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Correlates of facility-based childbirth: A health belief model approach using the National Demographic and Health Survey - Philippines

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Abstract:

BACKGROUND: Facility-based delivery (FBD) is a key intervention for reducing maternal and neonatal mortality. Despite policies discouraging home births, 11% of all deliveries in the Philippines occur outside health facilities. The health belief model (HBM) suggests that healthcare-seeking is influenced by perceived risks, benefits and barriers, and cues to action.

OBJECTIVES: To examine how HBM indicators are associated with the likelihood of FBD and to assess the added value of increasing antenatal care (ANC) contacts from four to eight in line with recommendations by the World Health Organization.

METHODOLOGY: Using data from the 2017 National Demographic and Health Survey, we ran logistic regression models on a sample of 6551 women with a recent live birth to estimate how HBM indicators were linked to the probability of FBD.

RESULTS: FBD was more likely among women with higher pregnancy risks (first birth and delivery complications) and those facing fewer barriers to health care (higher education, wealthier households, public health insurance coverage, urban residence, and not Muslim). Being Muslim had the largest negative impact on the probability of FBD (–19% points). Having at least eight (instead of four) ANC contacts increased the probability of FBD by 6% points.

CONCLUSIONS: FBD in the Philippines is shaped by perceived risks, socioeconomic and cultural barriers, and ANC contacts as cues to action. Increasing antenatal contacts was associated with a higher likelihood of FBD. Policies should therefore prioritize expanding affordable, accessible, and culturally responsive maternal healthcare services to reduce inequalities, rather than penalizing home births.

Keywords:

Facility-based delivery, health belief model, maternal health, quantitative analysis

Introduction

The Philippines continues to face high maternal mortality rates (MMR), exceeding both the regional averages for East Asia and the Pacific and those of several neighboring countries.^[1] Between 2006 and 2015, approximately 1600 maternal deaths were recorded annually,^[2] increasing to 2008 in 2022, before adjusting for underreporting.^[3] The country's department

of health attributes high MMR to the continued prevalence of home births.^[4] The Philippine government thus strongly encourages all expectant mothers to deliver in health facilities, as indicated in the integrated maternal, newborn, and child health and nutrition strategy (administrative order [AO] no. 2008-0029).^[5] In response to this strategy, local government units have been prohibiting home births, imposing fines on women who deliver at home and on the attendants who assist them

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in doing so.^[6,7] Despite these policies, the most recent Demographic and Health Survey (2022) reveals that 11% of all births are still delivered outside of health facilities.^[8] This study examines the factors correlated with facility-based delivery (FBD) through the lens of the health belief model (HBM). Although previous quantitative studies have investigated the determinants of FBD, they are often discussed without an explicit theoretical framework.^[9-12] By applying the HBM, the current study situates individual variables as potential risks, benefits or barriers, and cues to action that may hinder or facilitate FBD. Employing a framework allows us to examine the broader mechanisms behind health-seeking behavior, instead of interpreting each variable in isolation. This study also uses a widely available quantitative dataset, allowing for replication and cross-context comparison by future research.

Existing studies highlight the influence of socioeconomic factors on maternal healthcare utilization, with higher educational attainment, greater wealth, and urban residence among the top predictors of seeking formal healthcare.^[13-16] Maternal age and parity are also key predictors, as older women and first-time mothers are more likely to seek skilled birth attendance due to their heightened awareness of the potential risks of childbirth.^[13,16] Other determinants of maternal health-seeking behavior include distance to healthcare facilities, health insurance coverage, and perceived need for formal care in cases of complications.^[13] Tradition and culture may also shape maternal health-seeking behavior. Minority groups may be held back from seeking formal health care due to a mismatch between traditional and modern medical practices. Indigenous women may have preferences for home births,^[17,18] and Muslim women may prefer to seek care from female providers within their communities.^[19] Indigenous women also encounter barriers to health care linked to their geographic isolation from medical providers.^[17,18]

Studies have also found a strong correlation between antenatal care (ANC) and FBD.^[20-23] More frequent ANC contacts increase the likelihood of FBD, as healthcare providers are able to reinforce the benefits of FBD and aid in familiarizing women with the formal health system during ANC contacts.^[20-24] ANC is a key intervention that contributes to the reduction of maternal and perinatal mortality through identification and treatment of complications, referral of at-risk women to appropriate levels of care, and the prevention and management of concurrent diseases.^[25-27] In 2016, the World Health Organization (WHO) increased its recommended minimum number of ANC contacts from four to eight, citing evidence of greater reductions in perinatal mortality.^[27] Philippine health guidelines, however, continue to follow the 2002 WHO standard of at least four

contacts. A recent study linked 8 or more ANC contacts with a higher likelihood of FBD, but its reference group combined women with very few ANC contacts and those who met the four-contact standard.^[28] The current study therefore directly tests the added value of having at least eight instead of at least four ANC contacts on increasing the probability of FBD.

According to the HBM, individuals seek health services when they perceive themselves at risk and believe that a condition could lead to serious consequences.^[29,30] In the context of maternal health, expectant women are more likely to opt for FBD if they perceive childbirth as risky to their own or their child's health. The mother's decision to seek formal healthcare may also be influenced by their perception of its benefits in reducing risks or treating a condition. However, factors such as accessibility challenges, financial constraints, or negative experiences may hinder formal healthcare utilization.^[29,30] Knowledge of the benefits of formal healthcare and the absence of barriers to access may thus determine FBD. Finally, cues to action, such as receiving advice from health providers during the ANC stage, may further influence maternal health-seeking behavior.^[29,30] Hence, using the HBM as a lens also allows us to emphasize the influence of ANC on the probability of FBD. This study hypothesizes the following, grouped under components of the HBM:

1. Potential risk. Women of advanced maternal age, first-time mothers, and those who experience complications during childbirth are more likely to opt for FBD, as they may perceive greater health risks and a greater need for formal health care
2. Perceived benefits and barriers. Women with higher educational attainment, greater household wealth, public health insurance coverage, urban residence, and affiliation with the Roman Catholic faith are expected to facilitate FBD, as they may recognize greater benefits and encounter fewer socioeconomic or cultural barriers to formal health care
3. Cues to action. ANC visits serve as cues to action for FBD. Women who initiate ANC on time and have a higher number of ANC contacts are more likely to deliver in a health facility, even after controlling for other factors. Those with at least 8 ANC contacts would be more likely to deliver in a health facility than those with fewer contacts.

This study contributes to ongoing discussions on maternal healthcare utilization and accessibility in the Philippines, and provides evidence that may inform both scholarly inquiry and policy development.

Methodology

The study drew data from the 2017 National Demographic and Health Survey (NDHS), which used a two-stage

stratified sampling design based on the master sample of the Philippine Statistics Authority.^[31] The survey yielded a nationally representative sample of 25,690 women aged 15–49 years. The analytic sample comprised 6551 married or cohabiting women aged 25–49 years who had a live birth in the 5 years preceding the survey. Women below 25 years were excluded from the sample to ensure that most women in the sample had completed their education at the time of the survey, given the cross-sectional measure of our education variable. The 2017 NDHS was used instead of the more recent 2022 NDHS because the former covers a broader range of experiences and conditions unaffected by the exceptional context of the COVID-19 pandemic.

The outcome variable was the place of delivery for the woman's most recent live birth, categorized as either in a health facility or at home/other nonfacility locations. To assess potential risk, we examined maternal age at birth, the child's birth order, and experiencing serious difficulties around the time of birth (e.g. long labor, bleeding, sepsis, and loss of consciousness). Benefits and barriers to formal healthcare were measured through women's highest educational attainment (primary, secondary, and higher), household wealth status (poor: 1st and 2nd quintiles, middle: 3rd quintile, and rich: 4th and 5th quintiles), being a beneficiary of public health insurance (yes or no), place of residence (urban or rural), and religion (Roman Catholic, Islam, and other religion/no religion). Cues to action were represented by the number of ANC visits, and whether the first visit occurred within the recommended first trimester of pregnancy (yes or no: includes women with no ANC visit). Correlation tests and variance inflation factor tests confirm the absence of multicollinearity among the independent variables.

Binary logistic regression models were estimated to assess the likelihood of FBD. This method is best suited for the analysis of categorical outcomes' associations with independent variables. A stepwise approach was employed in modeling. We first fit a model that included risk indicators only, then incorporated benefits and barriers, and finally, cues to action indicators. This stepwise approach allowed us to observe the incremental contribution of each set of variables. The Akaike information criterion (AIC) and Bayesian information criterion (BIC) values for each model were also calculated to assess whether the addition of each set of variables improved the model's fit to the data. Results were presented as average marginal effects (AMEs), expressed in percentage points, for ease of interpretation.

The data were weighted to account for the complex survey sampling design, and statistical significance was assessed at $P < 0.05$. All analyses were conducted using Stata 18.0 (StataCorp LLC, College Station, Texas, USA)..

This study is based on anonymized secondary data obtained from publicly available data. NDHS datasets were accessed through the DHS program's repository (<https://dhsprogram.com/data/available-datasets.cfm>). The survey instruments received approval from the ICF Institutional Review Board (ICF Project Number: 132989.0.000.PH.DHS.01) and complied with the ethical standards outlined in 45 code of federal regulations (CFR) 46 "Protection of Human Subjects." The (University of the Philippines Population Institute) also approved the study design for the master's thesis on which this article is based.

Results

Description of the study's analytic sample

A sample of 6551 women was selected from the original NDHS data. As shown in Table 1, the analytic sample consisted of women under 30 years old (56%) at the time of their most recent birth. One in five were first-time mothers. These women had a moderate level of education, with more than half (51%) having attended high school and nearly a third (32%) reaching tertiary education. Despite this, nearly half (47%) belonged to poor households. Public health insurance coverage was relatively high (69% of the sample). The majority (55%) of the women resided in rural areas. In terms of religious affiliation, most women (85%) were identified as Roman Catholics, while around 6% were Muslim.

Only 3% of the sample reported no ANC contacts during their last pregnancy (not shown in Table 1). Around half of the sample had between four and seven ANC contacts, while 38% had at least eight. Most women (85%) initiated ANC during the first trimester of their pregnancy.

Place of delivery by women's characteristics

Approximately 20% of women in the analytic sample did not give birth in a health facility [Table 1]. The percentage of women with FBD was highest among women aged 30–34 (84%), first-time mothers (91%), and those who did not experience serious complications during childbirth (85%). Notably, nearly 60% of Muslim women gave birth outside health facilities – the only group where out-of-facility births exceeded facility-based deliveries. Most bivariate relationships went in the hypothesized direction, except for maternal age, which exhibited a fluctuating pattern.

Multivariate analysis of factors correlated with facility-based delivery

Table 2 presents the results of the stepwise modeling approach. The decreasing AIC and BIC values indicate that incorporating the indicators of risk, benefits/

Table 1: Sample distribution and place of delivery according to independent variables: Philippines, 2017

Independent variables	Categories	Sample distribution	Place of delivery		n	P
			Percentage in the health facility	Percentage other		
Potential risk						
Age during childbirth	20–24	28.9	80.4	19.7	1822	0.001
	25–29	27.5	79.9	20.1	1851	
	30–34	22.6	83.8	16.2	1463	
	35 and over	21.0	74.6	25.5	1415	
Child's birth order	1 st	21.2	91.1	9.0	1274	<0.001
	2 nd and 3 rd	49.9	82.4	17.6	3161	
	4 th and higher	28.9	67.0	33.0	2116	
Serious difficulties during childbirth	Yes	22.2	78.3	21.7	1466	<0.001
	No	77.8	84.9	15.1	5085	
Benefits and barriers to formal health care						
Highest educational attainment	Primary	17.4	54.0	46.0	1373	<0.001
	Secondary	50.5	80.7	19.3	3175	
	Higher	32.2	92.4	7.6	2003	
Household wealth status	Poor	47.1	67.8	32.2	3776	<0.001
	Middle	19.9	84.2	15.8	1158	
	Rich	33.1	94.2	5.8	1617	
Public health insurance	Yes	68.5	83.0	17.0	4523	<0.001
	No	31.6	72.8	27.2	2028	
Place of residence	Urban	44.7	86.5	13.5	2095	<0.001
	Rural	55.3	74.4	25.6	4456	
Religion	Roman catholic	78.8	83.0	17.0	4659	<0.001
	Islam	6.0	40.7	59.3	1216	
	Other/none	15.1	78.6	21.4	676	
Cues to action						
Number of ANC visits	<4	12.1	49.8	50.3	997	<0.001
	4–7	50.3	78.5	21.5	3420	
	8 and over	37.5	91.3	8.8	2154	
First ANC visit during the first trimester	Yes	85.0	83.1	17.0	5365	<0.001
	No	15.0	61.3	38.7	1186	
Total		100.0	79.8	20.2	6551	

Numbers may not add up to 100.0% due to rounding. ANC=Antenatal care

barriers, and cues to action at each step improved model fit and strengthened the robustness of the estimates.

The values reported in the succeeding sections are point estimates of the AMEs and their 95% confidence intervals from the full model (model 3). Given that the baseline distribution largely favors FBD (80%), we interpret effect sizes as follows: a difference of <5% points as weak effect, 6%–15% points as moderate effect, and >16% points as strong effect.

Indicators of potential risk

Statistically significant differences in the probability of FBD by women's age were only evident in the model assessing risk factors alone (model 1). Other indicators of potential pregnancy/childbirth risk had a weak-to-moderate relationship with FBD in each of the models. On average, delivering a first child, compared to a second or third child, increased the probability of FBD by 5% points (95% CI = 2–7), whereas 4th and higher-order

births decreased it by 6% points (95% CI = 3–9). Experiencing serious childbirth complications increased the probability of FBD by 5% points (95% CI = 3–8).

Indicators of perceived benefits and barriers to formal health care

We also observed weak-to-moderate effects of socioeconomic indicators on the probability of FBD. Higher education increased the probability of FBD by an average of 5% points (95% CI = 2–9), compared to secondary education, whereas primary education reduced the probability of FBD by about 10% points (95% CI = 6–13). Coming from rich households, relative to middle-wealth households, increased the probability of FBD by 7% points (95% CI = 2–12). Being a beneficiary of public health insurance increased the probability of FBD by 5% points (95% CI = 2–7). Urban residence was also correlated with a greater probability of FBD than rural residence.

Table 2: Average marginal effects and confidence intervals of the factors correlated with facility-based delivery: Philippines, 2017

Independent variables	Categories	Model 1		Model 2		Model 3	
		AME (95% CI)	P	AME (95% CI)	P	AME (95% CI)	P
Potential risk							
Age during childbirth (ref. 25–29)	20–24	–0.07 (–0.11 to –0.02)	0.002	–0.03 (–0.06 to 0.01)	0.168	–0.02 (–0.05 to 0.02)	0.325
	30–34	0.07 (0.04 to 0.11)	<0.001	0.03 (–0.01 to 0.07)	0.153	0.03 (–0.01 to 0.07)	0.154
	35+	0.03 (0.00 to 0.07)	0.087	–0.02 (–0.06 to 0.03)	0.482	–0.01 (–0.05 to 0.03)	0.652
Child’s birth order (ref. 2 nd and 3 rd)	1 st	0.09 (0.07 to 0.12)	<0.001	0.06 (0.03 to 0.10)	0.001	0.05 (0.02 to 0.07)	0.003
	4 th and higher	–0.20 (–0.24 to –0.16)	<0.001	–0.07 (–0.11 to –0.04)	<0.001	–0.06 (–0.09 to –0.03)	<0.001
Serious difficulties during childbirth (ref. no)	Yes	0.05 (0.02 to 0.08)	0.001	0.06 (0.03 to 0.08)	<0.001	0.05 (0.03 to 0.08)	<0.001
Benefits and barriers to formal health care							
Highest education (ref. secondary)	Primary			–0.11 (–0.15 to –0.08)	<0.001	–0.10 (–0.13 to –0.06)	<0.001
	Higher			0.06 (0.03 to 0.13)	<0.001	0.05 (0.02 to 0.09)	0.003
Wealth status (ref. middle)	Poor			–0.05 (–0.09 to –0.01)	0.015	–0.04 (–0.08 to 0.00)	0.042
	Rich			0.08 (0.03 to 0.13)	0.001	0.07 (0.02 to 0.12)	0.005
Health insurance (ref. number)	Yes			0.06 (0.03 to 0.09)	<0.001	0.05 (0.02 to 0.07)	0.001
Residence (ref. rural)	Urban			0.05 (0.02 to 0.08)	0.003	0.05 (0.02 to 0.08)	0.003
Religion (ref. Roman catholic)	Islam			–0.25 (–0.30 to –0.20)	<0.001	–0.19 (–0.24 to –0.15)	<0.001
	Other/none			–0.03 (–0.06 to 0.01)	0.133	–0.02 (–0.05 to 0.01)	0.241
Cues to action							
Number of ANC visits (ref.: 4–7)	<4					–0.15 (–0.19 to –0.10)	<0.001
	8 and over					0.06 (0.03 to 0.10)	<0.001
First ANC visit during first trimester (ref.: No)	Yes					0.00 (–0.03 to 0.04)	0.781
Model AIC; BIC		5831; 5878		5110; 5212		4949; 5071	
Number of women		6551		6551		6551	

Estimates were based on coefficients of binary logistic regression models. Ref.: Reference category, ANC=Antenatal care, AIC=Akaike Information Criterion, BIC=Bayesian Information Criterion, AME=Average marginal effects

Religion had a strong impact on the probability of FBD. Being Muslim reduced the probability of delivering in a health facility by 19% points (95% CI = 15–24), relative to being Roman Catholic.

Antenatal care as cues to action

The number of ANC visits exhibited a moderate-to-strong, positive association with FBD. Having fewer than four ANC contacts was associated with a 15% point decrease in the probability of FBD, compared to having four to seven visits (95% CI: 10–19). On the other hand, having eight or more ANC visits (versus four to seven) was associated with a 6% point increase in the probability of delivering in a health facility (95% CI = 3–10). No statistically significant differences were observed related to the timing of ANC initiation, once other variables were controlled for.

Discussion and Conclusion

The study showed that FBD in the Philippines is shaped by factors consistent with the HBM. Nearly four in five women gave birth in a health facility, yet notable disparities were observed. Maternal characteristics

reflected potential risks, whereas socioeconomic characteristics captured perceived benefits and barriers to healthcare. ANC served as a key cue to action, with the frequency of visits strongly associated with the likelihood of FBD.

Among the indicators of risk, delivering a first child and experiencing serious complications during childbirth increased the likelihood of FBD. In both situations, a woman may anticipate a more difficult birth and may thus choose to deliver in a facility equipped with skilled personnel and resources to handle complications and emergencies. As first births are often physically and psychologically challenging because of women's lack of prior childbearing experience, women carrying a first child may also be more likely to receive advice from medical workers to deliver in a health facility.

Socioeconomic factors reflected perceived benefits and barriers to accessing formal health care. Women with higher levels of education were more likely to deliver in a health facility, possibly due to greater knowledge of health benefits and a stronger capacity to navigate healthcare systems. In contrast, women with less schooling may rely more on community attendants,

influenced by limited awareness of the risks of home births, or by stronger adherence to cultural traditions. A larger gap in the probability of FBD was observed between women with only primary education and those with secondary education, whereas differences between women with secondary education and higher education were smaller. This reflects the marginalization of the least educated, who may face compounded disadvantages in awareness and access to formal health care.

Wealthier households, public health insurance, and urban residence were also positively associated with FBD, reflecting persistent inequalities in financial and physical access to health care. Despite the passage of the Universal Health Care Act (Republic Act No. 11223) in 2019, good quality formal health care remains most accessible to those who can afford private providers. Out-of-pocket expenses still accounted for 45% of total healthcare expenditures in the Philippines as of 2022,^[32] and the availability of public hospital facilities remains limited, with shortages most severe in remote areas.^[33] These disparities highlight how structural barriers continue to constrain women's choices regarding place of delivery.

Religion emerged as one of the strongest predictors of FBD. The strong negative association between Muslim affiliation and FBD is striking but consistent with previous studies documenting Muslim women's reluctance to seek FBD, linked to concerns about modesty and physical contact with male or unknown healthcare providers.^[19,34] This finding points to the need for culturally sensitive reforms that address women's concerns about bodily exposure and that ensure the availability of female healthcare staff. Moreover, the presence of conflicts and persistently high poverty rates in areas with large Muslim populations in the south of the country further constrain both the provision of and access to (formal) health care.

The findings reinforce how socioeconomic inequalities and cultural barriers continue to shape access to maternal health care in the Philippines. Despite policy reforms, public healthcare facilities remain underfunded and overstretched, as illustrated by overcrowded maternity wards and shortages of hospital beds. For instance, in the capital city of Manila, the maternity ward of Fabella Memorial Hospital handles an average of 60 deliveries per day, with three mothers sharing a single bed.^[35] Geographic and economic disparities exacerbate inequities in healthcare access, particularly in rural and remote areas.^[36] Addressing these challenges requires a two-pronged approach: bringing maternal healthcare closer to underserved communities while also making home deliveries safer in contexts where facility delivery is not feasible or culturally acceptable.

Improving cultural responsiveness, particularly for Muslim women, is also critical to improving maternal health outcomes.

ANC contacts served as cues to action that encourage FBD. Women with fewer than four ANC contacts were substantially less likely to deliver in a health facility, while those with at least eight contacts were more likely to do so. This supports the WHO's updated recommendation to increase the minimum number of ANC contacts from four to eight. Beyond the number of visits, however, the quality of care during ANC is crucial. ANC encounters provide opportunities to counsel women in birth preparedness, identify barriers to FBD, and link women with support systems to overcome such barriers. Thus, strengthening ANC services in both coverage and quality may be one of the most effective strategies to improve FBD uptake.

It is important to acknowledge the limitations of this study. The cross-sectional nature of the data prevents causal inferences. Women's education, wealth status, and health insurance coverage at the time of the survey may not precisely reflect their status during their most recent birth in the past 5 years. Despite this limitation, the study demonstrated how perceived risks, structural conditions, and external interventions collectively contribute to maternal healthcare utilization in the Philippines. These patterns are not unique to the Philippines but are also evident in other low- and middle-income countries.^[37,38] Without significant improvements in the availability, affordability, quality, and cultural sensitivity of public maternal healthcare services, progress in reducing maternal mortality will remain constrained.

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Conflicts of interest

There are no conflicts of interest.

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