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STATISTICAL ANALYSIS ON THE PATTERN OF SOME SELECTED DISEASES AFFECTING CHILDREN OF UNDER FIVE YEARS OF AGE (A CASE STUDY OF GRIMARD CATHOLIC HOSPITAL, ANYIGBA)

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ABSTRACT: *The aim of this research is to examine the evaluation of the pattern of some selected diseases among children of under five years of age in Grimard Hospital Anyigba, Kogi State. Utilizing data obtained from the medical records of the hospital to carry out Chi-square, relative risk analysis and Odd ratio analysis. It was easy to study the pattern of the diseases affecting children. Based on the outcome of the study, it was observed that the diseases are independent of both age and sex. This implies that the diseases affect both sex irrespective of their age. Based on the outcome of the study, the relative risk analysis showed for each disease, the extent of association in both sexes. The risk of the outcome is increased by the exposure in Malaria, measles and malnutrition. This implies that the children are mostly affected by Malaria, Measles and Malnutrition. The risk of the outcome is decreased by exposure in Bronchus pneumonia, Gastric Enteritis and Anemia. This implies that the children are not mostly affected with the aforementioned diseases. From the Odd ratio, it was established that the probability of the occurrence of the disease i.e. Malaria, Measles and Malnutrition is not equal to the probability of the occurrence of the other disease i.e Bronchial Pneumonia, Gastric Enteritis and Anemia. The analysis recommend that adequate medical facilities should be provided and the federal government should improve the standard of living of its citizen and put more effort in the control programs and enlightenment campaign for immunization*

KEYWORDS: chi square, odd ratio, malaria, measles and malnutrition

INTRODUCTION

Diseases in many hospital regions, especially among children is regarded as being due to such ultra-human forces as divine visitation, evil spirits, magic, the infraction of taboos, or spells, or poisoning. It is these cultural attitudes, which give the mother confidence in the local with doctor, medicine man, or indigenous healer. The grossness of the pathology of many conditions seen is the pediatrics clinic in the tropic is partly due to the lateness of attendance. This, in turn is usually the result of attempts by the mother to try indigenous treatment first as well as if the distance involved the relative expenses, the inadequacy of transport, and the fear of foreign medicine especially of hospitals and certain of their practices, particularly (Jellifies and Bennett, 1960)

Developing countries carry a heavy burden of diseases and death. This is seen mainly in vulnerable groups such as children and women in the reproductive phase of life, in these groups inadequate nutrition, psychology demands and lack of resistance make the effects of disease more serials. The hostile physical environments manifest itself in heavy infant and child-mortality and this index taken give an indication of the health of a community.

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Low standards of health affect a society in many different ways. A heavy childhood mortality, where thirty to forty parent of the children do not reach the age of five (5) years, is a strong indicator of the ill-health in the community as a whole.

David & Derek (1977) stated that "infant mortality rates quoted from all tropical countries must be accepted with consideration reserve". They are often unreliable and incomplete owing to the extreme difficulty in ensuring the accurate collection of data. They often may be merely well informed, guess or "adjusted" for political reasons. They further indicated that in many communities only the major cities have compulsory birth and death registration. When theoretically, this may be impossible to enforce owing to every small health staff(s) available compared with the huge population concerned.

This research covered only some selected diseases (i.e Malaria, Measles, Malnutrition, Bronchial Pneumonia, Gastric Enteritis and Anaemia) which are affecting children of under five years of age and it is for a period of one year (2016). Children with incomplete record are omitted.Uche (1991) emphasized that adequate water supply is essential to the health of the children. Safe water is clean and colourless and it is free from germs, also it does not have disagreeable taste or odour. Absence of good sewage and indiscriminate water can cause destruction of natural life. Human excretes are sources of pathogenic organism causing especially diarrhoea.

Statement of the Problem

Research has shown that despite the fact that control measure against these diseases have not proved to be a failure; the percentage of death claim by the disease is still high especially in the developing countries.

Aim and Objectives of the Study

The aim of this research is to examine the evaluation of the pattern of some selected diseases among children of under five years of age. To achieve this aim, we have the following objectives:

1. To determine the pattern incidence of some selected disease on the age of children.
2. To determine the dependency of the disease on age
3. To also determine the dependency of the disease on gender.
4. To determine if a significant association exist in the incidence of the diseases between gender.

The Data

The data used in this research is a secondary data, the data was collected from the medical records department of the Grimard Catholic Hospital, Anyigba Kogi state. The data is on the reported cases on the admission and discharge register for children of under five years of age.

The data was collected on daily basis, due to space constraints, it would be presented on monthly basis to cover a period of one year i.e. 2016

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DISTRIBUTION OF DISEASE BY AGE (2016)

Month/Age	Malaria	Bronchus pneumonia	Measles	Gastric Enteristies	Anaemia	Malnutrition	Total
0-6 Months	140	16	3	34	85	5	283
6-12 Months	154	18	4	55	80	6	317
1-2 Years	187	12	3	55	100	1	358
2-3 Years	170	15	1	45	86	-	317
3-4 Years	136	13	-	42	75	-	266
Total	787	74	11	231	426	12	1541

TABLE : DISTRIBUTION OF CHILDREN DISEASE BY SEX

Disease	Male	Female	Total
Malaria	403	384	787
Bronchus pneumonia	35	39	74
Measles	6	5	11
Gastric Enteritis	107	124	231
Anaemia	206	220	426
Malnutrition	6	6	12
Total	763	758	1541

The Diseases

Diarrhoea, otherwise known as Gastric Enteritis, means frequent watery stool often children with diarrhoea also have vomiting and a swollen belly with cramps and the stool smell different. In many area's it is the most common causes of death in small children especially those between six months and three years. It is more dangerous in children who are malnourished and bottle-fed babies have diarrhoea six times more often than breast-fed ones.

Anaemia is widespread. After protein-calorie malnutrition, it is the second most common nutritional disorder in developing countries. Anaemia means that the blood does not contain

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enough haemoglobin, the substances that make blood red. People sometimes call anaemia "weak blood" or "thin blood""or pale blood". When there is not enough haemoglobin, it is difficult to get oxygen to the cells. The commonest causes of anaemia are iron deficiency, or lack of the nutrient iron.

Measles or rubeola is a highly contagious viral disease characterized by skin rash as well as inflammation of the eyes and the respiration tracts, it usually affects children but occur at any age in susceptible persons. Measles occurs in infancies and early childhood in crowded section of large early school years, but measles may occur from infancy to old age. Infants born of mother who have had measles are variable immunes from three to six months.

Malaria is disease of the blood that is transmitted to people by infected mosquitoes. Malaria is very common throughout the world; it is caused by anyone of the four species of one called Tara sites; (Plasmodium). The parasites are spread to people by the female anopheles mosquito, which feeds on human blood. Therefore, bring about infections that lead to illness and death of young children (people). The mosquito bite injects young forms of the malaria parasite into the person's blood. The parasites travel through the person's bloodstream to the liver, when they grow to their next stage of development. In 6 to 9 days the parasites leave the liver and enter the blood stream again.

Pneumonia is an infection of the lungs. It involves the tiny air sacs, called the alveoli, which are located at the tips of the body's smallest breathing tubes, called the bronchi. The alveoli are responsible for passing oxygen into the blood, pneumonia is an inflammation of the lung cause by the infection with bacteria viruses, or other organisms, pneumonia is usually triggered when a person's defence system is weakened; most often by a simple viral inspection. Bronchial pneumonia is when the pneumonia spreads to several patches in one or both lungs. Bronchial pneumonia is most prevalent in infants, young children and age adults.

Malnutrition refers to a condition that occurs when the nutrient available to a person's body is insufficient to meet the body's needs. Malnutrition can occur due to lack of single vitamin in a person's daily diet or because a person is not getting enough food. Starvation is a form of malnutrition.

Chi-Square Test

Chi-square supply a measure of discrepancy existing between the observed and expected frequencies often, it is the most frequently used method to test the hypothesis that two criteria of classification when applied to the same set of entities are independent or that the association existed.Suppose that in a particularly sample a set of possible event E_1, E_2, $E_{3,.....}E_k$ are observed frequencies and that according to probability rule they are expected to occur with frequencies e_1, e_2, $e_{3,.....}e_k$ are called expected or theoretical frequencies. Often we wish to know whether the observed frequencies differ significantly from the expected frequencies.

If $\chi^2= 0$ the observed frequencies agree exactly, white $\chi^2>0$, they do not agree exactly. The larger the value of χ^2 the greater is the discrepancy between the observed and expected frequencies.

If the observed frequencies occupy a single row and there are k number of columns, this is called a one-way classification tables. Similarly, it is referred to as a "1 x k" table.

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By extending these ideas, we can arrive at two-way classification table, or "h x k" tables, in which the observed frequencies occupy H rows and K columns. Such tables are often called contingency tables, and it consists of multinomial count data classified on two scales or dimension.

TEST FOR INDEPENDENCE

The chi-square test for independence test of statistics, denoted as χ is defined as;

$$\chi^2 = \sum\sum \frac{(O_i - E_j)^2}{E_j} \sim \chi^2(r-1 \times c-1)$$

Where O_i= observed frequency
E_j = expected frequency
N = total observation
With critical value:
χ^2 a based on (r - l) (c -1) degree of freedom.
The critical region is; we reject the null hypothesis (H_o) if χ^2_{cal} is greater than χ^2_{tab} and accept H_o if otherwise.

ASSUMPTION: The sample size n will be large enough so that, for every cell, the expected cell count (E_{ij}) will be equal to 5.

Measures of Association

To aid in the calculation of measures of association of epidemiological data are often presented in the form of two-by-two contingency table. The table contains two rows and two columns each representing the presence or absence of the exposure or disease.
This creates four cells labeled a, b, c, d each of which represents the number of individuals having that particular combination of exposure and disease status. The contingency table is shown below;

TABLE 1

	Disease			
		Yes	No	total
Exposure	Yes	A	B	a+b
	No	C	D	c+d
	Total	a+c	b+d	a+b+c+d

For the purpose of this project work, the following are to hold,
For the disease (column wise), yes implies specific disease and no implies other disease combined together.

For the exposure (row wise), yes implies male and No implies female.
Hence;
a = Number of children who are male and have specific disease
b = Number of children who are male but do not have specific disease
c = Number of children who are female and have specific disease
d = Number of children who are female but do not have specific disease
a+b = Total number of male children
c+d - Total number of female children

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a+c = Total number of children with specific disease
b+d = Total number of children without specific disease
a+b+c+d = Total sample size of children

RELATIVE RISK ANALYSIS

The relative risk estimate magnitude of association between exposure and disease and indicates the likelihood or developing the disease in the exposed group relative to those who are not exposed

$$RR = \frac{\text{Incidence of disease in the exposed group}}{\text{Incidence of disease among the non} - \text{exposed group}}$$

For a cohort study with count data in the denominator, the relative risk or risk ratio is calculated as cumulative incidence among those exposed to those not exposed.
Referring to the prototype two-by-two table shown earlier;

$$RR = \frac{\mathrm{a}/[\mathrm{a}+\mathrm{b}]}{\mathrm{c}/[\mathrm{c}+\mathrm{d}]}$$

A relative risk of 1.0 indicates that incidence rates of disease in the exposed group does not affect the outcome.
Thus, there is no association observed between the exposure and disease in the data. A value greater than 1.0 indicates that the risk of the outcome is increased by the exposure. While less than 1.0 indicates that the risk of the outcome is decreased by the exposure.

ODD RATIO ANALYSIS

The odd ratio of an event is defined as the probability of occurrence of such even to the probability of its non-occurrence. It provides an estimate of the relative risk under certain conditions via:

a. Cases of disease that are newly discovered.
b. Prevalent disease cases are not included in control group
c. Selecting of cases and controls that is not based on exposure data.

The OR is defined (using 2 × 2 contingency) as

$$OR = \frac{a}{c} \div \frac{b}{d} = \frac{ad}{bc}$$

ANALYSIS OF DATA

The analysis and the interpretation of the data are given below:

DATA ANALYSIS USING CHI-SQUARE (χ^2) TEST OF INDEPENDENCE AMONG DIFFERENT SEX FOR CHILDREN OF UNDER FIVE YEARS OF AGE

TABLE 4

Disease	Male	Female	Total
Malaria	403	384	787
Bronchus pneumonia	35	39	74
Measles	6	5	11
Gastric Enteritis	107	124	231
Anaemia	206	220	426
Malnutrition	6	6	12
Total	763	758	1541

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HYPOTHESIS:
H_O: The disease is dependent on sex
H_1: The disease is independent on sex

TEST STATISTICS

$$\chi^2 = \sum\sum \frac{(O_i - E_j)^2}{E_j}$$

Where E_{ij} is the expected value of the i^{th}row and j^{th} column
O_{ij} is the observed value of the i^{th} row and j^{th} column

$$E_{ij} = \frac{(Rowtotal)(columntotal)}{N}$$

Where: N is the grand total
Hence,

$$E_{11} = \frac{787\ x\ 763}{1541} = 389.7$$
$$E_{12} = \frac{787\ x\ 778}{1541} = 397.3$$
$$E_{21} = \frac{74\ x\ 763}{1541} = 36.6$$
$$E_{22} = \frac{74\ x\ 778}{1541} = 37.4$$
$$E_{31} = \frac{11\ x\ 763}{1541} = 5.4$$
$$E_{32} = \frac{11\ x\ 778}{1541} = 5.6$$
$$E_{41} = \frac{231\ x\ 763}{1541} = 114.4$$
$$E_{42} = \frac{231\ x\ 778}{1541} = 116.6$$
$$E_{51} = \frac{426\ x\ 763}{1541} = 210.9$$
$$E_{52} = \frac{426\ x\ 778}{1541} = 215.1$$
$$E_{61} = \frac{12\ x\ 763}{1541} = 5.9$$
$$E_{52} = \frac{12\ x\ 778}{1541} = 6.1$$

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TABLE
EXPECTED FREQUENCY VALUE OFDATA BASE ON SEX

Disease	**Male**	**Female**	**Total**
Malaria	390	397	787
Bronchus pneumonia	37	37	74
Measles	5	6	11
Gastric Enteritis	114	117	231
Anaemia	211	215	426
Malnutrition	6	6	12
Total	763	778	1541

Hence, Chi-Square calculated is shown below

O_i	E_j	$O_i - E_j$	$(O_i - E_j)^2$	$\frac{(O_i - E_j)^2}{E_{ij}}$
403	390	13	169	0.433
35	37	-2	4	0.108
6	5	1	1	0.2
107	114	-7	49	0.429
206	211	-5	25	0.118
6	6	0	0	0
384	397	-13	169	0.426
39	37	-2	4	0.108
5	6	-1	1	0.167
124	117	7	49	0.419
220	215	5	25	0.116
6	6	0	0	0
				2.524

Therefore, $\chi^2_{cal} = \dfrac{\sum_{c}^{r}\sum_{r}^{c}(O_i - E_j)}{E_{ij}}$

$\chi^2_{cal} = 2.524$

Critical value:

$X^2_{\alpha,}\,(r-1)\,(c-1) = \chi^2_{0.05},\,(6-1)\,(2-1)$

$= \chi^2_{0.05,5} = 11.070$

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$= \chi^2_{tab} = 11.070$

Critical region:
Accept H_0 if χ^2_{cal} is greater than $\chi^2_{tab,}$ otherwise, we reject.

Decision Rule:
Since $\chi^2_{cal} = 2.524$ is less than $\chi^2_{tab}, = 11.070$, we reject H_0 and conclude that the disease are independent on sex.

TABLE 6: DATA ANALYSIS USING CHI-SQUARE (χ^2) TEST OF INDEPENDENCE AMONG DIFFERENT AGE GROUPS FOR CHILDREN OF UNDER FIVE YEARS OF AGE

Month/Age	Malaria	Bronchus pneumonia	Measles	Gastric Enteristies	Anaemia	Malnutrition	Total
0-6 Months	140	16	3	34	85	5	283
6-12 Months	154	18	4	55	80	6	317
1-2 Years	170	15	1	45	86	-	385
3-4 Years	136	13	-	42	75	-	266
Total	787	74	11	231	426	12	1541

HYPOTHESIS:
H_O: The diseases are dependent of age
H_1: The diseases are independent of age

TEST STATISTICS

$$\chi^2 = \sum\sum \frac{(O_i - E_j)^2}{E_j}$$

Where E_{ij} is the expected value of the i^{th}row and j^{th} column
O_{ij} is the observed value of the i^{th} row and j^{th} column

$$E_{ij} = \frac{(Rowtotal)(columntotal)}{N}$$

$$E_{11} = \frac{283\ x\ 787}{1541} = 144.5$$

$$E_{12} = \frac{283\ x\ 74}{1541} = 13.6$$

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$$E_{13} = \frac{283\ x\ 11}{1541} = 2.0$$
$$E_{14} = \frac{283\ x\ 231}{1541} = 42.4$$
$$E_{15} = \frac{283\ x\ 426}{1541} = 78.2$$
$$E_{16} = \frac{283\ x\ 12}{1541} = 2.2$$
$$E_{21} = \frac{317\ x\ 787}{1541} = 161.9$$
$$E_{22} = \frac{317\ x\ 74}{1541} = 15.2$$
$$E_{23} = \frac{317\ x\ 11}{1541} = 2.3$$
$$E_{24} = \frac{317\ x\ 231}{1541} = 47.5$$
$$E_{25} = \frac{317\ x\ 426}{1541} = 87.6$$
$$E_{26} = \frac{317\ x\ 12}{1541} = 2.5$$
$$E_{31} = \frac{358\ x\ 787}{1541} = 182.8$$
$$E_{32} = \frac{358\ x\ 74}{1541} = 17.2$$
$$E_{33} = \frac{358\ x\ 11}{1541} = 2.6$$
$$E_{34} = \frac{358\ x\ 231}{1541} = 53.7$$
$$E_{35} = \frac{358\ x\ 426}{1541} = 98.9$$
$$E_{36} = \frac{358\ x\ 12}{1541} = 2.8$$
$$E_{41} = \frac{317\ x\ 787}{1541} = 161.9$$
$$E_{42} = \frac{317\ x\ 74}{1541} = 15.2$$
$$E_{43} = \frac{317\ x\ 11}{1541} = 2.3$$
$$E_{44} = \frac{317\ x\ 231}{1541} = 47.5$$
$$E_{45} = \frac{317\ x\ 426}{1541} = 87.6$$
$$E_{46} = \frac{317\ x\ 12}{1541} = 2.5$$

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$$E_{51} = \frac{266\ x\ 787}{1541} = 135.8$$
$$E_{52} = \frac{266\ x\ 74}{1541} = 12.8$$
$$E_{53} = \frac{266\ x\ 11}{1541} = 1.9$$
$$E_{54} = \frac{266\ x\ 231}{1541} = 39.9$$
$$E_{55} = \frac{266\ x\ 426}{1541} = 73.5$$
$$E_{56} = \frac{266\ x\ 12}{1541} = 2.1$$

TABLE 7: EXPECTED FREQUENCY VALUE OF DATA BASE ON AGE GROUPS

Month/Age	**Malaria**	**Bronchus pneumonia**	**Measles**	**Gastric Enteristies**	**Anaemia**	**Malnutrition**	**Total**
0-6 Months	145	14	2	42	78	2	283
6-12 Months	162	15	2	48	88	3	318
1-2 Years	183	17	3	54	99	3	359
2-3 Years	162	15	2	48	88	3	318
3-4 Years	136	13	2	40	73	2	266
Total	788	74	11	232	426	13	1541

Hence χ^2 calculated is shown below

$\mathbf{O_i}$	$\mathbf{E_j}$	$\mathbf{O_i - E_j}$	$\mathbf{(O_i - E_j)^2}$	$\frac{(\mathbf{O_i - E_j})^2}{\mathbf{E_{ij}}}$
140	145	-5	25	0.172
154	162	-8	64	0.395
187	183	4	16	0.087
170	162	8	64	0.395
136	136	0	0	0
16	14	2	4	0.286
18	15	3	9	0.6

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12	17	-5	25	1.471
15	15	0	0	0
13	13	0	0	0
3	2	1	1	0.5
4	2	2	4	2
3	3	0	0	0
1	2	-1	1	0.5
0	2	-2	4	2
34	42	-8	64	1.524
55	48	7	49	1.021
55	54	1	1	0.019
45	48	-3	9	0.188
42	40	2	4	0.1
85	78	7	49	0.628
80	88	-8	64	0.727
100	99	1	1	0.01
86	88	-2	4	0.045
75	73	2	4	0.055
5	2	3	9	4.5
6	3	3	9	3
1	3	-2	4	1.333
-	3	-3	9	3
-	2	-2	4	2
Total				26.556

Therefore,

$$\chi^2_{cal} = \frac{\sum_{c}^{r}\sum_{r}^{c}(O_i - E_j)}{E_{ij}} = 26.556$$

Critical value:

$\chi^2_{\alpha,}$ (r-1) (c-1)

Where r = 5, c = 6

= $\chi^2_{0.05}$ (5-1) (6-1)

= $\chi^2_{0.05}$,20 = 31.410

Critical region:

If χ^2_{cal} is greater than $\chi^2_{tab,}$ we accept H_0 at 5% level of significance, otherwise we reject.

Decision Rule:

Since χ^2_{cal} = 26.556 is less than χ^2_{tab} = 31.410 we reject $H_0$and conclude that the disease are independent of age.

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RELATIVE RISK ANALYSIS

Referring to the prototype two-by-two table shown earlier in section 3 the Relative Risk (RR) is given as:

$$RR = \frac{a/[a+b]}{c/[c+d]}$$

For Malaria

	MALARIA	**OTHER DISEASES**	**TOTAL**
MALE	403	360	763
FEMALE	384	394	778
TOTAL	787	754	1541

$$RR = \frac{403\ /\ 763}{384\ /\ 778} = 1.07$$

Since RR = 1.07 is greater than 1, it indicates that the risk of the outcome is increased by the exposure.

For Bronchus Pneumonia

	BRONCHUS PNEUMONIA	**OTHER DISEASES**	**TOTAL**
MALE	35	728	763
FEMALE	39	739	778
TOTAL	74	1467	1541

$$RR = \frac{35\ /\ 763}{39\ /\ 778} = 0.92$$

Since RR = 0.92 is less than 1, it indicates that the risk of the outcome is decreased by the exposure.

For Measles

	MEASLES	**OTHER DISEASES**	**TOTAL**
MALE	6	757	763
FEMALE	5	773	778
TOTAL	11	1530	1541

$$RR = \frac{6\ /\ 763}{5\ /\ 778} = 1.22$$

Since RR = 1.22 is greater than 1, it indicates that the risk of the outcome is increased by the exposure.

For Gastric Enteristics (DIARRHOEA)

	GASTRIC ENTERISTICS	OTHER DISEASES	TOTAL
MALE	107	656	763
FEMALE	124	654	778
TOTAL	231	1310	1541

$$RR = \frac{107\ /\ 763}{124\ /\ 778} = 0.88$$

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Since RR = 0.88 is less than 1, it indicates that the risk of the outcome is decreased by the exposure.

For Anaemia

	ANAEMIA	OTHER DISEASES	TOTAL
MALE	206	557	763
FEMALE	220	558	778
TOTAL	426	1115	1541

$$RR = \frac{206 / 763}{220 / 778} = 0.95$$

Since RR = 0.95 is less than 1, it indicates that the risk of the outcome is decreased by the exposure.

For Malnutrition

	MALNUTRITION	OTHER DISEASES	TOTAL
MALE	6	757	763
FEMALE	6	772	778
TOTAL	12	1115	1541

$$RR = \frac{6 / 763}{6 / 778} = 1.02$$

Since RR = 1.02 is greater than 1, it indicates that the risk of the outcome is increased by the exposure.

4.3 ODD RATIO ANALYSIS

The odd ratio analysis is defined using (2 × 2 contingency table)

ODD RATIO (OR) $\frac{a}{c} \div \frac{b}{d}$

$$OR = \frac{a}{c} \times \frac{b}{d}$$

$$OR = \frac{ad}{bc}$$

For Malaria

	MALARIA	OTHER DISEASES	TOTAL
MALE	403	360	763
FEMALE	384	394	778
TOTAL	787	754	1541

$$OR = \frac{403}{384} \times \frac{394}{384} = 1.149$$

For Bronchus Pneumonia

	BRONCHUS PNEUMONIA	OTHER DISEASES	TOTAL
MALE	35	728	763
FEMALE	39	739	778
TOTAL	74	1467	1541

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$$OR = \frac{35}{728} \times \frac{739}{39} = 0.911$$

For Measles

	MEASLES	OTHER DISEASES	TOTAL
MALE	6	757	763
FEMALE	5	773	778
TOTAL	11	1530	1541

$$OR = \frac{6}{757} \times \frac{773}{5} = 1.225$$

For Gastric Enteristics (DIARRHOEA)

	GASTRIC ENTERISTICS	OTHER DISEASES	TOTAL
MALE	107	656	763
FEMALE	124	654	778
TOTAL	231	1310	1541

$$OR = \frac{107}{656} \times \frac{654}{124} = 0.860$$

For Anaemia

	ANAEMIA	OTHER DISEASES	TOTAL
MALE	206	557	763
FEMALE	220	558	778
TOTAL	426	1115	1541

$$OR = \frac{206}{557} \times \frac{558}{220} = 0.938$$

For Malnutrition

	MALNUTRITION	OTHER DISEASES	TOTAL
MALE	6	757	763
FEMALE	6	772	778
TOTAL	12	1115	1541

$$OR = \frac{6}{757} \times \frac{772}{6} = 1.019$$

CONCLUSION

From the result obtained on the statistical analysis on the pattern of some selected disease affecting children of under five years (2016) in Grimard Catholic Hospital, Anyigba, Kogi State.
The Chi-Square analysis, established that the disease are independent on both age and sex of the children. This portray that the disease affects both the male and female children regardless of the age.
From the relative risk analysis, showed for each disease the extent of association in the sex of the children. The risk of the outcome is increased by the exposure in Malaria, Measles and

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Malnutrition; this implies that the children are mostly affected by Malaria, Measles and Malnutrition.
The risk of outcome is decreased by the exposure in Bronchus Pneumonia, Gastric Enteritis and Anaemia, this implies that the children are not mostly affected with the aforementioned disease.
From the odd ratio analysis, it was established that the probability of the occurrence of the disease (Malaria, Measles and Malnutrition) is not equal to the probability of the occurrence of the other diseases (Bronchus Pneumonia, Gastric Enteritis and Anaemia).

RECOMMENDATIONS

From the results obtained, the following recommendations were made;

1. Adequate medical facilities and even more hospital with improve medical care should be provided.
2. More enlightenment programmes should be embarked upon by the ministry of health to emphasize on the need for parent to improve on their personal hygiene.
3. The Federal Government should put more effort in the control programs and enlightenment campaign for immunization.
4. It is an indisputable fact that poor standard of living affect the body immunity system. Therefore, the federal government should provide to improve the standard of living of its citizens.

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