P-ISSN: 2709-6254	Journal of Development and Social Sciences	Apr-June 2024, Vol. 5, No.2(S)
O-ISSN:2709-6262	https://doi.org/10.47205/jdss.2024(5-II-S)41	[420-433]

Journal of Development and Social Sciences
www.jdss.org.pk

RESEARCH PAPER

Factors Influencing Health Facility Births: Insights from the 2017 Pakistan Demographic Health Survey

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ABSTRACT

Infant mortality in Pakistan was alarmingly high until the early 1990s, at 86 deaths per 1,000 live births. Despite a 24-point decline over the past three decades, reducing the rate to 62 per 1,000, Pakistan remains among countries with the highest infant mortality rates. This study evaluated the extent, causes, and associated risk factors of infant mortality in Pakistan. Using Univariate and cross-tabulation analyses, data were weighted by survey year. A two-stage multi-variable logistic regression model analyzed the risk factor of childbirth in health facilities. Results included odds ratios (OR) and Chi-square tests for categorical differences. Interviews with 167,151 women revealed 84,352 (50.46%) gave birth in health facilities: 22,089 in 1991, 8,166 in 2007, 11,751 in 2013, and 41,372 in 2017. Health facility births rose from 13.6% in 1991 to 64% in 2017. Urban residence, age 30+, secondary education, and government employment were significant factors in health facility usage.

KEYWORDS 2017 Health Survey of Pakistan, Chi-Square Test, Logistics Regression, Socio-Demographic Feature

Introduction

Better health significantly contributes to human well-being and economic development. Healthy populations live longer, are more productive, and save more. Various factors affect a country's ability to provide quality health services. Health and nutrition are crucial when planning for a family. Adopting correct lifestyle habits before conception prepares the body for pregnancy. Women of childbearing age should pay attention to their health, not only before but also during pregnancy. Regular physical activity before pregnancy helps achieve fitness levels that support health and maintain a healthy weight throughout pregnancy.

Health Facility

Pakistan's healthcare system comprises federal and provincial governments alongside private sectors, offering disease-specific care. Key players include governmental bodies, social security setups, NGOs, and private entities. However, rural areas face shortages in healthcare personnel. Determinants of health facility usage for childbirth include urban residence, higher education, government employment, and older age. Additionally, larger households and older respondents are more inclined to use health facilities.

Pakistan demographic and health survey (PDHS)

Demographic and Health Surveys (DHS) are vital for monitoring population, health, and nutrition indicators. Two main types exist: Standard DHS Surveys, conducted every 5 years with large sample sizes for longitudinal comparisons, and Interim DHS Surveys,

focusing on key performance indicators. Maternal mortality in Pakistan decreased from 541 per 100,000 live births in 1990 to 376 in 2008, and globally by 44.5% to 216 per 100,000 live births in 2015 (Agha & Carton, 2011).

In Pakistan, MCH services are provided by a mixed public-private system across primary, secondary, and tertiary levels. The public sector includes 965 tertiary and secondary hospitals, and 13,051 primary care facilities, with a range of specialists and staff (Bhutta et al., 2013).

Especially in South Asia and Africa that are emerging countries, approximately 99% of neonates and mothers die during the pregnancy period, roughly every year 69,000 maternal deaths and the infant mortality rate was 106 per 1,000 births in live births 1990 and 62 per 1,000 live births in 2017. The mortality rate during 1990 and 2015 a reduction of 47% (from 36 to 18 deaths in every 1,000 live births) saw in neonates globally (Lawn et al., 2005).

To diminish under-five mortality extensively, accordingly, it is appropriate to focus on neonatal mortality, particularly in low- and middle-income countries. Past exploration has indicated that numerous neonatal deaths are preventable with existing minimal effort medications (Oestergaard et al., 2011).

Health facility usage in Pakistan remains low due to distance, limited hours, poor infrastructure, staff shortages, equipment, and financial constraints. Despite 73,000 private health facilities serving 71% of the population, antenatal care and skilled deliveries have increased, with notable urban-rural and regional disparities. Neonatal mortality rose slightly, while maternal mortality significantly declined from 1990-91 to 2012-13 (Bicego & Ahmad, 1996).

Advancements in antenatal and delivery care impact maternal but not neonatal mortality in Pakistan. Given slow progress in reducing neonatal mortality, understanding epidemiology, causes, and risk factors is crucial. This study aims to explore neonatal mortality determinants using representative data (Nisar & Dibley, 2014).

Child health, vital for social well-being, is a pressing concern in Pakistan. Literature shows high infant and child mortality rates compared to Asian peers, indicating insufficient progress in child health and survival (Mahmood, 2002).

Millions of women in creating nations experience hazardous and different genuine medical issues identified with pregnancy or labor. Inconveniences of pregnancy and labor cause a greater number of passing and inability than some other consecutive medical issues. The circumstance is more awful in creating nations like Bangladesh because of lacking admittance to present day well-being administrations and helpless usage (Chakraborty et al., 2002).

Despite the government's commitment to providing health services through initiatives like the Essential Service Package (ESP), utilization remains below acceptable standards. In developing countries like Bangladesh, identifying vulnerable groups and ensuring access to preventive and curative services is a major public health challenge (Chakraborty et al., 2003).

Literature Review

Global efforts to reduce maternal mortality require urgent action to achieve and ultimately eliminate preventable maternal deaths. While many high-mortality countries face challenges in meeting SDG targets, those that invested in reducing maternal mortality between 2000 and 2010 offer guidance for acceleration. (Alkema et al., 2016).

Responsive stimulation involvement can be delivered efficiently by positively affects growth outcomes. The lack of a main effect of the improved nutrition involvement on development shows the need for further analysis of arbitrating variables that will help to enhance future nutrition employment design (Yousafzai et al., 2014).

Progress towards Millennium Development Goal 4 has reduced under-five mortality significantly, but neonatal mortality remains stagnant, especially in middle and low-income countries. Facility-based childbirth reduces newborn mortality by 29% in such contexts. Strengthening and promoting health facility utilization during childbirth is crucial (Tura et al., 2013).

To decrease the horrific parental mortality statistics that they have worldwide particularly in source poor countries, there was a worldwide promise to reduce parental (Pongponich et al., 2019).

By 2017, the goal was to reduce deaths by three-quarters using 1990 as a baseline. Two indicators were used: parental mortality ratio and percentage of births attended by skilled personnel. The aim was 80% by 2005, 85.2% by 2010, and 90.2% by 2015. However, by 2008, only 65.78% of women were attended by skilled personnel during pregnancy, childbirth, and postpartum, with some countries reporting less than 20%. Achieving this target is challenging but possible amid the global human resource crisis (Adegoke & Van Den Broek, 2009).

Encouraging parental health service utilization requires addressing factors at individual, household, community, and policy levels. Effective interventions should target these fundamental factors, reflecting their varying roles in promoting access to and utilization of parental health services (Babalola & Fatusi, 2009).

This guide outlines the selection process for statistical tests in research projects. It advises assessing data type (nominal, ordinal, interval), research objectives (comparing independent or paired groups), and provides examples of appropriate tests to avoid erroneous conclusions (McCrum-Gardner, 2008).

We utilized WHO guidelines for managing childbirth. Our evaluation included written tests and practical assessments at five skill levels. We found a gap between evidence-based practices and provider capabilities, discussing implications and proposing strategies in Ecuador, Nicaragua, and Niger (Harvey et al., 2007).

This article offers a comprehensive guide for utilizing logistic regression in research articles. It discusses tables, figures, and diagrams needed for result evaluation and hypothesis validation. Recommendations for reporting logistic regression results and predictor-to-sample size ratio are provided (Peng et al., 2002).

To address rural health challenges comprehensively, efforts must focus on both national and regional levels, targeting the poorest. Shifting from a biomedical to a cross-cultural model is vital. An updated National Health Policy should prioritize rural health and long-term planning (Patil et al., 2002).

Methodology

Keeping in view the objectives of the study, a secondary data from PDHS (PDHS) was obtained from the last four surveys conducted by National Institute of Population Studies (NIPS) in 1991, 2007, 2013 2017 was collected from: https://www.nips.org.pk/PDHS_Data_Set.htm.

PDHS

The PDHS used a two-stage survey design. The first stage involved selecting 580 test clusters (enumeration blocks) with a probability proportional to their size. The second stage systematically sampled 28 households per cluster, totaling approximately 16,240 families. Household selection was centrally managed at the NIPS data processing office. Survey teams only interviewed pre-selected households, with no substitutions or changes allowed to prevent bias during the execution stages.

PDHS Questionnaires

The Pakistan Demographic and Health Surveys of 1991, 2007, 2013, and 2017 used six questionnaires: Household, Woman's, Man's, Biomarker, Fieldworker, and Community Questionnaires. These were based on DHS Program standards and adapted to Pakistan's context. The Community Questionnaire aligned with previous surveys. Input was gathered from government bodies, NGOs, and international donors. Protocols were approved by the National Bioethics Committee, Pakistan Health Research Council, and an Institutional Review Board. Translations were made into Urdu and Sindhi, and data collection was paper based. Variables aimed to identify determinants of health facility use for childbirth, with the dependent variable derived from the 'Place of giving birth' (Pongponich et al., 2019).

Statistical Analysis

Data was analyzed by using different statistical techniques.

Frequency Distribution

Frequency distribution of all the selected variables were presented for each survey separately to identify the trend to use the health facility by the respondents.

Chi-Square Test of Association

Chi square test of association was used to identify the association use of health facility for childbirth and other selected variables. Association was tested using level of significance 5%.

Logistic Regression

Since the dependent variable is dichotomous and all the independent variables are categorical, appropriate model to predict the dependent variable is logistic regression model. Logistic regression model equation is given by

$$\log \pi = \beta_0 + \beta_i X_i \quad , i = 1, 2, 3, \ldots \quad (1)$$

Logistic regression model predicts the log odds ratio for the dependent variable. We can also predict the Odd Ratio and the probability for the category of interest from the logistic regression model.

Odds Ratio

The odds ratio is defined as the ratio of the probability of success to probability of failure.

$$OR = \frac{\pi}{1 - \pi}$$

Odds ratio were predicted from the fitted logistic regression model as (2)

$$\pi = \exp^{\beta}0+\beta iXi \quad , i = 1, 2, 3, ... \quad (3)$$

odds ratios were computed for all the independent variables to predict the odds of using health facility by the respondents. A 95% confidence interval was also computed for odd ratios. Logistic regression model was fitted to each independent variable for each survey data set.

Results and Discussion

Table 1
Contingency of respondent residence and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	139.93	1	0.001
2007	38.045	1	0.001
2013	44.595	1	0.001
2017	15.62	1	0.001

The respondents from **Urban** areas are more probable to use the health facility as compared to respondent from **Rural** areas. $\chi 2$ also confirmed the association between residence and the use of health facility with P<0.001.

Table 2
Contingency of respondent age and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	4469.8	6	0.001
2007	11 170	6	0.001
2013	15118	6	0.001
2017	14937	6	0.001

The distribution of respondents with respect to age (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49) and the use of health facilities for giving birth to the child (No, Yes) is given in Table 2 . The respondents that' age between 25-34 are more probable to use the health facility. $\chi 2$ also confirmed the association between Respondent age and the use of health facility with P<0.001.

Table 3
Contingency of husband age and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	3012.2	3	0.001
2007	7885.1	3	0.001
2013	11, 139	3	0.001
2017	3715.4	3	0.001

The distribution of respondents with respect to age (12-25, 26-35, 36-45, 46 or more, NA) and the use of health facilities for giving birth to the child (No, Yes) is given in Table 3 The respondents that' age 12-25 are more probable to use the health facility as compared to the other respondents. $\chi 2$ also confirmed the association between Husband age and the use of health facility with P<0.001.

Table 4
Contingency of household members and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	118.11	2	0.001
2007	264.69	2	0.001

2013	282.05	2	0.001
2017	407.27	2	0.001

Table 4 .The respondents that' household members are **5 or more** are more probable to use the health facility as compared to the respondents from **1 to 4**. $\chi 2$ also confirmed the association between Household members and the use of health facility with P<0.001.

Table 5
Contingency of children 5 years and under and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	593.84	3	0.001
2007	771.5	3	0.001
2013	1239	3	0.001
2017	1387	3	0.001

T able 5 shows the distribution of respondents with children under five and their use of health facilities for childbirth. Out of 50,495 respondents, 37,813 did not use health facilities, while 12,682 did. Respondents with 1-4 children are more likely to use health facilities. Chi-square tests confirmed this association (P<0.001).

Table 6
Contingency of children ever born and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	1846	2	0.001
2007	4901.8	2	0.001
2013	5780	2	0.001
2017	5306.3	2	0.001

Table 6 respondents that's children are **1 to 4** are more probable to use the health facility as compared to the other respondents. $\chi 2$ also confirmed the association between children and the use of health facility with P<0.001.

Table 7
Contingency of respondent education and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	Df	P-Value
1991	56.741	3	0.001
2007	431.4	3	0.001
2013	1387.9	3	0.001
2017	1387.9	3	0.001

The distribution of respondents with respect to respondent education (**no education**, **primary**, **secondary** and **higher**) and the use of health facilities for giving birth to the child (**No**, **Yes**) is given in Table 7 .The respondents that's education is **secondary** and **higher** probable to use the health facility as compared to the other respondent. $\chi 2$ also confirmed the association between education and the use of health facility with P<0.001.

Table 8
Contingency of husband education and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	38.964	4	0.001
2007	189.73	4	0.001
2013	176.4	4	0.001
2017	180.46	4	0.001

The distribution of respondents with respect to Husband education (**no education**, **primary**, **secondary** and **higher**) and the use of health facilities for giving birth to the child (**No**, **Yes**) is given in Table 8 . The respondents that's education is **secondary** and **higher** probable to use the health facility as compared to the other respondent. $\chi 2$ also confirmed the association between education and the use of health facility with P<0.001.

Table 9
Contingency of respondent occupation and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	25	10	0.001
2007	148	9	0.001
2013	122	10	0.001
2017	50	10	0.001

Table 9 The respondents that's occup. is **teachind** and **skilled** probable to use the health facility as compared to the other respondents. $\chi 2$ also confirmed the association between Respondent occup. and the use of health facility with P<0.001.

Table 10
Contingency of husband occupation and birth in a health facility (GBH) from 1991-2017

Chi-Square Test	$\chi 2$	df	P-Value
1991	21	10	0.001
2007	61	9	0.001
2013	101.93	11	0.001
2017	99	7	0.001

The distribution of respondents with respect to Husband occup. (**teaching**, **clerical**, **sales**, **agri. self**, **domestic**, **services**, **skilled, unskilled.**, **NA** and **no work)** and the use of health facilities for giving birth to the child (**No**, **Yes**) is given in Table 10 . The respondents that's occup. is **teaching**, **skilled** and **unskilled** probable to use the health facility as compared to the other respondents. $\chi 2$ also confirmed the association between occup. and the use of health facility with P<0.001.

Table 11
Regression and Odds ratios of Residence 1991- 2017

coef	Estimate	Std. Error	z value	Pr(>|z|)	OR
(Intercept)	1.3	0.024	53.281	0.001	3.671
Residence Rural	-0.245	0.034	-7.281	0.001	0.783
		2007			
(Intercept)	-0.762	0.023	0.001	-32.432	0.467
Residence Rural	-0.089	0.029	0.002	-3.107	0.915
		2013			
(Intercept)	-0.795	0.019	0.001	-42.13	0.452
Residence Rural	0.002	0.025	0.95	0.063	1.002
		2017			
(Intercept)	-0.961	0.021	0.001	-45.36	0.383
Residence Rural	-0.095	0.028	0.001	-3.352	0.909

Rural residents are more likely to use health facilities for childbirth compared to urban residents, with odds ratios of 0.909, 0.783, and 0.915, indicating greater curiosity and concern about childbirth in rural areas, as shown in Table 11.

Table 12
Regression and Odds ratios of Respondent aged 1991-2017

				1991			
coef	**(Intercept)**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**

Estimate	-1.498	1.213	2.101	2.701	3.11	3.628	3.936
Std. Error	0.254	0.259	0.256	0.256	0.257	0.26	0.268
z value	-5.904	4.676	8.211	10.545	12.102	13.938	14.69
Pr(>|z|)	0.001	0.001	0.001	0.001	0.001	0.001	0.001
OR	0.224	3.362	8.174	14.89	22.411	37.649	51.219
			2007				
Estimate	3.073	-1.845	-2.995	-3.832	-4.369	-4.977	-5.792
Std. Error	0.457	0.461	0.458	0.458	0.458	0.46	0.463
z value	6.718	-4.003	-6.534	-8.364	-9.529	-10.825	-12.502
Pr(>|z|)	0	0.001	0.001	0.001	0.001	0.001	0.001
OR	21.6	0.158	0.05	0.022	0.013	0.007	0.003
			2013				
Estimate	3.597	-2.226	-3.498	-4.27	-4.863	-5.538	-6.659
Std. Error	0.715	0.717	0.715	0.715	0.716	0.716	0.719
z value	5.031	-3.104	-4.889	-5.968	-6.797	-7.73	-9.259
Pr(>|z|)	0.001	0.002	0.001	0.001	0.001	0.001	0.001
OR	36.5	0.108	0.03	0.014	0.008	0.004	0.001
			2017				
Estimate	12.566	-11.361	-12.608	-13.26	-13.819	-14.464	-15.368
Std. Error	83.348	82.849	83.848	83.848	83.848	83.848	83.848
z value	0.15	-0.135	-0.15	-0.158	-0.165	-0.173	-0.183
Pr(>|z|)	0.881	0.892	0.88	0.874	0.869	0.863	0.855
OR	17.53	1.15	0.244	0.35	0.14	0.18	0.062

According to Table 12, respondents aged 45-49 are 51.219 times more likely to use health facilities for childbirth compared to those aged 15-19, while those aged 20-24 are 3.362 times more likely. This increase in odds ratio suggests that older age groups are more concerned about childbirth, possibly due to medical complexities or prior childbirth experiences. However, another part of the data shows contradictory results, with respondents aged 45-49 being 0.003 times, 0.001 times, and even 0.000 times as likely to use health facilities compared to those aged 15-19.

Table 13
Regression and Odds ratios of Husband aged 1991-2017

		1991		
coef	**(Intercept)**	**26-35**	**36-45**	**46 or more**
Estimate	-0.341	1.026	1.828	2.309
Std. Error	0.067	0.072	0.073	0.08
z value	-5.088	14.228	25.05	28.75
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.711	2.789	6.223	10.061
		2007		
Estimate	1.187	-1.325	-2.322	-3.236
Std. Error	0.068	0.072	0.072	0.079
z value	17.419	-18.469	-32.306	-40.943
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	3.278	0.266	0.098	0.039
		2013		
Estimate	1.195	-1.284	-2.356	-3.336
Std. Error	0.064	0.067	0.067	0.075
z value	18.613	-19.145	-34.923	-44.481
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	3.304	0.277	0.095	0.036
		2017		
Estimate	-0.613	-0.928	-1.599	-1.19
Std. Error	0.017	0.033	0.069	0.167
z value	-35.223	-27.995	-23.095	-7.109
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.542	0.396	0.202	0.304

According to Table 13, respondents aged 46 or older are 10.061 times more likely to use a health facility for childbirth compared to those aged 12-25, while those aged 26-35 are 2.789 times more likely. The increased odds ratio suggests that older age groups are more concerned about childbirth, possibly due to medical complexities or previous childbirth experiences. Conversely, other data show that respondents aged 46 or older are 0.039 times more likely, and those aged 26-35 are 0.266 times more likely, indicating a lower probability of using health facilities. This suggests variability in childbirth concerns across different age groups.

Table 14
Regression and Odds ratios of Household members 1991-2017

1991			
coef	**(Intercept)**	**5 to 7**	**8 or more**
Estimate	0.392	0.8	0.933
Std. Error	0.048	0.056	0.054
z value	8.098	14.362	17.275
Pr(>|z|)	0.001	0.001	0.001
OR	1.48	2.225	2.543
2007			
Estimate	0.209	-1.021	-1.218
Std. Error	0.042	0.048	0.046
z value	4.96	-21.082	-26.484
Pr(>|z|)	0.001	0.001	0.001
OR	1.233	0.36	0.296
2013			
Estimate	0.106	-0.96	-1.057
Std. Error	0.035	0.04	0.038
z value	3.058	-23.728	-27.482
Pr(>|z|)	0.002	0.001	0.001
OR	1.112	0.383	0.348
2017			
Estimate	-0.297	-0.703	-0.895
Std. Error	0.04	0.046	0.045
z value	-7.476	-15.379	-20.029
Pr(>|z|)	0.001	0.001	0.001
OR	0.743	0.495	0.409

According to Table 14, households with 8 or more members are 2.534 times more likely to utilize health facilities for childbirth compared to those with 1-4 members. Similarly, those with 5-7 members have 2.225 times higher odds. However, odds for larger households vary (0.296 to 0.453), indicating differing concerns or access to care.

Table 15
Regression and Odds ratios of Children 5 years and under 1991-2017

1991				
coef	**(Intercept)**	**51 to 2**	**53 to 4**	**55 to more**
Estimate	1.988	-1.06	-1.326	-1.356
Std. Error	0.038	0.043	0.062	0.098
z value	52.546	-24.399	-21.28	-13.794
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	7.304	0.346	0.266	0.258
2007				
Estimate	-1.592	1.023	1.171	1.206
Std. Error	0.029	0.034	0.05	0.07
z value	-54.073	29.81	23.554	17.242

Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.204	2.783	3.224	3.342
		2013		
Estimate	-1.638	1.15	1.356	1.381
Std. Error	0.026	0.03	0.045	0.067
z value	-63.696	38.037	30.316	20.516
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.194	3.158	3.88	3.98
		2017		
Estimate	-1.67	0.979	1.111	1.076
Std. Error	0.027	0.033	0.053	0.084
z value	-62.346	29.904	21.115	12.812
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.188	2.662	3.038	2.933

Table 15 reveals that respondents with five or more children under five years old are significantly more likely to use health facilities for childbirth. Odds ratios are 3.342, 3.980, and 2.933. Similarly, those with one to two children under five show increased usage, with odds ratios of 2.783, 3.158, and 2.662. This suggests higher concern about childbirth among respondents with more young children.

Table 16
Regression and Odds ratios of Children ever born 1991-2017

		1991	
coef	**(Intercept)**	**3 to 4**	**5 to more**
Estimate	0.031	0.96	1.69
Std. Error	0.036	0.048	0.044
z value	0.875	20.064	38.314
Pr(>|z|)	0.382	0.001	0.001
OR	1.032	2.612	5.419
		2007	
Estimate	0.642	-1.334	-2.227
Std. Error	0.03	0.04	0.038
z value	21.22	-33.762	-59.055
Pr(>|z|)	0.001	0.001	0.001
OR	1.899	0.263	0.108
		2013	
Estimate	0.507	-1.286	-2.104
Std. Error	0.025	0.033	0.033
z value	20.639	-38.729	-64.649
Pr(>|z|)	0.001	0.001	0.001
OR	1.66	0.276	0.122
		2017	
Estimate	-0.008	-0.94	-1.61
Std. Error	0.028	0.037	0.037
z value	-0.269	-25.127	-43.41
Pr(>|z|)	0.788	0.001	0.001
OR	0.992	0.391	0.2

Respondents with five or more children are significantly more likely to use health facilities for childbirth, with odds ratios of 5.419 and 3.342 compared to those with 1-2 children. Those with 3-4 children have odds ratios of 2.12 and 2.783. These increased odds suggest that having more children raises concern and curiosity about childbirth, likely due to medical complexities or past experiences. Table 16 shows that as the number of children

ever born increases, the probability of using health facilities for childbirth also rises, highlighting the impact of childbirth experiences and potential medical issues.

Table 17
Regression and Odds ratios of Respondent education 1991-2017

		1991		
coef	**(Intercept)**	**Primary**	**Secondary**	**Higher**
Estimate	1.147	-0.078	0.331	1.437
Std. Error	0.018	0.059	0.064	0.3
z value	62.344	-1.308	5.19	4.799
Pr(>|z|)	0.001	0.191	0.001	0.001
OR	3.147	0.925	1.393	4.21
		2007		
Estimate	-0.963	0.327	0.705	0.952
Std. Error	0.016	0.042	0.046	0.069
z value	-60.433	7.855	15.253	13.885
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.382	1.387	2.024	2.592
		2013		
Estimate	-0.993	0.409	0.7	0.77
Std. Error	0.015	0.036	0.036	0.046
z value	-65.545	11.246	19.397	16.644
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.37	1.506	2.013	2.161
		2017		
Estimate	-1.236	0.232	0.557	0.983
Std. Error	0.019	0.044	0.039	0.046
z value	-66.348	5.257	14.452	21.369
Pr(>|z|)	0.001	0.001	0.001	0.001
OR	0.291	1.261	1.745	2.671

Respondents with higher education are significantly more likely to use health facilities for childbirth, with odds ratios from 2.161 to 4.210, indicating greater awareness and concern among the educated. Respondents with primary education also show increased use, with odds ratios from 0.925 to 1.506. This highlights education's positive impact on health facility utilization for childbirth. Additionally, respondents whose husbands have higher education are 1.408 to 1.630 times more likely to use health facilities, while those with primary-educated husbands are 0.955 to 1.222 times more likely. Employment in services increases usage odds to 1.586, contrasting with lower odds for clerical and unskilled workers.

Conclusion

The global maternal mortality ratio decreased by 44% to 140 deaths per 100,000 live births by 2017, with 99% of these deaths occurring in emerging countries, particularly South Asia and Africa, totaling 69,000 annually. The neonatal mortality rate dropped by 89%, from 36 to 4 deaths per 1,000 live births between 1990 and 2017, with deaths in the first 28 days decreasing from 5.1 million to 2.4 million from 1991 to 2017. The global maternal mortality ratio's annual reduction rate averaged 2.9%. This study used data from four Pakistan Demographic Health Surveys (1991, 2007, 2013, 2017) available online. Data were analyzed using R for inferential statistics, with variables selected through uni-variate analysis and cross-tabulation. Data were weighted by survey year, and a two-stage multi-variable logistic regression model analyzed the risk of childbirth in health facilities. Results were presented as odds ratios (OR), with Chi-square tests and P-values supporting the null hypothesis. Of 167,151 women interviewed, 84,352 (50.46%) gave birth in health facilities:

22,089 in 1991, 8,166 in 2007, 11,751 in 2013, and 41,372 in 2017. Health facility births increased from 13.6% in 1991 to 64% in 2017. Urban residence, age 30+, secondary education, and government employment were significant factors in health facility usage.

Recommendations

Enhance investment and policy focus in emerging regions, particularly South Asia and Africa, to sustain maternal and neonatal mortality reduction efforts. Prioritize access to and utilization of health facilities, targeting urban areas and empowering women with higher education and stable employment for improved maternal and neonatal outcomes.

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