

# Determining diseases influencing mortality of under 5 years children in Gazira

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## Abstract

*The aim of the study is to find out the most important diseases influencing child mortality in Gazira state "Sudan" from five diseases (diarrhea, Malaria, Pneumonia, Meningitis and Measles). These diseases were selected because they are the most prevalent in the state. The source of data for the present study is Wad Medani Educational Hospital for Children, which is the main hospital in the Gazira state, for the period (2003-2012). Multiple linear regression analysis "stepwise regression" used as a method of analysis. The study concluded that about 71% of the under 5 year's children death is caused by diarrhea and Pneumonia, 12% caused by Malaria,*

## Introduction:

The infant mortality rate has dropped by half in the last few decades due to better nutrition, health care and living standards. In 1990, 13 million children died in developing countries before the age of five due to diseases such as diarrhea and malnutrition, pneumonia, AIDS, malaria and tuberculosis (TB). By 2006, that number had dropped to 10 million. However, the rate of under-five mortality remains unacceptable, because there are 8 million children under five die each year because of preventable

*Meningitis and Measles and about 17% due to other reasons, also concluded that Pneumonia is the most frequent disease during the study period, while Measles is the least frequent and Measles has the highest growth rate (14.1%) and Diarrhea has the less (3.1%).*

*The study recommended that the Ministry of Health must give more attention to the causes of diarrhea and Pneumonia and quick intervention is required in case of infection and this procedure requires availability of well-trained Physicians especially in rural areas.*

causes. Half of those deaths are in Africa "south desert" and are caused by outbreaks of Epidemics and civil strife, which hindered progress in the region. In addition, the proportion of children under the age of 5 is about 15% of the population in the Sudan based on estimates of the Sudan family health survey for 2006. These younger citizens daily threats of malaria and diarrhea diseases, acute respiratory infections and diseases are preventable through vaccines and good nutrition. Half of the Sudanese population cannot access

adequate health-care services, while 40% of Sudanese cannot access safe water.

Research problem comes from that there is more than one child out of every ten children who are born alive in the Sudan do not survive until the age of five where the rate of under-five mortality is 112

deaths per 1,000 live births (family health survey, 2006, Sudan).

The importance of the study is that the most important diseases that lead to the death of children -who are the most important determinants of the evolution of human societies- will be highlighted and hence put powerful impact diseases on mortality in control priorities.

**Data description: Table 1: mean and standard deviation of diseases**

Year	Deaths	Diarrhea	Malaria	Pneumonia	Meningitis	Measles
2003	251	2189	2423	3683	117	139
2004	224	3392	2859	4711	98	449
2005	200	3130	3595	5687	190	14
2006	198	3091	3157	4132	123	135
2007	185	3113	3303	3791	117	109
2008	151	3571	4011	3851	114	25
2009	178	4385	3446	4903	145	0
2010	134	2972	2596	2851	93	3
2011	131	2504	3019	874	69	46
2012	137	2893	5343	1719	73	39
mean	178.93	3123.94	3375.17	3620.24	113.92	95.83
Standard deviation	40.73	596.11	835.983	1460.73	35.34	134.78

Table 1 shows that, according to the mean Pneumonia is the most frequent disease during the period, while Measles is the least frequent. However, one can say in general, that Pneumonia, Malaria and Diarrhea are most frequent than

Measles. In addition, according to the standard deviation there is highly homogeneity in the number of patients of Meningitis and the number of deaths during the period of the study.

Table2: growth rate

Disease	Growth rate	Disease	Growth rate
Deaths	6.7.%	Pneumonia	8.5.%
Diarrhea	3.1%	Meningitis	5.2.%
Malaria	8.8%	Measles	14.1.%

Table 2 shows that Measles has the highest growth rate (14.1%) and Diarrhea has the less one (3.1%).

**Research model :** the dependent variable is the child mortality, symbolized as (y) and the independent variables are The following diseases: diarrhea and symbolized as (X1), Malaria and symbolized as (X2), Pneumonia and symbolized as (X3), measles and symbolized as (X4), meningitis and symbolized his icon (X5) and the mathematical model can be formulated for multiple regression line as follows:

$$y = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + U_i$$

Where: ( $\beta_k$ ) are model parameters to be estimated.

**Application of the model:** Statistical package for social sciences "SPSS" used for analyzing data and yields the following output:

Table 3 : Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.647 <sup>a</sup>	.418	.346	32.93947	
2	.841 <sup>b</sup>	.708	.624	24.95884	2.332

a. Predictors: (Constant), X3

b. Predictors: (Constant), X3, X1

c. Dependent Variable: y

Table1 shows that model 2 has R Square (0.708) which indicates that X1 and X3 explain 71% of the variation in the dependent variable y, so that the two variables X1 and X3 are the variables that will enter the model. Durbin Watson is closer to 2 which means that there is no serial correlation. ie the residuals are uncorrelated

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6244.831	1	6244.831	5.756	.043 <sup>a</sup>
	Residual	8680.069	8	1085.009		
	Total	14924.900	9			
2	Regression	10564.293	2	5282.147	8.479	.013 <sup>b</sup>
	Residual	4360.607	7	622.944		
	Total	14924.900	9			

a. Predictors: (Constant), X3

b. Predictors: (Constant), X3, X1

c. Dependent Variable: y

Table 2 shows that the two regression models 1 and 2 are significant since the significant values are less than 0.05, but model 2 is the best, because it is more significant than model 1.

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	113.616	29.138		3.899	.005
	X3	.018	.008	.647	2.399	.043
2	(Constant)	215.150	44.432		4.842	.002
	X3	.028	.007	.989	4.085	.005
	X1	-.044	.017	-.638	-2.633	.034

a. Dependent Variable: y

Table 3 determined coefficients of the model, hence the regression model is:

$$y = 215.150 - 0.044X1 + 0.028 X3$$

Table 6: Excluded Variables

Model	Beta In	t	Sig.	Partial Correlation	Collinearity Statistics	
					Tolerance	
1	X1	-.638 <sup>a</sup>	-2.633-	.034	-.705-	.712
	X2	-.341 <sup>a</sup>	-1.287-	.239	-.437-	.959
	X4	-.364 <sup>a</sup>	-.651-	.536	-.239-	.250
	X5	.463 <sup>a</sup>	1.933	.094	.590	.944
2	X2	-.141 <sup>b</sup>	-.587-	.579	-.233-	.801
	X4	-.595 <sup>b</sup>	-1.570-	.167	-.540-	.240
	X5	.356 <sup>b</sup>	1.957	.098	.624	.896

a. Predictors in the Model: (Constant), X3

b. Predictors in the Model: (Constant), X3, X1

c. Dependent Variable: y

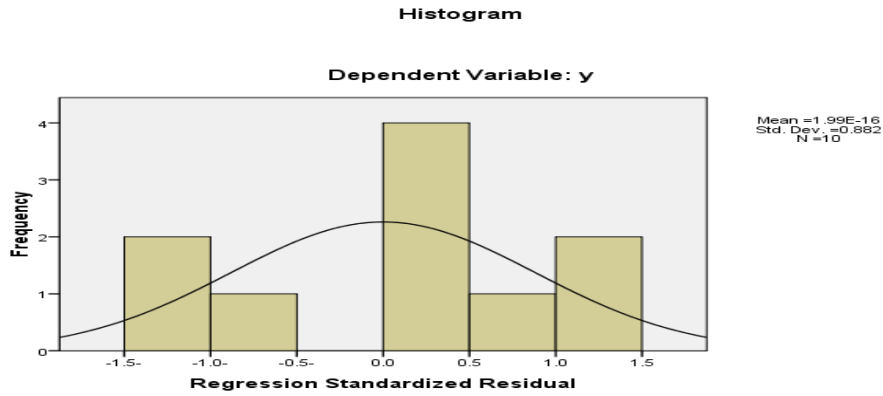
Table 4 shows variables X2, X4 and X5 are excluded from the model, because they are not significant since their significant values are all greater than 0.05

Table 5: Mah-1

Case No	Mah-1
1	4.27
2	7.30
3	6.46
4	0.23
5	0.02
6	2.19
7	5.55
8	4.53
9	7.52
10	6.89

Table 5 shows that all Mahalanobis values are less than the value of chi-square with 9 degrees of freedom at 0.05 level of significant which is 16.09, which indicates that there is no extrememultiple values.

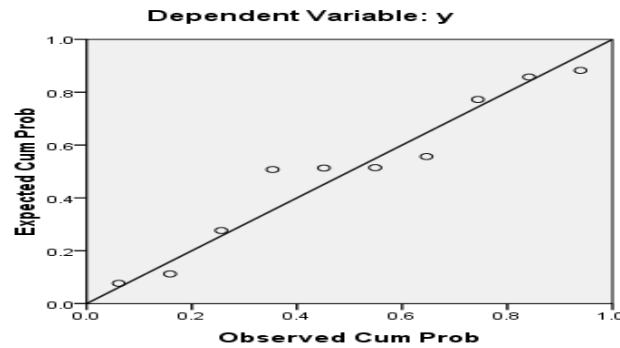
### Shape1



Shape 1 shows that data is normally distributed

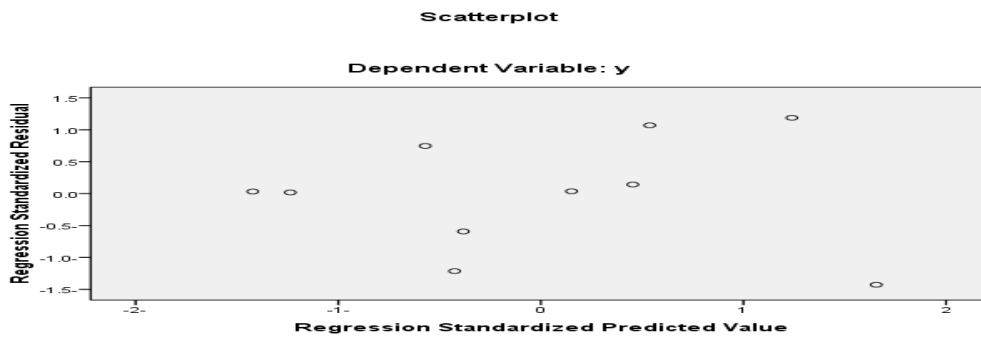
### Shape 2

**Normal P-P Plot of Regression Standardized Residual**



Shape 2 shows that the points clustered around the line and therefore the data (residuals) are distributed according to the normal distribution.

### Shape 3



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Shape3 shows that the relation between residuals and expected values has no certain pattern, which is consistent with linearity condition.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.908 <sup>a</sup>	.825	.606	25.56655

a. Predictors: (Constant), x5, x1, x2, x4, x3

Table 6 shows R square When all variables are entered using enter method which is 0.825

**Results:**

1. The study concluded that about 71% of the under 5 year's children death is caused by diarrhea and Pneumonia, 12% caused by Malaria, Meningitis and Measles and about 17% due to other reasons.

2. Pneumonia is the most frequent disease during the study period, while Measles is the least frequent.

3. Measles has the highest growth rate (14.1%) and Diarrhea has the less (3.1%) in the study period.

**Recommendation:** ministry of health must give more attention to the causes of diarrhea and Pneumonia and quick intervention is required in case of infection and this procedure requires availability of well-trained Physicians and this procedure requires availability

of well-trained Physicians especially in rural areas. In addition, more studies are to be done in The Gazira state focusing on diarrhea and Pneumonia.

**References:**

1. Adnan Majid Abdul Rahman. "Linear regression analysis." King Saud University, KSA, (2009).
2. Mohammed Abdel Rahman Ismail. "Linear regression analysis", Institute of public administration, the Research Center, KSA, (2001).