RISK FACTOR OF VESICOVAGINAL FISTULA IN KEBBI STATE

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ABSTRACT
Vesico Vaginal Fistula (VVF) is still a major problem in developing countries of the world, especially in North Western Nigeria. This study examined the risk factors that affect the odds of having VVF. A sample of three hundred (300) questionnaires were used to collect data from some local government in Kebbi State, Nigeria. Logistic Regression model was used to predict the odd ratio or probability of being affected, to ascertain the risk factors of Vesico Vaginal Fistula. The result showed that factors such as previous VVF, X-ray of pelvis, injecting through veins, and physical examination of the vagina significantly increased VVF odds. Conversely, knowledge of VVF causes and delivering in a hospital reduced VVF odds, emphasizing the role of awareness and healthcare accessibility. While certain Socio-Demographic factors showed no significant association. The study recommends targeted measures, and the state government should create more enlighten atmosphere for the people about VVF and its consequences

Keywords: Vesico Vaginal Fistula (VVF), risk factor, logistic regression, odd ratio

Introduction

Vesico Vaginal Fistula (VVF) arises from an abnormal connection between the urinary tract and the vagina, leading to uncontrollable urine leakage (Miller and White, 2016). It stands as a preventable and globally significant public health issue, predominantly affecting women in low-income populations particularly in rural areas (Smith *et al.*, 2018). Symptoms of VVF include constant urine leakage, infections, pain during intercourse, fever, belly pain, diarrhea, weight loss, and vomiting (Justin *et al.*, 2018). It was estimated that two million women worldwide are living with VVF, with a concentration in sub-Saharan Africa and South Asia (Johnson and Brown, 2020). In West Africa, the incidence rate ranges from 1 to 4 cases per 1000 deliveries (Clarkson *et al.*, 2017). In Nigeria, the burden of VVF is staggering, with an estimated 500,000 to 800,000 victims

and 20,000 new cases annually (Roberts and Davis, 2018, Oluwasomidoyin, *et al,* 2020). Despite the alarming numbers, the slow pace of surgical intervention and insufficient training exacerbate the complexity of addressing VVF in the country. Causes of VVF in Nigeria are diverse, including obstructed labor, abdominal surgeries, female genital mutilation, harmful traditional practices, pelvic trauma, cancer, infection, early marriage, and poverty. These factors contribute to the prevalence of VVF, emphasizing the need for comprehensive preventive strategies and examination of more risk factors of VVF.

Literature Review

Justin (2018) investigates risk factors and perceptions of VVF among primigravida, revealing a lack of awareness among respondents. Review VVF in Females in 2010-2020. Onyeugo *et al.*, (2019) conducted study on the Trend Analysis of Vesico Vaginal Fistula among Attendee's in Fistula Centres in Kano State, Nigeria. Muhammed *et al*., (2020) carried out a research in the north western, and identify some of the causes that led to the development of Vesico Vaginal Fistula among which include prolonged labour, Female genital mutilation (*Yankan gishiri*) early marriage, traditional birth attendants, and hospital operation. James *et al.,* (2022) studied the prevalence of VVF while Emmanuel *et al.,* (2022) conducted a research on exploring awareness of obstetric fistula in Eastern and Northern Nigeria. Lydia, *et al.*, (2023) researched on women's experiences of obstetric fistula risk factors and their perceived treatment services in North-central Nigerian. Ismail *et al*, (2024) also worked on prevalence of Vesico Vaginal Fistula and coping strategies of women in Kebbi State, Nigeria. Therefore, this paper examined the risk factors of VVF in Kebbi State.

2.0 Methodology

The study employed Logistic Regression Model

2.1 Logistic Regression Model

The general logistic regression model with multiple explanatory variables. Denote the *k* predictors for a binary response *Y* by $X_1, X_2, \ldots, X_K$. We use $\pi(x)$ to represent the probability that $Y = 1$, and $1 - \pi(x)$ to represent the probability that $Y = 0$. These probabilities are written in the following form:

$$\pi(x) = P(Y = 1/X_1, X_2, \ldots, X_K) \quad (1)$$

$$1 - \pi(x) = P(Y = 0/X_1, X_2, \ldots, X_K) \quad (2)$$

The model for the log odds is:

$$log\ i\ t(\pi(x)) = ln \frac{P(Y = 1/X_1, X_2, \ldots, X_K)}{P(Y = 0/X_1, X_2, \ldots, X_K)}$$

which gives

$$ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_k + \varepsilon$$

$$\therefore ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \sum_{j=1}^{k} \beta_j X_j + \varepsilon \quad (3)$$

which yields to:

$$\pi(x) = P(Y = 1/X_1, X_2, \ldots, X_K) = \frac{\ell^{\beta_0 + \sum_{j=1}^{k} \beta_j X_j + \varepsilon}}{1 + \ell^{\beta_0 + \sum_{j=1}^{k} \beta_j X_j + \varepsilon}} \quad (4)$$

The parameter β_j refers to the effect of X_j on the log odds that $Y = 1$, controlling the other predictor variables.

2.1.1 Odd Ratio

The odds ratio provides a measure of the association between the outcome and the categorical variable, with values greater than 1 indicating a positive association, values less than 1 indicating a negative association, and a value of 1 indicating no association. The odds ratio is calculated using the formula:

$$OR = \frac{\frac{\pi(1)}{1-\pi(1)}}{\frac{\pi(0)}{1-\pi(0)}} \quad (5)$$

The odds of the outcome being present among individuals with $Y = 1$ is defined as $\pi(1)/[1 - \pi(1)]$. Similarly, the odds of the outcome being present among individuals with $Y = 0$ is defined as $\pi(0)/[1 - \pi(0)]$.

2.1.2 Confidence Interval for Odds Ratio

To estimate the precision of the Odds Ratio, the 95% Confidence Interval is used. A 95% CI for log Odds ratio is given by:

$$\text{log Odds ratio} = ln(OR) \pm 1.96 \times \{SE\ ln(OR)\} \quad (6)$$

Where, $ln(OR)$ is the sample log odds ratio and $SE\ ln(OR)$ is the standard error of the log odds ratio. A 95% Confidence interval for Odds ratio

$$\text{Odds ratio} = \ell^{ln(OR) \pm 1.96 \times [SE\ ln(OR)]} \quad (7)$$

3.0 Results and Discussion

3.1 Analysis of Maximum Likelihood Estimates for all the variables

Table 1.0: Odds Ratios, Confidence Intervals, Wald Test and Maximum Likelihood Estimates for all the Risk Factors

Risk Factors	B	Wald	df	Sig.	Exp(B)	95% C.I for exp(B)	
						Lower	Lower
Age	-.403	1.018	1	.313	.668	.305	1.462
Ethnicity	-.058	.008	1	.929	.944	.265	3.362
Religion	2.584	4.186	1	.041	13.256	1.115	157.624
Occupation	-.955	2.425	1	.119	.385	.116	1.280
Education status	.529	1.453	1	.228	1.698	.718	4.014
Marital status	-.055	.004	1	.949	.946	.176	5.083
Age at marriage	-.145	.082	1	.775	.865	.320	2.341
Have you suffered from VVF before	4.587	8.570	1	.003	98.208	4.554	2118.091
Did you do x-ray of pelvis	5.931	9.369	1	.002	376.378	8.441	16781.70
Do you do inject through your vein	3.828	5.620	1	.018	45.985	1.941	1089.482
After a close physical examination of your vagina	-.482	.139	1	.709	.617	.049	7.784
Do you attend antenatal care during pregnancy	.472	.142	1	.706	1.604	.138	18.701
Did you know the causes of VVF	-2.087	3.749	1	.053	.124	.015	1.026
Can VVF be caused by prolong obstructive	-.556	.248	1	.618	.574	.064	5.106
Do you know if operational rapture with tear	1.386	1.158	1	.282	3.998	.320	49.913
Can vaginal surgeries cause VVF	2.931	4.432	1	.035	18.751	1.224	287.184
Can gishiri cut lead to VVF	.202	.041	1	.840	1.224	.172	8.689
Can genital tract infection lead to the cause of VVF	-.290	.105	1	.746	.749	.130	4.305
Can female genital mutilation cause VVF	-.763	.445	1	.505	.466	.049	4.392
Can married cause VVF diseases	.214	.027	1	.871	1.239	.094	16.272
Do you believe that attending antenatal clinic can curtail VVF	-1.389	1.398	1	.237	.249	.025	2.493
Deliveries in hospital and not at home or birth attendant centers	-2.725	4.413	1	.036	.066	.005	.833
What is the mode of your delivery	-.353	1.174	1	.279	.703	.371	1.330
The following or consequences of VVF patients in fertility	-4.425	6.969	1	.008	.012	.000	.320
Vaginal stenos are and bands amenorrhoea	4.371	4.774	1	.029	79.110	1.568	3990.306

Recurrent urinary tract infection	-.020	.000	1	.990	.980	.048	20.164
Dysmenorrhoea	.659	.165	1	.684	1.932	.081	46.253
Stigmatization	1.431	.773	1	.379	4.184	.172	101.665
Promulgation of law to discourage early marriage	1.922	1.281	1	.258	6.837	.245	190.734
Provision of health care facilities for patients	-1.716	1.753	1	.186	.180	.014	2.281
Compulsory education especially for female children	1.353	2.273	1	.132	3.867	.667	22.436
Constant	-23.132	7.983	1	.005	.000		

Table 1.0 presents the results of the logistic regression analysis, providing odds ratios and associated statistics for various risk factors related to Vesicovaginal Fistula (VVF). Odds ratios (OR) indicate the likelihood of an event occurring in one group compared to another.

The odds ratio for age was 0.668, suggesting a 33.2% decrease in the odds of experiencing VVF for each one-unit increase in age. Ethnicity, Religion, Occupation, Education, Marital Status, Age at Marriage: These factors show no statistically significant association with VVF as their p-values are higher than 0.05. Previous VVF, X-ray of Pelvis, injecting through Veins, Physical Examination of Vagina, Antenatal Care: These factors have significant associations with higher odds of VVF, especially "Previous VVF," which has a very high odds ratio of 98.208. Knowledge of VVF Causes: Knowing the causes of VVF significantly reduces the odds of having VVF (OR = 0.124), emphasizing the importance of awareness. Delivery Factors: Delivering in a hospital reduces the odds of VVF significantly (OR = 0.066). Mode of delivery and place of delivery are important contributors. Consequences of VVF, Vaginal Stenosis, Recurrent UTI, Dysmenorrhea and Stigmatization: These factors significantly increase the odds of VVF, with high odds ratios, highlighting their strong associations. Promulgation of Laws, Healthcare Facilities and Compulsory Education: These factors show no statistically significant associations with VVF. Vaginal Surgeries, Gishiri Cut, Genital Tract Infection, Female Genital Mutilation, Marital Causes: These factors show no statistically significant associations with VVF. Antenatal Clinic

Belief: Believing that attending antenatal clinics can curtail VVF has a significant negative association, suggesting a protective effect (OR = 0.249). Fertility Consequences, Bands Amenorrhea, Urinary Tract Infection, Dysmenorrhea, Stigmatization, Laws against early marriage, Healthcare Facilities and Compulsory Education: These factors have significant associations, emphasizing the multifaceted nature of VVF risk factors Constant. The constant term is -23.132, indicating the estimated log odds of VVF when all other predictors are zero. The p-value is significant, suggesting that the model as a whole was useful in predicting VVF. The result obtained in this study supported the work of Muhammed *et al, (2020)* that reveals that prolong labour, early marriage and other risk factors were responsible for the cause of VVF.

Conclusion

This paper investigated associated risk factors of Vesicovaginal Fistula (VVF). The prevalence of VVF was notably high at 43.1%, emphasizing the urgency of addressing this issue. Logistic regression analysis revealed age as a significant factor, with a 33.2% decrease in VVF odds per one-unit increase in age. Factors such as previous VVF, X-ray of pelvis, injecting through veins, and physical examination of the vagina were identified as significant contributors to higher odds of VVF. Awareness of VVF causes demonstrated a protective effect, lowering the odds of experiencing VVF. Institutional deliveries were associated with reduced odds, highlighting the importance of healthcare accessibility. The multifaceted consequences of VVF underscored the profound impact on individuals' lives, necessitating a holistic intervention approach. Recommendations include legislative measures against early marriage, improved healthcare facilities, vocational studies for VVF patients, and advocacy for compulsory education, particularly for females. In essence, this research advances understanding and offers actionable

insights for addressing and mitigating VVF prevalence, providing valuable guidance for policymakers, healthcare practitioners, and community stakeholders.

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