



## RENAL FUNCTION IN PREGNANT WOMEN WITH AND WITHOUT MALARIA IN THE UNIVERSITY OF PORT HARCOURT TEACHING HOSPITAL, RIVERS STATE

\*<sup>1</sup>Ogbondah Augustina Chizoma, <sup>2</sup>Professor Patrick Iwuanyawu and <sup>3</sup>Dr. Solomon Joseph Chiegil

<sup>1</sup>African Centre of Excellence in Public Health and Toxicological Research, University of Port Harcourt, Choba Rivers State.

<sup>2</sup>Department of Biochemistry, University of Port Harcourt, Choba Rivers State.

<sup>3</sup>Global Healthplus Public Initiative, Nigeria.

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\*Corresponding Author: Ogbondah Augustina Chizoma

African Centre of Excellence in Public Health and Toxicological Research, University of Port Harcourt, Choba Rivers State.

### ABSTRACT

Malaria continues to constitute a great challenge in Sub-Saharan African countries, and it is a major concern for most pregnant women since it lowers their immunity and poses a risk to the mother's life as well as the possibility of transfer to the fetus. The goal of this study is to assess renal function in malaria-affected pregnant women. The 120 pregnant women who attended the antenatal clinic at the University of Port Harcourt Teaching Hospital (main site) and the University of Port Harcourt Teaching Hospital Primary Health Centre were recruited using a case-control study design (60 women with gestational malaria and 60 healthy pregnant women at the study center) at Umuoko, Aluu within every four to six months using a convenient non-probability sampling method. The respondents' socio-demographic information, medical and obstetric histories were collected, and they were tested for malaria parasite infection and subsequent kidney biochemical markers (urea, creatinine, sodium, potassium, chlorine, and bicarbonate) using conventional laboratory techniques. The levels of urea and creatinine were found to be significantly lower ( $p < 0.000$  and  $p < 0.000$ , respectively) in this investigation. Electrolytes (sodium, chloride, potassium, and bicarbonate) in malaria-positive pregnant women, on the other hand, were within normal limits for adult females and pregnant women. As a result, the current study found that malaria has no significant influence on renal biochemical parameters, particularly at the specified levels of urea and creatinine, indicating that there is no risk factor associated with malaria infection. However, pregnant women who present to hospitals with malaria should have their renal function checked.

**KEYWORDS:** Malaria, Renal, Pregnancy, Function, Immunity, Plasmodium.

### BACKGROUND TO THE STUDY

Malaria continues to be a problem in Sub-Saharan African countries. Abossie, Yohanes, Nedu, Tafesse, & Damitie (2020) and OCHA (2019) reported Malaria as a life-threatening disease, with nearly half of the world's population being vulnerable to the infection, accounting for an estimated 150-300 million (2-5%) of all deaths. Malaria is also responsible for untold annual morbidity in approximately 300-500 million people, caused by a parasite [plasmodium spp.], which is transmitted by female Anopheles mosquitoes, causing malaria in humans (Schantz-Dunn, & Nour, 2009). Four species of the Plasmodium include the falciparum, vivax, malariae and ovale, Plasmodium falciparum being responsible for most deaths and most of the severe complications including cerebral malaria, anemia, and renal failure

(Menkin-Smith, Winders, 2022). Serious cases of renal problems associated with malaria take the form of nephritic syndrome, which gradually progresses to renal failure; characterized by severe proteinuria, rise in blood urea, low urine, specific gravity, and low ratio of urinary to blood urea. Hyper-kalaemia and metabolic acidosis (Conroy, Datta & John, 2019) resulting in Acute Renal Failure in about 60% of all cases of complicated malaria (Conroy, Datta, Hoffmann & Wassmer, 2023).

Thirty three (33) million African ladies get pregnant in regions in which malaria is endemic, but a fragment of those ladies have gotten the right of entry to powerful interventions (Wagbatsoma and Omoike, 2018). To Wagbatsoma and Omoikem Pregnant ladies are also vulnerable to malaria than non-pregnant ladies because

of their diminished immunity. This is because their physiological and pathological modifications resulting from malaria have a synergistic impact on the patient, the mother, the kid, and the treating physician. One of the most dreaded reasons for fetal mortality and morbidity is malaria in being pregnant (Masoumi, Kashanian, Arab, Sheikhsari, & Arab, 2017). Because of anti-disease immunity established from past exposure, the majority of cases in subsequent pregnancies remain asymptomatic (Rogerson, Desai, Mayor, Sicuri, Taylor, & van Eijk, 2018). However, in Sub-Saharan Africa, spontaneous miscarriage, preterm delivery, and anemia are among the most commonly reported symptoms (Alves & Rapp, 2022). Even though only 1% of *P. falciparum* infections progress to more serious clinical implications, which can lead to the collapse of multiple systems, Patel *et al.* (2003) noted that renal biochemical parameters are significantly altered as a result of changes in the body's systemic hemodynamics, caused by physiologic changes in the kidney during pregnancy. Malaria causes severe renal damage, which presents as a nephritic syndrome and eventually leads to kidney failure; Proteinuria, low urine-to-blood urea ratio, hyperkalemia, and metabolic acidosis are some of the most common clinical symptoms of renal function in malaria infection (Ogbadoyi and Gabi, 2008). As a result of enhanced plasma flow, blood urea nitrogen (BUN) and creatinine levels, as well as plasma indicators of Glomerular Filtration Rate (GFR), are lowered (Elbadawi *et al.*, 2013). After the first trimester, this is most noticeable (Jeyabalan and Conrad, 2007). The severity of malaria-associated renal impairment in a particular area is a majorly result of the disease prevalence and other aetiological factors occurring in the area (Naqvi *et al.*, 2003). This calls for accurate assessment of renal function in both clinical practice and research.

Anemia, hypoglycemia, and different malaria-associated headaches can affect the fetus and interestingly, *Falciparum* malaria has been proven to reason troubles ensuing in fetal mortality of as much as 15% (Rouamba, Samadoulougou, Ouédraogo, *et al.*, 2021). Rouamba, *et al* identified outcome of these: Spontaneous abortions, placental insufficiency, and stillbirth located due to malaria at some point of being pregnant. The latest examination to apprehend the hyperlink between malaria and kidney failure discovered a big growth in serum creatinine, with 67.14% of sufferers having serum creatinine tiers above ordinary. Researcher additionally suggested that 52.86% of their contributors had serum urea tiers above the ordinary variety defined by the World Health Organization as indicative of kidney failure (Ogbadoyi and Gabi, 2008). Pregnancy outcomes call for common tracking of biochemical and hematological parameters to keep away from headaches in the complete trimester of pregnancy, so clinicians should identify pathologic deviations from those ordinary anatomical and physiologic modifications at some point in pregnancy to provoke suitable measures to enhance maternal and fetal outcomes (Maconi,

Cardaropoli, & Cenci, 2012). Urea is nitrogen waste from metabolism, produced in the breakdown of proteins and removed in urine through the kidneys, depending on its concentration, first the urine and then, the blood, as scientific use to evaluate kidney function (Weiner, Mitch, & Sands, 2015).

This phenomenon is an unexpected increase in renal records (creatinine, urea, and electrolytes (sodium, potassium, bicarbonate, and chloride) in patients with intestinal illness is a sign of renal failure (Gounden, Bhatt, & Jialal, 2022). This has necessitated the necessity to assess for renal weakness in pregnant women with jungle fever, which has been undertaken by several countries.

All things considered, regardless of the association of jungle fever to renal honesty in intestinal sickness contamination, there is as yet very little data about the impact of these biochemical renal boundaries among pregnant ladies in Port Harcourt in Rivers State, Nigeria. Besides, existing examinations in the space have restricted extension. The negligible portion of unfavorable impacts of jungle fever disease that might be deflected in pregnancy is relied upon to be high, as detailed by Afrifa (2016), particularly according to natural renal chemistry. Henceforth, we looked to experimentally assess renal capacity in pregnant ladies with jungle fever.

#### **The specific objectives that guided this study include to**

1. Evaluate the renal biochemical parameters of women with malaria in pregnancy attending antenatal care at the University of Port Harcourt Teaching Hospital in Rivers State.
2. Evaluate the renal biochemical parameters of pregnant women without malaria attending antenatal care at the University of Port Harcourt Teaching Hospital in Rivers State.
3. Compare the renal biochemical parameters of pregnant women with malaria to those of healthy pregnant women attending antenatal care at the University of Port Harcourt Teaching Hospital in Rivers State.
4. Compare the renal biochemical parameters of pregnant women with malaria with the World Health Organization (WHO) indication range for renal failure.

#### **METHODOLOGY**

##### **Research Design**

Case-control study plan with a subjective and trial approach was utilized.

##### **Research Setting**

This study was carried out at the antenatal clinic of the University of Port Harcourt Teaching Hospital (main site) and the University of Port Harcourt Teaching Hospital Primary Health Centre at Umuoko, Aluu. The

University of Port Harcourt Teaching Hospital (UPTH), Alakahia, is arranged in Obio/Akpor Local Government Area of Rivers State. The University of Port Harcourt Teaching Hospital is a five-star clinic that renders various kinds of medical care administrations. This clinic is lined in the east by Alakahia town, in the west by Emouhua town, and in the south by Aluu town. This clinic is a tertiary foundation that renders care at the tertiary level and here and there at the auxiliary and essential levels. It is concerned with routine administrations of delivering medical care administrations, analysts, and preparing nursing and clinical understudy. The University of Teaching Hospital was set up in April 1980. By and by, the University of Port Harcourt Teaching Hospital has over 100 expert advisor staff in practically all fortes Neurology and Neurosurgery, cardiology, and Cardiothoracic Surgery, Pediatrics, and Neonatology, Urology, Hematology, Anatomical Pathology, Chemical Pathology, Radio symptomatic, and so forth it has more than 200 Resident specialists (Trainee Specialists), more than 400 medical attendants in different strengths and around 40 drug specialists. The medical clinic treats a gauge of 400,000 out-patients per annum, more than 10,000 in persistence per annum and well over 3000 surgeries per annum. The University of Port Harcourt Teaching Hospital is, by the righteousness of the convergence of qualified staff and a huge number of patients, an entirely reasonable setting for this nature of examination. This clinic has more than 20 divisions, including clinical wards, careful wards, pediatrics, gynecology wards, unique consideration child unit, muscular health, mishap and crisis ward, oral maxillofacial unit, ear, nose, and throat unit, and so on the exploration is sure that satisfactory example size will be acquired from the emergency clinic.

The University of Port Harcourt Teaching Hospital Primary Health Center is situated in Aluu in Ikwere Local Government Area., Rivers State, Nigeria. The region is arranged between scopes 5° 54', 295 N and longitudes 6°, 53', 889 and 7°E; witness normal precipitation of 2,500cm<sup>3</sup> and yearly temperature scope of between 28°C-30°C which goes with the rainforest vegetation. The settlement is a sub-metropolitan in structure, with about 40% of the occupants being, for the most part, provincial high-quality anglers and subsistent ranchers. By the by, the way of life of the indigenes is enormously affected by the presence of the University of Port Harcourt and a few ventures around the local area environment.

### Population of the Study

The population for this investigation included the more than 400 pregnant ladies who conceded to the antenatal facility at the University of Port Harcourt Teaching Hospital (principle site) and the University of Port Harcourt Teaching Hospital Primary Health Center at Umuoko, Aluu inside each four to a half year.

### Inclusion Criteria

#### The inclusion criteria for the study include;

1. Consenting pregnant women attending antenatal care at the study Health Centre
2. Pregnant women with no history of renal complications, hypertension, diabetes mellitus, human immunodeficiency virus, and acquired immune deficiency syndrome.

### Exclusion Criteria

#### The exclusion criteria include;

1. Non-consenting pregnant women attending antenatal care at the study Health Centre
2. Pregnant women with a history of renal complications, hypertension, diabetes mellitus, human immunodeficiency virus, and acquired immune deficiency syndrome.

### Sample Size and Sampling Technique

The sample size for the investigation was inferred utilizing the advantageous non-likelihood testing strategy. An aggregate of 120 (60 ladies with gestational jungle fever and 60 sound pregnant ladies at the investigation community) was locked in for the examination.

### Instrument for Data Collection

The instrument utilized for this examination was a survey created by the scientist and lab test units for the jungle fever parasite test and renal capacity test. The survey comprised one area designated for getting the socio-segment (age, occupation, equality, gravidity, and gestational age) information of the respondent. The instrument for the research center investigation incorporated the following:

1. Malaria test kit
2. Micropipettes
3. Water bath
4. Microscope
5. Bijou bottle
6. Glass Test tubes
7. Quality control
8. Spectrophotometer
9. Chemistry /Electrolyte autoanalyser
10. Distilled Water
11. Indicator (Phenol Red)
12. HCl
13. NaOH
14. Color Reagent
15. Acid Reagent
16. H<sub>2</sub>SO<sub>4</sub>
17. Sodium Tungstate
18. Picric acid

### Validity/Reliability of the Instruments

The exploration survey was created by the specialist, and a duplicate was shipped off to the examination administrator, to make sure information and adjustments were essential; the poll was at last modified by

coordinating the ideas and amendments to guarantee its legitimacy.

### Method of Data Collection

The specialist worked inseparably with the chief or organizer and research center researcher responsible for the antenatal center of the examination office. Full clinical and obstetric history was taken, and an actual assessment was performed. Then, at that point, the respondents were inspected for jungle fever parasite disease and ensuing renal capacity boundary with an examination time of four (4) months.

### Socio-Demographic Data

The socio-segment information and obstetric history (age, conjugal status, equality, gravidity, and so on) was obtained from the member with the guidance of a semi-organized poll after they have assented to take part in the investigation. A clarification directing the filling was accommodated for those that didn't get it, and they were recovered in the wake of filling with guaranteed secrecy and classification.

### Experimental Design

#### Sample Collection

With a sterile needle and needle, 5ml of venous blood was taken from every member and moved to a named test bottle (each example bottle was named with a novel code for distinguishing proof reason) for the organic chemistry test. The blood tests were dissected for the level of parasitaemia, urea, creatinine, sodium, potassium chloride, and bicarbonate.

#### Malaria parasite Test

This was finished utilizing the thick film, which is the highest quality level and a quick indicative test unit. The example was picked in a drop of 5ml for the quick test, and it was dropped in the test cushion, and 3 drops of the test distillate were added. It was considered 20 minutes, and the test outcome section contrasted and the outcome as shown by the test/reagent cushion. For the thick film, a drop of the example was picked, and it was made in a thick film on a perfect oil-free slide. Whenever it was permitted to air-dry, it was then blended utilizing GIEMAS stained for 2 minutes, and flushed in clean water. It was permitted to air dry. The film was then seen under a magnifying instrument utilizing objective in an oil drenching.

#### Method of Data Analysis and Presentation

The information obtained from the recovered survey was investigated utilizing mean, standard deviation, straightforward rate, and recurrence counts, while the Statistical importance was tried utilizing T-test and chi-square inferential measurements at 0.05 degree of importance and surmising was drawn and was contrasted and intelligent inspected.

### Statistical Analysis

Data collected were coded, entered into a computer, and cleaned. The statistical package Graph Pad Prism-6 was used to analyze the data. Results were presented in tables using means and percentages. Chi-square, p-value, and one-way were used to assess the statistical significance. Statistical significance was decided.

### Ethical Consideration

A letter of presentation was sent from the Africa Center of Excellence for Public Health and Toxicological Research (ACE-PUTOR), University of Port Harcourt, to the examination moral advisory group of the University of Port Harcourt Teaching Hospital looking for authorization to lead the exploration in the clinic. An acknowledgment letter was expected and gotten from the medical clinic moral board before the investigation was led. Assent was sort from the respondent, and secrecy of data was guaranteed to all respondents. A moral endorsement was additionally gotten from the University of Port Harcourt Research Ethical Committee to approve the exploration.

## RESULTS

### Demographic Characteristics of Respondents

This study enrolled a total of 120 respondents (ANC attendees) in the University of Port Harcourt Teaching Hospital (UPTH) and the UPTH Primary Health care Center (60 pregnant women diagnosed with Gestational Malaria and 60 healthy women) with an age range of 25-34years. A Case control design was adopted in the study in Umuoko, Aluu, and every four to six months using a convenient non-probability sampling method. Young women of 25-34 years of age constituted a majority (39.2%) with primiparous (42.5%), Secundigravi women (40%) in their second trimester (38.3%) gestational age.

**Table 1: Frequency distribution of demographic characteristics of respondents in this study (N=120).**

Variables Response	Frequency	%	
Age	18-24 years	27	22.5
	25-34 years	47	39.2
	35-44 years	21	17.5
	45 years and Above	25	20.8
Total		120	100
Parity	Nulliparous	38	31.7
	Primiparous	51	42.5
	Multiparous	31	25.8
Total		120	100
Gravidity	Primigravida	40	33.3
	Secundigravida	48	40.0
	Multigravida	32	26.7
Total		120	100
Gestational age	1st trimester	39	32.5
	2nd trimester	46	38.3
	3rd trimester	35	29.2
Total		120	100

### Renal Function Parameters of Malaria Negative (MN) Pregnant Women

The Renal capacity boundaries for jungle fever-negative pregnant ladies uncovered that sodium particle (Na<sup>+</sup>) had a base and greatest centralization of 131.00 and 142.00, with a mean focus and standard deviation of 137.12 ± 0.23 and 1.75 separately. Potassium particles (K<sup>+</sup>) had a base and greatest convergence of 3.10 and 6.00, with a mean focus and standard deviation of 3.49 ± 0.05 and 0.40 separately. Chloride particle (Cl<sup>-</sup>) had a base and greatest convergence of 95.00 and 108.00, with a mean

focus and standard deviation of 103.55 ± 0.33 and 2.56 separately. Bicarbonate (HCO<sub>3</sub>) had a base and most extreme centralization of 14.00 and 25.00 separately, with a mean focus and standard deviation of 20.17 ± 0.33 and 2.56 individually. Urea had a base and most extreme centralization of 1.40 and 2.80 separately, with a mean focus and standard deviation of 1.89 ± 0.04 and 0.30 individually, while creatinine had a base and most extreme centralization of 50.00 and 75.00 separately, with a mean focus and standard deviation of 59.75 ± 0.72 and 5.56 individually.

**Table 2: Renal Function Parameters of Malaria Negative (MN) Pregnant Women.**

Variables	Na <sup>+</sup> (mmol/L)	K <sup>+</sup> (mmol/L)	Cl <sup>-</sup> (mmol/L)	HCO <sub>3</sub> (mmol/L)	UREA (mmol/L)	Creatinine (μmol/L)
Minimum	131.00	3.10	95.00	14.00	1.40	50.00
Maximum	142.00	6.00	108.00	25.00	2.80	75.00
Mean	137.12 ± 0.23	3.49 ± 0.05	103.55 ± 0.33	20.17 ± 0.33	1.89 ± 0.04	59.75 ± 0.72
Std. Deviation	1.75	0.40	2.56	2.56	0.30	5.56
Normal Ref. Range	135 - 145	3.3 - 5.5	97 - 106	20 - 26	3.0 - 6.6	72.0 - 126.0

### Renal Function Parameter of Malaria Positive (MP) Pregnant Women

The renal capacity boundaries for jungle fever-positive pregnant ladies uncovered that sodium particle (Na<sup>+</sup>) had a base and most extreme grouping of 135.00 and 140.00 separately, with a mean fixation and standard deviation of 137.55 ± 0.18 and 1.37 individually. Potassium particles (K<sup>+</sup>) had a base and greatest convergence of 2.60 and 5.00 individually, with a mean fixation and standard deviation of 3.45 ± 0.05 and 0.42 separately. Chloride particle (Cl<sup>-</sup>) had a base and greatest convergence of 102.00 and 107.00, with a mean fixation and standard deviation of 104.37 ± 0.19 and 1.53 separately. Bicarbonate (HCO<sub>3</sub>) had a base and most extreme grouping of 16.00 and 25.00, with a mean focus and standard deviation of 20.32 ± 0.31 and 2.44,

separately. Urea had a base and most extreme grouping of 1.40 and 3.00 individually, with a mean focus and standard deviation of 1.97 ± 0.05 and 0.36 separately, while creatinine had a base and most extreme grouping of 50.00 and 75.00 individually, with a mean focus and standard deviation of 62.00 ± 0.84 and 6.52 separately. The findings then mean that there was an increase or high in creatinine level with 75.00 (μmol/L) and normal values in urea level 3.00 (μmol/L)



**Table 3: Renal Function Parameter of Malaria Positive (MP) Pregnant Women.**

	Na <sup>+</sup> (mmol/L)	K <sup>+</sup> (mmol/L)	Cl <sup>-</sup> (mmol/L)	HCO <sub>3</sub> <sup>-</sup> (mmol/L)	UREA (mmol/L)	Creatinine (μmol/L)
Minimum	135.00	2.60	102.00	16.00	1.40	50.00
Maximum	140.00	5.00	107.00	25.00	3.00	75.00
Mean	137.55 ± 0.18	3.45 ± 0.05	104.37 ± 0.19	20.32 ± 0.31	1.97 ± 0.05	62.00 ± 0.84
Std. Deviation	1.37	0.42	1.53	2.44	0.36	6.52
Normal Ref. range	135 - 145	3.3 - 5.5	97 - 106	20 - 26	3.0 - 6.6	72.0 - 126.0

### The Level of Significance Renal Function Parameter of Malaria Negative (MN) and Malaria Positive (MP) Pregnant Women

Table 4 shows the level of importance of renal capacity boundary of Malaria Negative (MN) and Malaria Positive (MP) pregnant ladies uncovered that sodium particle (Na<sup>+</sup>) altogether expansion in jungle-fever positive pregnant ladies contrasted with intestinal sickness-negative pregnant ladies with  $P < .000$  and mean distinction of 137.55000mmol/L and 137.11667mmol/L separately. Potassium particle (K<sup>+</sup>) fundamentally declined in intestinal sickness-positive pregnant ladies contrasted with also jungle-fever-negative pregnant ladies with  $P < .000$  and mean distinction of 3.45167 and 3.49333 individually. Chloride particle (Cl<sup>-</sup>) altogether expansion in jungle fever-positive pregnant ladies contrasted with intestinal

sickness-negative pregnant ladies with  $P < .000$  and mean distinction of 104.36667mmol/L and 103.55000mmol/L separately. Additionally, bicarbonate (HCO<sub>3</sub><sup>-</sup>) fundamentally expanded in jungle fever-positive-pregnant ladies contrasted with intestinal sickness-negative pregnant ladies with  $P < .000$  and mean distinction of 20.31667mmol/L and 20.16667mmol/L separately. Urea fundamentally declined in jungle fever-positive pregnant ladies contrasted with intestinal sickness-negative-pregnant ladies with  $P < .000$  and mean distinction of 1.97333mMol/l and 1.89167mMol/l separately. Creatinine altogether declined in intestinal sickness-positive pregnant ladies contrasted with jungle fever-negative pregnant ladies with  $P < .000$  and mean distinction of 62.00000μMol/L and 59.75000μMol/L separately.

**Table 4: T-Test Showing Level of Significance Renal Function Parameter of Malaria Negative (MN) and Malaria Positive (MP) Pregnant Women.**

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MN_Na <sup>+</sup>	607.763	59	.000	137.11667	136.6652	137.5681
MN_K <sup>+</sup>	67.022	59	.000	3.49333	3.3890	3.5976
MN_Cl <sup>-</sup>	313.242	59	.000	103.55000	102.8885	104.2115
MN_HCO <sub>3</sub> <sup>-</sup>	61.046	59	.000	20.16667	19.5056	20.8277
MN_UREA	48.141	59	.000	1.89167	1.8130	1.9703
MN_CREAT	83.302	59	.000	59.75000	58.3147	61.1853
MP_Na <sup>+</sup>	777.310	59	.000	137.55000	137.1959	137.9041
MP_K <sup>+</sup>	64.209	59	.000	3.45167	3.3441	3.5592
MP_Cl <sup>-</sup>	528.724	59	.000	104.36667	103.9717	104.7617
MP_HCO <sub>3</sub> <sup>-</sup>	64.522	59	.000	20.31667	19.6866	20.9467
MP_UREA	42.264	59	.000	1.97333	1.8799	2.0668
MP_CREAT	73.630	59	.000	62.00000	60.3151	63.6849

## DISCUSSION OF RESULTS

The findings from this study showed that urea and Creatinine significantly decreased in malaria-positive pregnant women when compared against the normal reference level of 3.0-6.6mmol/L and 72.0 - 126.0μmol/L, respectively. Though Information regarding the level of urea and creatinine among malaria patients is diverse, some studies reported an increase in the level of urea and creatinine (Ekeanyanwu and Ogu, 2010; Afrifa *et al.*, 2017). This study and other studies (Jurado, & Mattix, 2023 and Jose, & Salazar, 2014) reported reduced levels of urea and creatinine, which is not a risk factor for renal impairment. The principle

motivation behind this examination was to experimentally assess the renal capacity in pregnant ladies with intestinal sickness among ladies going to antenatal consideration in chosen wellbeing offices in Rivers State. The examination tracked down that a large proportion of the ladies (39.2%) that partook in the investigation were primiparous (42.5%), secundigravida (40%) women in their second trimester ((38.3%) within the age range of 25-34years.

The investigation set that sodium particle (Na<sup>+</sup>) altogether expansion in intestinal sickness-positive pregnant ladies with  $P < .000$  and mean contrast of

137.55000. However, it was inside the not-unexpected reference scope of 135-145mmol/L. Chloride particle (Cl<sup>-</sup>) and bicarbonate (HCO<sub>3</sub>) likewise altogether expansion in intestinal sickness-positive pregnant ladies with P <.000 and mean distinction of 104.36667 and P <.000 and mean contrast of 20.31667 respectively. Nonetheless, chloride particle (Cl<sup>-</sup>) was inside the reference scope of 97-106mmol/L while bicarbonate (HCO<sub>3</sub>) was inside the reference scope of 20-26mmol/L for pregnant ladies (Abbassi-Ghanavati, Greer, and Cunningham, 2009). Alternately, the investigation further uncovered that potassium particle (K<sup>+</sup>) essentially declined in intestinal sickness-positive pregnant ladies with P <.000 and a mean contrast of 3.45167 and was underneath the ordinary scope of 3.3–5.2 mmol/L for pregnant ladies (Abbassi-Ghanavati, Greer and Cunningham, 2009).

The finding from the investigation additionally showed that urea and Creatinine altogether declined in intestinal sickness-positive pregnant ladies when analyzed against the typical reference level of 3.0-6.6mmol/L and 72.0 – 126.0µmol/L separately. Data for even out of urea and creatinine among jungle fever patients are assorted. While a few investigations (Ekeanyanwu and Ogu, 2010; Afrifa *et al.*, 2017) detailed expansion in the degree of urea and creatinine. This examination and different investigations (Jurado, & Mattix, 2023) revealed diminished degrees of urea and creatinine. The diminishing in the degree of urea and creatinine may not be a circumstance for worry since ordinary pregnancies present indications of decreased creatinine and urea regularly in ordinary pregnancy, there is a consistently lower level of plasma urea and creatinine focus because of different elements, including the dilution impact of an expansion in volume plasma, diminished creation (positive nitrogen equilibrium), and expansion in renal discharge because of a pregnancy-prompted expansion in the glomerular filtration rate (Maynard and Thadhani, 2009). Study shows that there is no huge connection between renal capacity and intestinal sickness in pregnancy, p<0. 202 esteem more noteworthy than 0.05.

## CONCLUSION

It is being concluded that a form of renal impairment associated with malaria exists, and Malaria has a significant impact on renal function (most importantly, urea and creatinine) which is also significantly associated with increasing gestational age.

The outcomes from the current examination set up that intestinal sickness altogether also affects renal biochemical parameters, particularly with the demonstrated degree of urea and Creatinine It is anyway, still significant that pregnant ladies who report to medical clinics with intestinal sickness be analyzed for kidney work as quickly as possible.

## Recommendation

The following recommendations are drawn from the results of this study and include:

1. Pregnant women with malaria in pregnancy should ensure to manage and treat selves adequately to prevent imminent maternal and fetal effects.
2. Pregnant women who report to the clinic with malaria should also be examined selves adequately for renal function.
3. Nurses and Midwives should ensure counselling and health education, especially during ANC, on Malaria in pregnancy as it affects as regards to urea and creatinine as well as other fluids and electrolytes substances.
4. Government should create a stable environment for both patients and midwives.

## Limitations of Study

Limitations to this study included limited time space for the study and lack of financial support from any organization.

**Generalizability:** The responses given can be generalized.

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