$4 - d_L < d < 4 : 2.387 < 2.589 < 4$$

$$4 - d_U \leq d \leq 4 - \ d_L \ :2.26 \leq 2.589 \leq 2.387$$

$$d_U < d < 4 - \ d_U \ : 1.735 < 2.589 < 2.26$$

Table 4.4: ANOVA Table for significance value

S.O.V	Sum of square	Df	Mean square	F	Sig
Regression	64935045.427	6	10822508.071	3.742	.001(a)
Residual	2672601457.474	924	2892425.820		
Total	273756505.901	930			

Table 4.4 indicates that the results of the analysis of variance. Also, the computed F-value (3.742) is large, and the results confirmed the significance of the variables in explaining the dependent variable. The F-test rejected a hypothesis that perhaps the partial slope coefficient is equivalent to 0 at the same time. The significant value of F indicates that the model is a good fit.

4.4 Detection of Multicollinearity

I have diagnosed the multicollinearity based the value of R-square, tolerance and Variance inflation Factor (VIF), Condition indicates (CI), eigenvalues, tolerance

Table 4.5: Collinearity detection of multicollinerity

Independent variables	Collinearity Statistics	
	Tolerance	VIF
Preceding birth intervals	.993	1.007
Succeeding birth intervals	.995	1.005
Respondent's month of birth	.994	1.006
Age of respondent at 1st birth	.962	1.039
Respondent education level	.997	1.003
Birth order number	.964	1.038

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Table 4.5, we conclude that there is no multicollinearity problem.

Table 4.6: Collinearity Diagnostics diction of multicollinearity

Independent variables	Eigenvalue	Condition index
Preceding birth intervals	.702	2.838
Succeeding birth intervals	.199	5.336
Respondent's month of birth	.188	5.479
Age of respondent at 1st birth	.167	5.827
Respondent education level	.077	8.572
Birth order number	.013	20.599

Since there are no lower eigenvalues and CI<30, i.e. all values are less than 30, so there is no collinearity. Thus, by the results discussed above, there is no one explanatory are correlated with each other.

4.5 Detection of Heteroscedasticity

Table 4.7: Glejer test detection of heteroscedasticity

Independent variables	B	T	Sig,
(Constant)	.589	1.657	.098
OneoverX2	-1.841	-.831	.407
OneoverX3	-2.985	-1.298	.195
OneoverX4	-.295	-1.505	.133
OneoverX5	-5.563	-1.124	.262
OneoverX6	.235	1.590	.113
OneoverX7	.952	2.539	.012

After applying the Glejser test table shows that one regression coefficients (birth order number) are sig, so these are the cause of heteroscedasticity. Table 4.7 shows that there is a heteroscedasticity problem present in the data. In the presence of heteroscedasticity, OLS estimates remain unbiased but not efficient with variances.

Heteroscedasticity is not a severe problem.

4.6 Remedial of hetroscedasticity

Table 4.8: Remedial of hetroscedasticity

Independent variables	**B**	**T**	**Sig,**
(Constant)	9.382	27.728	.000
LnX2	-.032	-.860	.390
LnX3	-.056	-1.307	.192
LnX4	-.030	-1.189	.235
LnX5	-.003	-.032	-975
LnX6	.043	1.380	.168
LnX7	.052	1.343	.180

Table 4.8 indicates the overall results of log transformation and these results show that heteroscedasticity was removed in all factors. Since OLS estimators are unbiased and efficient.

V. CONCLUSION

The finding of the present report presents the effect of different factors of birth weight of newly born of rural/urban areas in Punjab, Pakistan. The type of residence affects the birth weight of newly born, the people who live in urban areas of Punjab, Pakistan has a low birth weight of newly born as compared to those who live in rural areas. Social-economic status has decreased. The birth weight of newly born is affected by the factor of education. The respondents who do not get an education have children with low birth weight. Such problem mostly rises in rural areas because the economic status of the rural respondent is not higher so they cannot get an education, but in urban areas peoples are educated so their behavior towards the birth weight of newly born. The government should take a step to provide better education: more instruction should be open in rural areas, because as people become educated their behavior towards the low birth weight of newly born. The present report shows the significant relationship between respondents at the age first birth and also the birth weight of newly born, compared to those who get early marriages have a low birth weight of newly born.

VI. RECOMMENDATIONS

It is recommended that the age of respondents has negative effects on the birth weight of newly born... People should be late marriages their daughter. Respondent's education effected on birth weight and step to provide better education, more instructions should be opened in rural areas, because as people become educated, their behavior towards the birth weight of newly born increase. In addition, to provide knowledge on wellness, new health centers should be arranged in rural areas. Employment opportunities for females should be encouraged.

Acronyms

- WHO (World Health Organization)
- IUGR (Intrauterine Growth Retardation)
- UNICEF (University of California-Davis)
- WIC (Women, Infants, and Children)
- LBW (Low Birth Weight)
- NIPS (National Institute of Population Studies)
- PDHS (Pakistan Demographic and Health Survey)
- PSID (panel Study of Income Dynamics)

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