Factors Associated with Low Birth Weight of Children Among Employed Mothers in Pakistan

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Abstract Evidence shows that Pakistan has an increasing rate of children with low birth weight (LBW). Employed mothers in paid work (EMPW) in the country have predominantly been disadvantaged in terms of access to education and low-income employment; with negative consequences on maternal and child health. The objective of this study was to determine socio-demographic characteristics of EMPW and identify the association between maternal employment and child birth weight in Pakistan. Secondary data from the Pakistan Demographic Health Survey (PDHS) conducted for the year 2006–2007 was used. PDHS is a nationally representative household survey. Relevant data needed from the PDHS data file were coded and filtered. The sample size of EMPW with at least one child born in the last 5 years was 2,515. Data was analyzed by using SPSS. Descriptive and inferential statistics were used to see the association between EMPW characteristics and LBW. Findings confirm that the majority of EMPW in Pakistan are illiterate, poor, employed in unskilled work, and belonging to rural regions. Multivariate regression analysis revealed statistical association between EMPW and LBW among mothers who did not receive prenatal care from unskilled healthcare provider (AOR 1.92; 95 % CI 1.12–3.30), had lack of access to information such as radio (AOR 1.88; 95 % CI 1.28–2.77), during pregnancy did not receive calcium (AOR 1.19; 95 % CI 1.05–1.34), and iron (AOR 1.33; 95 % CI 1.05–1.69), had experienced headaches during pregnancy (AOR 1.41; 95 % CI 1.12–1.76), and were not paid in cash for their work (AOR 1.41; 95 % CI 1.04–1.90). EMPW in Pakistan, especially in low-income jobs and rural regions, need urgent support for healthcare awareness, free supplementation of micronutrients and frequent consultation with trained practitioner during the prenatal period. Long-term mobilization of social structure and governance is needed to encourage maternal health awareness, hospital deliveries, and formal sector employment for EMPW.

Abbreviations

LBW	Low birth weight
PDHS	Pakistan Demographic and Health Survey
EMPW	Employed mothers in paid work

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Background

The United Nations and Key Millennium Development Goals are targeting increasing birth weight to reduce child mortality [1]. Of the 20 million low birth weight (LBW)

children born globally, 96 % are from the developing world [2]. Pakistan especially is a critical region due to evidence of increasing rates of LBW from 22 % in 1991 to 31 % in 2007; with children of LBW at 68 % more risk of child mortality [3]. Previously women's employment status was believed to facilitate mother and child health. In the last few decades, research has found that even employed mothers in paid work (EMPW) have children of LBW; with greater incidence found in the South-Asian developing regions [4, 5].

LBW is an indication of possible risk for child mortality in the first year, lack of development ability and higher disease likelihood [6, 7]. Maternal demographic characteristics including poverty, rural belonging, literacy, nutritional deficiency and limited formal sector employment have all been correlated with LBW [8–11]. Research from developing regions indicate that mostly employed mothers with higher incomes and adequate nutrient consumption bear child with satisfactory birth weight [12, 13].

Pakistan is a developing nation in South-Asia plagued by sectarian, regional, political and economic instability [14]. Socio-demographic characteristics of EMPW in the region reflect high rates of illiteracy, rural belonging and low income jobs [15–17]. Married and working women have further been described as lacking decision-making ability with regard to child delivery location and medical consultation [18]. Additionally, micronutrient and vitamin deficiencies in pregnant women are estimated to be very high [19, 20]. This study aims to identify: (1) the socio-demographic characteristics of EMPW in Pakistan, and (2) the association between maternal employment factors and child's birth weight.

Methodology

Data and Sample

Demographic and Health Survey (DHS) has become an important instrument to assist countries globally in collecting, monitoring and evaluating policy improvement of women's fertility, health and nutritional status [21]. The present study uses secondary data from the Pakistan Demographic and Health Survey (PDHS) 2006–2007, which was the second national household survey conducted in the country. The data was collected using a stratified two-stage cluster national sample across 95,000 household and represented a total of 10,023 ever-married women of reproductive age. Our study was limited to EMPW, with at least one child born in the last 5 years, resulting in a sample size of 2,515. The reason for selecting cases in the last 5 years was to avoid memory recall bias of the mother. The PDHS is produced by DHS in collaboration with

NIPS, Macro International, the Government of Pakistan, the U.S. Agency for International Development, and the United Nations (United Nations Population Fund and UNICEF Pakistan). The birth weight of child in PDHS has been recorded through subjective estimation by the respondent and weight in kilos. The use of subjective estimation to measure birth weight has been accepted, for developing regions, because of the high incidence of home delivery and the absence of recorded weight estimates for newborns [22].

Measurement Variables

Socio-demographic Variables

Nine socio-demographic variables were included in our analysis, including: (1) maternal age (with 3 categories of '15–24', '25–34' or '35–49' years), (2) maternal education ('illiterate' or 'literate'), (3) maternal occupation ('unskilled' or 'skilled'), (4) total number of children born ('1–3' or '≥4'), (5) regional belonging ('urban' or 'rural'), (6) provincial belonging ('Punjab', 'Sindh', 'KPK' or 'Baluchistan'), (7) wealth status ('poor', 'middle' or 'rich'), (8) spouse education ('illiterate' or 'literate'), and [9] spouse occupation ('unemployed', 'unskilled' or 'skilled'). The categories for socio-demographic variables were limited between 2 and 4 because of the small number of cases in some categories.

Maternal Variables

On the basis of literature review for incidence of child birth weight in EMPW [23–30], thirteen independent variables were included in the analysis: (1) received prenatal care from unskilled healthcare provider (e.g. nurse, midwife or lady health worker) (with 2 categories of 'yes' or 'no'), (2) had lack of access to information such as radio ('yes' or 'no'), (3) prenatal checkup from doctor ('yes' or 'no'), (4) place of delivery ('home' or 'hospital'), (5) given or bought calcium during pregnancy ('yes' or 'no'), (6) given or bought iron during pregnancy ('yes' or 'no'), (7) ever been vaccinated ('yes' or 'no'), (8) experienced night blindness during pregnancy ('yes' or 'no'), (9) experienced headaches during pregnancy ('yes' or 'no'), (10) had ultrasound during pregnancy ('yes' or 'no'), (11) knows blood group ('yes' or 'no'), (12) earning in cash ('yes' or 'no'), and (13) husbands desire for children ('both want same', husband wants more' or 'husbands want fewer').

Statistical Analysis

Data was analyzed using SPSS version 17. For this study, the dependent variable of LBW was computed by

combining two variables of 'subjective estimation of birth weight' and 'birth weight in kilos'. For subjective estimation of birth weight categories of 'smaller than average' and 'very small' were combined to show LBW; whereas categories of 'very large', 'larger than average' and 'average' were combined to show normal birth weight. The term *normal* birth weight was used to avoid confusion with research on high birth weight and problems related to development of child obesity [31]. For birth weight in kilos, all values of <.5 kilos were combined to show LBW and all values of ≥2.5 kilos were combined to show normal birth weight. For analytical purposes normal birth weight was scored '0' and LBW was scored '1'. Descriptive statistics were used to report findings of EMPW through frequencies and percentages. Simple bivariate and multivariate binary logistic regression was used to identify association between socio-demographic and other pregnancy related variables of employed mothers and LBW of child. For the multivariate logistic model, all variables were controlled for maternal age (as a continuous variable), household wealth status and maternal educational level (as categorical variables). Odds ratio with 95 % confidence intervals and *p* values were calculated; and the significance level was assigned at 0.05 %.

Ethical Considerations

We used publically available secondary data from PDHS 2006–2007 for this study. Hence, ethical approval was not required from the concerned institution. However permission to use the dataset was obtained from Measure DHS.

Results

Socio-demographic Results

Table 1 shows the socio-demographic breakdown of EMPW in Pakistan; of which 36.6 % have reported having a LBW child. The mean ± SD age of EMPW was 33.73 ± SD 8.9 years. Illiteracy and rural belonging were highly predominant characteristics of the sample (both at 75.0 %). Majority of EMPW belonged to the provinces of Punjab and Sindh (42.3 and 39.4 % respectively). A significant number of EMPW were poor (60.5 %) and involved in unskilled work (97.7 %); and consequently belonged to the informal employment sector. Very few mothers were getting paid in cash (13.5 %). Almost half of the sample was married to illiterate spouses (46.9 %); and nearly all of the spouses were either unemployed or employed in unskilled work (90.0 %). Majority of the sample claimed to have the same desire as their spouse regarding the number of children they wanted in their

family (68.3 %). Almost 62.0 % of the mothers had 4 or more children. A significant number of EMPW had not had prenatal checkups from a doctor during pregnancy (78.3 %); however majority claimed to have had some prenatal consultation from an unskilled healthcare provider (94.5 %). Overall, 70.4 % of EMPW had delivered their child at home and more than half had taken or been given calcium (62.2 %) and iron (59.8 %) supplements during pregnancy. Respondent mothers recalled experiencing headaches and night blindness during pregnancy, at 44.4 % and 67.6 respectively. Less than half of the sample had taken an ultrasound during pregnancy (43.3 %) and a large number knew their blood group (82.5 %). Lastly, very few of the mothers had ever been vaccinated (09.9 %).

Simple Bivariate Logistic Regression

Simple bivariate regression analysis (Table 2) revealed that LBW was more likely to occur in EMPW who were illiterate (OR 1.51; 95 % CI 1.16–1.96), from poor wealth status (OR 1.59; 95 % CI 1.19–2.13), belonging to the province of Baluchistan (OR 2.07; 95 % CI 1.42–2.99), and who were not paid in cash (OR 1.50; 95 % CI 1.08–1.97). LBW was also more likely to occur when the mother had not received prenatal care from an unskilled healthcare provider (OR 1.97; 95 % CI 1.15–3.39), had lack of access to information such as radio (OR 2.02; 95 % CI 1.38–2.97), and had not had a prenatal checkup from doctor (OR 1.31; 95 % CI 1.05–1.64). LBW was also more likely when, during pregnancy, the mother had not consumed calcium supplements (OR 1.70; 95 % CI 1.34–2.14), had not consumed iron supplements (OR 1.47; 95 % CI 1.17–1.85), had not had an ultrasound (OR 1.36; 95 % CI 1.02–1.80), had experienced night blindness (OR 1.76; 95 % CI 1.65–1.90), and had history of headaches (OR 1.68; 95 % CI 1.54–1.85). Similarly, the odds of LBW were high when the mother had delivered at home (OR 1.31; 95 % CI 1.03–1.68), had never been vaccinated (OR 1.50; 95 % CI 1.00–2.25), and did not have knowledge of her blood group (OR 1.55; 95 % CI 1.04–2.25).

Multivariate Logistic Regression

Multivariate regression analysis (Table 3) confirmed that LBW was more likely when EMPW had not received prenatal care from unskilled healthcare provider (AOR 1.92; 95 % CI 1.12–3.30), and had lack of access to information such as radio (AOR 1.88; 95 % CI 1.28–2.77). The odds were higher for mothers who did not receive calcium (AOR 1.19; 95 % CI 1.05–1.34), and iron during pregnancy (AOR 1.33; 95 % CI 1.05–1.69), and had history of headaches during pregnancy (AOR 1.41; 95 % CI 1.12–1.76). The odds of LBW were also high when

Table 1 Socio-demographic characteristics of employed mothers

Variables (EMPW with child born in last 5 years = 2,515)	EMPW f (%)
Birth weight of child	
LBW	546 (36.6 %)
Normal	945 (63.4 %)
Age	
15–24	45 (17.4 %)
25–34	132 (51.0 %)
35–49	82 (31.7 %)
Education	
Illiterate	1,031 (75.0 %)
Literate	343 (25.0 %)
Occupation	
Unskilled	1,508 (97.7 %)
Skilled	35 (02.3 %)
Number of children	
1–3 children	155 (38.1 %)
≥4	252 (61.9 %)
Region	
Urban	343 (25.0 %)
Rural	1,031 (75.0 %)
Province	
Punjab	581 (42.3 %)
Sindh	542 (39.4 %)
KPK	108 (07.9 %)
Baluchistan	143 (10.4 %)
Wealth status	
Poor	831 (60.5 %)
Middle	252 (18.3 %)
Rich	291 (21.2 %)
Spouse education	
Illiterate	644 (46.9 %)
Literate	730 (53.1 %)
Spouse occupation	
Unemployed	32 (0.7 %)
Unskilled	379 (89.3 %)
Skilled	49 (10.7 %)
Received prenatal care from unskilled healthcare provider	
Yes	1,296 (94.5 %)
No	76 (5.5 %)
Had lack of access to information such as radio	
Yes	2,209 (87.8 %)

Table 1 continued

Variables (EMPW with child born in last 5 years = 2,515)	EMPW f (%)
No	306 (12.2 %)
Prenatal checkup from doctor	
Yes	770 (78.3 %)
No	214 (21.7 %)
Place of delivery	
Home	966 (70.4 %)
Hospital	406 (29.6 %)
Given or bought calcium during pregnancy	
Yes	853 (62.2 %)
No	519 (37.8 %)
Given or bought iron during pregnancy	
Yes	818 (59.8 %)
No	550 (40.2 %)
Ever been vaccinated	
Yes	105 (09.9 %)
No	957 (90.1 %)
Experienced night blindness during pregnancy	
Yes	925 (67.6 %)
No	443 (32.4 %)
Experienced headaches during pregnancy	
Yes	609 (44.4 %)
No	762 (55.6 %)
Had ultrasound during pregnancy	
Yes	367 (43.3 %)
No	480 56.7 %)
Knows blood group	
Yes	699 (82.5 %)
No	148 (17.5 %)
Earning in cash	
Yes	340 (13.5 %)
No	2,170 (86.5 %)
Husbands desire for children	
Both want same	1,088 (68.3 %)
Husband wants more	434 (27.3 %)
Husband wants fewer	70 (4.4 %)

Absolute number of participants does not perfectly correspond to total cases selected due to missing values in the data set of PDHS 2006–2007

mothers were not paid in cash (AOR 1.41; 95 % CI 1.04–1.90). Additionally, the findings revealed that when the region variable was adjusted for mother's age, education and wealth status, the odds of LBW declined for Baluchistan (AOR 0.51; 95 % CI 0.35–0.74) and the KPK province (AOR 0.58; 95 % CI 0.39–0.84).

Discussion

Despite critical prevalence of LBW and neonatal mortality in Pakistan, health investment still remains ineffectively low at <2 % of the total government expenditure [32, 33]. Findings from our study confirm that the majority of EMPW in Pakistan are illiterate, belonging to rural regions, from poor wealth status and occupied in unskilled jobs from the informal employment sector. Our findings also reveal that more than one-third of EMPW in Pakistan have LBW children. A reason for LBW may be that employed women, in patriarchal societies like Pakistan, have lack of decision-making power regarding their own and their child's health within their households, despite independent incomes [34]. Additionally, none of the national policies or legislative acts in Pakistan support EMPW in terms of skill development for formal sector employment, minimum wage rights, maternity benefits, health insurance and child-care support [35]. Findings from our study confirm that women who do not get paid with cash, and instead get paid in kind, have higher risk of LBW child. Recent scholarship discusses that the value of worker productivity is better returned when workers are paid in cash and cash payments also afford women, especially from disadvantaged and patriarchal backgrounds, more liquidity to be able to purchase commodities of need and more independence to take care of their health needs [36]. Our findings imply that employment contracts of EMPW are a decisive factor in maternal health and child health. If working mothers are unable to negotiate cash payment and cash increments, they would be even less likely to negotiate other employee benefits related to maternal needs, such as maternity leave with pay and child day-care centers at their workplace.

We found that lack of information and formal communication through media increases the likelihood of LBW. Working mothers who had heard about family planning and maternal health on mass media, like the radio, were more likely to take better health decisions for themselves and their child's health. Other literature, from developing regions, also suggests that LBW occurs in employed mothers due to their inadequate knowledge and access to information concerning prenatal healthcare [37–39]. Of additional concern, is that mothers with less information about prenatal health, would also be ignorant about problems associated with LBW of child and the special health care efforts required for catch-up growth [40]. Catch-up growth for low birth children in developing regions is further compromised due to higher exposure to infectious diseases, disadvantaged communities and the absence of government protective policies [41].

A significant finding is that LBW can be prevented through semi-formal and out-of-hospital care provision from unskilled healthcare provider. In other words, mothers who do not receive prenatal care provision from a nurse, midwife or a lady health worker (LHW) are at higher risk of LBW. In this way, mothers who are receiving care and guidance from female practitioners at medical centers or are being visited by female practitioners at their homes are at an advantage for child birth weight. This is an important consideration for rural populations who are not able to access large tertiary-care hospitals, visit distant medical centers or take consultation from male doctors [42, 43]. In addition, training traditional birth attendants in the region could also be beneficial for maternal and child health [44].

Our findings confirm that LBW is also associated with the absence of micronutrient intake of supplements like calcium and iron during pregnancy. Other research has confirmed that micronutrient deficiencies exist in mothers from developing regions; with recommendation for pregnant and lactating women to be provided daily supplementation of important nutrients like vitamin D, calcium [24] and iron [20], careful vitamin A interventions [45], and active provision of vitamin A and zinc for LBW child development [5]. Additionally, our findings show that mothers who experienced headaches during pregnancy were more likely to have LBW child. International literature suggests that mothers who experience severe headaches and migraines during pregnancy must be monitored clinically with appropriate medication, due to high risk of hypertensive disorders in mother, foetus development and LBW [46].

Finally, our findings show that the provinces of KPK and Baluchistan show lower risk of LBW, compared to the provinces of Punjab and Sindh. This is an unexpected finding, given that KPK and Baluchistan are known to be disadvantaged and unstable regions [47]. The improvement in the situation may be due to maternal and child health initiatives being taken by women's development organization, international organizations and NGO's in the regions. A positive impact on maternal and child health indicators may have occurred through increased awareness, distribution of micronutrient supplements, provision of primary healthcare through LHWs at mothers doorstep, and training of local midwives [48–50].

This study has several limitations. PDHS data for anthropometric weight estimates were not available.

Table 2 Simple bivariate logistic regression for predictors of LBW among employed mothers, Pakistan Demographic and Health Survey 2006–2007

Variable	LBW OR–(CI 95 %)	p value
Age		
15–24	1.02 (0.75–1.39)	0.884
25–34	0.82 (0.64–1.06)	0.132
35–49	1	
Education		
Illiterate	1.51 (1.16–1.96)	0.002**
Literate	1	
Occupation		
Unskilled	0.59 (0.22–1.60)	0.302
Skilled	1	
Number of children		
4 or above	1.19 (0.72–1.94)	0.496
1–3 children	1	
Region		
Rural	0.83 (0.65–1.08)	0.176
Urban	1	
Province		
Baluchistan	2.07 (1.42–2.99)	0.000***
KPK	1.42 (0.93–2.17)	0.102
Sindh	1.22 (0.95–1.56)	0.113
Punjab	1	
Wealth status		
Poor	1.59 (1.19–2.13)	0.001**
Middle	1.29 (0.89–1.84)	0.168
Rich	1	
Spouse education		
Illiterate	1.14 (0.92–1.42)	0.228
Literate	1	
Spouse occupation		
Unemployed	1.69 (0.89–3.22)	0.106
Unskilled	1.04 (0.80–1.35)	0.759
Skilled	1	
Received prenatal care from unskilled healthcare provider		
No	1.97 (1.15–3.39)	0.014**
Yes	1	
Had lack of access to information such as radio		
No	2.02 (1.38–2.97)	0.000***
Yes	1	
Prenatal checkup from doctor		

Table 2 continued

Variable	LBW OR–(CI 95 %)	p value
No	1.31 (1.05–1.64)	0.016**
Yes	1	
Place of delivery		
Home	1.31 (1.03–1.68)	0.031**
Hospital	1	
Given or bought calcium during pregnancy		
No	1.70 (1.34–2.14)	0.000***
Yes	1	
Given or bought iron during pregnancy		
No	1.47 (1.17–1.85)	0.001***
Yes	1	
Ever been vaccinated		
No	1.50 (1.00–2.25)	0.050**
Yes	1	
Experienced night blindness during pregnancy		
No	1.76 (1.65–1.90)	0.001**
Yes	1	
Experienced headaches during pregnancy		
No	1.68 (1.54–1.85)	0.010**
Yes	1	
Had ultrasound during pregnancy		
No	1.36 (1.02–1.80)	0.035**
Yes	1	
Knows blood group		
No	1.55 (1.04–2.28)	0.029**
Yes	1	
Earning in cash		
No	1.50 (1.08–1.97)	0.015**
Yes	1	
Husbands desire for children		
Both want same	0.86 (0.47–1.58)	0.643
Husband wants more	1.21 (0.64–2.27)	0.054
Husband wants fewer	1	

OR odds ratio, *ns* not significant, *CI* confidence interval

** $p < 0.05$; ***$p < 0.001$

Reliability and measurement of LBW was problematic because of the dependency on subjective description and memory recall of the mother [33, 34]. Missing values made utilization of certain variables not possible for analysis in the study, for example: the breakdown of expenditure on

Table 3 Multivariate logistic regression for predictors of LBW among employed mothers, Pakistan Demographic and Health Survey 2006–2007

Variable	LBW AOR–(CI 95 %)	p value
Occupation		
Unskilled	0.72 (0.47–1.09)	0.126
Skilled	1	
Number of children		
4 or above	1.19 (0.72–1.94)	0.496
1–3 children	1	
Region		
Rural	1.08 (0.80–1.47)	0.594
Urban	1	
Province		
Baluchistan	0.51 (0.35–0.74)	0.000***
KPK	0.58 (0.39–0.84)	0.004**
Sindh	0.77 (0.46–1.28)	0.317
Punjab	1	
Spouse education		
Illiterate	1.14 (0.92–1.42)	0.235
Literate	1	
Spouse occupation		
Unemployed	1.45 (0.55–3.81)	0.454
Unskilled	1.47 (0.35–6.17)	0.599
Skilled	1	
Received prenatal care from unskilled healthcare provider		
No	1.92 (1.12–3.30)	0.019**
Yes	1	
Had lack of access to information such as radio		
No	1.88 (1.28–2.77)	0.001***
Yes	1	
Prenatal checkup from doctor		
No	1.16 (0.91–1.47)	0.210
Yes	1	
Place of delivery		
Home	1.12 (0.86–1.46)	0.392
Hospital	1	
Given or bought calcium during pregnancy		
No	1.19 (1.05–1.34)	0.004**
Yes	1	
Given or bought iron during pregnancy		
No	1.33 (1.05–1.69)	0.018**

Table 3 continued

Variable	LBW AOR–(CI 95 %)	p value
Yes	1	
Ever been vaccinated		
No	1.45 (0.96–2.18)	0.075
Yes	1	
Experienced headaches during pregnancy		
No	1.41 (1.12–1.76)	0.003**
Yes	1	
Had ultrasound during pregnancy		
No	1.22 (0.90–1.65)	0.184
Yes	1	
Knows blood group		
No	1.31 (0.82–2.07)	0.249
Yes	1	
Earning in cash		
No	1.41 (1.04–1.90)	0.029**
Yes	1	
Husbands desire for children		
Both want same	0.89 (0.48–1.64)	0.708
Husband wants more	1.19 (0.63–2.25)	0.588
Husband wants fewer	1	

Multivariate logistic regression analysis was carried out to obtain AOR after controlling for mother's age (continuous variable), education (categorical variable) and wealth status (categorical variable)

AOR adjusted odds ratio, *CI* confidence interval

** $p < 0.05$; *** $p < 0.001$

food, different micronutrient intake, the quality of drinking water, sanitation and cognitive capabilities of mother. PDHS did not conduct the survey in the northern areas of Pakistan such as the Federally Administered Tribal Areas, Federally Administered National Areas and Azad Jammu and Kashmir due to political and regional instability. Thus, the overall LBW statistics for EMPW in Pakistan may be higher than estimated by PDHS, since the northern areas of Pakistan are known to have immense socio-structural problems and inadequate healthcare services for women [51].

Despite the limitations, this study is an important contribution for maternal and child health research in the region. To the best of our knowledge, this research is the first of its kind to address the problems of EMPW in Pakistan; as most scholarship and investment in developing regions is directed toward increasing employment and not understanding the problems that EMPW may have. This

study highlights that informal sector employment, non-cash remuneration, prenatal neglect and micronutrient intake deficiencies have dire consequences on child birth weight. Results of this study encourage further research and aggressive policy improvements for employed mother's health in Pakistan.

Recommendations

Since cultural and legislative improvements require heavy investment and time for change; in the interim prenatal health of employed mother must be safeguarded at the community-level through free provision of micronutrient and vitamin access for pregnant mothers, aggressive awareness programs for expectant mothers and their families, and trained LHW campaigns in the rural regions [52, 53].

In the long-run, critical investment in socio-demographic and socio-structural shortfalls is needed to support employed women through a combination of government, private, media and civilian efforts. Policies need to be geared toward improving access to public healthcare awareness, poverty alleviation and rural development, raising educational levels and formal sector employment opportunities, and increasing access to trained medical practitioners specialized in maternal and child care through hospitals or health centers [54]. Social media campaigns for awareness of maternal and child health could reach across rural populations [55], given that access to TV the radio and mobiles in such areas of Pakistan is common [56].

Lastly, the increase in hospital or health center deliveries must be aggressively pursued, as this will enable the government and healthcare sector to better monitor and record birth weight and maternal health in a systematic and longitudinal manner and prevent maternal and early child mortality. Hospital records will also enable planning for internatal care so that recurrence of LBW does not occur in the next pregnancy. In addition, records of maternal and child health will improve macro planning and policies for the region in a holistic manner; with attention to clinical and psychosocial interventions.

Conclusion

Countries like Pakistan, despite their patriarchal belief systems, are allowing women to enter into paid employment, due to economic necessities. However, concern exists that despite employment women may not be benefiting in terms of their own and their child's health. Our study shows that working mothers who: had not received prenatal care from unskilled healthcare provider, had lack of access to information about family planning, had not consumed calcium and iron and had experienced headaches during pregnancies, and mothers who were not paid in cash, were all found to be independently associated with LBW. Employed women in the region need to be critically supported through national and community initiatives, in both the long and short run, in order to ensure formal sector employment and improved labor contracts, natal and postnatal care, and safe early child development.

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