

# Delivery Health Service Satisfaction of Mothers and Fear of COVID-19: Implications for Maternal and Child Health in Pakistan

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## Research Article

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# Abstract

High maternal and neonatal mortality rates in developing regions like Pakistan are linked to low rates of institutional deliveries. One way to improve rates of institutional deliveries is through improving institutional delivery service satisfaction in mothers. The aim of this research is to identify which factors influence delivery service satisfaction in mothers during the era of COVID-19 and to identify socio-demographic characteristics of mothers associated with greater fear of catching COVID-19 during institutional deliveries. A total of 190 women who had delivered a baby between May 2020 and June 2020 were sampled from two private and two public hospitals of Lahore which gave permission for data collection. Results reveal that majority women at 74.7% are afraid of contracting COVID-19, specifically women: delivering at public hospitals, who are illiterate or semi-literate, with more than 4 children, with low household income, and who are unemployed. Four multiple regression models were used to identify factors related to higher satisfaction in delivery services, including: (i) pre-delivery care (explanatory power of  $R^2 = 0.651$ ), (ii) during delivery care ( $R^2 = 0.716$ ), (iii) after delivery care for mother ( $R^2 = 0.525$ ), and (iv) after delivery care for newborn ( $R^2 = 0.780$ ). Based on our findings we recommend improved regulation of delivery services, especially at public hospitals, increased protection for disadvantaged women groups, and improved service quality by healthcare providers.

## Background

The maternal mortality rate, neonatal mortality rate, and under 5 child mortality rate for Pakistan are not satisfactory (Alimohamadi, Khodamoradi, Khoramdad, Shahbaz, & Esmaeilzadeh, 2019; Habib et al., 2019). One of the reasons touted for the high mortality rates in developing regions is low levels of institutional deliveries with skilled providers (Randive, San Sebastian, De Costa, & Lindholm, 2014; Yoseph, Abebe, Mekonnen, Sisay, & Gonete, 2020). Most recent nation-wide data from the Pakistan Demographic Health Survey reports that 34% of women do not use institutions for safe deliveries (National Institute of Population Studies, 2017-18). The reasons for not opting for institutional deliveries in the country include factors such as: (i) preference for home deliveries and traditional midwives of the community (Sarfraz & Hamid, 2014), (ii) fear that institutional staff will force unnecessary C-sections (Nazir, 2015), (iii) inability to access or pay for institutional deliveries (Jafree, Zakar, Mustafa, & Fischer, 2018), and (iv) lack of permission from husband and in-laws (Agha, 2011). In the era of coronavirus pandemic, there is additional fear that many mothers might revert to home deliveries if they hear about lack of safety and preventive precautions by hospitals and health centers.

The fear of home deliveries is that in the event of an emergency or complications there would be no time, or less time, to shift the mother to an institutional setting with required resources, equipment (Khan, Bhutta, Munim, & Bhutta, 2009), and specialized assistance (Tura, Fantahun, & Worku, 2013). In addition, home deliveries are not known for developing and providing holistic services for post-partum care for mother and newborn care, such as advice for feeding, immunization, family planning, and physical recovery of mother (Lancet Neonatal Survival Steering Team, 2005; World Health Organization, 2010). Research suggests that fewer than 50% of Pakistani women gain postpartum and newborn care

(National Institute of Population Studies, 2013). One of the major reasons for lower delivery service care, as discussed above, includes lower institutional deliveries, but also the lack of training of healthcare providers found at hospitals of developing countries (Simkhada, Teijlingen, Porter, & Simkhada, 2008). Healthcare providers have been found not to be held accountable for their delivering services to mothers and newborns (Mathole, Lindmark, Majoko, & Ahlberg, 2004), and some research also suggests that providers may exhibit negative attitudes and abuse (Mousa & Turingan, 2019). It is argued that one means of improving this culture of fear and resistance to institutional deliveries is to improve the services of care for mothers who do deliver at institutions (Colombara et al., 2016). This would help improve word of mouth promotion for institutional deliveries and build trust for institutional healthcare providers and staff (Khowaja et al., 2018).

Both the public and private hospitals of Punjab are bound by the provincial regulatory authority, Punjab Healthcare Commission (PHC), which is an independent health regulatory body. The PHC is mandated to ensure that all healthcare establishments adhere to the Minimum Service Delivery Standards (MSDS) while offering maternal and child health services (Punjab Healthcare Commission, 2020). The MSDS have been developed by the PHC and comprise a set of indicators that cover the entire spectrum of healthcare service delivery and care services for obstetric patients, including clinical and managerial aspects for maternal and newborn health.

### **Aim of study**

One way to improve rates of institutional deliveries is through improving institutional delivery service satisfaction in mothers. This is especially pertinent as in the era of pandemics a traditional society like Pakistani might revert to home deliveries if they fear contracting COVID-19 from unsafe institutions. The aim of this study was to: (i) identify demographic variables associated with fear of contracting COVID-19 during institutional deliveries and (ii) ascertain factors for delivery service satisfaction in women opting for institutional deliveries during coronavirus pandemic, specifically with respect to: a. pre-delivery care, b. during delivery care, and c. after delivery care for mother and newborn.

## **Methods**

Ethics approval for this study was taken from the Institutional Review Board of Forman Christian College University. No names were asked from participants. All confidentiality and anonymity was maintained of women participants. No hospital names have been reported due to lack of permission. Women were provided a number for free counseling services by a trained clinical psychologist, if needed, as survey included questions related to fear.

### **Sampling Selection criteria**

Only women who had delivered a baby at public or private hospitals of Lahore during the COVID-19 pandemic were invited to be part of this study. Both public and private hospitals from Category-I Hospitals (Punjab Healthcare Commission, 2020) were considered eligible for sampling, in order to

provide homogeneity for data analysis and conclusions from findings. Category-I hospitals are defined as hospitals with at least 50 in-patient beds.

## **Survey**

The survey (Appendix A) comprised of 39 questions from a standardized tool by the UK National Health Services (NHS) Survey 2017 (Henderson & Redshaw, 2017). The scale covered the following domains: 1. Registration and admission services; 2. Birthing and delivery services; and 3. Post-delivery services. Some modifications for regional relevancy were made and questions related to COVID-19 were added to the survey. Likert scale items ranged from 1-5 ('Not at all', 'Not really', 'Somewhat', 'Very much', 'All the time'). The Cronbach alpha results showed high internal validity of the survey: (i) Pre-delivery care was measured by 6 items, and had a Cronbach alpha of 0.870; (ii) Care during delivery was measured with 12 items which, and had a Cronbach alpha of 0.955; and (iii) Care after birth was measured with 7 variables, and had a Cronbach alpha of 0.870. The survey was translated in Urdu, the local language, by the first two authors, who are fluent in both languages.

## **Data collection**

The second and fourth authors are medical doctors currently working in Lahore. They were able to gain permission to collect data from two public sector and two private sector hospitals. Data was collected between May 15<sup>th</sup> 2020 to June 13<sup>th</sup> 2020 by the first four authors of the study. The face to face method of data collection was used, so if the mother was illiterate or busy with the baby, the data collector was present for assistance in reading of questions and survey completion. Women were asked permission to participate in the study and if they were not alone, they were asked for a free time for the data collector to come back for survey completion. Women respondents were communicated an informed cover letter, in both English and Urdu, about the research objectives and the option to withdraw from the study at any time while answering questions.

Data collectors adorned PPE kit while collecting data and if the woman respondent was not wearing a mask, they were provided one, to ensure safety of interviewer and interviewee. On average the sampled public sector hospitals have 50-70 women delivering daily and the private hospitals have 10-15 women delivering daily. The four data collectors spent one month collecting data from each hospital respectively and were able to spend two-four hours a day on average requesting interviews from a self-assigned daily target of 10 women a day. In total 100 women were sampled from the two public sector hospitals and 90 women were sampled from the private hospitals. The response was low, at 15.8%, with only 190 women being sampled, despite request from 1,200 women who had delivered. We were unable to continue sampling due to revocation of permission to continue collecting data from the hospitals due to increased protocols for COVID-19 safety.

## **Data Analysis**

Initially descriptive statistics and correlations between study variables were calculated. Next, t-tests were used to identify which socio-demographic characteristics of mothers were significantly associated with fear for self and child catching COVID-19 during institutional delivery. For t-test calculations socio-demographic variables were recoded into bivariate groups. Last multivariate regression analysis was performed to identify the predictors for four maternal and child health support areas of: (i) satisfaction with pre-delivery care services, (ii) satisfaction with care during delivery, (iii) satisfaction with maternal post-delivery care, and (iv) satisfaction with care for newborn.

## Results

### Socio-demographic characteristics of sample

Table 1 presents the socio-demographic characteristics of the sample (N=190) and the chi square associations for women who are afraid of catching COVID-19 during institutional deliveries (n=142, 74.7%). Nearly all women lie between the ages of 20-39 years (94.2%) and are currently married (97.8%). A significant number of women are illiterate (17.9%) or educated to 10<sup>th</sup> grade secondary studies (25.8%). Majority women have a household income between PKR 7,000- PKR 59,999/ USD 42.01-360.06 (68.9%) and have between 1-3 children (75.8%). Nearly all women are Muslims (95.3%) and unemployed housewives (73.2%). A near majority of women had C-sections, emergency or planned, (57.9%) and delivered at private hospitals (52.6%). Frequencies and percentages of other variables of study measuring delivery satisfaction in women have been presented in Appendix B. Most chi square associations for fear of catching COVID-19 show significance and helped determine which variables were included in the multiple regression analysis.

**Table 1**

*Socio-demographics of women respondents and fear of catching COVID-19 due to institutional deliveries with chi square association*

Variable	f(%) N= 190	Afraid of catching COVID-19 n=142	$\chi^2$ (p-value)
Age			
20-29	102 (53.7%)	69 (54.3%)	4.67 (0.792)
30-39	77 (40.5%)	52 (40.9%)	
40-49	11 (5.8%)	06 (4.8%)	
Education			
Illiterate	34 (17.9%)	23 (18.1%)	36.45 (0.000)
Primary - Secondary	49 (25.8%)	38 (29.9%)	
Middle - Intermediate	83 (43.7%)	53 (41.7%)	
Higher Education	24 (12.6%)	13 (10.3%)	
Marital Status			
Married	186 (97.8%)	126 (99.2%)	14.76 (0.064)
Separated	02 (1.1%)	00 (0.0%)	
Single	02 (1.1%)	01 (0.8%)	
Monthly Household Income			
7,000 - 19,999	42 (22.1%)	37 (29.2%)	47.26 (0.001)
20,000 - 39,999	38 (20.0%)	30 (23.6%)	
40,000 - 59,999	51 (26.8%)	31 (24.4%)	
60,000 - 79,999	10 (5.3%)	06 (4.7%)	
80,000 - 100,000	26 (13.7%)	15 (11.8%)	
≥ 100,001	23 (12.1%)	08 (6.3%)	
Children			
None	07 (3.7%)	02 (1.6%)	22.28 (0.035)
1 - 3	144 (75.8%)	95 (74.8%)	
4- 6	38 (20.0)	29 (22.8%)	
7 or more	01 (0.5%)	01 (0.8%)	
Religion			
Islam	181 (95.3%)	122 (96.1%)	4.84 (0.304)
Christianity	09 (5.7%)	05 (3.9%)	
Current Profession			
Housewife/ Unemployed	139 (73.2%)	100 (78.7%)	14.77 (0.044)
Skilled	34 (17.9%)	10 (7.9%)	
Unskilled	17 (8.9%)	17 (13.3%)	
Type of delivery			
Normal Vaginal	62 (32.6%)	37 (29.1%)	18.37 (0.105)
Assisted Vaginal	18 (9.5%)	15 (11.8%)	
Emergency C Section	91 (47.9%)	63 (49.6%)	
Planned C Section	19 (10.0%)	12 (9.5%)	
Type of Institution			
Public	90 (47.4%)	45 (35.4%)	36.378 (0.000)
Private	100 (52.6%)	82 (64.6%)	
Pre-delivery care services satisfaction			
Not satisfied	46 (24.2%)	37 (26.1%)	76.702 (0.000)
Satisfied	144 (75.8%)	105 (73.9%)	
Care during delivery satisfaction			
Not satisfied	57 (30%)	28 (19.7%)	58.871 (0.000)
Satisfied	133 (70%)	114 (80.3%)	
Maternal post-delivery care satisfaction			
Not satisfied	76 (40%)	42 (29.6%)	63.012 (0.000)

Satisfied	114 (60%)	100 (70.4%)	
Care for newborn satisfaction			
Not satisfied	73 (38.4%)	52 (36.6%)	60.832 (0.000)
Satisfied	117 (61.6%)	90 (63.4%)	

## Mean analysis for socio-demographic comparisons for fear of catching COVID-19

T-test results for differences between mean satisfaction scores showing greater fear of catching COVID-19 during institutional deliveries reveal the following: (i) women delivering at public hospitals have greater fear versus private ( $M= 4.04$  vs.  $M=3.10$ ,  $p=0.000$ ); (ii) illiterate women and women educated till secondary level (grade 10) have greater fear versus women educated above grade 10 ( $M= 3.76$  vs.  $M=3.46$ ,  $p=0.000$ ); (iii) women with 4-7 children have greater fear versus women with 1-3 children ( $M= 4.00$  vs.  $M=3.49$ ,  $p=0.001$ ); (iv) women having a household income between PKR 7,000- PKR 59,999/ USD 42.01-360.06[1] have greater fear versus women with household income greater than PKR 59,999/ USD 360.06 ( $M= 3.79$  vs.  $M=3.15$ ,  $p=0.001$ ); (v) unemployed women have greater fear versus employed ones ( $M= 3.76$  vs.  $M=3.16$ ,  $p=0.001$ ); and (vi) currently married women have greater fear versus separated or widowed ( $M= 3.62$  vs.  $M=2.00$ ,  $p=0.022$ ).

[1] PKR to USD conversions, as at July 15<sup>th</sup> 2020, at the rate of 1 USD to 166.634 PKR, from: <https://usd.fxexchangerate.com/pkr/>

	N	Mean	P value
Hospital Type			
Public	90	<b>4.04</b>	<b>0.000</b>
Private	100	3.10	
Education			
Illiterate- secondary	83	<b>3.76</b>	<b>0.000</b>
Intermediate- graduate	107	3.46	
Marital Status			
Married	184	<b>3.62</b>	<b>0.022</b>
Separated/ widowed	04	2.00	
Total Household Income			
PKR 7,000-59,999	131	<b>3.79</b>	<b>0.001</b>
PKR 60,000-100,000	59	3.15	
Number of children			
1-3	151	3.49	<b>0.001</b>
4-7	39	<b>4.00</b>	
Religion			
Muslim	181	3.61	0.419
Christian	09	3.22	
Profession			
Unemployed	139	<b>3.76</b>	<b>0.001</b>
Employed	51	3.16	
Type of delivery			
Vaginal	80	3.61	0.883
C-section	110	3.58	

## Multiple regression results for satisfaction with delivery services

Seven factors explained 65.1% of the variance in overall satisfaction with pre-delivery care services (Table 3). Five variables show statistical significance in association with satisfaction with overall support and attention during pre-delivery: (i) services of hospital staff and administration ( $t= 5.74, P=0.000$ ); (ii) mothers involvement in decision-making ( $t= 4.70, P=0.000$ ); (iii) timely registration and room admission ( $t= 4.16, P=0.00$ ); (iv) less fear of coronavirus ( $t= -2.74, P=0.007$ ); and (v) current profession of skilled work ( $t= 2.30, P=0.022$ ).

**Table 3**

Multiple regression model for satisfaction with pre-delivery care services

Model	Unstandardized coefficients		Standardized Coefficients		Sig.	95% CI for $\beta$	
	B	Std. Error	B	t		Lower Bound	Upper Bound
(Constant)	-0.188	0.313		-0.601	0.549	-0.805	0.429
Hospital Type	0.189	0.132	0.075	1.431	0.154	-0.071	0.448
Current Profession	0.173	0.075	0.108	2.303	<b>0.022</b>	0.025	0.321
Fear catching COVID-19	-0.124	0.045	-0.140	-2.743	<b>0.007</b>	0.035	0.213
Satisfaction with hygiene and sanitation of hospital upon entry	-0.037	0.052	-0.042	-0.701	0.484	-0.139	0.066
Timely registration and room admission	0.242	0.058	0.233	4.160	<b>0.000</b>	0.127	0.357
Involved in decision-making about your care	0.265	0.056	0.254	4.705	<b>0.000</b>	0.154	0.376
Services of hospital staff and administration during pre-delivery	0.350	0.061	0.407	5.743	<b>0.000</b>	0.230	0.470

Dependent Variable: Satisfaction with overall support and attention at hospital for institutional delivery during pre-delivery time.

The prediction model was statistically significant,  $F(7, 182) = 48.480, p < 0.001$

$R^2 = .651, \text{Adjusted } R^2 = .637, * < 0.001$

Eight factors explained 71.6% of the variance in overall satisfaction with support during delivery (Table 4). Four variables show statistical significance in association with satisfaction with overall support during delivery: (i) comfortable position and movement ( $t= 5.06, P=0.000$ ); (ii) confidence and trust in staff ( $t= 4.32, P=0.000$ ); (iii) involved in decision-making ( $t= 3.55, P=0.000$ ); and (iii) staff assistance in reasonable time ( $t= 2.07, P=0.040$ ).

**Table 4**

Multiple regression model for satisfaction with care during delivery

## Coefficients

Model	Unstandardized coefficients		Standardized Coefficients	T	Sig.	95% CI for $\beta$	
	B	Std. Error	$\beta$			Lower Bound	Upper Bound
(Constant)	0.326	0.296		1.102	0.272	-0.258	0.910
Education	0.052	0.060	0.037	0.863	0.389	-0.067	0.171
Hospital Type	-0.144	0.126	-0.056	-1.145	0.254	-0.393	0.104
Fear catching COVID-19	-0.012	0.042	-0.013	-0.295	0.768	-0.095	0.070
Satisfaction with hygiene and sanitation of delivery room	0.070	0.048	0.080	1.459	0.146	-0.025	0.166
Comfortable position and movement during delivery	0.279	0.055	0.301	5.065	<b>0.000</b>	0.171	0.388
Staff assistance in reasonable time during delivery	0.131	0.063	0.139	2.073	<b>0.040</b>	0.006	0.255
Involved in decision-making during delivery	0.214	0.060	0.221	3.559	<b>0.000</b>	0.095	0.332
Confidence and trust in staff providing care during delivery	0.290	0.067	0.305	4.319	<b>0.000</b>	0.157	0.422

Dependent Variable: Satisfaction with overall support during delivery

The prediction model was statistically significant,  $F(8, 181) = 57.005$ ,  $p < 0.001$  $R^2 = .716$ , Adjusted  $R^2 = .703$ ,  $* < 0.001$ 

Seven factors explained 52.5% of the variance in satisfaction with maternal postnatal care (Table 5). Five variables show statistical significance in association with satisfaction with maternal postnatal care: (i) given necessary information and explanations ( $t = 3.17$ ,  $P = 0.002$ ); (ii) private hospital ( $t = 2.76$ ,  $P = 0.006$ ); (iii) working women ( $t = 2.77$ ,  $P = 0.006$ ); (iv) information about physical recovery ( $t = 2.48$ ,  $P = 0.014$ ); and (v) less fear of catching COVID-19 ( $t = -1.83$ ,  $P = 0.049$ ).

**Table 5**

Multiple regression model for satisfaction with maternal post-delivery care

Model	Unstandardized coefficients		Standardized Coefficients		t	Sig.	95% CI for $\beta$	
	B	Std. Error	B				Lower Bound	Upper Bound
(Constant)	0.569	0.373			1.526	0.129	-0.167	1.305
Hospital Type	0.505	0.182	0.177		2.767	<b>0.006</b>	0.145	0.865
Current Profession	0.278	0.100	0.152		2.771	<b>0.006</b>	-0.476	-0.080
Fear catching COVID-19	-0.109	0.060	-0.108		-1.830	<b>0.049</b>	-0.009	0.227
Satisfaction with hygiene and sanitation of room or ward	-0.089	0.079	-0.081		-1.128	0.261	-0.244	0.066
Given all the necessary information and explanations needed after the birth	0.300	0.095	0.277		3.172	<b>0.002</b>	0.113	0.487
Treated with kindness and understanding after the birth	0.162	0.095	0.152		1.705	0.090	-0.025	0.348
Information about physical recovery after birth	0.204	0.082	0.196		2.481	<b>0.014</b>	0.042	0.366

Dependent Variable: Satisfaction with maternal postnatal care

The prediction model was statistically significant,  $F(7, 182) = 28.719, p < 0.001$  $R^2 = .525$ , Adjusted  $R^2 = .507$ ,  $* < 0.001$ 

Seven factors explained 78.0% of the variance in satisfaction with care for newborn (Table 6). Four variables show statistical significance in association with satisfaction with care for newborn: (i) advice and support for breast feeding ( $t = 5.39, P = 0.000$ ); (ii) advice and support for child immunization ( $t = 3.29, P = 0.001$ ); (iii) advice for family planning and birth spacing ( $t = 2.38, P = 0.018$ ); and (iv) satisfaction with room hygiene and sanitation of room or ward ( $t = 1.98, P = 0.048$ ).

**Table 6**

Multiple regression model for satisfaction with care for newborn

Model	Coefficients				Sig.	95% CI for $\beta$	
	Unstandardized coefficients $\beta$	Std. Error	Standardized Coefficients B	t		Lower Bound	Upper Bound
(Constant)	0.169	0.200		0.849	0.397	-0.225	0.563
Hospital Type	-0.083	0.128	-0.030	-0.649	0.517	-0.337	0.170
Fear catching COVID-19	0.030	0.041	0.030	0.744	0.458	-0.050	0.110
Satisfaction with hygiene and sanitation of room or ward	0.100	0.050	0.093	1.988	<b>0.048</b>	0.001	0.200
Advice and support for breast feeding	0.444	0.082	0.448	5.392	<b>0.000</b>	0.281	0.606
Advice and support for child immunization	0.268	0.081	0.269	3.297	<b>0.001</b>	0.108	0.429
Advice for emotional changes and attachment with child	0.019	0.059	0.020	0.317	0.752	-0.098	0.136
Advice for family planning and birth spacing to give adequate attention to newborn	0.144	0.060	0.151	2.388	<b>0.018</b>	0.025	0.263

Dependent Variable: Satisfaction with care for newborn

The prediction model was statistically significant,  $F(7, 182) = 92.161, p < 0.001$  $R^2 = .780$ , Adjusted  $R^2 = .771, * < 0.001$ 

## Discussion

Majority of the sample indicate fearing COVID-19 during institutional deliveries in hospitals of Lahore. Recent literature also suggests that vulnerable populations like pregnant women are more at risk of catching COVID-19 and thus they face great stress and fear on being admitted in hospital for child delivery (Dashraath et al., 2020). On a positive note however, this has not deterred the respondents from choosing institutional deliveries. Our results imply that, women and their families, belonging to urban cities from the developing world, are more cognizant of and committed to safer delivery practices to secure maternal and child health. Our mean analysis results show significance of specific socio-demographic characteristics with greater fear of catching COVID-19. Women from disadvantaged backgrounds of illiteracy, unemployment, and lesser household income have greater fear of contracting COVID-19 during institutional deliveries. This aligns with international literature in that women of more disadvantaged groups are at greater risk of catching infectious diseases (Bishwajit, Ide, & Ghosh, 2014), and also receiving less support from healthcare providers during pandemics (McLemore et al., 2018) and national health emergencies (de Paz, Muller, Munoz Boudet, & Gaddis, 2020).

Our findings also show that married women with more than four children face greater fear of contracting COVID-19. Recent scholarship from Pakistan also confirms that married people and women have greater fear of catching COVID-19, as they have more to lose in terms of risk to children and aging parents

(Mahmood, 2020). Having already raised children, these women are also more aware of the ramifications of contracting infections on the wellbeing of children. Our findings also reveal that women delivering at public sector hospitals show greater fear of contracting COVID-19. This finding is not unusual as most developing countries have poor public sector quality standards, with low levels of delivery satisfaction in mothers (Peters, El-Saharty, Siadat, Janovsky, & Vujicic, 2009). Other local research also confirms that public sector hospitals in the country are known for lack of cleanliness, more waiting time, and unsatisfactory behavior of healthcare providers (Kanwal, Hameed, & Riaz, 2017).

With regard to multiple regression results, our first model showing satisfaction with pre-delivery care services, shows significant associations with better services of staff and administration, greater involvement in decision-making of mother, and timely room registration and room admission. Our findings align with other developing world literature that better hospital services at pre-delivery time improves satisfaction for mothers (Sayed, AbdElAal, Mohammed, Abbas, & Zahran, 2018). Model 1 also shows that satisfaction with pre-delivery care services is associated with lesser fear of contracting COVID-19. Results imply that women are more observant of safety protocols for COVID-19 at registration and admission. Hospitals with more visible manifestation for COVID-19 prevention must help to reduce fears in mothers at the outset, making their stay at the hospital a less anxious time. These visible signs for preventive safety include: sterilization at entrance, mandatory face masks, physical distancing between seating areas, frequent sanitation of institution and availability of hand sanitizers, and PPE kits for healthcare staff.

Our second regression model showing satisfaction with care during delivery, shows significant associations with comfortable delivery position and movement, confidence and trust with staff, involvement in decision-making, and staff assistance in reasonable amount of time. Our findings align with the developing world literature suggesting that the most pertinent determinants of satisfaction of labouring women is healthcare provider's interpersonal behaviour in terms of courteousness, promptness, and non-abuse (Srivastava, Avan, Rajbangshi, & Bhattacharyya, 2015). It is also important to note that our findings show that during delivery time, services of healthcare staff are more important for mothers than the fear of COVID-19. This maybe because during delivery mothers are more worried for the safe arrival of their child. This implies that the period during delivery is an extremely vulnerable time for women, and it is the healthcare staff that has to ensure hygiene and sanitation for mother and newborn in the delivery room.

Our third regression model showing satisfaction with maternal post-delivery care shows significant associations with greater provision of necessary information and explanations, private hospital deliveries, and lesser fear of catching COVID-19. Our findings corroborate international results that post-delivery satisfaction is high of mothers when they are provided adequate information about postnatal care for self and newborn (Karkee, Lee, & Pokharel, 2014). Despite high poverty rates in women of the country and low health financing (Hassan, 2014), of the 66% of women that do deliver at institutions, 44% opt to deliver at costly private centers compared to 22% at free or subsidized public centers (National Institute of Population Studies, 2017-18). Previous research from Pakistan suggests that mothers are happier with

private hospitals compared to public ones due to better services, less shortages in staff and resources, and timely service (Ashraf, 2012). There is also the concern that women are known to face disrespect by staff and providers of public sector hospitals, thus influencing their choice for private hospitals (Munawar et al., 2017). Research from other developing regions also corroborates our findings that public sector hospitals are perceived to be providing inferior quality of maternity services in comparison with private sector hospitals (Baltussen & Ye, 2006). In addition, private sector hospitals perform better than public sector hospitals, as they are more patient oriented and maintain focus on interpersonal relations between the healthcare provider and patient (Hulton, Matthews, & Stones, 2007).

Our fourth and final regression model showing satisfaction with care for newborn shows significant associations with greater advice and support for breast feeding, child immunization, and family planning and birth spacing. Satisfaction with care for newborn also showed satisfaction with room hygiene and sanitation of room or ward. International literature suggests that when mothers are provided improved services for newborn feeding, immunization, and birth spacing, it results in improved child development in early years (Bhutta, 2005; Lassi, Das, Salam, & Bhutta, 2014). Findings also revealed that mothers are more satisfied with care for newborn when the hygiene and sanitation in the room or ward post-delivery was adequate. Recent research also suggests that mothers are concerned about hygiene and sanitation and contracting COVID-19 after the baby is born and before it is taken home safely (Brooks, Weston, & Greenberg, 2020).

Limitations of this study include the small sample size, perception based responses, and inability to sample other cities. However the strength of this study include (i) gathering data from women across both private and public hospitals, (ii) identifying socio-demographic characteristics of women who are afraid of contracting COVID-19 during institutional deliveries, and (iii) determining factors that are associated with higher satisfaction in delivery services. Our findings can help direct improved policy for hospitals during the age of infectious pandemics. Our study also has implications for other developing regions attempting to improve delivery services at hospital-level and also aiming to improve institutional delivery rates at national-level. Finally, this study's findings would hold true not just after the coronavirus pandemic is over, but also when infectious disease burden is generally high, as is the case in developing regions of the world, especially Pakistan (Hyder & Morrow, 2000).

## Conclusion

Reducing maternal mortality and increasing rates of institutional deliveries has to become a targeted focus if Pakistan is to meet its Sustainable Development Goals. This is possible only by assessing delivery service satisfaction of women and building a culture of trust for institutional deliveries. The satisfaction levels and safety during childbirth would be communicated by women and their families, to encourage and improve institutional delivery rates. We have found that when women are provided better services and assured of safety from infection they have higher rates of satisfaction with delivery services.

Given that the time for delivery for women is usually uncertain and a time of anxiety, it would not be illogical to juxtapose time of delivery with time of pandemics. Both bring with them immense pressure to save lives, maintain hygiene, and uphold quality services in order to retain trust and confidence in healthcare institutions and healthcare providers. Thus any improvements made in delivery services in response to allaying fears of COVID-19 would help overall in maternal and neonatal health after the pandemic is over. We recommend urgent compliance by the PHC across hospitals and other health delivery centres for: (i) MSDS for maternal and newborn health services and (ii) preventive protocols for COVID-19.

To improve accountability, we recommend the linking of hospital licensing, practitioner licensing, and practitioner promotions with delivery satisfaction surveys of mothers. We recommend improvement in maternal health services of the public sector hospitals by taking into account perspective of women on the care they require and by factoring in their feedback about the healthcare they receive. Policy and regulation must also ensure availability of standardized maternal and newborn healthcare across both private and public hospitals for family planning, child immunization, and breast feeding. Special attention needs to be paid on training of staff on communications and improving interpersonal skillset, and timely attention and support for maternal and newborn care. We also recommend stricter protocols for disadvantaged women groups- defined by lower literacy, lower household income, and unemployed status, as they are more vulnerable not just to contracting infectious diseases, but also receiving sub-optimal services from healthcare providers. We must stay cognizant of the fact that most disadvantaged women, especially the ones seeking healthcare from the public sector, are unaware of what quality healthcare services entail, hence the satisfaction rates stated in this and similar studies should be interpreted with caution.

## **Declarations**

### **Conflict Of Interest**

None

### **Funding**

None

### **Declarations section: Competing interests**

The authors declare no competing interests.

### **Declarations section: Participants consent**

All participants consented to participate in this study by completing a consent form prior to taking the survey.

Ethics approval for this study was taken from the Institutional Review Board of Forman Christian College University. No names were asked from participants. All confidentiality and anonymity was maintained of women participants. No hospital names have been reported due to lack of permission. Women were provided a number for free counseling services by a trained clinical psychologist, if needed, as survey included questions related to fear.

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