



SOCIOECONOMIC DETERMINANTS OF MATERNAL HEALTHCARE  
UTILIZATION: A LOGISTIC REGRESSION APPROACH FOR THE CASE OF  
GOMBE METROPOLIS IN GOMBE STATE, NIGERIA

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**Abstract**

*The main objective of this study was to examine the major determinants of maternal healthcare utilization among pregnant women who also gave birth to at least one child before the study in the metropolis of Gombe State. A cross-sectional data set was collected from a sample of 399 women in 11 wards of Gombe Metropolis using well structured questionnaires. Within the theoretical framework of Anderson's Behavioral Model of healthcare services utilization, the study employed Logistic Regression Model (LRM) to empirically examine the influence of socioeconomic factors on the utilization of maternal healthcare services among women. On the whole, the results obtained revealed that mothers' age, educational attainment, employment status, household economic status and accessibility to healthcare facility have significant impact on women utilization of maternal healthcare services. Furthermore, the findings showed that birth order has significant negative effect on maternal healthcare utilization, while cultural practices, child sex and desire to have a child were found to have no influence on utilization of maternal healthcare services among women. The study, therefore, recommends programmes such as women empowerment via skills acquisitions, establishing more healthcare centers, organization of literacy programmes and compulsory child education, particularly female by both government and healthcare organization.*

**Keywords:** Maternal Healthcare, Utilization, Logistic Regression, Gombe Metropolis.

**1. Introduction**

Although the cases of maternal deaths have remarkably decreased by about 35% at global level, the problem is still alarming in some specific countries (WHO, 2013). In the case of Nigeria for example, maternal deaths was about 630 per 100,000 live births (CIA, 2012). This was against the 160 per 100,000 live births in Botswana, 8 per 100,000 live births in United States and 400 per 100,000 live births worldwide in the year 2012. This has been the trend with Nigeria recording the relatively higher number of maternal mortality cases across the globe. However, lack of access and use of maternal healthcare services have been identified to be the major factor responsible for the high cases of maternal deaths. According to De Bernis, Sherratt, AbouZahr and VanLerberghe (2013), almost 4 million newly born infants were not been taken through consistent postnatal care; and a significant number of them were disabled mainly due to birth complications that were poorly attended. This has buttressed the report by the Federal Ministry of Health (FMOH, 2014) which posited that a large number of maternal mortality in Nigeria occurred at homes and that made it difficult for health agencies to see, assess and properly account for the cases in the official records of statistics.



In view of the above, many policies and programmes were initiated to reduce maternal mortality and encourage the use of healthcare services by pregnant women in Nigeria. These include: Free Maternal and Child Health Policy (FMCHP) initiated in 2006; Integrated Maternal, Newborn and Child Health (IMNCH) in 2007; Midwives Service Scheme (MSS) in 2009; Saving One Million Lives (SOML) in 2012; and Nigerian Urban Reproductive Health (NURH) that spans from 2009 to 2014. Despite these initiatives, utilization of maternal healthcare services among pregnant women still remain an issue of concern due to socioeconomic and cultural barriers (Izugbara, Wekesah and Adedini, 2016).

Going by the above submissions, the major challenge in Nigeria revolves around not only ensuring safe delivery and healthy childhood but also adequate provision, access and use of maternal healthcare facilities. This, however, requires effective government interventions at all levels targeted at women and their beliefs on the use of maternal healthcare services, given the socioeconomic and cultural context in which they live. Above all, despite the efforts of previous studies such as Shamaki and Buang (2014), and Oluwaseyi (2014) to examine the factors contributing to poor outcomes in terms of maternal health and access to healthcare in Nigeria, a gap still exists in understanding barriers limiting the accessibility and utilization of maternal healthcare services. This is because most of these studies were conducted in specific areas and regions with distinct socioeconomic characteristics. This is what motivated the conduct of similar study for the case of Gombe metropolis in Gombe State, Nigeria.

Therefore, the objective of this study is to examine the socioeconomic variables predicting the demand and utilization of healthcare services among pregnant women who at the same time gave birth to at least one child before the study. However, to put the paper on a proper perspective, the remaining part covers the following: section two reviews both the theoretical and empirical literatures in relation to the demand and utilization of healthcare services. While section three presents the methodology, section four dwells on interpretation and analyses of results. The last section, however, presents conclusion, recommendations and suggestion for further research.

## **2. Literature Review**

Numerous empirical studies have been put forward to examine the determinants of maternal healthcare utilization among women of reproductive age in different countries. For instance, to investigate the factors associated with non-utilization of maternal healthcare in Botswana, Letamo and Rakgoasi (2003) drawn a sample of 19,031 women aged between 15 to 49 years who at least had one record of pregnancy in the last five years before the survey. The data of the study were sourced from the Botswana Family Health Survey. Based on simple cross-tabulations and logistic regression technique, the results revealed that low level of education, rural residence and low socioeconomic status significantly reduced the possibility of using healthcare services among women of reproductive age.

In another study, Abor, Abekah-Nkrumah, Sakyi, Adjasi, and Abor (2011) examined the socioeconomic factors of maternal healthcare utilization in Ghana. Using probit and ordered probit models, the results of their study indicated that factors such as age of the mother, type of birth, education of mother, ethnicity, economic status, geographic location, residence, and



religious affiliation have significant influence on the use of healthcare services among pregnant women in Ghana.

Also, Chimankar and Sahoo (2011) studied the factors influencing the utilization of maternal healthcare facilities in Uttarakhand, India. They employed both bi-variate and multi-variate techniques to examine the factors using data from the National Family Health Survey, 2006 to 2006. The findings of the study revealed that women's level of education, birth order and wealth index were the main predictors of maternal healthcare utilization in the study area.

In relation to Nigeria, Babalola and Fatusi (2009) investigated the determinants of maternal healthcare utilization in Nigeria using data from the National HIV/AIDS and Reproductive Health Survey, 2005. The study covered 2,148 women with at least a baby in the past five years before the survey. However, based on the multilevel analytical methods and state-level random effects technique, the study revealed that level of education, mother's age, ethnicity, family size were among the significant predictors of maternal healthcare utilization.

Again, Obiyan and Kumar (2015) studied the socioeconomic disparities in the use of antenatal care and medical assistance among women aged 15 to 49 with at least one live birth. The study employed cross-sectional data from the survey of Nigerian Demographic Health Survey (DHS) ranging from 1990 to 2008. Also, the study used Chi-square statistical technique to examine the association between maternal healthcare utilization and socioeconomic factors inform of household wealth index and women's level of education. It was revealed from the overall findings of the study that differences in socioeconomic status among women significantly influence the use of maternal healthcare services. Specifically, the study shows that poor and uneducated women have lower chances of using maternal healthcare services in Nigeria.

Moreover, Oyedele (2017) examined the factors that influence the decision of using healthcare services among women of reproductive age with at least a child in Nigeria. The study obtained data from the Harmonized Nigeria Living Standard Survey, 2010; and employed both logit and probit models to examine the impact of the predictor variables. On the whole, the findings of this study showed that level of education increases the use of healthcare services among both urban and rural women. Similarly, age of mothers and urban residence positively influence the use of maternal healthcare services in Nigeria.

On the whole, the above empirical studies have buttressed the arguments of Lawn *et al* (2010) that low socioeconomic status of women in developing countries does not only signify low incomes but is also associated with the general well-being and health seeking behaviors which can affect their health and that of their newborns. Therefore, based on the above empirical studies, it is apparent that non-obstetric factors also account for significant differences in the use of maternal healthcare services among women of reproductive age.

However, most of the above studies have neglected or at best, did not take into account the community based indicators and complexities associated with maternal healthcare utilization, particularly in Nigeria which has heterogeneous population with varied socio-cultural and religious beliefs.



### *Theoretical Framework*

Andersen (1968) proposed a Behavioral Model of healthcare utilization in which he categorized the determinants into three major categories divisions. According to this model, healthcare utilization strongly depends on the predisposition of an individual to use the services (predisposing factors); factors that facilitate or hinder the use (enabling factors) and the individuals need for the service (need factors). The initial model has been revised consistently to incorporate more predictor variables that have been acknowledged to account for the differences in the access and use of healthcare services (Andersen, 1995, Andersen and Newman, 2005). Consequently, the model has been successfully employed by various studies that investigated the determinants of maternal healthcare services utilization across countries and regions (Amin, Shah, and Becker, 2010; Oluwaseyi, 2014; Shamaki and Buang, 2014). Therefore, in line with the main objective of this study, this model is adopted with some modifications as the theoretical framework.

### **3. Methodology**

The area of the study covers Gombe Metropolis which has eleven (11) wards including: Shamaki, Bolari East, Bolari West, Kumbiya-Kumbiya, Dawaki, Ajiya, Nasarawo, Pantami, Bajoga, Herwagana and Jekadafari. Thus, the population of the study comprises of all pregnant women in the metropolis. The data set for this study was collected from the primary healthcare centers in the metropolis using instrument of well structured questionnaires. The aim of using this kind of data set was to take advantage of sampling a host of pregnant women at a given point in time. However, where possible, the questionnaires were translated in to Hausa language for easy response. The choice of Gombe metropolis is premised on the fact that it has a relatively large population with varied socioeconomic and cultural settings. This unique characteristic gave the study the advantage of a wide choice of respondents with different backgrounds.

The target population of the study was pregnant women who at the same time, gave birth to at least one child before the study. In order to have a faster data collection and equal number of respondents from the eleven Geo-Political wards of the metropolis, the study administer a total of 36 questionnaires per ward and additional 3 to a ward with largest population to give a total of three hundred and ninety nine (399) respondents for the entire metropolis. This sample size was determined using Yamane (1973) formula on 374,897 population of the study area as at 2015 annual population projection (NPC, 2006). The sample size of the study is 399.

This study applied stratified sampling method by dividing the population into 11 strata based on the eleven (11) wards that made up the metropolis. Secondly, a non-probability sampling method based on purposive sampling method was applied to select thirty six (36) households from each stratum with additional three (3) from a stratum with largest population (i.e. Shamaki Ward). Again, the same purposive sampling technique was employed in selecting respondents so that married women from different socioeconomic and cultural backgrounds were captured to avoid having one-sided data set.

Utilization of maternal healthcare services is influenced by many factors as earlier identified in the literature. Accordingly, a host of proxies for both dependent and independent variables have been identified. Therefore, following the conceptual framework of Anderson's (1995)



Behavioral Model and Young's (1982) Choice-Making Model of healthcare services utilization, a measure of each of the variables to be used in this research is highlighted below.

Utilization of Maternal Healthcare services is the dependent variable. This is measured as a dichotomous variable assuming the value of one if the woman utilizes healthcare services and zero if otherwise as measured by Letamo and Rakgoasi (2003).

This study employed some of the 'predisposing', 'enabling' and 'need' factors that predict the use of maternal healthcare services as identified by Anderson and Newman (2005) as Independent Variables. The predisposing factors (comprising both mother and child characteristics) include

*Mother's Age:* In this study, the age of the mother is measured in years and coded as follows: 15-24 = 1, 25-34 = 2, and 35+ = 3. However, in order to capture the non-linear effect of mother's age, we introduced a mother's age-squared term in the model specifications in line with the work of (Babalola and Fatusi, 2009).

*Mother's Education:*

This refers to the highest level of educational attained by the mother. It is divided into three levels: no education, primary education, and secondary/higher level of education (Babalola and Fatusi, 2009). This study merged the last two categories and adopted a dichotomous techniques of mother's education using 1 = Literate and 0= Illiterate. The study anticipates a direct relationship between mother's levels of education and utilization of maternal healthcare services.

*Mother's Employment Status:* Usually, women who are employed may have the capacity to pay for maternal healthcare services and high power of decision making in the family. This study considered women employment status as dichotomous variable which assumes value of 1 = employed and 0 = otherwise. The study anticipates a positive relationship between mother's employment status and the utilization of maternal healthcare services.

*Use of Cultural Practices:* Some studies revealed that using cultural practices such as herbs, waistbands, etc. during pregnancy and after birth reduce the utilization of maternal healthcare services in Nigeria (Shamaki and Buang, 2014). This study adopts a dichotomous technique of using cultural practices as 1 = if mothers use of cultural practices and 0 = if otherwise. However, the study expects a negative relationship between using cultural practices and maternal healthcare utilization among women.

*Sex of Child:* -According to Nkamleu and Kielland (2006), child sex is measured as gender of the child (1 = Male, 0 = Female). Some studies have shown that more resources are allocated to favour male child in access to maternal health services (Bishari, Suzuki, McQuestion, Chakraborty, and Koenig, 2002; and Yount, 2003). Thus, a positive relationship is expected. This study also used the same measurement.

*Birth Order:* This is an important determinant that influences women's desire to use maternal healthcare services. It is most likely that women may demand for maternal healthcare for their first-order births than for the subsequent ones, particularly because of the perceptions of risk and uncertainties associated with first pregnancies (Oluwaseyi, 2014). The categories included



for birth order and their coded values are 1 = 1, 2-3 = 2 and 3+ = 3. However, a negative relationship is anticipated between birth order and maternal healthcare utilization. Because it is assumed that the higher the number of birth given by a woman, the experience she has and therefore, the likely she demands for maternal healthcare services.

*Economic Status:* - Where household income and consumption can hardly be ascertained and assessed reliably, the quality of the shelter in which we live may be a good proxy for economic status. Therefore, shelters built with clays and straw roofs were given the lowest economic status (=0), while shelters built with bricks and iron sheets or other forms of solid roof were given the highest economic status (=1). This study applied the same pattern with slight adjustment and thus, the variable takes the value of 1 = Rich and 0 = otherwise. A positive relationship is anticipated between household economic status and woman utilization of maternal healthcare because the higher the economic status, the more likely to spend on healthcare services.

*Accessibility to Health Facility:* Usually, travel time and transportation costs used to be neglected when analyzing the ease of access to healthcare services. This study used three standard measures to get a proxy for access to healthcare facilities. These are: (i) the money required for treatment (ii) proximity to healthcare facilities and (iii) desire to take transport. The responses were categorized as 1 = Big problem and 2 = Not a big problem.

The needs factor is Woman's Desire to have a Child: This has to do with mother's desire to have a child at conception; and it was categorized into three as follows: 3 = desired, 2 = desired later and 1 = undesired.

*Method of Data Analysis*

A cross-sectional data set was analyzed using the STATA version 14 econometric software. Since the dependent variable is categorical, the ordinary least square (OLS) method can no longer be used as the best linear unbiased estimator. According to So (1996) the standard alternative is to use Categorical Dependent Variable Model (CDVM).

Therefore, Logistic Regression Model (LRM) was used as presented below:

$$\{Pr (y = 1/x)\} = \beta_0 + \beta X_i \dots\dots\dots 1$$

Where:

P (y = 1/x) = Probability of the outcome

Y = Response

X<sub>i</sub> = Vector of explanatory variables

β<sub>0</sub> = Intercept of the equation.

β = Vector of parameters to be estimated

*Model Specification*

From the literature a very notable and related model to this study is that of Imran *et al.* (2008). In exploring the economic determinants of school attendance at primary level in Punjab province, the authors used a logistic model to regress school attendance on other control variables. Adopting this pattern, this study specified the following logistic model with slight changes. The dependent variable U<sub>i</sub> takes the value of one or zero.



$$P_r (U_i = 1/0) = \alpha + \beta_1 MAge^2 + \beta_2 MEdu + \beta_3 MEmSta + \beta_4 CulPrc + \beta_5 ChldSex + \beta_6 BrthOrd + \beta_7 EcoSta + \beta_8 AccHFac + \beta_9 WomDes + \mu_i \dots\dots\dots 2$$

Where:

- $P_r (S_i = 1/0)$  = Probability of Utilization
- $\alpha$  = Constant Parameter of the Equation
- $\beta_s$  = Coefficient of the Independent Variables
- MAge2 = Mother's Age Square
- MEdu = Mother's Education
- MEmSta = Mother's Employment Status
- CulPrc = Use of Cultural Practices
- ChldSex = Child Sex
- BrthOrd = Birth Order
- EcoSta = Economic Status
- AccHFac = Accessibility to Healthcare Facility
- WomDes = Woman's desire to have a child
- $\mu_i$  = Error term

**4. Results**

*Results of Logistic Regression Model*

Using a logistic regression model, a number of variables were employed to examine the major determinants of maternal healthcare utilization in Gombe metropolis. The value of 1 and 0 were used with 1 if a woman utilizes maternal healthcare services and 0 if otherwise. The independent variables used include mothers' age, mothers' education, and mothers' employment status, use of cultural practices, sex of a child, birth order, and economic status. Others include accessibility to health facility, and woman's desire to have a child.

From the results in Table 1 above, mothers' age was revealed to have a positive and statistically significant relationship with the utilization of maternal healthcare services at 1% level, while mothers' age square was found to have negative impact on maternal healthcare utilization but not significant. This suggests that the demand and use of maternal healthcare services increases with the increase in mothers' age until they reach a certain age level where the need for maternal healthcare may begin to decline as their age increases. As rightly argued by Chimankar and Sahoo (2011), mother's age has a positive effect on maternal healthcare utilization especially ante-natal care (ANC) when we control for the birth order.

Also, mothers' level of education which is a dummy variable (1 = literate and 0 otherwise) is positively related to utilization maternal healthcare services and significant at 1% level of significance, meaning that an increase in mothers' level of education leads to about 56.23% increase in the probability of utilizing maternal healthcare services. This is because women who are educated have more chances of having knowledge of pregnancy complications which in turn, increases their likelihood of utilizing healthcare services. This concurred with the findings of Chimankar and Sahoo (2011) that as women attain higher level of education, the chances for seeking medical attention and safe delivery also increases.



Similarly, the coefficient of mothers' employment status revealed positive and statistically significant relationship with maternal healthcare services utilization at a significance level of 5%. This means that mothers who are employed are more likely to utilize maternal healthcare services than those who are unemployed. This confirmed the assertion of Bhisare and Khakase (2014) that women who are employed may have more ability to cater for travelling expenses for going to primary health center without relying on their husbands.

Furthermore, the coefficient cultural practices which is considered as a dummy variable having a value of 1 = if mothers use cultural practices and 0 = if otherwise showed that using cultural practices is negatively related to maternal healthcare utilization but is not significant. Thus, cultural practice is less likely to reduce the use of maternal healthcare services among women in Gombe metropolis.

The gender of a child also has 2 outcomes with 1 if male and 0 otherwise. It could be observed from the results that the coefficient of gender of a child is positive but statistically insignificant at 5% level. Therefore, child sex does not have any significant influence on mothers' decision to utilize maternal healthcare services.

Table 1: Logistic Regression Results

Dependent Variable: Utilization of Maternal Healthcare Services: 1 = Utilized, 0 = Not utilized	
Independent variables	Coefficients
Mothers' age	1.3368 (3.94)***
Mothers' age square	-0.0222 (1.63)
Mothers' education	0.5623 (4.51)***
Mothers' employment Status	0.2217 (2.16)**
Use of cultural practices	-0.3148 (-0.39)
Child sex	0.0358 (0.23)
Birth order	-1.1027 (-2.49)**
Economic status	0.4383 (2.56)**
Accessibility to healthcare facility	0.3973 (2.17)**
Woman's desire to have a child	0.6355 (-0.72)
Pseudo R <sup>2</sup>	0.7771
Value of Likelihood Ratio (LR)	381.80***

Source: Authors Computation (July, 2016). \*\*\* and \*\* indicates level of significance at 1% and 5% respectively.





In relation to birth order, the results showed a negative and statistically significant relationship with maternal healthcare utilization among women at 5% level of significance. For instance, as birth order of mothers becomes higher, the likelihood of using maternal healthcare services reduces by 1.1027. This is in line with the a priori expectation, and also with the work of Chimankar and Sahoo (2011). Because women with higher birth-order are less likely to demand and use maternal healthcare services compared to those with lower order of births.

As for the economic status (1 stands for rich and 0 otherwise), the coefficient is found to be positive and statistically significant. Precisely, the result shows that higher economic status increases the probability of utilizing maternal healthcare services by about 44% among women in Gombe metropolis. This also concurred with the findings of Chimankar and Sahoo (2011) that women with high economic status have more capacity to access and use maternal healthcare facilities than otherwise.

With respect to accessibility, women who said that the distance to a healthcare facility was never a serious problem for them (either the facility was not far away or there were reliable means of transportation) were more likely to seek for maternal healthcare than women who said the distance to a healthcare facility was a serious problem. From the results in table 4.2.1 above, it can be observed that the chances of utilizing maternal healthcare services among women in Gombe metropolis increases by about 40% with the increases in the ease of accessing the health facility. This indicates that the more health facility becomes accessible, the more likely to be utilized. This confirmed the findings of Imran et al (2008) which indicated that the probability of utilizing healthcare facility increases as the difficulties involved in its accessibility decreases. It also supported the work of Oluwaseyi (2014) who posited that accessibility to healthcare facilities was among the major predictors of using post-natal care (PNC) services among women in Nigeria.

Moreover, the woman's desire to have a child is found to relate positively with maternal healthcare utilization though not significant, indicating that has no influence on maternal healthcare utilization among women in Gombe metropolis. This, however, contradicted the findings of Oluwaseyi (2014) and Chimankar and Sahoo (2011) who argued that increase in the desire to have a child among women leads to a significant increase in their chances of using maternal healthcare services.

Finally, for the coefficient of determination, it can be observed that the value of Pseudo  $R^2$  is 0.7771 indicating that approximately 78% of the variations in utilization of maternal healthcare services were explained by the changes in the predictor variables. Also, the value of the Likelihood Ratio (LR) Chi-square test is significant at 1% level, meaning that the model used was adequate.

#### *Major Findings*

Using logistic regression analysis, this study generates and applied a cross sectional data set for a sample of 399 respondents in Gombe metropolis of Gombe State. However, the major findings obtained from the study are summarized below:

The study finds that mothers' age, level of education, employment status, household economic status and accessibility to healthcare facilities have significant positive impact on the utilization



of maternal healthcare services. Also, the study revealed that birth order has negative and statistically significant impact on women's desire to utilize maternal healthcare facilities. On the other hand, mothers' age square and the use of cultural practices have an insignificant negative influence on women utilization of maternal healthcare services. In addition, the study revealed that child sex and the woman's desire to have a child have positive but also insignificant influence on maternal healthcare services utilization. Finally, the study observed that illiteracy, unemployment, poverty, and inaccessibility to healthcare facility are the major barriers to maternal healthcare utilization among women in Gombe State.

### **5. Conclusion and Recommendation**

This study attempted to theoretically and empirically examine the determinants of maternal healthcare utilization in Gombe State using Gombe Metropolis as a case study. Within the theoretical framework of Anderson's Behavioral Model (Anderson, 1995) of healthcare services utilization, the study employed Logistic Regression Model (LRM) on a cross-sectional data set of 399 married women to empirically examine the impact of socioeconomic factors on the utilization of maternal healthcare services. However, based on the results obtained, the study concluded that the age of mothers, level of education, employment status, birth order as well as household economic status and accessibility to healthcare facility influence women utilization of maternal healthcare services in Gombe State, while cultural practices, child sex and the desire to have a child among women have no influence on utilization of maternal healthcare services in the state. Thus, the study rejected the null hypothesis that says socioeconomic factors have no significant impact on women's decision to demand and utilize maternal healthcare services in Gombe State.

Therefore, following the major findings and conclusions drawn from this study, a number of policy issues and recommendations were raised. Since the results have identified some areas of interest, this study recommends that all policies and programs by government and other relevant stakeholders in the health sector, aimed at reducing maternal and newborn morbidities and mortalities in Nigeria, and Gombe State in particular, should be geared towards increasing women's access to education; and poverty alleviation by providing skills acquisitions programs to the targeted women.

The study also suggest that both government and healthcare organizations should prioritized accessibility to maternal healthcare services by improving health facilities and establishing more health centers in appropriate areas that are relatively far from the existing ones. This may increase healthcare delivery and utilization in the state. Also, there is a need for government and healthcare managers in particular to embark on the organization of literacy programmes (be it formal or informal) in order to increase the general awareness of women (particularly illiterates) on the problems associated with the non-utilization of maternal healthcare services. Lastly, government should reinforce its commitment towards making child education compulsory, especially female education as this may serve as a preferred alternative to eliminating the incidence of non-utilization of maternal healthcare services from the grassroots.



#### *Suggestion for further Research*

This study has empirically examined the socioeconomic determinants of maternal healthcare utilization among pregnant women who at the same time, gave birth to at least one child before the study in Gombe metropolis. However, being a state with diverse people with different socio-cultural and religious background, the findings of this study may not reflect what is obtainable in other parts of the state. This calls for further research to explore the major determinants of healthcare utilization in other parts of the state in order to ensure equal access to health care services.

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