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Statistical Analysis on People Affected with Malaria Fever in Rumirgo Askira Uba Local Government, Borno State using Chi-Square Test

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Abstract**:** *The main aim of this research is to assess people with malaria fever according to sex and age in Rumirgo Hospital, Askira Uba local Government, and Borno state. Based on the finding it is revealed that the result of the analysis of chi-square test statistics in Table 4.1 2017 at a 5% level of significance the result show that is3.289318<4.575, and table 2020 is 8.648452<4.575 s both the two table H1 is rejected and H0 is accepted. Concluded that malaria fever does not depend on age and sex in Rumirgo hospital in Askira Uba local Area in Borno state, Table 2018 At a 5% level of significance the result show that that is 81.13969>4.575, table 2019 show that that is 27.26504 >4.575, and show that that is 8.648452<4.575 in both the three tables the result obtained reveal that H0 is rejected and H1 is accepted. Concluded that the malaria fever depends on age and sex in Rumirgo hospital in Askira Uba local Area in Borno state, From the result of the analysis, there are no means significant differences in tables 2017 and 2020 the result shows again malaria fever does not depend on age, while in the analysis from tables 2018, 2019, and 2021 there is a means significant difference it shows malaria is fever depend on age and sex. The government would provide enough hospitals for collecting drugs to eradicate malaria and Provision more laboratory equipment to enhance testing for malaria parasite*

Key words: *Chi-Square, Fever, Malaria, and Rumirgo*

INTRIODUCTION

The Chi-square statistic is a non-parametric (distribution-free) technique used to analyze group differences. Like every non-parametric statistic, to be more precise, this statistic can be used to see if the proportions of the relevant risk factor differ between the study groups. Karl Pearson created the chi-square test and the logic of hypothesis testing (Rakesh, 2015) and (Mary, 2013). One- way ANOVA and chi-squared technique are algebraically related and the null hypothesis

asymptotically the same (Ralph, 1972). According to Cengiz , (2009), Chi-square test statistic is given by the equation:

$$\chi_p^2 = \sum_{ij} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}$$

Chi-square test statistics were used in determines the degree of association between malaria prevalence and other factors influencing its transmission. The obtained showed that malaria prevalence depends on risk factors that promote transmission (Faga *et al*, 2010).
Chi-square tests were used in testing the mean of a population or comparing the means from two continuous populations (Teshome, 2019).
Nureni *et al* (2020) investigate that the Logistic regression method was used for the simple analysis of the dataset and it was revealed that people the age of 38-47 years are commonly affected with malaria and that females are the most infected gender species with headache being the most significant symptom based on its Wald statistic value.
Based on the results obtained in the analysis using Chi-Square statistical test, (8.409) > (3.841). Then > and p-value (0.000 <α 0.05) means that H0 is rejected, concluding that there is a statistically significant relationship between parental education level and malaria incidence (Lia, 2017).

Lawrence (2016) Revealed that children who visited rural areas were 6 times more to be expected to have malaria than those who did not Visit the rural areas.
The results reveal that patient symptoms cannot be used to forecast the patient's position, and additional information is required on medical history (AL-NAJJAR *et al*, 2020).
Asogwa (2015) carry out a study to confirm whether patients' diagnosed with the aliment have any relationship established on their gender, years, and age of diagnosis. The observation from the hypotheses agreed in this study using chi-square statistic, was that none of the variables of interest measured were dependent on each other.

Chi-square statistics is one of the usual statistical tests, used for the fit of measurement models and is also sensitive to sample size (Daniel, 2015).
Scholars have employed chi-square tests for more than one hundred years. This research addresses the question of how one would follow a statistically significant chi-square test result to determine the source of that result. Four methods were assessed: calculating residuals, comparing cells, ransacking, and partitioning (Donald, 2015).

RESULT OF THE ANALYSIS

Computational on the effect of malaria fever on sex and age using chi-square statistical technique that Employed for the test of independent of the data at 5% level of significance

H_0: malaria does not depend on age and sex

H_1: malaria does depend on age and sex

Table 1.1: Effect of Malaria Fever on Sex (2017)

S/N	MALE	FEMALE	TOTAL
1	95	105	200
2	93	84	177
3	100	90	190
4	152	148	300
5	125	125	250
6	117	113	230
7	150	160	310
8	128	112	240
9	140	130	270
10	141	143	284
11	136	124	260
12	149	141	290
TOTAL	1526	1475	3001

Table 1.2: Contingency Table

O	E	o-e	(o-e)^2	(O- e)^2/e
95	101.6994	-6.69943	44.88241	0.441324
105	98.30057	6.699434	44.88241	0.456583
93	90.004	2.996001	8.976024	0.099729
84	86.996	-2.996	8.976024	0.103177
100	96.61446	3.385538	11.46187	0.118635
90	93.38554	-3.38554	11.46187	0.122737
152	152.5492	-0.54915	0.301566	0.001977
148	147.4508	0.54915	0.301566	0.002045
125	127.1243	-2.12429	4.512616	0.035498
125	122.8757	2.124292	4.512616	0.036725
117	116.9543	0.045651	0.002084	1.78E-05
113	113.0457	-0.04565	0.002084	1.84E-05
150	157.6341	-7.63412	58.27982	0.369716
160	152.3659	7.634122	58.27982	0.382499
128	122.0393	5.96068	35.5297	0.291133
112	117.9607	-5.96068	35.5297	0.3012
140	137.2942	2.705765	7.321163	0.053325
130	132.7058	-2.70576	7.321163	0.055168
141	144.4132	-3.4132	11.6499	0.080671
143	139.5868	3.413196	11.6499	0.08346
136	132.2093	3.790736	14.36968	0.108689
124	127.7907	-3.79074	14.36968	0.112447

149	147.4642	1.535821	2.358747	0.015995
141	142.5358	-1.53582	2.358747	0.016548
				3.289318

DECISION RULE

At 5% level of significance the result show that $\chi_{cal} < \chi_{tab}$ that is 3.289318<4.575 H_1 is rejected and H_0 is accept. Concluded that the malaria fever does not depend on age and sex in the year 2017 in Rumirgo hospital in Askira Uba local Area in Borno state,

Table 1.3: Effect of Malaria Fever on Sex (2018)

S/N	MALE	FEMALE	TOTAL
1	157	210	367
2	201	246	447
3	196	172	368
4	189	199	388
5	138	149	287
6	165	83	248
7	158	106	264
8	178	143	321
9	204	197	401
10	165	200	365
11	165	191	356
12	250	153	403
TOTAL	2166	2049	4215

Table 1.4: Contingency Table

O	E	o-e	(o-e)^2	(O- e)^2/e
157	188.5936	-31.5936	998.1552	5.292625
210	178.4064	31.59359	998.1552	5.594839
201	229.7039	-28.7039	823.9147	3.586855
246	217.2961	28.70391	823.9147	3.791668
196	189.1075	6.892527	47.50692	0.251217
172	178.8925	-6.89253	47.50692	0.265561
189	199.3851	-10.3851	107.8493	0.54091
199	188.6149	10.38505	107.8493	0.571796
138	147.4833	-9.48327	89.93249	0.609781
149	139.5167	9.483274	89.93249	0.6446
165	127.442	37.55801	1410.604	11.0686
83	120.558	-37.558	1410.604	11.70062

158	135.6641	22.33594	498.8944	3.677425
106	128.3359	-22.3359	498.8944	3.887409
178	164.9552	13.04484	170.1678	1.031601
143	156.0448	-13.0448	170.1678	1.090506
204	206.0655	-2.06548	4.266209	0.020703
197	194.9345	2.06548	4.266209	0.021885
165	187.5658	-22.5658	509.217	2.714871
200	177.4342	22.56584	509.217	2.869892
165	182.9409	-17.9409	321.8768	1.759458
191	173.0591	17.94093	321.8768	1.859924
250	207.0932	42.90676	1840.99	8.889668
153	195.9068	-42.9068	1840.99	9.397277
				81.1399

DECISION RULE

At 5% level of significance the result show that $\chi_{cal} > \chi_{tab}$ that is 81.13969>4.575 H_0 is rejected and H_1 is accept. Concluded that the malaria fever depends on age and sex in the year 2018 in Rumirgo hospital in ASkira Uba local Area in Borno state,

Table 1.5: Effect of Malaria Fever on Sex (2019)

S/N	MALE	FEMALE	TOTAL
1	165	151	316
2	168	134	302
3	207	171	378
4	185	176	361
5	159	160	319
6	197	203	400
7	169	169	338
8	203	199	402
9	160	136	296
10	195	109	304
11	166	161	327
12	232	169	401
TOTAL	2206	1938	4144

Table 1.6: Contingency Table

O	E	o-e	(o-e)^2	(O- e)^2/e
165	168.2181	-3.21815	10.35647	0.061566
151	147.7819	3.218147	10.35647	0.070079
168	160.7654	7.234556	52.3388	0.32556

134	141.2346	-7.23456	52.3388	0.370581
207	201.223	5.777027	33.37404	0.165856
171	176.777	-5.77703	33.37404	0.188792
185	192.1733	-7.17326	51.4557	0.267757
176	168.8267	7.173263	51.4557	0.304784
159	169.8152	-10.8152	116.9676	0.688793
160	149.1848	10.81515	116.9676	0.784045
197	212.9344	-15.9344	253.9039	1.192405
203	187.0656	15.93436	253.9039	1.357299
169	179.9295	-10.9295	119.4548	0.663898
169	158.0705	10.92954	119.4548	0.755706
203	213.999	-10.999	120.9788	0.565324
199	188.001	10.99903	120.9788	0.643501
160	157.5714	2.428571	5.897959	0.03743
136	138.4286	-2.42857	5.897959	0.042607
195	161.8301	33.16988	1100.241	6.798742
109	142.1699	-33.1699	1100.241	7.738919
166	174.0738	-8.07384	65.18692	0.374479
161	152.9262	8.073842	65.18692	0.426264
232	213.4667	18.5333	343.4833	1.609072
169	187.5333	-18.5333	343.4833	1.831585
				27.26504

DECISION RULE

At 5% level of significance the result show that $\chi_{cal} > \chi_{tab}$ that is 27.26504 >4.575 H_0 is rejected and H_1 is accept. Concluded that the malaria fever depend on age and sex in the year 2019 in Rumirgo hospital in Askira Uba local Area in Borno state,

Table 1.7: Effect of Malaria Fever on Sex (2020)

S/N	MALE	FEMALE	TOTAL
1	138	153	291
2	152	172	324
3	188	190	378
4	109	101	210
5	167	154	321
6	155	134	289
7	148	162	310
8	127	123	250
9	167	162	329

10	170	177	347
11	191	158	349
12	189	173	362
TOTAL	1901	1859	3760

Table 1.8: Contingency Table

O	E	o-e	(o-e)^2	(O-e)^2/e
138	147.1253	-9.12527	83.27048	0.565984
153	143.8747	9.125266	83.27048	0.578771
152	163.8096	-11.8096	139.466	0.851391
172	160.1904	11.80957	139.466	0.870627
188	191.1112	-3.11117	9.67938	0.050648
190	186.8888	3.11117	9.67938	0.051792
109	106.1729	2.827128	7.992651	0.07528
101	103.8271	-2.82713	7.992651	0.07698
167	162.2928	4.707181	22.15755	0.136528
154	158.7072	-4.70718	22.15755	0.139613
155	146.1141	8.885904	78.95929	0.540395
134	142.8859	-8.8859	78.95929	0.552604
148	156.7314	-8.73138	76.23705	0.486419
162	153.2686	8.731383	76.23705	0.497408
127	126.3963	0.603723	0.364482	0.002884
123	123.6037	-0.60372	0.364482	0.002949
167	166.3375	0.6625	0.438906	0.002639
162	162.6625	-0.6625	0.438906	0.002698
170	175.438	-5.43803	29.57219	0.168562
177	171.562	5.438032	29.57219	0.17237
191	176.4492	14.5508	211.7257	1.199924
158	172.5508	-14.5508	211.7257	1.227034
189	183.0218	5.978191	35.73877	0.195271
173	178.9782	-5.97819	35.73877	0.199682
				8.648452

DECISION RULE

At 5% level of significance the result show that $\chi_{cal} < \chi_{tab}$ that is 8.648452<4.575 H_1 is rejected and H_0 is accept. Concluded that the malaria fever depends on age and sex in the year 2020 in Rumirgo hospital in Askira Uba local Area in Borno state.

Table 1.9: Effect of Malaria Fever on Sex (2021)

S/N	MALE	FEMALE	TOTAL
1	159	118	277
2	221	146	367
3	117	157	274
4	124	177	301
5	163	168	331
6	165	144	309
7	187	115	302
8	176	164	340
9	189	138	327
10	157	186	343
11	160	109	269
12	160	171	331
TOTAL	**1978**	**1793**	**3771**

Table 1.10: Contingency Table

O	e	o-e	(o-e)^2	(O-e)^2/e
159	145.2946	13.70538	187.8375	1.292804
118	131.7054	-13.7054	187.8375	1.426195
221	192.5023	28.49775	812.1215	4.218764
146	174.4977	-28.4977	812.1215	4.654052
117	143.721	-26.721	714.0134	4.968051
157	130.279	26.72103	714.0134	5.48065
124	157.8833	-33.8833	1148.079	7.271695
177	143.1167	33.88332	1148.079	8.021982
163	173.6192	-10.6192	112.7674	0.64951
168	157.3808	10.6192	112.7674	0.716526
165	162.0796	2.920446	8.529002	0.052622
144	146.9204	-2.92045	8.529002	0.058052
187	158.4078	28.59215	817.5111	5.160799
115	143.5922	-28.5922	817.5111	5.693285
176	178.34	-2.33996	5.475426	0.030702
164	161.66	2.339963	5.475426	0.03387
189	171.5211	17.47892	305.5126	1.781195
138	155.4789	-17.4789	305.5126	1.964978
157	179.9136	-22.9136	525.0308	2.918239
186	163.0864	22.91355	525.0308	3.21934

160	141.0984	18.90162	357.2711	2.532071
109	127.9016	-18.9016	357.2711	2.793328
160	173.6192	-13.6192	185.4826	1.06833
171	157.3808	13.6192	185.4826	1.178559
				67.1856

DECISION RULE

At 5% level of significance the result show that $\chi_{cal} > \chi_{tab}$ that is 8.648452<4.575 H_0 is rejected and H_1 is accept. Concluded that the malaria fever depend on age and sex in the year 2021 in Rumirgo hospital in Askira Uba local Area in Borno state.

CONCLUSION

Table 1.1 at a 5% level of significance the result shows that that is3.289318<4.575, and table 1.7 that is 8.648452<4.575 that s both the two table H1 is rejected and H0 is accepted. Concluded that malaria fever does not depend on age and sex in Rumirgo hospital in ASkira Uba local Area in Borno state. Table 1.3 At a 5% level of significance the result show that that is 81.13969>4.575, table 1.5 show that that is 27.26504 >4.575, and show that that is 8.648452<4.575 in both the three tables the result obtained reveal that H0 is rejected and H1 is accepted. Concluded that the malaria fever depends on age and sex in Rumirgo hospital in ASkira Uba local Area in Borno state. From the result of the analysis, there are no means significant differences in the tables 1.1 and 1.7 the result shows again malaria fever does not depend on age, while in the analysis from tables 1.3, 1.5, and 1.9 there is a means significant difference it shows malaria is fever depend on age and sex.

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