



Statistical investigation of the relationship between adult education and age in respect to safe delivery

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Abstract

This study looks at the statistical relationship between age, adult education, and safe delivery among women. Safe delivery is very important because it helps reduce problems during childbirth and lowers the risk of death for both the mother and the baby. Many women still give birth at home without skilled health support. This can lead to serious health problems such as heavy bleeding, infection, and even death. The research uses quantitative methods with secondary data from the Nigeria Demographic and Health Survey (NDHS). The data were analyzed using frequency tables, percentages, chi-square test, and binary logistic regression. The findings show a significant relationship between adult education and safe delivery. Women with higher levels of education are more likely to experience safe delivery. Age has a small effect, with increasing age slightly raising the likelihood of unsafe delivery. The study recommends improving adult education and focusing on certain age groups to increase safe delivery practices and reduce maternal mortality.

Keywords: Adult education, safe delivery, health support and childbirth

Introduction

Maternal health is an important component of public health because it focuses on the health and well-being of women during pregnancy, childbirth, and the period after delivery. One of the most important aspects of maternal health is safe delivery, which refers to childbirth that takes place under the supervision of trained healthcare professionals in an environment equipped to manage complications. According to the World Health Organization, maternal mortality remains a major global health challenge, particularly in developing countries where access to healthcare services is limited. Many maternal deaths occur during pregnancy and childbirth due to complications such as severe bleeding, infection, hypertension, and obstructed labour. However, most of these deaths can be prevented through proper medical care and safe delivery practices. Safe delivery requires access to skilled birth attendants, adequate healthcare facilities, and proper maternal health services such as antenatal and postnatal care. Despite these requirements, many women in developing countries still give birth at home without the assistance of trained health professionals, which increases the risk of complications and maternal mortality. Several factors influence whether a woman experiences safe delivery. These factors include socioeconomic status, access to healthcare services, cultural beliefs, maternal age, and level of education. Among these factors, age and education are particularly important determinants of maternal health outcomes. Maternal age plays a significant role in pregnancy and childbirth outcomes. Very young mothers, especially adolescents, are more likely to experience complications during pregnancy and delivery due to biological immaturity and lack of knowledge about maternal healthcare services. Research has shown that adolescent mothers are at higher risk of complications such as premature birth, low birth weight, and obstructed labour. Similarly, women of advanced maternal age may also experience increased risks during pregnancy

and childbirth. Studies have shown that women above the age of 35 are more likely to develop pregnancy-related complications such as hypertension and gestational diabetes. Education is another important factor that influences maternal health and safe delivery practices. Education improves knowledge, awareness, and decision-making abilities, enabling women to make informed choices regarding their health. Adult education programs provide learning opportunities for individuals who did not complete formal education earlier in life. These programs help individuals acquire knowledge and skills that improve their quality of life. Participation in adult education programs may increase women's awareness of maternal healthcare services and the importance of safe delivery. Studies have shown that women with higher levels of education are more likely to utilize healthcare services during pregnancy and childbirth. Given the importance of maternal age and education in influencing maternal health outcomes, this study investigates the statistical relationship between age, adult education, and safe delivery using data from the Nigeria Demographic and Health Survey (NDHS).

Literature Review

Safe delivery means giving birth in a health facility with the help of trained health professionals. The World Health Organization explains that skilled care during childbirth is necessary to prevent maternal and newborn deaths. Safe delivery includes the presence of a skilled birth attendant, a clean and safe environment, and access to emergency care if complications happen. Age plays an important role in pregnancy and childbirth. Women in different age groups face different risks. Young mothers (15–19 years) may face higher risk because their bodies may not be fully developed for childbirth. Women aged 20–34 years are generally considered to have lower risk. Women aged 35 years and above may face higher risk of complications such as high blood pressure and diabetes. Adult education refers to

organized learning activities designed for adults. It helps individuals improve literacy, knowledge, and life skills. A woman who has attended adult education programs may better understand danger signs during pregnancy, the importance of antenatal care, and the benefits of delivering in a health facility.

The study is guided by the Health Belief Model, Human Capital Theory, and Social Determinants of Health Theory. Several studies have examined factors influencing maternal health and safe delivery. Research indicates that teenage mothers and older mothers have higher risks during childbirth compared to women aged 20–34. Studies also show that women with higher levels of education are more likely to deliver in health facilities. However, most previous studies examined general education level, not specifically adult education programs. This study fills that gap by statistically examining the relationship between age, adult education, and safe delivery.

Methodology

This study adopted a descriptive cross-sectional research design using secondary data from the Nigeria Demographic and Health Survey (NDHS). The population of the study consists of women of reproductive age (15–49 years) in Nigeria who had given birth within the five years preceding the survey. The NDHS employs a multi-stage stratified sampling technique.

Dependent Variable

Safe Delivery (1 = Safe delivery, 0 = Unsafe delivery)

Independent Variables

Age (in years), Adult Education Level (0 = No education, 1 = Basic education, 2 = Advanced education)

Method of Data Analysis

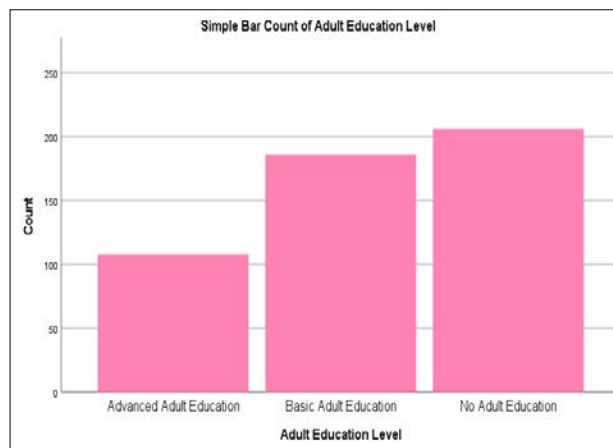
Data were analyzed using SPSS. Descriptive statistics (mean, standard deviation, frequencies, percentages, charts) and inferential statistics (Chi-square test of independence and Binary Logistic Regression) were used. The logistic regression model is specified as: $\text{logit}(P) = \beta_0 + \beta_1(\text{Age}) + \beta_2(\text{Education}) + \epsilon$. Model fit was assessed using Omnibus test, Hosmer and Lemeshow test, and classification accuracy. The level of significance was 0.05.

Demography Analysis

Frequency Distribution of Adult Education

Variables	Frequency	Percent	Cumulative Percent
Advanced Adult Education	108	21.6	21.6
Basic Adult Education	186	37.2	58.8
No Adult Education	206	41.2	100.0

The distribution of adult education shows that a higher proportion of respondents have no formal education compared to other categories. Specifically, 206% of respondents have no education, 186% have basic education, while 108% have advanced education. It indicates a considerable number of women in the study have low educational attainment.

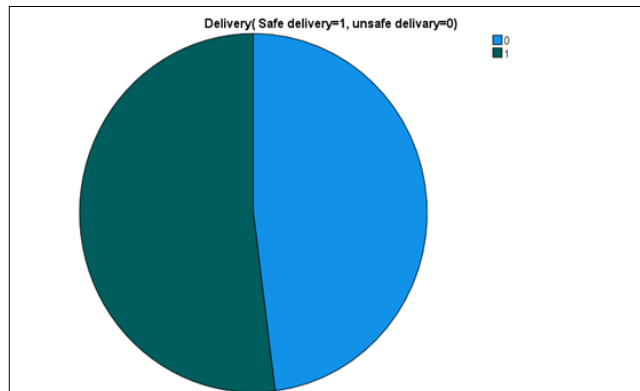


A higher proportion of respondents have no formal education compared to other categories. This indicates that a considerable number of women have low educational attainment. This shows variation in educational attainment among the respondents.

Frequency Distribution of Safe and Unsafe Delivery

Variables	Values	Frequency	Percent	Cumulative Percent
Unsafe delivery	0	240	48.0	48.0
Safe delivery	1	260	52.0	100.0

The results show that 260% of the respondents experienced safe delivery, while 240% experienced unsafe delivery. This indicates that most of the women in the dataset had safe delivery outcomes.

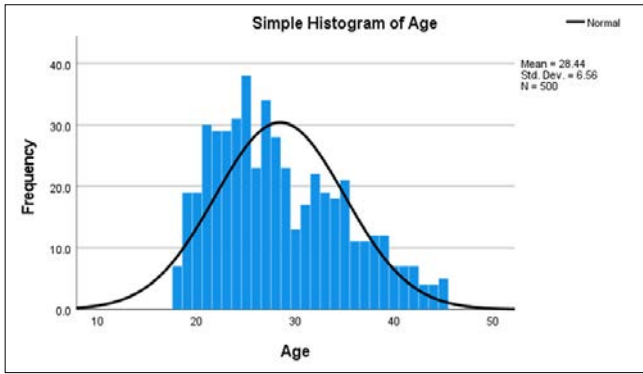


The Pie chart distribution shows that a larger proportion of the respondents experienced safe delivery compared to unsafe delivery.

Age of Respondents

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Age	500	18	45	28.44	6.560

The average age of the respondents is approximately 28 years, with a standard deviation of 7yrs. the minimum and maximum age recorded is 18 and 45 years, respectively. This indicates that the respondents fall within the reproductive age group, showing variation in age distribution among the participants.

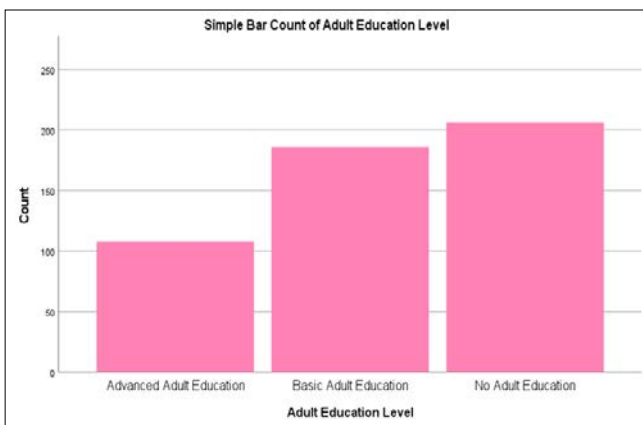


Most respondents fall within the 20-35 years range. The distribution appears approximately normal with a slight skew to the right, indicating that there are fewer women in the higher age groups.

To evaluate the relationship between Adult Education and Safe Delivery

Adult Education Level	Delivery (safe delivery=1, unsafe delivery=0)		
	0	1	Total
Advanced Adult Education	29 26.9%	79 73.1%	108 100.0%
Basic Adult Education	87 46.8%	99 53.2%	186 100.0%
No Adult Education	124 60.2%	82 39.8%	206 100.0%
Total	240 48.0%	260 52.0%	500 100.0%

The Cross Tabulation shows the distribution of safe and unsafe delivery across different levels of adult education. Among women with advanced education, 73.1% experienced safe delivery, while 26.9% had unsafe delivery. For women with basic education, 53.2% had safe delivery, while 46.8% experienced unsafe delivery. However, among women with No education, a higher proportion of 60.2% experienced unsafe delivery, while only 39.8% had safe delivery. Overall, the results show that the proportion of safe delivery increases with higher levels of education. This suggests that education plays an important role in improving safe delivery among women.



Among women with advanced education, 73.1% experienced safe delivery, while 26.9% had unsafe delivery. For women with basic education, 53.2% had safe delivery. Among women with no education, 60.2% experienced

unsafe delivery. The proportion of safe delivery increases with higher levels of education.

Test of Statistical Significance, Model fit and Predictive Ability of the Model.

Chi-square Test of Independence

Pearson Chi-square = 31.736, df = 2, p < 0.001.

Decision: Reject H₀

There is a significant relationship between adult education and safe delivery.

Binary Logistic Regression

Chi-square	D f	P-value
37.677	3	0.000

Omnibus Tests of Model Coefficients

Chi-square	D f	P-value
5.219	8	0.734

The Omnibus test of model coefficients indicates that the model is statistically significant.

Hosmer and Lemeshow Test

Variable	B	S.E.	Wald	D f	P-value	Exp(B)
Age	0.032	0.014	4.950	1	0.026	1.032
No Adult Education	_____	_____	31.637	2	0.000	_____
Basic Education	-1.469	0.262	31.355	1	0.000	0.230
Advanced Education	-0.930	0.265	12.338	1	0.000	0.394
Constant	0.138	0.442	0.098	1	0.754	1.148

The Hosmer and Lemeshow test show good model fit.

Evaluating Percentage Decrease

Exp (B) = Odds Ratio

If Exp (B) < 1 (reduction)

Percentage Decrease = (1 – Exp (B)) x 100

Basic Education

Where Exp (B) = 0.230 (From Table 4.8)

(1 – 0.230) x 100 = 0.770 x 100 = 77.0%

Advanced Education

Where Exp (B) = 0.394 (From Table 4.8)

(1 – 0.394) x 100 = 0.606 x 100 = 60.6%

From the table of variables in the equation; Age increases the likelihood of unsafe delivery by 3.2% per year. Women with Basic Education are 77.0% less likely to experience unsafe delivery compared to no education. Women with Advanced Education are 60.6% less likely to experience unsafe delivery compared to no education.

Observed		Predicted		
		Unsafe delivery	Safe delivery	Percentage Correct
Unsafe delivery	0	150	90	62.5
Safe delivery	1	106	154	59.2
Overall Percentage		_____	_____	60.8

Classification Table

The classification table shows the model correctly predicted 60.8% of cases overall (62.5% of unsafe deliveries and

59.2% of safe deliveries). This indicates that the model has a moderate predictive ability in distinguishing between safe and unsafe delivery outcomes.

To propose recommendations to Reduce Maternal Mortality among women of Reproductive age

- Efforts should be made to improve women's access to adult education programs.
- Health education and awareness campaigns should be strengthened.
- Access to quality healthcare services, especially in rural areas, should be improved.
- Special attention should be given to older pregnant women.
- Future studies should include other factors such as income, residence, and distance to health facilities.

Discussion

The results confirm that adult education has a strong positive effect on safe delivery outcomes. Higher education levels are associated with increased likelihood of delivering in a health facility with skilled personnel. Age shows a modest effect, with older women facing slightly higher chances of unsafe delivery. These findings are consistent with previous studies on maternal education and health service utilization.

Conclusion

Based on the findings, age and adult education are important factors influencing safe delivery among women. Adult education has a strong effect on delivery outcomes, while increasing age slightly increases the likelihood of unsafe delivery. Improving women's education and providing proper healthcare support can help reduce unsafe deliveries and improve maternal health outcomes.

Limitations and Future Research

The study is limited by the use of secondary data, which restricts the researcher to available variables. Causal relationships cannot be fully established due to the cross-sectional nature of the data. Future studies should consider including other important factors such as income level, place of residence, and access to healthcare services for a more comprehensive understanding.

Authors Contribution

All Authors contributed immensely in the aspect of Technical Writing.

Acknowledgment

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Ethical Consideration

This study made use of secondary data obtained from the Nigeria Demographic and Health Survey (NDHS). The data is publicly available and was collected following standard ethical procedures. No personal identifiers were included. The data was used strictly for academic purposes.

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