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CARING PREMATURE NEONATES THROUGH KANGAROO MOTHER CARE; CASES FROM PAKISTAN

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Abstract:

Introduction: *Change in the subsectors of economy constantly got top need in various models of monetary betterment. In Pakistan progressive governments including the occupant government have tried for poverty mitigation through a few projects.*

Methodology: *The cross-section data is obtained from KMC section of Services Hospital, Lahore. It consists of 142 patients since the inception of KMC procedure in Pakistan. The section maintains necessary data of patients for their analysis and further use. The data is secondary and micro because it obtained from secondary source and provides information about individual patient admitted in the hospital.*

Results: *This part presents the estimates of the proposed model, statistical significance, model selection criteria, and results of test and biological interpretation of the findings. The coefficients of unrestricted model are listed in table 7. The coefficients of age of the mother and gender of the baby are tested using Wald test for their equality in the two equations. The results of the test are given in table 9 & 10. The p-value of Wald test in table 9 is .30 which is higher than our 5% of significance level. Therefore we cannot the reject our null hypothesis that age of mother have similar effect in both equations. In table 10, the p-value of Wald test is above our 5% level of significance. Therefore we cannot reject our null hypothesis that gender of the baby have equal effect in both equations.*

Conclusion

This study analyses the impact of kangaroo mother care on growth of premature new-born babies. It uses cross sectional secondary data from KMC section Services Hospital Lahore, Pakistan. The methodology includes two equation which are estimated jointly using three stage least square method in STATA. The model is firstly estimated without restriction and that proposed conditions are tested for their significance. The significant conditions are then applied in the estimation process. The results found that higher age of the mother has reducing effect on weight of the baby, and the male babies have higher weight on birth and gain weight more quickly as compared to male. KMC, the midpoint of the study, exerts positive impact on the growth of the premature baby.

Keywords: *Caring, Premature Neonates, Kangaroo Mother Care, Pakistan*

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INTRODUCTION:

Human welfare and improvement is an essential right of each person as stated in the constitution of the Islamic Republic of Pakistan and the contract of the United Nations. In any case, at the worldwide level and inside country expresses, a debate has been on-going for quite a long time whether welfare or development ought to be the gauge of real financial advancement. Wellbeing, training, drinking water and sewerage were thought to be the primary provider of welfare of the natives of a nation. It was, therefore that change in these subsectors of economy constantly got top need in various models of monetary betterment. In Pakistan progressive governments including the occupant government have tried for poverty mitigation through a few projects.

Pakistan consists of a collective land of 796,096 square kilometer and it is separated into five territories and other federal regulatory areas. The population is around 210 Ms in 2017. Internationally Pakistan has highest infant mortality rate (IMR) that is 55 per thousand live births. In spite of achieving huge ground in combining new-conceived mind in nationwide strategies and transform in the scope of intervention relevant for new-born's endurance during the recent decade, IMR has fallen steadily with an annual decrease of 0.9 percent during a similar time. This depicts the present declining rate will be inadequate for the public to achieve its Sustainable Development Goals. Pakistan Demographic and Health review (PDHS) 2014–15 has revealed a neonatal mortality of 55 for every 1,000 live births.

Causes of Infant Mortality

Prematurity

Prematurity is the main source of baby mortality. Prematurity is the birth of a child before 37 weeks of incubation. The developing organs are not developed enough for survival. The correct reason for untimely birth is as yet obscure.

Pneumonia

Pneumonia is the second driving reason for newborn child mortality (19% of aggregate). It is the inflammation of the lung and can be caused by microorganisms, parasites, infections or protozoa. Almost 50% of the deaths might be prevented by immunization against causative microscopic organisms.

Birth Asphyxia

Birth asphyxia happens when the fetus is denied of adequate amount of oxygen, either before or after the birth. It might be caused by maternal smoking, cord prolapse, placental dead tissue or cord occlusion.

Diarrhea

Diarrhea is the expansion in the recurrence and ease of stools. It causes drying out and electrolyte depletion. It might be caused by irresistible agents, malabsorption or because of different reasons.

Neonatal Sepsis

Presence of bacteria in circulation system along with the fever is called sepsis. It might be early beginning sepsis (prior to initial seven days of life) or late beginning sepsis (following seven days of life).

Injuries

Any harm to the living body might be included into wounds. Numerous wounds in newborn children happen because of imprudence and can be effortlessly kept away from.

Congenital Anomalies

Basic imperfections in the creating fetus are termed as Congenital Anomalies. They may emerge because of hereditary, intrauterine or unkown reasons. Utilization of anti-microbials, especially sulfonamides and nitrofurantoin are responsible for congenital abnormalities.

Measles

Measles is the contamination of respiratory ways by an infection. It causes fever, red eyes, cough and rash. It is an exceptionally infectious illness. Predisposing factors incorporate hunger, immunodeficiency and vitamin A inadequacy.

Austin et al. (2004) carried a test to think about a hybrid plan with observational and subjective information gathered on thermal condition and moms demeanors to STS was done in the infant wards of 3 health care provider's facilities in Lagos, Nigeria. Thirteen qualified babies were breast fed by their moms in thirty-eight four-hour sessions of Kangaroo Mother Care and the outcomes contrasted and thirty eight sessions of conventional delivery care. The danger of low body temperature was lessened by greater than ninety percent after breast fed during KMC as opposed to conventional care, relative risk (RR) zero point zero nine.

Often instances of increased body temperature happened with Kangaroo Mother Care, and core margin thermal condition contrasts were broadened, yet the danger of increase in body temperature was not noteworthy. Small scale surrounding thermal conditions were higher amid KMC, in spite of the fact that the normal room thermal conditions amid the two methodologies did not contrast fundamentally. Moms felt that KMC was protected, and favored the strategy to STS since it didn't separate them from their newborn children, albeit some had issues changing in accordance with this technique for care. Where hardware for warm control is missing or problematic, KMC is a best technique for overseeing stable low birth weight babies.

METHODOLOGY:

Data

The cross-section data is obtained from KMC section of Services Hospital, Lahore. It consists of 142 patients since the inception of KMC procedure in Pakistan. The section maintains necessary data of patients for their analysis and further use. The data is secondary and micro because it obtained from secondary source and provides information about individual patient admitted in the hospital.

Variables

New-born's Weight

This is dependent variable of first equation. It is measured as kilo-grams. One of the objectives of the study is to find the determinant of the weight of a new-born baby. Therefore this variable is included as dependent variable.

Gain in Weight during KMC

This variable is dependent variable of second equation. It is computed by taking difference between weight on birth and weight on discharge and it is measured in kilo-grams. To capture the impact of Kangaroo Mother Care on neonate's growth this variable is incorporated in the model as dependent variable.

Age of Mother

The age of mother is highly important for a healthy baby. That is why this variable is included in the model to understand its impact on the weight of neonatal. The purpose of the factor is to ensure if there is any role of female age in neonate's weight.

Duration of Pregnancy

Majority of the low-weight babies are caused by premature of delivery. The more early birth before the maturity date the more lose in weight is expected. To understand its behaviour, the variable is included in the model. Mature duration for the pregnancy is 37-40 weeks. Premature days are computed by subtracting pregnancy duration from 280 days. The more premature days the lower the weight of the baby is expected.

Gender of the Baby

This variable is included to apprehend if there is any difference in weight of male and female new-born baby. Further this variable is also included to see growth in babies by gender. This is a categorical variable and coded "0" for female and "1" for male.

Kangaroo Mother Care

Kangaroo Mother Care is the focus of the study. This is measured in number of days of KMC provided to the baby. KMC has significant role in survival of premature babies. In this study KMC is included to depict its role in growth of babies.

Breast Feeding

It is highly significant to be included in the model because after birth breastfeed is the major source of feed for premature babies and help them a speedy recovery. It is measured as total minutes a baby gets breast-feed during KMC process.

RESULTS AND CONCLUSION:

Descriptive Analysis

The descriptive analysis presents a detailed picture of the data to apprehend the basic information about the data. It mainly include mean of variables, their standard deviation, total number of observation, minimum values, and maximum values. Categorical variables are described in frequencies and percentages.

The descriptive statistics of the variables included in the study are given in the table 1. There is no missing observation in the data. The mean weight of neonate is 1.97 Kg with a standard deviation of 0.26. The minimum weight of new-born is 1.3 Kg and maximum weight is 2.5 Kg. The duration of pregnancy has a mean of 249 days with a variation of 14.75. Its minimum values is 218 days while 286 days is the maximum duration of pregnancy.

Table 1: Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
Weight on Birth	142	1.967887	.2618424	1.3	2.5
Pregnancy Duration	142	249.0563	14.75174	218	286
Weight on Discharge	142	2.030951	.3089555	.92	2.7
KMC	142	4.147887	2.062661	0	10
Breast Feeding	142	36.28873	38.65075	0	130
Weight Gain	142	.178	.1085	0	0.5

The weight on discharge (WD) has a mean of 2.03 Kg. Its lowest value is 0.92 Kg which is lower than minimum weight on birth. Therefore, there are some indications that some neonates lose weight during KMC. However, WD has highest value which is greater than weight on birth. KMC ranges from 0 to 10 days with a mean of 4.15 days. Similarly breast feeding varies from 0 to 130 minutes and its mean value is 36.3 minutes.

Table 2: Distribution of Data by Gender

Gender of baby	Frequency	Percent	Cumulative Frequency
Baby Girls	69	48.59	48.59
Baby Boys	73	51.41	100.00
Total	142	100.00	

Table 2 presents frequency distribution of data by gender. The data consists of 48.6 percent of female and 51.4 percent of male. Table 3 lists correlation between weight on birth, age of mother, pregnancy duration and gender. Likewise table 4 presents correlation of weight on discharge with age of mother, pregnancy duration, KMC, breast feeding and gender of baby.

Table 3: Correlation between Weight on Birth and Independent Variables

	Weight on Birth	Age of Mother	Pregnancy Duration	Gender of Baby
Weight on Birth	1.0000			
Age of Mother	0.1205	1.0000		
Pregnancy Duration	0.2573	0.0371	1.0000	
Gender of Baby	0.0996	0.0132	0.0814	1.0000

As expected KMC and breast feeding depict positive correlation with weight on discharge. It means greater the number KMC days the more the gain in weight of the baby. Similarly weight of baby increases as the breast feeding increases.

Table 4: Correlation Matrix of Weight on Discharge and Independent Variables

	Weight on Discharge	Age of Mother	Pregnancy Duration	Gender of Baby	KMC	Breast Feeding
Weight on Discharge	1.0000					
Age of Mother	0.0204	1.0000				
Pregnancy Duration	0.3010	0.0371	1.0000			
Gender of Baby	0.2046	0.0132	0.0814	1.0000		
KMC	0.3944	0.1667	-0.1003	-0.1357	1.0000	
Breast Feeding	0.0739	0.0822	0.0054	-0.1306	0.3242	1.0000

Table 5: Frequency Distribution of KMC Days for Male Babies

kmc	Freq.	Percent	Cum.
0	2	2.74	2.74
1	3	4.11	6.85
2	7	9.59	16.44
3	25	34.25	50.68
4	15	20.55	71.23
5	6	8.22	79.45
6	6	8.22	87.67
7	7	9.59	97.26
8	2	2.74	100.00
Total	73	100.00	

Frequency distribution of KMC days for baby boys is given in table 5 and for baby girls it is provided in table 6. Where KMC represents total days a baby admitted in KMC section. In the second column frequencies are given. The third column consists of percentages and last column provides cumulative frequencies.

By comparing the table 5 & 6 we reach on some interesting results. 71% of the baby boys (table 5) got KMC /discharged on or before fourth day. While 61% of the baby girls (table 6) are discharged on or before fourth day. Similarly 97% of the male babies are discharged on or before seventh day, contrarily 88% of the female babies are discharged in same period. Therefore we can conclude that male babies on average grow rapidly as compared to female babies.

Table 6: Frequency Distribution of KMC Days for Female Babies

kmc	Freq.	Percent	Cum.
0	1	1.45	1.45
1	3	4.35	5.80
2	6	8.70	14.49
3	20	28.99	43.48
4	12	17.39	60.87
5	9	13.04	73.91
6	3	4.35	78.26
7	7	10.14	88.41
8	3	4.35	92.75
9	3	4.35	97.10
10	2	2.90	100.00
Total	69	100.00	

RESULTS:

This part presents the estimates of the proposed model, statistical significance, model selection criteria, and results of test and biological interpretation of the findings. The coefficients of unrestricted model are listed in table 7. The coefficients of age of the mother and gender of the baby are tested using Wald test for their equality in the two equations. The results of the test are given in table 9 & 10. The p-value of Wald test in table 9 is .30 which is higher than our 5% of significance level. Therefore we cannot the reject our null hypothesis that age of mother have similar effect in both equations. In table 10, the p-value of Wald test is above our 5% level of significance. Therefore we cannot reject our null hypothesis that genders of the baby have equal effect in both equations.

Table 7: Coefficients of the Un-Restricted Model

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wob						
age	.0040088	.0048479	0.83	0.408	-.0054929	.0135104
preg	-.004712	.0015085	-3.12	0.002	-.0076686	-.0017554
1.sex	.0355299	.0462786	0.77	0.443	-.0551745	.1262342
_cons	1.959144	.1403826	13.96	0.000	1.684	2.234289
wgain						
age	-.0017989	.0018142	-0.99	0.321	-.0053548	.0017569
1.sex	.0379481	.0172619	2.20	0.028	.0041153	.0717809
feeding	.0003758	.0002248	1.67	0.095	-.0000648	.0008165
kmc	.0103801	.0042647	2.43	0.015	.0020214	.0187388
_cons	.1489169	.0491618	3.03	0.002	.0525616	.2452723

Endogenous variables: wob wgain
Exogenous variables: age preg 1.sex feeding kmc

Note: In table7 wob represents 'weight on birth', 'preg' is short name for prematurity days and 'wgain' is 'weight gain during KMC period'.

Table 8: Coefficients of the Restricted Model

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wob						
age	-.0007347	.0014945	-0.49	0.623	-.0036639	.0021946
preg	-.0047484	.0015075	-3.15	0.002	-.007703	-.0017938
1.sex	.0373585	.0142294	2.63	0.009	.0094694	.0652477
_cons	2.08276	.0661349	31.49	0.000	1.953138	2.212382
wgain						
age	-.0007347	.0014945	-0.49	0.623	-.0036639	.0021946
1.sex	.0373585	.0142294	2.63	0.009	.0094694	.0652477
feeding	.0003747	.0002248	1.67	0.096	-.0000659	.0008154
kmc	.0101037	.0042595	2.37	0.018	.0017551	.0184522
_cons	.1227134	.0415388	2.95	0.003	.0412989	.2041279

Endogenous variables: wob wgain
Exogenous variables: age preg 1.sex feeding kmc

Note: In table 8wob represents 'weight on birth', 'preg' is short name for prematurity days and 'wgain' is 'weight gain during KMC period'.

Table 9: Wald Test for Coefficient of Age

```
( 1)  [wob]age - [wgain]age = 0

          chi2(  1) =    1.06
        Prob > chi2 =    0.3030
```

Table 10: Wald Test for Coefficient of Gender

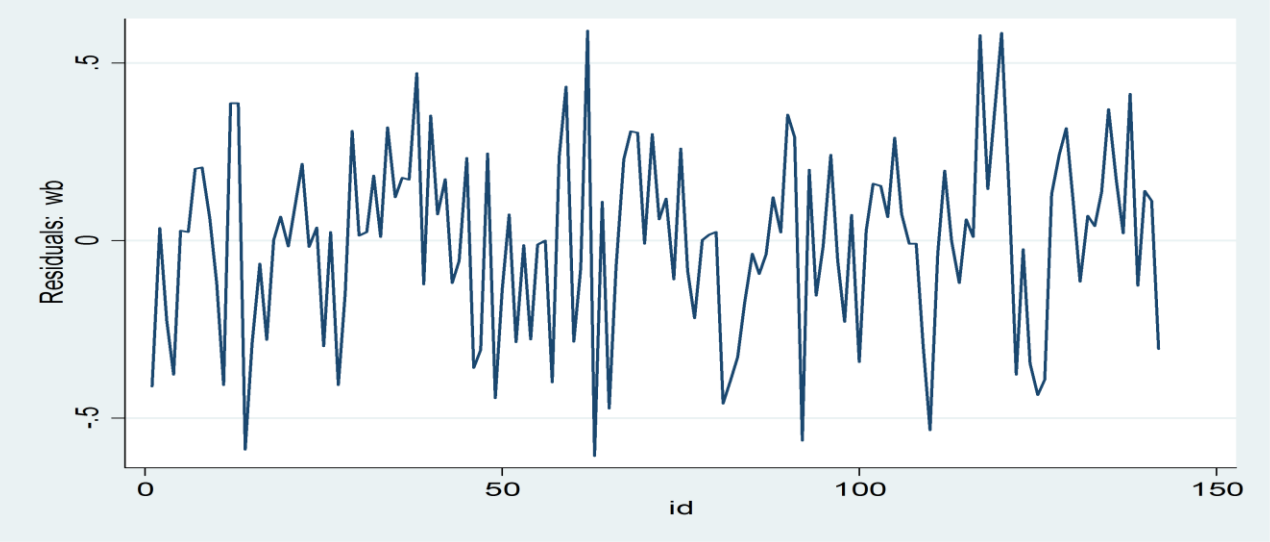
```
( 1)  [wob]1.sex - [wgain]1.sex = 0

          chi2(  1) =    0.00
        Prob > chi2 =    0.9641
```

Table 11: Model Selection Criteria

	Degree of Freedom	AIC	BIC
Unrestricted Model	9	-205	-178
Restricted Model	9	-208	-187

The values of information criteria or model selection criteria are given in table 11. The model with lower AIC and BIC value is considered more suitable model. In the table, restricted model has smaller values for AIC and BIC. Consequently we select restricted model.

Figure 1: Residual Plot of Equation 1



Graph 1 & 2 present line graphs of residuals/ error term from equation 1 and equation 2. The two graphs indicate no signs of hetroskadasticity and serial correlation. In the presence of any of the two problems we cannot trust out results. Hetroskaasticity arises when error terms change variance and serial correlation means that residuals follows a specific patron. In the graphs no particular trend is revealed and residuals have constant variance. In the absence of these two problems we can rely on our results.

Figure 2: Residual Plot of Equation 2

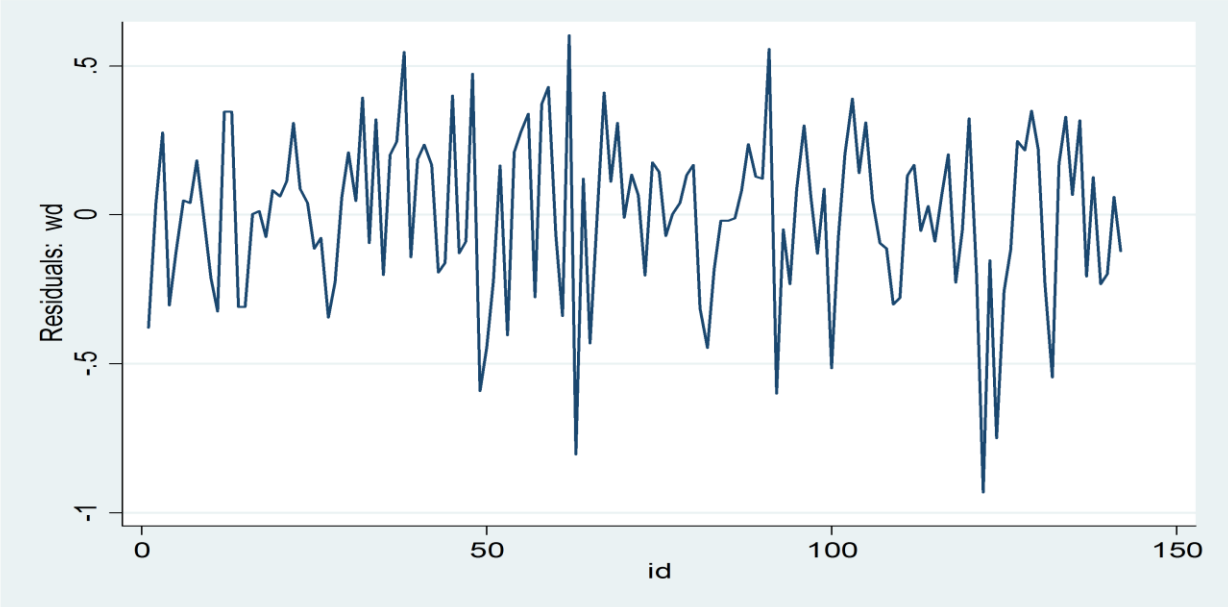
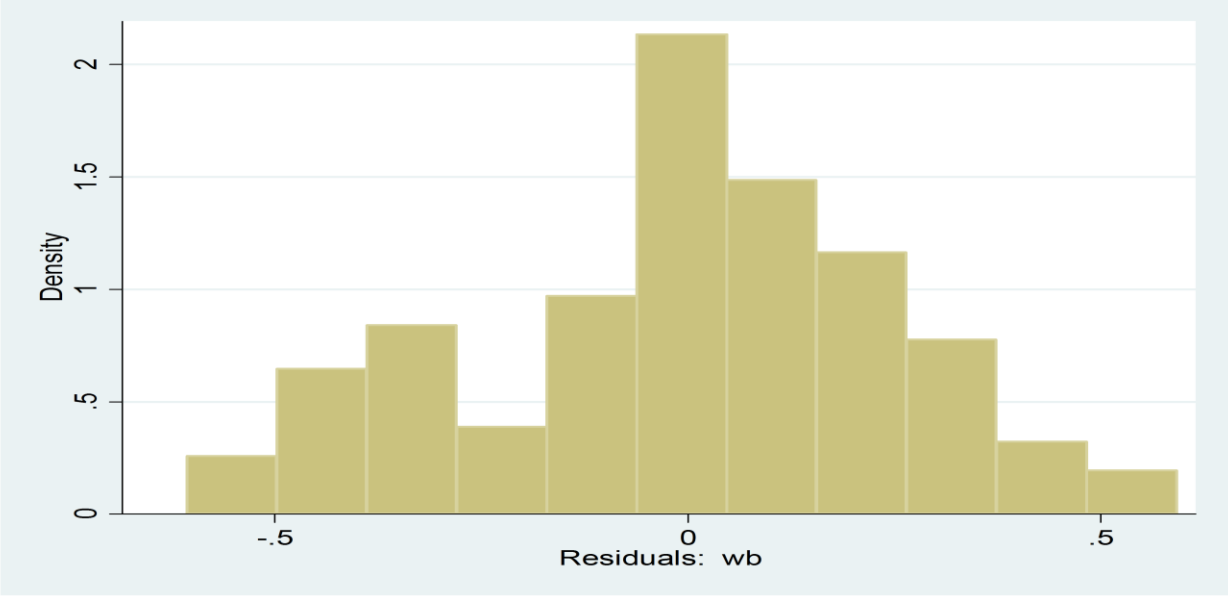


Figure 3: Histogram for Residuals of Equation 1



Graph 3 & 4 pictured the residuals from the two equations in the form of histograms. The two histograms are presented to depict the normality of the error terms. Here these show that the residuals are almost normally distributed. Hence we can rely on our results.

Figure 4: Histogram for Residuals of Equation 2

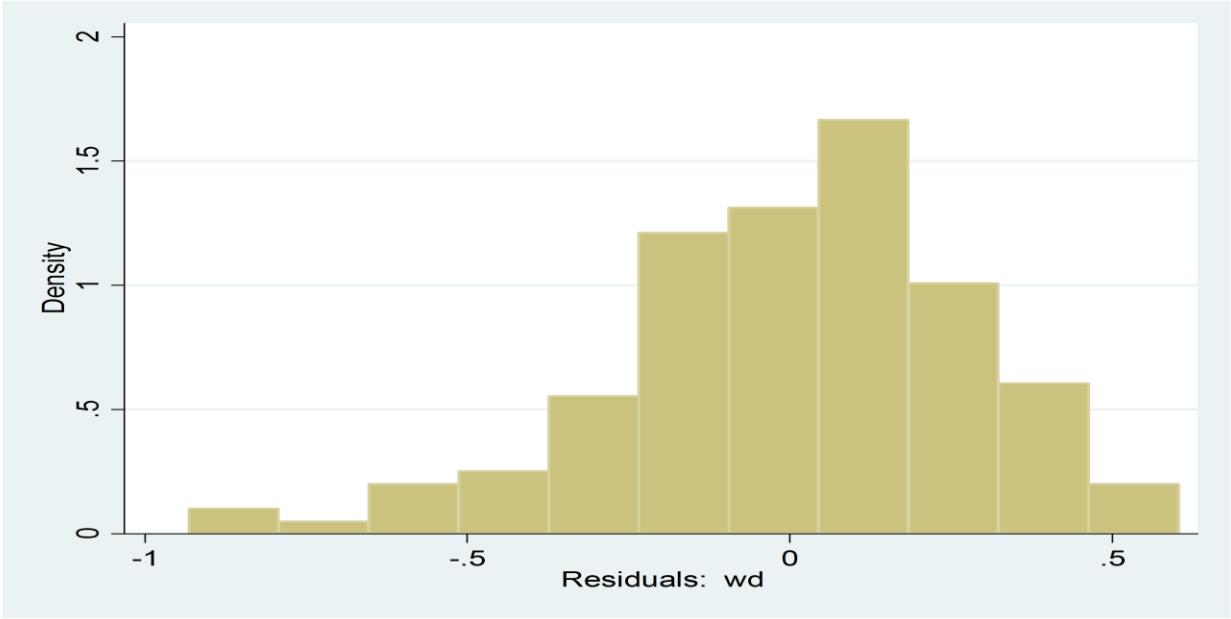


Figure 5: Q-Q Plot for Residuals of Equation 1

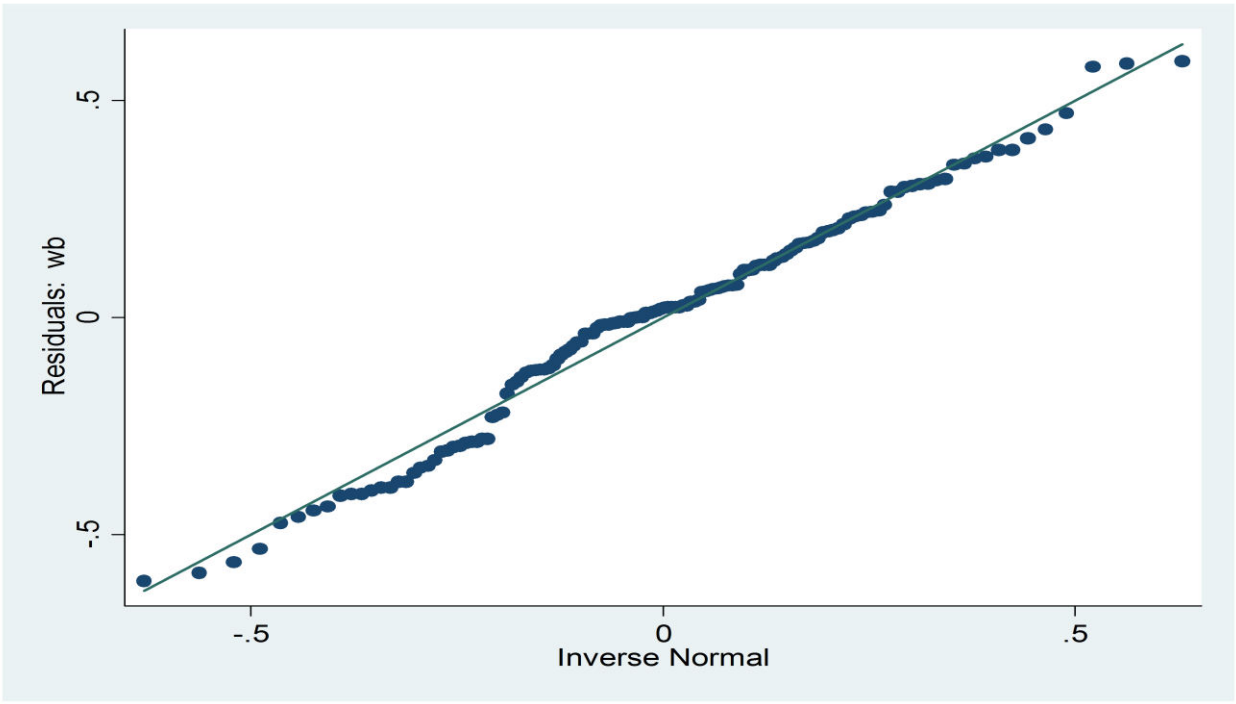
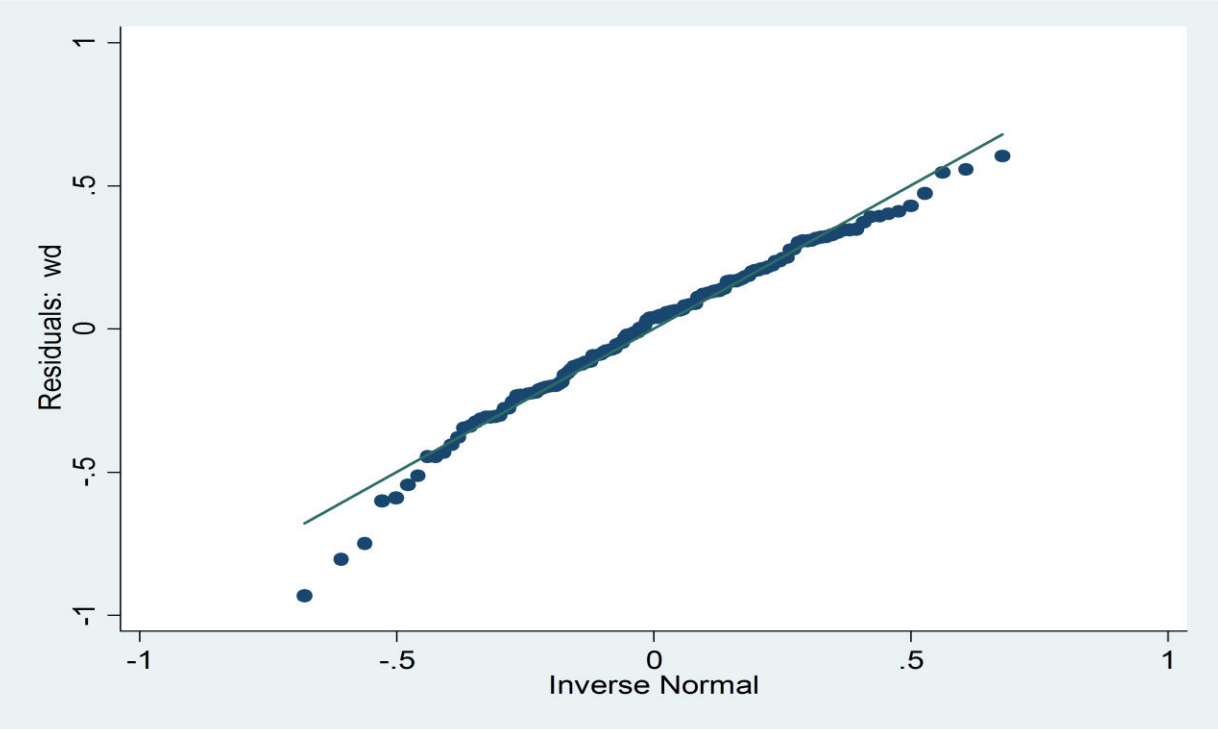


Figure 6: Q-Q Plot for Residuals of Equation 2



Interpretation of the Coefficients

Table 8 contains the coefficients of the restricted model. In this model we applied restrictions proposed in equation 3 & 4 after successful acceptance through statistical testing prior to the estimation.

The coefficient of age has negative sign which means that as the age of the female increases the new-born baby will have lower weight. In other words age of the mother and weight of new-born baby have inverse relationship. There is more likelihood that aged women will produce offspring with lower weight. This coefficient is statistically insignificant because absolute z-value is smaller than 2 and p-value is higher than 5% level of significance.

The coefficient of number of premature days has negative sign and it is statistically significant. One day more early birth of baby than the maturity period will reduce the weight of the baby.

Gender of the baby revealed very interesting information. Its coefficient is positive and significant. Which means the male baby has higher weight than the weight of the female baby on birth and according to second equation, boys are quick in gaining weight as compared to girls after birth.

Breast feeding is the major source of diet for neonate. According to our model breast feeding has positive impact on weight gain but is insignificant at 5% level of significance. However it is significant at 10%. This coefficient indicates that more minutes of breast feeding to the neonate results in more and quick weight gain.

The most important variable and centre of the study is kangaroo mother care. This factor is included in the second equation. Its coefficient has positive sign and it is statically significant. KMC has important role in survival and in gaining weight after birth. In other words the longer the kangaroo mother care the rapid weight gain in a baby is expected.

CONCLUSION:

This study analyses the impact of kangaroo mother care on growth of premature new-born babies. It uses cross sectional secondary data from KMC section Services Hospital Lahore, Pakistan. The methodology includes two equation which are estimated jointly using three stage least square method in STATA. The model is firstly estimated without restriction and that proposed

conditions are tested for their significance. The significant conditions are then applied in the estimation process. The results found that higher age of the mother has reducing effect on weight of the baby, and the male babies have higher weight on birth and gain weight more quickly as compared to male. KMC, the midpoint of the study, exerts positive impact on the growth of the premature baby.

Policy Recommendations

Keeping in view, following policy options are recommended to improve the weight gain in new-born premature babies.

Firstly it is found that as a female grows older its effects weight of the babies inversely. This is caused by ill-health and nutrition. In such circumstances it is highly recommended that female during pregnancy take extra care for themselves and family members too play their role in healthy mother and infant.

Secondly estimates indicted that male baby is more heavy as compared to female baby and gain weight rapidly. This is possibly due to biased behaviour towards female babies. A baby girl is blessing of Allah and we must not discriminate against them. We need to guide mother and father to care their baby girl equally. Arrange best food for them and do not feel cursed.

Thirdly it is found that breast feeding is very effective in increasing weight of the premature baby. Therefore we try our best that mother feed her baby as much as possible and medically feasible. Along increasing weight, breast feeding protects baby from several diseases.

Lastly kangaroo mother care indicates positive impact on growth and survival of premature baby. This method is very significant in reducing infant mortality in Pakistan. We need to initiate similar projects in other hospitals so that more of the premature babies can be saved and people avail this service as nearest as possible.

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