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The Impact of Different Malaria Drugs in Curing Malaria Within the Ghanaian Populace: A Case Study of Sekondi-Takoradi

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Abstract
Pharmaceutical companies are industries who engage in Research and Developments (R&D) to evolve new and improved therapies (drugs) to provide an efficient cure to individuals in the society. This research examines the impact of some selected malaria drugs on the lives of category of individuals (children, adults and the aged). The main objective is to know the impact of some selected malaria drugs on children, adults and the aged, to determine the affordability of malaria drugs and to know the efficacy rate of the selected malaria drugs among children, adults and the aged.The study population comprise of Sekondi-Takoradi of which 60 samples were drawn. A simple random sample technique was used in selecting the samples with the help of questionnaire as the main instrument. Preliminary analysis made use of descriptive statistics tools such as bar chart, pie chart and frequency tables. Analysis of variance (ANOVA) was used as tool for statistical inference. A combination of statistical software (SPSS and Minitab) and other software such as Microsoft Excel were used during data processing.The research results indicated that the ability of the selected malaria drugs to cure malaria disease is well appreciated; meaning that it has a positive impact on the lives of individuals. It was also known that the prices of the malaria drugs are moderate. The hypothesis claim (H_o) was accepted meaning if the drug cures malaria disease among children, it can also cure malaria disease among adults and the aged.The study recommends that pharmaceutical industries should engage in more research and developments (R&D) to bring out antimalarial drugs that "if all things been equal" can have a perfect relation in curing malaria disease among categories of individuals.
Keywords: Pharmaceutical companies, Research and Development, Individuals(children,adult and aged),Simple Random Sample, ANOVA, Afordability, Efficacy rate

1.0 **INTRODUCTION**

1.1 Background of the study

In any country the health sector comes first on the top of the agenda for the government; as such the authorities make it their priority to make health care issues a matter of importance. Luckily enough in Ghana, the efforts of governments have laid a solid foundation for National Health Insurance to function better in Modern Ghana. Such strenuous steps taken already show the government effort to make health care affordable to the majority of the working people.

Public and private organisations involved in the discovery, development, and manufacture of drugs and medications. Historically, medicines were prepared by physicians and later by apothecaries. Today, drug development relies on the collaboration and effort of highly trained scientists at universities and private companies. The modern era of drug discovery and development originated in the 19th century when scientists learned how to isolate and purify medicine compounds and developed large-scale manufacturing techniques. As understanding of biology and chemistry improved in the 20th century, the occurrence and severity of such diseases as typhoid fever, poliomyelitis, and syphilis were greatly reduced. While many drugs, such as quinine and morphine, are extracted from plant substances, others are discovered and synthesized by techniques including combinatorial chemistry and recombinant DNA (Deoxydbonacleic Acid) technology. The pharmaceutical industry has greatly aided medical progress, and many new drugs have been discovered and produced in industrial laboratories. Identifying new drug targets, attaining regulatory approval, and refining drug discovery processes are among the challenges that the pharmaceutical industry faces in the continual advancement of control and elimination of disease.

All patients whether fighting deadly diseases or managing long-term, chronic conditions – live in the hope that tomorrow will bring the promise of new medicines and improved therapies. America's biopharmaceutical research companies work hard every day to live up to those understandably high expectations and meet our common goals: improved health and developing better treatment options.

Antimalarial drug resistance is a major public health problem which hinders the control of malaria. The WHO publication, Drug resistance in malaria, describes the state of knowledge about this problem and outlines the current thinking regarding strategies to limit the advent, spread and intensification of drug-resistant malaria. Antimalarial drugs are used for the treatment and prevention of malaria infection. Most antimalarial drugs target the erythrocytic stage of malaria infection, which is the phase of infection that causes symptomatic illness. The extent of pre-erythrocytic (hepatic stage) activity for most antimalarial drugs is not well characterized.

Chloroquine was the first drug produced on a large scale for treatment and prevention of malaria infection. Chloroquine has activity against the blood stages of Plasmodium ovale, P. malariae, and susceptible strains of P. vivax and P. falciparum. Widespread resistance in most malaria-endemic countries has led to decline in its use for the treatment of P. falciparum, although it remains antimalarial drugs that is effective across various stages of the malaria parasite's lifecycle has been developed by an international research team. Early indications also show that it may take longer for the parasite to develop resistance to the new molecules than it has for existing drugs targeting the same pathway. Malaria is a devastating disease worldwide, and the ability of the Plasmodium family of parasites that cause the disease to develop resistance to drugs leads to a constant arms race for new medicines.

1.2 Statement of the problem

Drugs and pharmaceutical industry plays a vital role in the economic development of a nation. It is one of the largest and most advanced sectors in the world, acting as a source for various drugs, medicines and their intermediates as well as other pharmaceutical formulations.

Being the intense knowledge-driven industry, it offers innumerable business opportunities for the investors/corporate and the world over. The existence of well-defined and strong pharmaceutical industry is important for promoting and sustaining research and developmental (R&D) efforts and initiatives in an economy as well as making available the quality medicines to all at affordable prices. That is, it is essential to improve the health status of the individuals as well as the society as a whole, so that positive contributions could be made to the economic growth and regional development of a country. Although there have been several interventions aimed at improving rational use of antimicrobials in developing countries, few studies have focused on rational use of antimalarial drugs. Improved targeting of antimalarial treatments has become critical in the era of ACTs, because ACTs are more expensive, limited in supply and potentially more toxic than previously used mono-therapies.

This study accesses the impact of pharmaceutical industries on the lives of people, thus it accesses specifically the impact of some selected antimalarial drugs produced by local pharmaceutical companies, by looking at the influence of these drugs on the lives of people in Sekondi-Takoradi society; as whether these drugs produced by pharmaceutical companies through their research and development is having a positive impact on lives of people or not.

1.3 Objective of the study

The main objectives of this study are as follows:

1. To know the impact of some selected malaria drugs on children, adults and the aged.
2. To know the affordability of malaria drugs.
3. To know the efficacy rate of some selected malaria drugs among children, adults and the aged.

1.4 Hypothesis to be tested

The null hypothesis formulated are as follows:

1. The impact of Lonart malaria drug is the same among children, adults and the aged.
2. The impact of Coartem malaria drug is the same among children, adults and the aged.
3. The impact of P-Alaxin malaria drug is the same among children, adults and the aged.
4. The impact of Artemos plus malaria drug is the same among children, adults and the aged.
5. The impact of Artefan ACT malaria drug is the same among children, adults and the aged.

2.0 Methodology

2.1 Collection of data

The target population for the project comprised the total population of Sekondi-Takoradi, a capital city of Western Region. A total sample of size 60 was drawn from the study area for this research. In order to prevent biasness the sample size comprise of 20 respondents from each category group (children, adults and the aged) respectively.

Simple random sampling technique was introduced in the selection of the research objects from respondents. Simple random technique gives equal chance to every member of the population to be selected, thus each distinct possible sample of size (n) has the same chance of been selected or chosen. The nature of data and the type of research investigation allowed the researcher to use simple random sampling technique in selecting the samples. This is because no one can be denied of not being affected by malaria before , therefore everybody stands a chance of been selected.

The main instrument of data collection was questionnaire. The questionnaire was close ended with alternative answers as response to be given by the respondents. It was in two parts which consists of twenty-three

items of questions in all. Section A consist of eight items and section B also contain 15 items. To ensure accuracy of responses, the research instrument was self-administered by the researcher to the subjects of the study.

2.2 Review of theory of statistical method

Various statistical analysis tools have been used during the analysis of the data. Some of the statistical tools were used in preliminary analysis as well as in further analysis. The main statistical tool used was analysis of variance (ANOVA).

2.2.1 Analysis of variance (TWO-WAY-ANOVA)

Two-way ANOVA has many of the same ideas as one-way ANOVA, with the main difference being the inclusion of another factor (or explanatory variable) in the model.

In the two-way ANOVA model, there are two factors, each with its own number of levels. When we are interested in the effects of two factors, it is much more advantageous to perform a two-way analysis of variance, as opposed to two separate one-ANOVAs.

There are three main advantages of two-way ANOVA: It is more efficient to study two factors simultaneously rather than separately, we can reduce the residual variation in a model by including a second factor thought to influence the response, we can investigate interactions between factors.

The interaction between two variables is usually the most interesting feature of a two-way analysis of variance. When two factors interact, the effect on the response variable of one explanatory variance depends on the specific value or level of the other explanatory variable. The term main effect is used to describe the overall effect of a single explanatory variable.

The assumptions of two- way-anova

It implies that there should be homogeneity of variance. The dependent variable is approximately normally distributed for each combination of levels of the two independent variables. Dependent variable is either interval or ratio (continuous). There should be independence of cases.

The test statistics

In two-way analysis of variance, we wish to test simultaneously the hypothesis;

(a) $H_o: \mu_1 = \mu_2 = \cdots \mu_i$
$H_1: \mu_1 \neq \mu_j$ for some *i* and *j* (i.e. at least a pair of treatment means are different)
And

(b) $H_o: \beta_1 = \beta_2 = \cdots \beta_b$
$H_1: \beta_1 \neq \beta_j$ for some *i* and *j* (i.e. at least a pair of treatment means are different)

The test statistics for comparing treatment means is

$$F = \frac{SS_{TR/(t-1)}}{SS_E/(t-1)(b-1)}$$

It has F-distribution with $(t-1)$ and $(t-1)(b-1)$ degrees of freedom. The null hypothesis is rejected when the calculated value of F is greater than table value of F at a given significant level.

The test statistics for comparing blocks mean is

$$F = \frac{SS_{B/(b-1)}}{SS_E/(t-1)(b-1)}$$

It has F-distribution with $(b-1)$ and $(t-1)(b-1)$ degrees of freedom. The null hypothesis is rejected when the calculated value of F is greater than table value of F at a given significant level.

Computing formula

$$SS_T = \sum_{i=1}^{b}\sum_{j=1}^{i} x_{ij}^2 - \frac{T^2}{tb}$$

$$SS_{Tr} = \frac{\sum_j^t = 1T_j^2}{b} - \frac{T^2}{tb}$$

$$SS_B = \frac{\sum_i^b = 1T_i^2}{b} - \frac{T^2}{tb}$$

$$SS_B = SS_T - SS_{TR} - SS_B$$

Two-way ANOVA table is given by

Source of variation	Degrees of freedom	Sum of squares	Mean squares	F
Treatment	$t-1$	SS_{Tr}	$MS_{Tr}=\frac{SS_{Tr}}{t-1}$	$\frac{MS_{Tr}}{MS_E}$
Block	$b-1$	SS_B	$MS_B=\frac{SS_B}{b-1}$	$\frac{MS_E}{MS_E}$
Error	$(t-1)(b-1)$	SS_E	$MS_E=\frac{SS_E}{(t-1)(b-1)}$	
Total	$bt-1$	SS_T		

3.0 Analysis and findings

3.1 Preliminary analysis

Preliminary analyses made use of statistical software like Microsoft excel. It used frequency tables to represent information. The impact of malaria drugs was categorized into three levels; "was cured" refers to the drug having a positive impact, "worsen situation" and "no cure" were referred to as having a negative impact. The affordability of the malaria drugs had three levels, as expensive, moderate and cheap. Efficacy rate was also rated at four levels, as very good, good, poor and very poor.

3.1.1 **Distribution of malaria drug usage by groups**

Table1 Distribution of Malaria Drug Usage by Groups

MALARIA DRUG USAGE BY GROUPS						
Group	Lonart	Coartem	P-Alaxin	Artemos plus	Artefan ACT	Totals
Children	12 26.09%	6 13.04%	6 13.04%	3 6.52%	19 41.30%	46 100.00%
Adults	19 26.76%	14 19.72%	8 11.27%	11 15.49%	19 26.76%	71 100.00%
Aged	18 33.96%	5 9.43%	6 11.32%	5 9.43%	19 35.85%	53 100.00%
Total	49 28.82%	25 14.71%	20 11.76%	19 11.18%	57 33.53%	170 100.00%

Table 1 shows the various distribution of type of malaria drug by the three groups. Among the children, it reveals that the use of Artefan ACT malaria drug had the highest response of 19 which recorded 41.30%. Lonart malaria drug had response of 12 recording 26.09%. Artemos plus had 3 response (that is 6.52%).

It reveals that the use of Artefan ACT and Lonart malaria drug had the highest responses of 19 (that is 26.76%) respectively among adults group. P-Alaxin had smallest response of 8 (11.27%). It also revealed that the use of Artefan ACT malaria drug among the aged had the highest usage of 19 which recorded 35.85%. Coartem and Artemos plus had the same responses of 6 (9.43%) respectively.

Moreover it also reveals that, out of the 60 respondents surveyed, 57 of them representing 33.53% often use Artefan ACT malaria, 49 (that is 28.82%) respondents also use Lonart malaria drug, 25(14.71%) respondents often use Coartem malaria drug, 20(11.76%) respondents often use P-Alaxin and 19 respondents representing 11.18% often use Artemos plus.

It was observed that the use of Artefan ACT , Lonart malaria drug had the highest responses of 19 (that is 26.76%) respectively among adults group. P-Alaxin had smallest response of 8 (11.27%). It also reveals that the use of Artefan ACT malaria drug among the aged had the highest usage of 19 which recorded 35.85%. Coartem and Artemos plus had the same responses of 6 (9.43%) respectively.

Also , out of the 60 respondents surveyed, 57 of them representing 33.53% often use Artefan ACT malaria, 49 (that is 28.82%) respondents also use Lonart malaria drug, 25(14.71%) respondents often use Coarten malaria drug, 20(11.76%) respondents often use P-Alaxin and 19 respondents representing 11.18% often use Artemos plus.

3.1.2 Efficacy rate of malaria drugs by groups

Table 2: Efficacy Rate of Five Malaria Drugs by Groups

Efficacy rate of malaria drugs					
Drug	Groups	Very good	Good	Poor	Very poor
LONART	Children	5	6	1	0
	Adults	6	11	1	1
	Aged	16	2	0	0
COARTEM	Children	5	1	0	0
	Adults	8	5	1	0
	Aged	5	0	0	0
P-ALAXIN	Children	1	3	1	1
	Adults	0	1	4	3
	Aged	0	5	1	0
ARTIMOS PLUS	Children	0	1	2	0
	Adults	3	6	2	0
	Aged	4	1	0	0
ARTEFAN ACT	Children	12	7	0	0
	Adults	5	12	2	0
	Aged	7	12	0	0
	Totals	77	73	15	5

Table 2 shows the efficacy rates of the various types of malaria drugs and how it was rated by every group. Rate here is referred to as the level of ability of the drugs to provide cure of malaria which has been categorize into four levels (very good, good, poor and very poor) Lonart malaria drug rated 5, 6 and 16 respectively by children, adults and aged as “very good”. Children, adults and the aged rated 6, 11, 2 respectively as “good”. Children and adults rate 1, 1 respectively as “poor”.

Coartem malaria drug was rated 5, 8, and 5 by children, adults, and aged respectively as “very good”. Children and adults rated 1, 5 respectively as “good”. Adults rated as “poor”.

For P-Alaxin malaria drug was rated as follows children rated 1 as “very good”. Children, adults and aged rated 1, 4, 1 respectively as “poor”. Children and adults rated 1, 3 respectively as “very poor”.

Artemos plus malaria drug rated 3, 4 respectively by adults and aged as “very good”. Children, adults and aged rated 1, 6 and 1 respectively as “good”. Children and adults rated 2, 2 respectively as “poor”.

Artefan ACT malaria drug also indicates the following as rated by them. Children, adults and aged rated 12, 5, and 7 respectively as “very good”. Children, adults and the aged rated 7, 12, 12 respectively as “good”. Adults rated 2 respectively as “poor”.

Again it shows the overall total rates for the five malaria drugs (Lonart, Coartem, P-Alaxin, Artemos plus and Artefan ACT) under study. It reveals a total of 77 (45.29%) responses rated these drugs as “very good” in curing malaria disease 73(42.94%) response also rated “good”. 15(8.82%) rated “poor” and 5(2.94%) responses also rated “very poor”

3.1.3 Rated prices of malaria drugs by groups

Table 3 Malaria Drug Rated Prices by Groups

Rated prices of malaria drugs by groups				
Drug	Groups	Expensive	Moderate	Cheap
LONART	Children	1	11	0
	Adults	7	12	0
	Aged	5	13	0
COARTEM	Children	4	2	0
	Adults	8	5	0
	Aged	5	0	0
P-ALAXIN	Children	1	3	2
	Adults	0	1	7
	Aged	0	1	5
ARTEMOS PLUS	Children	2	1	0
	Adults	3	6	2
	Aged	5	0	0
ARTEFAN ACT	Children	1	17	1
	Adults	0	14	5
	Aged	1	18	0
	Totals	104	43	22

Table 3 also shows the types of malaria and how it has been rated by every group. Rate here is also referred to as the level of affordability of the malaria drugs which have been categorise into three levels (expensive, moderate and cheap). Price rated of Lonart malairia drug among the groups indicates that, children, adults, and aged rated 1, 7, 5 respectively as “expensive”. Children, adults and aged also rated 11, 12, 13 respectively as “moderate”.

Price rated of Coartem malaria drug shows that, children adults and aged rated 4, 8, 5 respectively as “expensive”. Children and adults also rated 2, 5 respectively as “moderate”. P-Alaxin malaria drug also reveals that, children rated 1 respectively as “expensive”. Children, adults and aged also rated 3, 1, 1 respectively as “moderate”. It also rated 2, 7, 5 respectively by children, adults and aged as “cheap”.

Price rated of Artemos plus malaria drug indicate that, children, adults and aged rated 2, 3, 5 respectively as “expensive”. Children and adults also rated 1, 6 respectively as “moderate”. It also rated 2 respectively adults as “cheap”.

Artemos plus malaria drug also reveals the following rated prices among the groups. Children, adults and aged rated 2, 3, 5 respectively as “expensive”. Children and adults also rated 1, 6 respectively as “moderate”. It also rated 2 adults also rated the drug as “cheap”.

It also shows that, from the population surveyed, 104 (61.54%) responses rated the prices of malaria drugs to be “moderate” 43(25.44%) responses rated the prices of the drugs to “expensive” and 22(13.02%) responses as “cheap”

3.1.4 The impact of malaria drugs among groups

Table 4 Impact of Antimalarial Drugs among Groups

Impact of antimalarial drugs among groups				
Drugs	Groups	Was cured	Worsen situation	No cure
LONART	Children	11	1	0
	Adults	17	2	0
	Aged	18	0	0
COARTEM	Children	6	0	0
	Adults	14	0	0
	Aged	5	0	0
P-ALAXIN	Children	3	3	0
	Adults	0	4	4
	Aged	5	1	0
ARTEMOS PLUS	Children	2	0	1
	Adults	9	0	2
	Aged	5	0	0
ARTEFAN ACT	Children	18	1	0
	Adults	16	0	3
	Aged	19	0	0
	Totals	147	12	10

Table 4 reveals the impact of antimalarial drugs among category of group. It shows that 11 children, 17 adults and 18 aged were cured of malaria disease using Lonart drug, only 3 people had a negative impact using Lonart drug. This means that Lonart malarial drug has a positive impact on children, adults and the aged.

Coartem drug also had a positive influence among group. It shows that 6 children, 14 adults and 5 aged were cured of malaria disease using Coartem drug.

For P-Alaxin malaria drug it reveals that, 3 children and 5 aged were cured, 12 people from the various groups had a negative influence of which were 4 people “no cure” and 8 people “worsen situation”.

Artemos plus malaria drug cured 16 people of which constitute 2 children, 9 adults and 5 aged. Only 3 people had no cure using Artemos plus malaria drug.

Artefan ACT malaria drug had also cured 52 people who constitute 18 children, 16 adults and 19 aged. 3 adults were not cured using Artefan ACT malaria drug. Only 1 child responded of the drug worsening the malaria disease.

Moreover, the table also reveals that for all the drugs, 148 responses were cured of malaria disease using the drugs, 12 responses shows that the drugs worsen the malaria disease and 10 responses also indicated of “no cure” using the drugs.

3.2 Further analysis

Further analysis made use of inferential statistical tool “Analysis Of Variance (Two-ANOVA) to make inference on the population under study. The use of statistical software Minitab and SPSS (version 16) were used to process and analyze the data. The three groups were coded as follows: children = 0, adults = 1, aged = 2. The impact of malaria drugs were also categorized into three levels and coded as follows: was cured = 3, worsen situation = 4, no cure = 5. All the coding was done in SPSS and Minitab statistical software. Confidence interval was 95% (that is α=0.05). decisions and conclusions were made by comparing alpha value (0.05) and the computed values.

3.2.1 The impact of lonart antimalarial drug among groups

Table 5 The Impact of Lonart Malaria Drug Among Groups

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	266.778	1	266.778	1.208	0.386
	Error	441.556	2	220.778		
Group	Hypothesis	9.556	2	4.778	0.905	0.474
	Error	21.111	4	5.278		
Impact Levels	Hypothesis	441.556	2	220.778	41.832	0.002
	Error	21.111	4	5.278[o]		
Group *Impact Levels	Hypothesis	21.111	4	5.278		
	Error	000	0			

Table 5 reveals that impact of Lonart antimalarial drug among children, adults and the aged. The significant figure 0.474 among "Group" explains that we fail to reject the null hypothesis (H_o) meaning that group means are the same. This in actual terms means that the use of Lonart malaria drug among the various groups had the same impact. For instance it cured malaria disease among the aged, it is the same as it cured in adults and children.

Significant figure 0.002 among "Impact Level" rejected the null hypothesis which means that impact levels among group are different. In actual terms this means that the impact Lonart antimalarial drug may have on children may be different from the impact it will have on aged or adults. For instance it can cure malaria disease among children and no cure among the aged.

3.2.2 The impact of coartem antimalarial drug among groups

Table 6 The Impact of Coartem Malaria Drug Among Groups

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	69.444	1	69.444	1.000	0.423
	Error	138.889	2	69.444		
Group	Hypothesis	16.222	2	8.111	1.000	0.444
	Error	32.444	4	8.111		
Impact Levels	Hypothesis	138.889	2	69.444	8.562	0.036
	Error	32.444	4	8.111[b]		
Group *Impact Levels	Hypothesis	32.444	4	8.111		
	Error	000	0			

Table 6 reveals that impact of Coartem antimalarial drug among children, adults and the aged. The significant figure 0.444 among "Group" accounts that we fail to reject the null hypothesis (H_o) meaning that group means are the same. This in actual terms means that the use of Coartem malaria drug among the various groups had the same impact. For instance Coartem malaria drug cure malaria among children and provide the same cure among adults and the aged.

Significant figure 0.036 among "Impact Level" rejected the null hypothesis which means that there is significant difference among group on the levels of impact. In actual terms this also means that the impact Coartem antimalarial drug may render on children may be different from the impact if may have on aged or adults. It may cure malaria among the aged but may worsen the disease situation among children.

3.2.3 The impact of p-alaxin antimalarial drug among groups

Table 7 The Impact of P-Alaxin Malaria Drug Among Groups

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	44.444	1	44.444	25.000	0.038
	Error	3,556	2	1.778		
Group	Hypothesis	.889	2	.444	0.066	0.938
	Error	27.111	4	6.778		
Impact Levels	Hypothesis	3.556	2	1.778	0.262	0.982
	Error	27.111	4	6.778[b]		
Group *Impact Levels	Hypothesis	27.111	4	6.778		
	Error	000	0			

Table 7 reveals that impact of P-Alaxin antimalarial drug among children, adults and the aged. The significant figure 0.938 among "Group" accounts that we fail to reject the null hypothesis (H_o) meaning that

group means are the same. This in actual terms means that the use of P-Alaxin malaria drug among children, adults and aged had the same impact. For instance, it negative impact on adults might be the same as that of children..

Significant figure 0.982 among "Impact Level" accepted the null hypothesis which means that there is no significant difference among levels of impact on children, adults and aged. It may also means that the impact P-Alaxin antimalarial drug may render on children might not be different from the impact it may have on aged or adults. It it is a negative influence it runs throughout the groups.

3.2.4 The impact of artemos plus antimalarial drug among groups

Table 8 The Impact of Artemos Plus Malaria Drug Among Groups

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	40.111	1	40.111	1.664	0.326
	Error	48.222	2	24.111		
Group	Hypothesis	11.556	2	5.778	1.529	0.321
	Error	15.111	4	3.778		
Impact Levels	Hypothesis	48.222	2	24.111	6.382	0.057
	Error	15.111	4	3.778[o]		
Group *Impact Levels	Hypothesis	15.111	4	3.778		
	Error	000	0			

Table 8 reveals that impact of Artemos plus antimalarial drug among children, adults and the aged. The significant figure 0.321 among "Group" accounts that we fail to reject the null hypothesis (H_o) meaning that group means are the same. This means that the use of Artemos plus malaria drug among children, adults and aged had the same impact. It cures malaria among the aged as the same as among children and adults.

Significant figure 0.057 among "Impact Level" fail to rejected the null hypothesis which means that there is no significant difference among levels of impact on children, adults and aged. It may also means that the impact Artemos plus antimalarial drug may render on children might not be different from the impact it may have on aged or adults. For instance if it is positive, it runs throughout the groups.

3.2.5 The impact of artefan act antimalarial drug among groups

Table 9 The Impact of Artefan ACT Malaria Drug Among Groups

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	361.000	1	361.000	1.248	0.380
	Error	578.667	2	289.333		
Group	Hypothesis	000	2	.000	0.000	1.000
	Error	11.333	4	2.833		
Impact Levels	Hypothesis	578.667	2	289.333	102.118	0.000
	Error	11.333	4	2.833[b]		
Group *Impact Levels	Hypothesis	11.333	4	2.833		
	Error	000	0			

Table 9 reveals that impact of Artefan ACT antimalarial drug among children, adults and the aged. The significant figure 1.000 among "Group" accounts that we fail to reject the null hypothesis (H_o) meaning that group means are the same. This in actual terms means that the use of Artefan ACT malaria drug among the various groups had the same impact. For instance it cured malaria disease among children, adults and aged.

Significant figure 0.000 among "Impact Level" rejected the null hypothesis which means that there is significant difference among group on the levels of impact. In actual terms this also means that the impact Artefan ACT antimalarial drug may render on children may be different from the impact it may have on aged or adults. It can cure malaria among children but would not cure malaria efficiently among adults or the aged.

4.0 Discussion, conclusions and recommendations

4.1 Discussion

From the study, descriptive statistics shows that the use of Artefan ACT malaria drug is very common in diagnosing malaria among people of different age groups in Sekondi-Takoradi. It might be that the Artefan ACT malaria drug has a moderate price because from the research, it indicates that out of the 60 respondents under study, 31 respondents rated the drug to be good and 24 respondents concluded that it is very good.

In general this research reveals that the prices of the selected malaria drugs (Lonart, Coartem, P-Alaxin, Artemos plus and Artefan ACT) used in treating malaria is moderate. The research indicates that 61.54% which constitute 104 responses which was given reveals that the prices of the selected drugs are moderate in price. It

also reveals that the ability of the selected malaria drugs to cure malaria disease is well accepted. This means that there is a positive impact of these drugs on individual lives. The study indicates by 77(45.29%) responses which rate "very good" and 73(42.94%) responses also rated "good". It also indicates by 148 responses which were cured of malaria disease using the drugs among the groups.

Inferential statistics of this study reveals that, for all the drugs under studied, hypothesis among groups explains that the impact or the influence a drug may have on a category of people is the same as the influence on another category of people. For instance if the drug cured the malaria disease among adults, it is the same impact that it had on children and the aged.

Moreover, hypothesis among impact level also explains that the kind of influence a drug may have on children might be different from that of adults or the aged. For example the drug could cure malaria disease among adults but may worsen the disease situation among children or no cure among adults.

For P-Alaxin and Artemos plus malarial drug, the hypothesis among impact level explains that impact or influence of these drugs on children is the same as that of adult and the aged. For example if they worsen the sickness situation among adults, it is the same impact it will have on children and the aged. It means that they have a constant impact that can run through all the groups.

4.2 Conclusion

This research concluded that the ability of the selected malaria drugs to cure malaria disease is well appreciated. It reveals that the selected malaria drugs had a positive impact on the lives of people in Sekondi-Takoradi since more responses were shown that the drugs can cure malaria disease. It was also revealed that the impact of the selected malaria drugs among category of people (children, adults and aged) were the same (failed to reject the null hypothesis). This means that if the drug cures malaria disease among children, it could also cure malaria disease among adults and the aged.

This study came to conclusion that prices of these selected malaria drugs are moderate in prices but some are expensive especially the imported drugs (an example is Coartem antimalarial drug)

4.3 Recommendations

This study would therefore recommends that pharmaceutical industries should engage in more research and development to bring out antimalarial drugs that "if all things been equal" could have a perfect relation in curing malaria disease among categories of people.

It would also recommend that, since malaria is a tropical disease relating to tropical issues therefore issues which brings about that disease should be investigated.

It would also recommend that, the government would give funds to local institutions to do intensive actions in the eradication of malaria disease.

It would also recommend that since waste product is a factor to malaria disease, recycling of products should form a major priority within developing countries. This would indirectly create companies, jobs and help reduce malaria.

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