Haematological Profile in the Oil Producing Localities of Imo State, South-East, Nigeria

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ABSTRACT

Aim: To determine if oil exploration and production in Ohaji/Egbema and Oguta LGAs have resulted in carcinogenic effects for a specific lifetime from exposures since our secondary data have shown a high percentage of cancer cases from the two LGAs.
Study Design: This was a comparative study aimed at determining whether oil exploration and production in the selected LGAs had resulted in carcinogenic effects for a specific lifetime.
Place and Duration of Study: Ohaji/Egbema, Oguta, Mbaitoli and Onuimo LGAs, Imo State, Nigeria, between June 2014 and August 2018.
Methodology: Haematological estimations were carried out at Silver Press Laboratory, Owerri, Nigeria. The Neubauer counting chamber was used in red blood cell count after the addition of red blood cell diluting fluid. The Neubauer counting chamber was used in white blood cell count after the addition of Turk solution. The platelet was also counted using the Neubauer counting chamber. The differential white blood cells were counted manually after smearing the Leishman's stained drop of blood onto a glass slide. Olympus CX21FS1 Binocular Microscope was used to examine all blood samples.
Results: The oil-producing LGAs recorded 89% clinically diagnosed leukaemic cases while the non-oil producing LGAs recorded 11% and all results correlated strongly (r = 0.997) with the University of Nigeria Teaching Hospital, Enugu Cancer Registry data.
Conclusion: Overall results have indicated a high level of contamination and exposure in the oil-producing localities.

KEYWORDS: Imo State; Oil exploration; Blood samples; Haematological estimations; Leukaemia

1.0 INTRODUCTION

Naturally Occurring Radioactive Materials (NORMs) such as ^{40}K, ^{226}Ra and ^{232}Th are present in many geological materials and are consequently encountered during geologically related activities. NORMs have the characteristic that, owing to their wide distribution, they give rise to a very much larger radiological effect on the public than that caused by the nuclear industry and other anthropogenic sources of radiation [1]. Technologically Enhanced Natural Radiation (TENR) is used on exposure to natural sources of radiation that would not occur without, or which is increased by, some technological activities not expressly related to the radioactive nature of the materials [2]. Oil and gas production and processing operations sometimes cause naturally occurring radioactive materials (NORMs) to accumulate at elevated concentrations in by-product waste streams [3]. The sources of most of the radioactivity are isotopes of uranium-238 (U-238) and thorium-232 (Th-232), which are naturally present in the subsurface formations from which oil and gas are produced [3]. Naturally occurring radioactive materials generated by the petroleum industry may be divided

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into two general categories: (1) wastes containing radium isotopes and their progeny and (2) wastes containing only lead-210 (Pb-210) and its progeny. For the radium-bearing wastes, the primary radionuclide of concern is radium-226 (Ra-226) of the U-238 decay series. Radium-228 (Ra-228), of the Th-232 decay series, also occurs in these NORM wastes but is usually present in lower concentrations. Other radionuclides of concern include those that form from the decay of Ra-226 and Ra-228 [3]. The production waste streams most likely to be characterized by elevated radium concentrations include produced water (that is, the water produced along with the hydrocarbons), scale and sludge [3]. Produced water is a combination of formation water which occurs naturally in the reservoir and water injected into the well to increase pressure necessary for extracting oil [4]. Radium, which is slightly soluble, can be mobilized in the liquid phases of a subsurface formation and transported to the surface in the produced water stream. Dissolved radium either remains in solution in the produced water or, if the conditions are right, precipitates out in scales or sludges [3]. A separate category of naturally occurring radioactive materials wastes exists. This category includes wastes that do not contain any radium but do contain Pb-210, which is a decay product of Ra-226 and its progeny. These wastes accumulate inside gas processing equipment from the decay of radon-222 (Rn-222). The Pb-210 may be present in elemental form, as a chemical precipitate, or as an integrated constituent of the equipment metal. Total radium concentrations depend on the amount of radium present in the subsurface formation, formation water chemistry, extraction processes, treatment processes and age of production. Radium is brought to the surface in solution in produced water and as a result, a higher water production rate, such as is characteristic of older fields, can result in increased NORM concentrations [3]. When radium-bearing produced water, scales or sludges are released to the ground, the soil becomes contaminated with concentrations of radium [3]. The investigation and regulatory control of the impacts of most of these wastes have been overlooked by federal and state agencies while stringent controls have been placed on X-ray and other man-made sources of radiation. As a matter of fact, most oil firms use the environment as a free disposal system, endangering the lives of people exposed to radium-contaminated water and soil. The major radiological health concern from exposure to NORM is the potential induction of cancer [3]. Human and animal studies showed that radiation exposure at low to moderate doses might increase the long-term incidence of cancer [5]; [6]; [7]. The development of radiation-induced cancer is a stochastic process and is considered to have no threshold dose, that is, the probability of occurrence, not the severity of effect, increases with dose, and there is no dose level below which the risk is zero. Cancer is a public health problem worldwide affecting all categories of persons. It is among the leading causes of death in developing countries. Besides, 12.5% of all deaths are attributable to cancer and if the trend continues, it is estimated that by 2020, 16 million new cases will be diagnosed per annum out of which 70% will be in developing countries [8]. As stochastic effects of radiation have no thresholds and can cause cancers or genetic modifications, of which the curing rates are rather low to date, they become a major subject of research in radiation protection. Leukaemia is a type of cancer found in the blood and bone marrow and is caused by the rapid production of abnormal white blood cells. These abnormal white blood cells are not able to fight infection and impair the ability of the bone marrow to produce red blood cells and platelets [9]. Leukaemia can be either acute or chronic. Chronic leukaemia progresses more slowly than acute leukaemia, which requires immediate treatment. Leukaemia is also classified as lymphocytic or myelogenous. Lymphocytic leukaemia refers to abnormal cell growth in the marrow cells that become lymphocytes, a type of white blood cell that plays a role in the immune system. Thus, high lymphocytes count may indicate leukaemia. In myelogenous leukaemia, abnormal cell growth occurs in the marrow cells that mature into red blood cells, white blood cells, and platelets. There are four broad

classifications of leukaemia: Acute lymphocytic leukaemia (ALL), Acute myelogenous leukaemia (AML), Chronic lymphocytic leukaemia (CLL), Chronic myelogenous leukaemia (CML) [9]. Leukaemia occurs in both adults and children. ALL is the most common form of childhood leukaemia, and AML is the second most common. The two most common adult leukaemia are AML and CLL [9]. Although experts are uncertain about the causes of leukaemia, they have identified several risk factors that include the following: exposure to high levels of radiation, repeated exposure to certain chemicals (for example, benzene), chemotherapy, Down Syndrome, a strong family history of leukaemia [9]. A complete blood count (CBC) is usually conducted to determine if one has leukaemia. This test may reveal if leukaemic cells are present. Abnormal levels of white blood cells and abnormally low red blood cell or platelet counts may indicate leukaemia [9]. According to [10], normal ranges for White Blood Cell (WBC), Red Blood Cell (RBC) and Platelet (Plt) are (5-10) X 1,000/mm^3, (4.2-6.1) X 1,000,000/mm^3 and (150-450) X 1,000/mm^3, respectively. Mammalian blood contains 5 different types of white blood cells which can be distinguished by staining with dyes. The Difquik kit provides a rapid method for this purpose. In differential white cell count, the percentage of each type of leukocyte (white blood cell) present in blood is determined. The 3 types of white cells, neutrophils, eosinophils and basophils are described collectively as granulocytes. The 2 other types of white cells are lymphocytes and monocytes and are described collectively as agranulocytes. Deviations of different white cell counts from the normal values often indicate a diseased state [11]. According to [12], normal ranges for neutrophil, eosinophil, basophil, monocyte and lymphocyte are (50-70)%, (1-4)%, (0.5-1.0)%, (2-8)% and (20-40)%, respectively. Other laboratory features of blood samples may be used to diagnose acute and chronic leukaemia. Treatment depends on one's age, general health, and type of leukaemia. A combination of treatments that could include chemotherapy, biological therapy, radiation therapy, and stem cell transplantation might be received. Patients with acute leukaemia often undergo chemotherapy because this type of treatment targets fast-dividing cells. Many acute leukaemia patients have responded successfully to treatment [9]. On the other hand, because the cells divide more slowly in chronic leukaemia, it is better treated with targeted therapies that attack slowly dividing cells as opposed to traditional chemotherapy that targets rapidly dividing cells [9]. As soon as leukaemia is established, talking with a pathologist is critical as regards treatment. Imo State, one of the nine (9) Niger Delta States, was created on the 3rd of February, 1976. The State lies with latitudes $5^0\ 40^1$ and $7^0\ 5^1$ North and longitudes $6^0\ 35^1$ and $8^0\ 30^1$ East [13]. Imo State covers an area of 5,100 km^2 [14]. According to the national census of 2006 and estimations for subsequent years, Imo State has a population of 3,927,563 made up of 1,976,471 (males) and 1,951,092 (females). The National Population Commission projected that the population of the state should reach about 4,038,713 in 2010 using a 2.83% growth rate [15]. There are 27 Local Government Areas (LGAs) in Imo State. They include: Aboh Mbaise, Ahiazu Mbaise, Ezinihitte Mbaise, Ihitte Uboma, Ehime Mbano, Ideato North, Ideato South, Ikeduru, Isiala Mbano, Isu, Mbaitoli, Njaba, Ngor Okpala, Nkwerre, Nwangele, Obowo, Oguta, Ohaji/Egbema, Okigwe, Onuimo, Oru East, Oru West, Orlu, Orsu, Owerri Municipal, Owerri North and Owerri West. Imo State is located in the eastern part of Nigeria. It is located between Anambra State in the North and Rivers State in the South. It is bounded on the East by Cross River State and Akwa Ibom State and on the West by the River Niger. Imo State derives its name from Imo River, which takes its course from the Okigwe/Awka Upland. The sampling LGAs include Ohaji/Egbema, Oguta, Mbaitoli and Onuimo and cover the areas of 890 km^2, 483 km^2, 204 km^2 and 87.0 km^2, respectively [14]. Ohaji/Egbema, Oguta, Mbaitoli and Onuimo have the populations of 182,891, 142,340, 237,474 and 99,368, respectively [15]. From 1956, when first oil well was successfully drilled in Nigeria, scrambling for Nigeria's resources by Europeans took on a new dimension

[16]. In 1964, oil production and processing operations started in Ohaji/Egbema and Oguta LGAs, Imo State, Nigeria [17]. Oil production and processing operations are carried out in Ohaji/Egbema LGA by Shell Petroleum Development Company (SPDC) and Waltersmith Petroman Oil Limited (WPOL) and in Oguta LGA by Nigerian Agip Oil Company (NAOC) now called Addax Petroleum Development Nigeria Limited (APDNL) and Chevron Nigeria Limited (CNL). Currently, the production level in the LGAs is about 7,500 barrels per day [18]. Ohaji/Egbema and Oguta LGAs, apart from being the oil-producing areas of the state, are inhabited mainly by farmers. They subsist mainly by raising livestock and involvement in other types of agriculture. It should be noted that there are no chemical nor other industrial processes in Ohaji/Egbema and Oguta LGAs apart from oil. The physical infrastructure of those oil producing areas is poor and there are two general hospitals in the areas, General Hospital Egbema (GHE) and General Hospital Oguta (GHO). More than 40 oil wells surround the two LGAs. Most of the oil wells are just a few meters from residential houses and farmlands. The Flow Station and the wells dispose of waste in the rivers that traverse the towns. Those rivers are used by the population for drinking, cooking, bathing and washing of clothes. To the best of our knowledge, Mbaitoli and Onuimo LGAs do not have any oil wells and will serve as our control LGAs. Again, there are no chemical nor other industrial processes in Mbaitoli and Onuimo LGAs. According to [19], more Nigerians are at a greater risk of developing different types of cancer due to exposure to crude oil pollutants. In response to communities concern about the health effects of oil pollution, Egbema and Izombe towns in Ohaji/Egbema and Oguta LGAs, respectively surrounded by oil wells were visited in June 2014. Preliminary investigations showed that, there were reoccurring cases of oil spillage in Egbema, Izombe and other towns in Ohaji/Egbema and Oguta LGAs which had become the norm, there was severe gas flaring at Obokofia town in Ohaji/Egbema LGA where SPDC Flow Station is located which had equally become the norm, Sucker Pits were used in gathering crude waste which overflowed during rainy season, crude waste was disposed of at uncovered Waste Pits at least four times in a year, crude waste flowed through some openings on well-head fence into canals and farmlands, gas was flared from Gas Pipe and crude discharged at Pressure Line when any well-head was pressurized. In November 2014, as part of a broader study of the situation, the study team visited General Hospital, Egbema (GHE) and General Hospital, Oguta (GHO), local hospitals in Ohaji/Egbema and Oguta LGAs and found that there were several reported cases of cancer in the local hospitals. A medical doctor at GHE, who resumed duties in April 2012 could not remember the number of cancer cases he had referred to University of Nigeria Teaching Hospital (UNTH) Enugu. There are 13 cancer registries in Nigeria, located in various parts of the country. Most of the registries in Nigeria produce hospital-based data and population-based data. The Cancer Registry Unit, UNTH, Enugu in the South-Eastern Zone was visited in July 2016. The registry data (hospital-based and population-based) obtained on cases from Imo State, Nigeria from 2000 to 2015, which could well describe correlations with cancer incidence in the South-Eastern Zone, Nigeria, indicated that 23% of the clinically & histologically diagnosed cases on all types of cancer were from Ohaji/Egbema and Oguta LGAs only [20]. This is shown in Table (1). The clinically & histologically diagnosed cases included: hepatocellular carcinoma, anal cancer, breast cancer, prostate cancer, cervical cancer, ovarian cancer, skin cancer, thyroid cancer, lymphomas, kidney cancer and leukaemia. Consequently, oil exploration and production (E & P) in the LGAs might have resulted in carcinogenic effects for a specific lifetime from projected exposures. Considering these results and other findings, it becomes pertinent to evaluate the haematological profile in the oil-producing localities of Imo State, Nigeria in order to establish any possible relationship between oil E & P and leukaemia in particular. To our knowledge, no such study was previously conducted in Ohaji/Egbema and Oguta LGAs. The knowledge of the haematological profile in those LGAs

can improve awareness and encourage preventive action to minimize effects. The general objective is to determine if oil E & P in Ohaji/Egbema and Oguta LGAs have resulted in carcinogenic effects for a specific lifetime from exposures since our secondary data have shown high percentage of cancer cases from the two LGAs while the specific objectives are to: (a) carry out haematological estimations on selected human blood samples from the two oil-producing LGAs since leukaemia is prominent on our secondary data and (b) carry out haematological estimations on samples from the control LGAs.

2.0 RESEARCH METHODOLOGY

2.1 Study Design

This was a comparative study aimed at determining whether oil exploration and production in the selected LGAs had resulted in carcinogenic effects for a specific lifetime.

2.2 Study Settings

The sampled LGAs included Ohaji/Egbema, Oguta, Mbaitoli and Onuimo. The study covered the entire two (2) oil producing LGAs in Imo State (Ohaji/Egbema and Oguta). Similar types of samples were collected from two (2) non-oil producing LGAs (Mbaitoli and Onuimo) and analysed, which served as control. The distances between Ohaji/Egbema and Mbaitoli, Oguta and Onuimo, Ohaji/Egbema and Onuimo, Mbaitoli and Onuimo are about 40,000 m, 72,000 m, 79,000 m and 39,000 m, respectively while Mbaitoli and Oguta have a common boundary. The study area is shown in Figure (1).

2.3 Study Population for Haematological Estimations

The study population involved healthy volunteers in the selected towns in Ohaji/Egbema (Egbema, Awara/Ikweraede, Assa/Obile, Obudi-Agwa, Ohoba), Oguta (Izombe, Ezi-Orsu, Orsu-Obodo, Awa, Egwe), Mbaitoli (Mbieri, Ubomiri, Orodo, Ogwa, Ogbaku) and Onuimo (Okwelle, Alike, Umuna, Umuduru, Okwe).

2.4 Sample Size Determination for Haematological Estimations

The current population profile of Ohaji/Egbema and Oguta LGAs was 353,632 using the 2.83% growth rate according to [15] which represented 49.1% of the current population profile of the studied areas. The sample size for this study was determined using the formula below:

$$n = 2\left[\frac{(Z_\alpha + Z_{1-\beta})^2\, \pi(1-\pi)}{(P_1 - P_2)^2}\right], \text{[21]} \qquad (1)$$

where n = required sample size

Z_α = standard normal value corresponding to 95% confidence level set at 1.96

$Z_{1-\beta}$ = standard normal value corresponding to a power of 80% power set at 0.84

P_1 = proportion of exposed (49.1%), [15]

P_2 = proportion of unexposed (with 15% increase = 64.1%)

π = average proportion $\frac{P_1+P_2}{2} = \frac{0.491+0.641}{2} = 0.566$

$$n = 2\left[\frac{(1.96 + 0.84)^2 0.566(1 - 0.566)}{(0.491 - 0.641)^2}\right]$$

$n = 171$

Adjusting the sample size for 10% non-response:

$$n_f = \frac{n}{1-n_r}$$

$$n_f = \frac{171}{1-10\%}$$

$n_f = 190$

Therefore, a total of 190 participants per LGA were recruited into the study.

2.5 Sampling Technique for Haematological Estimations

A multi-stage sampling technique was adopted.

Stage one: Two (2) LGAs were selected from the twenty-seven (27) LGAs in Imo State using purposive sampling technique because they are oil producing LGAs in Imo State.

Stage two: Systematic sampling technique was used to select two (2) LGAs as the control clusters.

Stage three: Systematic sampling technique was adopted to select the households. The head or representative of the household was interviewed.

2.6 Minimum Duration of Residency for Haematological Estimations

Minors and young adults (≤ 29 years old) were residents for at least 5 years in Ohaji/Egbema & Oguta LGAs for eligibility. Adults (≥ 30 years old) were resident for at least 30 years in Ohaji/Egbema and Oguta LGAs for eligibility. Thus, the exposure time for participants ≤ 29 years old was 5 to 29 years while exposure time for participants ≥ 30 years old was 30 years and above.

2.7 Inclusion Criteria for Haematological Estimations

Participants ≥ 30 years old.

Minors and young adults ≤ 29 years old.

2.8 Exclusion Criteria for Haematological Estimations

Employees in oil/gas companies residing within the LGAs because they might have occupational exposure.

2.9 Data Collection Procedure for Haematological Estimations

A self-developed questionnaire was used to elicit some socio-demographic characteristics such as age and duration of stay in the environment.

2.10 Sample Collection for Haematological Estimations

About 5 ml of blood samples were collected from the participants. Blood samples of adults who were ≥ 30 years old in Ohaji/Egbema and Oguta LGAs were collected for haematological analysis because according to [22], increased mortality from acute myelogenous leukaemia was found in those who were employed in the production of crude oil for more than 30 years. Blood samples of minors and young adults (≤ 29 years old) in the two LGAs were collected for haematological analysis because children are more sensitive than adults to the oncogenic effects of radiation, resulting in higher risks for acute leukaemia and solid cancers [23]. Also, children have a longer lifetime risk for developing radiation-induced cancers.

2.11 Laboratory Procedure for Haematological Estimations

Haematological estimations were carried out at Silver Press Laboratory, Owerri, Nigeria. The blood samples collected into Ethyl Diethylamine (EDTA) bottles were used for the determination of haematological parameters. The Neubauer counting chamber was used in RBC count after the addition of RBC diluting fluid as described by [24]. The Neubauer counting chamber was used in WBC count after the addition of Turk solution as described by [24]. The Plt was also counted using the Neubauer counting chamber. The results from the RBC, WBC and Plt counts were compared with normal values according to [10] and Table (2) [25]. The differential white blood cells were counted manually after smearing the Leishman's stained drop of blood onto a glass slide as described by [26]. The neutrophils,

lymphocytes, basophils, monocytes and eosinophils were determined. The results from differential white cells count were compared with normal values according to [12]. All blood samples were examined under Olympus CX21FS1 Binocular Microscope. Subsequently, similar examinations were repeated on all samples from the control LGAs (Mbaitoli and Onuimo).

2.12 Statistical Analysis

All statistical analysis was done using Minitab v16 software.

3.0 RESULTS AND DISCUSSION

The haematological results from the five (5) locations in each LGA are presented in Tables (3) to (22). Ohaji/Egbema and Oguta oil producing LGAs recorded 13 and 18 clinically diagnosed leukaemic cases, respectively. Ogbaku was the only location in Mbaitoli LGA that recorded clinically diagnosed leukaemic cases (4 cases) and that could be because of its proximity to oil-producing LGAs. Onuimo LGA recorded no clinically diagnosed leukaemic case and all cases from the four (4) LGAs correlated strongly ($r = 0.997$) with the UNTH, Enugu Cancer Registry data [20]. Blast cells, which indicate AML, were seen in the blood samples from participants 24, 9, 3 and 29 from Egbema, Awara/Ikweraede, Izombe and Ogbaku Locations, respectively while lymphoblasts, which indicate ALL, were seen in the blood samples, from other remaining positive cases, investigated under Olympus CX21FS1 Binocular Microscope. However, bone marrow biopsy is required to make definitive diagnoses. According to the study carried out by [3] on the assessment of the disposal of petroleum industry NORM in non-hazardous landfills, when radium-bearing produced water was released to the ground, the environment became contaminated with the concentrations of radium. Thus, crude wastes which contained dissolved radium might have not been properly handled by oil companies in the oil producing LGAs. The present result agrees with [5], [6] and [7] which reported that radiation exposure at low to moderate doses might increase the long-term incidence of cancer. The haematological profile in the oil-producing localities of Imo State, Nigeria has been established through blood collection from 190 participants per LGA recruited into the study. The oil-producing LGAs recorded 89% clinically diagnosed leukaemic cases while the non-oil producing LGAs recorded 11%. It also agrees with a previous study in which an excess of cancers was observed among males in a village located in an oil-producing area [27]. This part of the study agrees with previous studies on oil and gas field workers which showed a positive association between work and acute myelogenous leukaemia [28]; [29]; [22]. The clinically diagnosed leukaemic cases from the oil producing LGAs might be associated with the pollution of the environment with contaminants from oil production (upstream sector). However, according to [28], there is no clear association between refining work (downstream sector) and leukaemia.

4.0 CONCLUSION

The overall results of the study indicated a high level of contamination and exposure in the oil-producing localities. However, bone marrow biopsy is recommended for definitive diagnosis. Oil E & P should not be seen as an opportunity to acquire wealth and contaminate the environment. It should rather be seen as a means of revenue generation for the country that should be handled professionally in order not to contaminate the environment. The activities of oil companies in Ohaji/Egbema and Oguta oil producing localities and the methods of disposal of oil E & P wastes have to be reviewed by relevant government agencies because of the age of production of oil wells in the areas. These steps will go a long way in protecting the environment and the people.

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COMPETING INTERESTS
Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS
Author NNJ supervised the study, laboratory procedures and statistical analysis. Author BCE designed the study, participated in the laboratory procedures and wrote the first draft of the manuscript. All authors read and approved the final manuscript.

ETHICAL APPROVAL
Authors have obtained all necessary ethical approval from University of Ibadan, Nigeria/University College Hospital, Ibadan, Nigeria (UI/UCH) Ethics Committee and the approval/assigned number is: UI/EC/17/0262.

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Table 3: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	45	M	4.65	4.30	153	56.3	35.4	0.8	3.7	3.8
2	8	F	5.25	4.74	313	54.0	39.4	0.7	2.9	3.0
3	32	M	9.85	4.78	413	56.3	39.1	0.6	2.5	1.5
4	12	M	9.95	4.38	187	52.7	35.4	0.9	7.1	3.9
5	49	M	16.70	1.73	110	49.3	45.1	0.8	2.9	1.9
6	71	M	7.35	4.67	214	60.5	35.7	0.8	2.0	1.0
7	19	F	9.00	5.32	317	62.4	33.9	0.5	2.1	1.1
8	30	M	6.60	4.25	425	62.0	34.0	0.6	2.2	1.2
9	28	F	10.40	5.33	170	65.6	30.1	0.7	2.3	1.3
10	21	M	5.20	5.92	179	63.9	31.5	0.8	2.4	1.4
11	52	M	6.25	5.47	163	60.9	34.2	0.9	2.5	1.5
12	50	F	18.15	1.54	120	43.0	47.7	0.6	5.1	3.6
13	6	M	8.60	4.19	168	66.5	28.8	0.5	2.6	1.6
14	20	F	5.75	4.77	172	69.2	25.8	0.6	2.7	1.7
15	23	M	9.80	5.74	183	61.1	33.6	0.7	2.8	1.8
16	41	M	5.40	5.38	155	54.9	39.2	0.5	3.2	2.2
17	39	F	6.55	5.97	192	55.7	38.1	0.6	3.3	2.3
18	45	M	15.53	1.80	115	49.5	44.0	1.0	3.7	1.8
19	39	F	6.55	6.01	207	60.3	33.2	0.7	3.4	2.4
20	32	M	19.83	2.01	118	44.9	48.0	0.5	4.3	2.3
21	41	M	10.55	4.20	165	61.4	31.2	0.8	3.5	3.1
22	29	M	5.35	5.30	152	62.2	30.1	0.9	3.6	3.2
23	50	F	5.80	5.98	188	56.5	35.1	0.8	4.2	3.4
24	60	F	15.50	2.04	119	75.3	18.1	0.9	2.9	2.8
25	10	M	5.50	5.14	215	70.0	20.6	0.5	5.2	3.7
26	77	M	6.20	4.35	320	59.1	28.2	1.0	7.9	3.8
27	50	M	5.23	4.73	405	50.1	39.2	0.5	6.2	4.0
28	23	M	7.53	5.33	435	50.3	39.0	0.7	7.9	2.1
29	40	F	7.25	5.71	332	51.1	38.8	0.9	8.1	1.1
30	75	M	8.23	5.47	205	55.3	36.4	0.9	3.8	3.8
31	15	M	11.40	4.26	207	69.0	21.6	0.5	5.3	3.6
32	18	M	4.59	5.88	385	52.1	37.8	0.9	8.0	1.2
33	40	F	13.55	4.66	173	56.0	35.7	0.8	3.7	3.8
34	70	M	7.70	6.12	195	61.3	32.2	0.7	3.5	2.3
35	28	M	20.10	1.58	105	31.6	65.1	0.0	2.1	1.2
36	65	M	7.80	4.35	153	56.1	35.6	0.8	3.7	3.8
37	50	M	6.20	4.40	174	50.3	38.0	1.0	7.9	2.8
38	28	M	9.00	5.31	249	62.4	30.2	0.9	3.4	3.1

Counts from Egbema Location in Ohaji/Egbema LGA

Note: Participants 5, 12, 18, 20, 24 and 35 may be leukaemic because of the clinical manifestations.

Table 4: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
1	29	F	6.20	5.88	156	52.7	43.3	0.0	2.9	1.1
2	13	M	7.51	4.94	231	54.9	40.0	0.7	3.1	1.3
3	33	M	5.00	4.27	401	68.7	23.5	0.9	4.0	2.9
4	27	M	7.88	5.71	270	52.1	38.3	2.0	5.6	2.0
5	40	M	6.44	5.03	244	53.4	42.0	0.7	2.2	1.7

Counts from Awara/Ikweraede Location in Ohaji/Egbema LGA

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
1	20	M	6.33	4.22	151	56.6	40.1	0.1	2.0	1.2
2	32	M	7.13	4.40	160	59.0	28.3	1.0	7.8	3.9
3	13	M	10.00	5.00	167	62.9	32.2	0.9	2.4	1.6
4	41	M	3.00	5.41	253	60.2	32.1	0.8	3.7	3.2
5	45	M	6.04	5.92	283	61.1	33.0	0.0	3.1	2.8
6	20	F	8.70	4.32	180	55.7	37.1	0.6	3.2	3.4
7	15	M	9.96	5.31	350	63.8	31.5	0.9	2.0	1.8
8	47	F	7.75	4.99	229	51.9	42.0	1.0	4.1	1.0
9	45	M	18.33	1.79	110	72.1	23.5	0.6	2.5	1.3
10	13	M	9.21	4.29	393	53.3	40.7	0.5	3.3	2.2
11	14	M	5.19	5.28	422	50.1	39.7	0.8	5.7	3.7
12	39	M	7.93	5.91	179	54.0	40.0	1.0	3.0	2.0
13	18	F	8.61	4.70	166	57.9	38.7	0.0	2.2	1.2
14	45	M	6.04	5.92	283	61.1	33.0	0.0	3.1	2.8
15	24	F	9.33	4.25	233	57.2	39.2	0.8	4.7	3.1
16	48	F	5.31	5.88	395	50.3	42.4	1.0	5.2	1.1
17	18	M	6.44	4.32	427	53.6	41.3	0.7	3.0	1.4
18	50	F	9.01	4.20	169	55.9	37.4	0.5	3.9	2.3
19	22	M	6.20	4.97	219	50.0	39.9	0.9	6.0	3.2
20	18	M	9.94	6.00	266	52.3	40.5	2.0	3.8	1.4
21	66	M	7.04	4.24	309	55.9	38.7	0.7	2.5	2.2
22	51	M	21.90	1.65	107	44.5	48.3	0.8	3.7	2.7
23	25	F	9.98	4.89	444	60.0	30.6	0.9	5.5	3.0
24	22	M	6.39	5.11	221	57.8	34.2	0.5	6.1	1.4
25	54	F	7.44	4.34	171	51.7	42.3	0.8	3.1	2.1
26	16	M	9.91	5.49	182	53.3	40.3	2.0	2.7	1.7
27	57	F	5.11	5.91	230	53.9	39.4	0.7	3.1	2.9
28	17	M	7.51	5.50	390	61.1	31.9	0.5	4.9	1.6
29	43	M	8.39	4.36	280	55.1	40.0	0.9	2.9	1.1
30	27	M	6.43	4.71	360	54.7	38.3	1.0	5.0	1.0
31	39	F	5.27	4.22	151	58.9	34.2	0.8	3.0	3.1
32	25	F	6.35	5.93	231	61.1	32.2	0.5	2.3	3.9
33	31	M	7.50	5.20	420	69.7	23.5	0.6	3.2	3.0
34	10	M	8.39	4.33	288	51.1	41.5	0.9	4.4	2.1
35	29	F	9.94	4.70	167	53.7	40.6	0.0	3.1	2.6
36	37	F	7.20	5.81	219	53.4	39.9	0.0	5.2	1.5
37	30	M	8.30	4.90	244	58.0	31.2	1.0	7.1	2.7
38	38	M	9.08	5.22	397	52.0	40.9	0.7	3.3	3.1

Note: Participants 9 and 22 may be leukaemic because of the clinical manifestations.

Table 5: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Assa/Obile Location in Ohaji/Egbema LGA

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
5	37	F	4.90	5.50	307	53.8	39.3	0.5	4.2	2.2
6	20	F	6.10	4.27	231	56.1	40.1	0.6	2.2	1.0
7	39	M	7.22	4.70	210	52.4	39.3	0.9	3.9	3.5
8	72	M	8.74	5.11	155	61.7	30.3	1.0	3.1	3.9
9	50	M	6.11	5.55	214	52.3	40.2	0.0	4.9	2.6
10	26	F	16.20	1.78	114	50.4	44.4	0.0	3.3	1.9
11	45	M	6.60	5.91	371	60.4	35.2	0.7	2.0	1.7
12	57	F	9.45	5.01	401	54.1	39.2	0.9	4.3	1.5
13	12	M	8.44	4.41	440	50.9	41.0	0.1	5.3	2.7
14	20	M	7.50	4.25	157	52.7	39.4	0.6	4.1	3.2
15	10	M	8.50	5.03	170	56.6	35.5	0.8	6.0	1.1
16	7	M	6.33	4.90	262	58.3	37.0	1.0	2.4	1.3
17	49	M	25.05	1.65	112	41.6	50.7	0.8	4.9	2.0
18	24	F	8.44	4.80	201	53.0	40.1	0.8	3.9	2.2
19	40	M	7.33	4.91	411	50.0	41.2	0.6	5.2	3.0
20	18	M	8.51	4.22	433	54.7	41.1	0.9	2.0	1.3
21	45	M	7.60	4.37	172	69.2	23.0	0.5	5.0	2.3
22	20	M	5.50	4.60	197	55.5	33.9	0.0	7.7	2.9
23	70	M	8.68	5.51	221	62.7	31.4	1.0	2.9	2.0
24	15	F	10.00	5.01	255	64.8	26.5	0.8	4.8	3.1
25	43	M	6.20	5.39	173	53.2	35.2	2.0	5.7	3.9
26	66	M	23.45	1.87	109	46.7	48.2	0.6	2.6	1.9
27	37	M	6.20	5.37	179	61.7	34.1	0.9	2.2	1.1
28	39	M	7.80	4.33	184	53.0	41.1	0.8	3.8	1.3
29	53	M	7.58	4.73	244	54.1	40.6	0.6	2.7	2.0
30	27	M	8.90	4.91	314	64.2	27.4	0.7	5.0	2.7
31	66	M	10.40	5.55	444	56.3	39.4	1.0	2.1	1.2
32	21	F	7.20	4.31	153	50.3	41.5	0.0	5.2	3.0
33	69	M	7.70	4.23	164	54.9	34.9	0.9	6.1	3.2
34	67	M	7.00	4.98	261	52.2	40.7	0.0	4.3	2.8
35	29	M	8.60	4.53	391	56.3	38.8	0.5	3.0	1.4
36	27	M	8.00	5.09	377	65.9	27.7	0.7	3.7	2.0
37	14	M	7.20	5.58	207	52.2	40.8	1.0	4.3	1.7
38	39	M	6.95	4.94	167	67.7	21.7	0.8	5.8	4.0

Note: Participants 10, 17 and 26 may be leukaemic because of the clinical manifestations.

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
10	38	M	5.11	5.29	442	66.9	25.2	0.0	4.8	3.1
11	29	F	6.80	5.96	247	51.1	43.8	1.0	3.0	1.1
12	50	M	6.22	4.81	394	53.0	40.3	0.7	5.0	1.0
13	17	M	8.77	4.25	173	58.9	33.1	0.9	3.1	4.0
14	20	F	9.93	5.19	284	64.7	29.5	0.5	2.1	3.2
15	62	M	6.51	4.33	223	53.3	39.2	0.8	4.8	2.0
1	19	M	6.21	4.29	233	52.0	43.4	0.0	2.7	1.9
16	25	M	9.11	5.96	388	50.5	40.8	2.0	3.0	1.7
2	33	M	7.44	5.81	198	54.3	39.5	0.9	3.1	2.2
17	44	M	5.01	4.80	175	53.8	38.5	0.6	4.3	2.8
3	47	M	8.90	4.91	271	51.1	42.4	1.0	4.2	1.3
18	27	M	6.04	5.71	152	68.1	25.9	0.9	2.1	3.0
4	44	M	7.01	5.03	100	60.9	33.1	0.8	2.2	3.0
19	21	F	8.55	4.36	229	54.2	41.8	0.5	5.2	1.3
5	23	F	8.99	4.26	183	67.7	25.1	0.9	5.0	1.3
20	20	M	9.03	5.20	422	53.4	36.8	0.0	6.4	2.5
6	40	M	3.93	5.50	303	52.4	39.9	0.8	4.5	2.8
21	39	F	6.61	4.90	231	58.9	33.1	0.5	4.2	3.2
7	25	F	9.11	3.97	415	54.1	39.7	0.9	3.9	1.4
22	26	M	8.05	5.27	410	50.4	43.5	0.9	3.3	1.9
8	29	M	7.90	4.58	229	56.0	37.2	0.5	3.0	3.3
23	18	M	9.32	5.50	223	53.9	40.2	0.7	4.1	1.1
9	27	M	8.95	5.49	243	50.3	41.6	1.0	5.1	2.0
24	32	M	9.06	4.28	157	68.1	26.6	0.8	2.5	2.0
10	38	M	9.91	4.28	171	53.7	42.9	0.7	2.2	1.1
25	11	M	5.11	4.71	264	53.5	39.2	0.5	3.8	3.0
26	40	F	5.51	5.94	230	50.7	43.1	0.6	4.1	1.5
27	29	F	6.10	4.24	155	53.7	41.6	0.5	2.2	2.0
28	22	M	8.66	4.89	175	51.1	41.9	0.9	5.0	1.1
29	28	M	9.93	5.95	282	54.6	39.2	0.0	3.3	2.9
30	41	F	6.30	4.27	424	52.5	39.9	0.6	5.7	1.3
31	16	F	7.00	5.10	384	50.7	41.0	0.8	6.4	1.1
32	9	M	8.02	5.94	433	54.7	38.6	1.0	3.7	2.0
33	45	M	7.85	4.24	170	50.3	41.6	0.0	5.0	3.1
34	27	F	9.91	5.61	158	52.7	42.6	0.7	2.8	1.2
35	30	M	6.13	5.98	289	60.9	30.7	0.9	4.7	2.8
36	18	M	7.55	4.36	244	51.3	39.3	2.0	6.0	1.4
37	39	M	8.87	4.22	229	55.8	37.0	0.6	3.1	3.5
38	22	M	9.92	4.80	166	69.7	20.9	0.5	7.2	1.7

Table 6: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Obudi-Agwa Location in Ohaji/Egbema LGA

Note: Participant 5 may be leukaemic because of the clinical manifestations.

11	18	F	6.20	5.96	157	57.9	33.2	0.5	6.1	2.3
12	60	M	5.39	4.33	283	61.9	29.8	0.9	5.7	1.7
13	23	F	5.04	4.79	181	50.3	43.0	0.7	3.0	3.0
14	20	M	6.91	5.95	151	65.8	27.9	0.9	4.3	1.1
15	21	F	9.10	4.34	211	52.4	42.3	0.6	3.1	1.6
16	66	M	9.91	5.29	274	55.9	34.9	1.0	6.0	2.2
17	30	F	6.64	4.90	449	68.5	20.1	0.7	7.7	3.0
18	19	M	7.73	5.49	350	57.3	34.9	0.5	2.3	5.0
19	20	F	6.22	4.28	222	50.9	42.0	0.9	5.1	1.1
20	37	M	9.84	5.71	240	52.9	43.7	0.8	2.2	1.3
21	48	M	3.64	5.71	471	54.7	38.3	0.8	4.2	2.0
22	32	M	8.53	5.10	307	58.8	34.1	0.9	3.4	2.8
23	22	M	17.49	4.26	293	69.2	28.9	0.6	0.7	1.2
24	39	M	6.69	5.61	157	52.7	42.5	0.5	3.2	1.1
25	23	F	6.19	5.95	244	51.1	43.8	0.0	2.1	3.0
26	13	M	7.75	5.01	151	50.3	43.3	0.8	4.3	1.3
27	40	M	5.66	4.79	187	55.9	35.4	1.0	5.6	2.1
28	55	M	23.73	1.54	102	43.0	50.6	0.7	3.7	2.0
29	48	M	6.08	4.33	422	55.5	37.9	0.5	2.2	3.9
30	15	M	8.81	4.99	170	53.0	38.4	0.8	4.0	3.8
31	13	F	9.92	5.91	397	50.9	43.0	0.6	3.1	2.4
32	19	F	6.44	4.35	265	54.9	37.2	1.0	5.2	1.7
33	33	M	5.19	5.41	166	51.2	42.8	0.6	3.2	2.2
34	36	M	8.66	5.95	275	50.7	42.6	0.9	2.0	3.8
35	27	M	9.94	4.90	231	54.1	38.8	0.0	5.9	1.2
36	44	F	6.33	4.25	401	57.3	35.9	0.5	3.7	2.6
37	35	F	7.44	5.19	222	53.0	38.5	0.7	4.8	3.0
38	8	F	9.96	5.08	409	60.8	34.9	0.0	3.2	1.1

Table 7: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Ohoba Location in Ohaji/Egbema LGA

Note: Participant 28 may be leukaemic because of the clinical manifestations.

Table 8: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Izombe Location in Oguta LGA

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
5	52	M	18.44	1.59	105	42.7	47.6	1.0	5.4	3.3
6	45	M	6.55	4.27	156	57.8	33.6	0.5	5.1	3.0
7	11	M	7.83	4.45	179	53.3	40.6	0.8	2.1	3.2
8	30	M	9.01	5.21	221	56.9	34.6	0.5	5.1	2.9
9	20	F	5.22	5.83	280	62.1	27.6	0.9	6.2	3.2
10	44	M	5.04	4.24	233	67.8	22.5	0.7	7.7	1.3
11	49	F	5.64	4.39	411	54.2	36.7	0.6	6.5	2.0
12	18	M	7.00	5.49	434	58.9	33.7	1.0	5.1	1.3
13	47	M	22.77	1.53	103	41.6	48.2	0.0	6.2	4.0
1	41	F	7.44	4.77	210	54.1	40.9	0.0	3.2	1.8
14	60	M	8.01	5.85	165	52.2	42.3	0.5	3.9	1.1
2	15	M	8.51	5.70	222	57.3	37.8	0.6	2.1	3.0
15	15	F	9.30	5.97	183	55.1	35.1	2.0	4.8	3.0
16	39	F	9.10	4.30	294	61.5	29.1	0.9	5.3	3.2
17	22	M	8.80	5.03	447	53.9	40.3	0.7	3.2	1.9
18	15	M	7.44	4.22	159	56.0	37.4	0.5	4.7	1.4
19	45	M	6.09	4.77	229	53.2	38.9	0.0	5.4	2.5
20	56	M	9.95	5.85	242	55.1	34.9	0.0	6.7	3.3
21	26	F	6.77	4.33	293	58.0	34.9	0.8	4.9	1.4
22	49	M	16.11	1.87	117	41.9	45.9	1.0	7.5	3.7
23	18	F	6.25	4.21	227	51.2	41.7	0.5	3.3	3.3
24	15	M	7.33	5.98	374	54.0	34.9	1.0	6.2	3.9
25	48	M	8.61	5.87	397	50.9	38.9	0.8	7.0	2.4
26	10	F	9.95	4.83	165	53.7	41.7	0.6	2.5	1.5
27	37	M	6.20	4.44	153	68.4	24.0	2.0	3.7	1.9
28	50	F	7.97	5.03	274	67.9	23.0	0.8	5.3	3.0
29	20	M	9.44	5.18	215	56.0	35.3	0.5	6.2	2.0
30	15	F	6.11	4.88	412	53.2	37.0	1.0	7.7	1.1
31	25	F	15.99	1.89	118	43.2	45.8	0.6	6.9	3.5
32	18	M	5.22	5.83	299	51.4	40.8	0.7	3.9	3.2
33	29	M	6.10	4.27	244	54.0	39.6	0.5	3.0	2.9
34	57	M	25.64	1.52	103	40.4	50.1	0.9	5.3	3.3
35	59	M	15.10	1.99	116	45.9	45.1	0.7	5.8	2.5
36	22	M	8.99	4.48	237	68.7	27.1	0.9	2.1	1.2
37	38	M	9.96	5.45	402	56.0	36.9	1.0	4.3	1.8
38	30	F	7.31	5.73	440	53.3	39.6	0.0	6.0	1.1

Note: Participants 3, 5, 13, 22, 31, 34 and 35 may be leukaemic because of the clinical manifestations.

Table 9: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Ezi-Orsu Location in Oguta LGA

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
3	63	M	9.92	5.04	1555	68.1	25.9	0.8	3.9	1.3
4	25	F	7.44	4.25	169	61.2	30.8	2.0	4.1	1.9
5	29	M	6.11	5.03	154	53.9	40.0	0.9	3.0	2.2
6	44	M	15.50	1.99	118	44.1	46.9	0.6	5.3	3.1
7	17	F	5.04	4.37	219	50.9	43.3	0.6	4.2	1.0
8	37	M	22.22	1.67	105	39.7	50.2	0.8	7.1	2.2
9	20	M	5.07	5.96	400	53.0	40.8	0.0	2.9	3.3
10	23	M	5.38	4.89	260	50.1	41.4	0.8	3.7	4.0
11	39	M	6.49	4.34	290	54.9	37.4	0.7	5.1	1.9
1	37	M	29.87	1.58	103	40.7	51.2	0.7	5.5	1.9
12	28	M	8.81	4.80	160	68.1	24.0	0.5	6.2	1.2
13	54	F	9.95	5.81	200	61.2	28.0	0.9	7.9	2.0
14	14	M	7.44	5.10	182	67.4	23.5	0.7	7.0	1.4
15	22	F	8.41	4.28	157	69.0	23.4	0.5	5.1	2.0
16	40	M	9.91	5.20	290	53.2	36.1	0.9	6.9	2.9
17	25	F	9.95	5.98	448	56.0	35.8	1.0	5.3	1.9
18	30	M	7.60	4.89	411	53.9	37.0	0.5	7.5	1.1
19	70	M	6.30	4.27	225	50.2	42.9	0.8	3.0	3.1
20	18	M	6.20	4.41	175	54.9	37.8	1.0	4.3	2.0
21	54	M	7.90	4.88	228	58.5	32.2	0.7	5.4	3.2
22	23	M	9.10	5.81	300	53.3	39.7	2.0	3.0	2.0
23	29	F	6.50	4.95	355	61.1	32.6	0.0	5.1	1.2
24	47	M	7.40	5.09	412	52.7	37.2	0.5	6.7	2.9
25	40	M	6.10	5.88	444	50.9	39.1	0.6	7.4	2.0
26	14	F	5.11	5.97	158	54.3	38.2	0.0	4.2	3.3
27	53	M	5.50	4.80	182	52.9	39.3	0.8	5.5	1.5
28	16	F	6.20	4.28	280	58.7	32.7	0.6	6.0	2.0
29	55	F	7.60	4.21	300	61.1	33.5	0.9	3.2	1.3
30	30	F	9.01	4.79	390	69.0	22.5	0.5	5.1	2.9
31	20	M	9.96	5.09	219	53.3	37.4	1.0	6.3	2.0
32	41	M	6.20	5.94	260	58.9	32.8	0.0	7.1	1.2
33	25	M	7.61	4.25	171	62.1	27.0	2.0	5.9	3.0
34	53	M	24.77	1.62	104	45.0	51.1	0.0	2.6	1.3
35	64	F	18.32	1.73	106	45.0	47.0	0.9	5.4	1.7
36	19	M	9.81	5.25	300	53.3	38.9	0.7	4.3	2.8
37	40	M	7.22	4.23	420	56.9	33.6	0.7	5.5	3.3
38	27	M	6.11	5.50	270	54.2	35.7	0.7	6.7	2.7

Note: Participants 6, 8, 34 and 35 may be leukaemic because of the clinical manifestations.

Table 10: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Orsu-Obodo Location in Oguta LGA

S/No	Age	Sex	WBC Count (x 10^3/mm^3)	RBC Count (x 10^6/mm^3)	Plt Count (x 10^3/mm^3)	N (%)	L (%)	B (%)	M (%)	E (%)
2	23	F	6.11	4.33	380	55.3	40.2	0.0	3.2	1.3
3	30	M	7.52	5.01	153	51.2	42.3	0.5	4.1	1.9
4	15	M	8.99	6.00	164	53.7	40.5	0.7	2.2	2.9
5	40	M	8.75	4.97	179	58.9	35.1	0.9	3.1	2.0
6	19	F	6.61	5.82	255	61.2	29.3	1.0	4.7	3.8
7	48	F	9.96	4.37	433	52.3	38.6	0.6	5.3	3.2
8	23	F	5.04	4.45	391	69.7	21.2	0.9	6.2	2.0
9	39	M	5.60	5.20	219	61.2	33.9	0.5	3.3	1.1
10	41	M	7.09	5.01	240	64.8	28.8	0.0	4.7	1.7
11	26	M	6.77	4.79	266	55.1	37.1	0.0	5.3	2.5
12	30	F	7.84	5.71	164	54.3	37.7	0.7	6.0	1.3
13	17	M	9.91	5.19	220	53.7	39.3	0.9	3.0	3.1
14	53	F	22.36	1.66	107	43.0	49.0	0.0	4.7	3.3
15	22	M	8.88	4.22	387	55.9	38.3	0.5	3.9	1.4
16	64	M	7.41	5.93	230	68.5	22.3	0.9	6.1	2.2
17	18	M	7.55	5.33	220	61.0	30.6	0.5	4.9	3.0
18	34	M	6.41	4.27	411	53.0	42.0	0.9	2.2	1.9
19	27	F	9.06	4.81	370	54.2	38.9	0.5	3.3	3.1
20	20	M	5.33	5.03	311	68.1	23.7	0.8	4.7	2.7
21	45	M	17.73	1.78	112	43.9	46.5	0.5	8.0	1.1
22	15	F	5.60	5.98	266	53.7	36.8	2.0	6.0	1.5
23	40	M	6.77	5.61	394	56.0	36.5	0.6	4.8	2.1
24	25	M	6.32	4.89	422	68.9	24.4	0.8	2.7	3.2
25	32	F	5.59	4.25	174	52.4	41.3	0.7	4.2	1.4
26	38	M	9.22	4.47	244	55.9	35.9	0.9	5.1	2.2
27	18	F	5.01	5.49	220	53.7	39.6	0.5	3.2	3.0
28	61	M	6.44	5.47	285	51.9	40.9	1.0	2.9	3.3
29	12	M	7.66	5.92	427	68.2	26.9	0.8	2.1	2.0
30	40	M	8.93	4.77	446	69.0	24.9	0.6	4.3	1.2
31	17	M	7.44	5.19	151	70.0	20.9	0.8	5.4	2.9
32	44	M	9.90	5.01	156	55.2	37.5	1.0	3.2	3.1
33	24	M	5.09	4.34	240	53.4	42.1	0.5	2.1	1.9
34	52	M	6.55	4.50	377	52.9	42.0	0.0	4.0	1.1
35	28	M	7.42	5.71	159	50.9	40.9	0.5	5.9	1.8
36	12	M	8.33	5.88	183	53.7	36.8	0.0	7.0	2.5
37	18	M	9.98	4.24	197	58.8	32.9	0.6	4.7	3.0
38	66	M	6.37	4.39	244	67.2	22.3	0.0	6.8	3.7

Note: Participants 1, 14 and 21 may be leukaemic because of the clinical manifestations.

Table 11: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Awa Location in Oguta LGA

S/No	Age	Sex	WBC Count	RBC Count	Plt Count	N (%)	L (%)	B (%)	M (%)	E (%)
1	51	M	7.50	4.30	154	64.1	28.7	2.0	3.1	2.1
2	17	M	8.60	4.91	250	61.2	34.5	0.1	2.9	1.3
3	30	M	8.99	5.92	430	57.9	34.5	0.7	4.0	2.9
4	62	F	5.11	5.10	221	53.7	41.8	0.9	2.2	1.4
5	13	M	5.21	4.33	182	51.0	43.2	0.6	3.2	2.0
6	38	M	6.40	4.50	157	53.3	38.9	0.5	4.1	3.2
7	19	M	7.55	5.92	210	54.7	36.3	0.8	6.0	2.2
8	26	M	9.95	4.28	380	51.2	44.3	1.0	2.1	1.4
9	44	F	15.91	1.92	117	44.8	47.0	0.8	5.4	2.0
10	18	F	5.04	5.29	400	53.4	38.6	2.0	3.0	3.0
11	60	M	6.09	5.91	250	55.6	35.5	0.0	4.9	4.0
12	27	M	7.99	4.28	171	68.1	24.6	0.0	5.1	2.2
13	15	F	8.91	4.40	183	62.7	32.2	0.6	3.2	1.3
14	59	M	28.44	1.67	109	38.2	51.2	0.7	7.2	2.7
15	28	M	6.33	5.49	233	55.9	36.2	0.9	5.9	1.1
16	40	M	8.51	4.71	287	53.3	37.0	0.7	7.0	2.0
17	14	M	9.94	4.50	392	51.2	42.0	0.5	3.2	3.1
18	30	M	6.44	4.33	210	53.3	40.4	0.9	4.1	1.3
19	23	M	7.00	5.00	169	50.9	43.2	0.6	2.2	3.1
20	44	M	5.77	6.00	180	53.7	37.1	2.0	5.3	1.9
21	57	M	6.31	4.23	283	52.7	38.1	3.0	4.0	2.2
22	25	M	8.73	4.39	387	50.9	44.0	0.6	3.1	1.4
23	37	M	27.94	1.71	111	39.8	50.3	0.5	5.5	3.9
24	17	F	9.94	5.01	159	54.1	36.7	0.8	5.9	2.5
25	47	M	6.01	5.94	229	53.7	39.5	0.9	3.2	2.7
26	22	M	6.80	5.99	430	50.9	43.6	0.6	3.5	1.4
27	19	F	9.30	4.90	290	57.8	34.8	0.5	5.0	1.9
28	58	F	5.00	4.28	310	55.1	39.8	0.0	2.1	3.0
29	10	M	6.20	4.37	171	51.2	42.5	0.0	4.2	2.1
30	50	M	8.61	5.05	157	58.9	36.4	0.5	3.1	1.1
31	33	M	7.98	5.87	219	63.4	29.4	0.6	4.9	1.7
32	12	M	6.22	4.85	390	60.1	32.7	0.7	3.3	3.2
33	66	M	7.30	4.47	179	52.2	39.4	0.7	4.7	3.0
34	26	M	8.40	5.72	360	66.7	24.1	0.8	6.3	2.1
35	43	M	9.94	5.03	202	54.1	40.6	0.9	3.3	1.1
36	28	F	5.10	4.33	210	52.8	42.1	0.7	2.7	1.7
37	67	M	6.60	5.30	240	67.1	26.1	0.5	4.1	2.2
38	16	M	7.99	4.23	380	58.9	33.6	0.9	3.3	3.3

Note: Participants 9, 14 and 23 may be leukaemic because of the clinical manifestations.

Table 12: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Egwe Location in Oguta LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	33	M	6.02	5.71	250	51.3	44.1	0.7	2.2	1.7
2	24	M	7.50	4.99	420	53.4	40.8	0.7	3.1	2.0
3	16	M	8.60	4.81	158	68.1	28.1	0.7	2.0	1.1
4	40	M	9.93	4.28	250	60.0	33.8	0.0	3.1	3.1
5	55	F	6.10	5.10	157	50.1	40.3	0.8	4.9	3.9
6	21	M	5.11	5.98	181	52.3	40.8	0.9	2.2	3.8
7	50	M	6.09	4.27	191	51.1	40.8	1.0	3.1	4.0
8	13	M	7.93	4.55	280	55.7	36.8	0.6	5.0	1.9
9	30	M	9.92	5.71	430	68.7	25.9	1.0	3.0	1.4
10	17	M	6.30	6.00	210	70.0	24.8	0.5	2.2	2.5
11	49	M	5.04	4.81	350	53.3	38.4	0.6	4.0	3.7
12	23	M	6.80	4.29	179	54.7	40.6	0.7	3.0	1.0
13	35	F	9.01	5.30	155	50.8	41.7	0.9	5.1	1.5
14	45	M	6.10	5.91	257	52.7	39.4	1.0	4.2	2.7
15	10	F	7.09	4.25	410	54.0	41.0	0.6	3.0	1.4
16	21	M	5.11	5.51	229	51.1	40.0	0.9	5.2	2.8
17	57	M	25.56	1.60	107	43.5	49.7	0.9	2.7	3.2
18	28	F	6.01	4.60	430	54.0	40.2	0.5	2.2	3.1
19	55	F	7.90	5.00	233	52.3	38.9	1.0	6.0	1.8
20	15	M	8.60	5.71	297	54.9	35.9	0.0	7.1	2.1
21	66	M	9.97	5.39	171	51.1	44.6	0.8	2.2	1.3
22	24	M	6.55	5.92	230	53.9	37.1	0.9	5.0	3.1
23	42	M	5.22	4.71	154	50.7	42.6	0.6	4.1	2.0
24	18	F	6.23	4.30	219	54.1	40.4	1.0	3.3	1.2
25	60	F	7.47	5.61	265	63.7	29.6	0.0	4.7	2.0
26	29	M	8.55	5.50	433	69.2	21.1	0.8	5.8	3.1
27	10	M	9.90	4.33	391	64.5	30.6	0.9	2.7	1.3
28	39	F	6.60	5.62	156	56.0	36.8	0.6	4.4	2.2
29	12	M	7.80	4.77	230	53.7	36.1	0.9	6.2	3.1
30	17	F	8.30	4.65	187	51.2	43.2	0.5	3.9	1.2
31	30	M	7.20	4.97	220	58.7	33.4	0.5	5.4	2.0
32	41	M	5.10	5.88	398	53.9	41.0	0.5	3.3	1.3
33	22	M	6.33	4.87	160	51.1	41.4	0.7	5.7	1.1
34	37	M	8.64	4.35	155	54.8	38.6	0.9	3.8	1.9
35	25	F	9.97	5.40	220	57.2	37.9	0.9	2.7	1.3
36	28	M	5.12	4.81	231	64.9	28.0	0.8	4.3	2.0
37	34	M	6.09	4.39	277	69.7	23.4	0.6	3.0	3.3
38	48	M	7.71	4.26	297	55.5	36.5	0.5	5.0	2.5

Note: Participant 17 may be leukaemic because of the clinical manifestations.

Table 13: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Mbieri Location in Mbaitoli LGA

S/No	Age	Sex	WBC Count	RBC Count	Plt Count	N (%)	L (%)	B (%)	M (%)	E (%)
1	29	M	7.00	5.66	372	59.1	34.1	0.0	4.9	1.9
2	5	F	8.61	5.92	156	67.4	27.4	0.7	3.2	1.3
3	63	F	9.93	5.05	240	55.1	36.0	1.0	4.9	3.0
4	66	F	6.30	4.95	221	50.9	40.4	2.0	5.3	1.4
5	20	M	7.60	4.40	250	55.2	35.1	0.0	6.7	3.0
6	45	M	5.04	5.11	430	61.4	32.8	0.6	3.2	2.0
7	30	M	6.50	5.95	260	69.5	20.5	0.9	5.9	3.2
8	25	F	7.80	5.81	291	56.7	32.7	2.0	6.7	1.9
9	44	F	9.97	4.89	310	53.7	34.5	0.6	7.9	3.3
10	30	F	9.00	4.40	180	57.1	35.1	0.0	4.0	3.8
11	10	M	7.70	4.35	160	68.3	23.4	2.0	3.3	3.0
12	12	M	6.30	4.22	219	53.2	39.4	0.6	4.1	2.7
13	25	M	7.99	4.79	240	56.0	36.9	0.9	3.2	3.0
14	26	F	7.81	5.71	422	60.0	31.1	2.0	4.4	2.5
15	29	F	7.65	5.00	229	52.9	38.2	0.0	5.1	3.8
16	70	M	9.02	5.97	350	54.1	36.4	0.9	5.8	2.8
17	53	M	5.32	4.88	400	50.7	38.5	1.0	6.7	3.1
18	15	M	6.98	4.35	450	54.2	37.3	0.5	5.1	2.9
19	30	F	6.45	4.28	169	53.3	38.1	0.6	4.7	3.3
20	19	F	7.44	5.19	154	62.1	28.4	0.8	6.0	2.7
21	53	M	8.77	5.99	230	53.3	35.0	0.9	7.7	3.1
22	24	M	9.90	4.81	410	55.7	35.8	1.0	4.2	3.3
23	51	M	6.52	5.94	270	61.2	30.0	0.8	5.4	2.6
24	44	M	7.81	5.03	300	58.0	33.0	0.6	6.4	2.0
25	34	M	7.55	4.33	251	52.4	35.8	1.0	7.7	3.1
26	29	F	8.80	4.48	231	55.9	37.3	0.0	3.0	3.8
27	18	F	7.44	5.05	202	53.7	38.1	0.6	4.3	3.3
28	13	M	6.10	5.74	300	69.7	22.4	0.9	4.5	2.5
29	55	F	8.85	4.93	180	55.3	34.6	1.0	6.0	3.1
30	27	M	9.92	4.76	400	53.0	37.5	0.0	6.6	2.9
31	25	F	6.44	5.06	266	54.9	36.6	0.7	5.3	2.5
32	39	F	6.80	5.45	230	66.6	23.3	0.0	7.0	3.1
33	20	M	5.04	5.78	202	53.2	39.2	0.5	4.4	2.7
34	47	M	6.70	4.93	181	55.7	35.4	0.5	5.3	3.1
35	30	M	6.01	4.31	251	57.7	35.3	0.0	5.0	2.0
36	25	M	8.39	4.40	412	69.2	21.2	0.5	5.9	3.2
37	65	F	7.65	5.81	160	55.5	36.5	0.6	4.7	2.7
38	44	M	8.77	5.03	430	50.8	37.8	0.0	7.9	3.5

Table 14: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Ubomiri Location in Mbaitoli LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	66	F	7.44	5.11	410	54.1	35.5	3.0	5.2	2.2
2	73	F	8.51	4.89	430	62.1	29.1	1.0	3.9	3.9
3	20	M	9.99	5.91	260	56.0	39.7	0.0	3.0	1.3
4	12	M	8.60	5.85	231	53.3	37.3	2.0	5.1	2.3
5	63	M	8.82	5.21	299	58.9	34.1	0.6	3.3	3.1
6	25	M	6.31	4.44	197	52.2	39.7	0.9	5.9	1.3
7	23	F	7.91	4.79	178	68.1	25.1	0.8	4.0	2.0
8	47	M	9.00	5.88	232	70.0	23.3	0.5	2.9	3.3
9	51	F	5.01	5.95	265	54.3	38.4	0.0	3.3	4.0
10	66	F	5.19	6.00	411	56.2	36.5	0.9	4.7	1.7
11	18	M	8.77	4.50	433	53.1	40.1	1.0	2.8	3.0
12	19	M	6.51	5.11	179	50.9	42.1	0.8	4.1	2.1
13	27	M	5.40	4.49	163	56.8	35.7	0.9	5.2	1.4
14	33	M	5.90	4.52	434	61.1	32.0	0.0	4.0	2.9
15	53	F	6.63	5.49	445	68.5	23.5	1.0	3.7	3.3
16	10	F	7.85	5.99	257	54.9	36.8	0.5	5.1	2.7
17	37	M	6.33	5.91	399	60.0	32.1	2.0	2.2	3.7
18	44	M	8.61	4.90	171	55.3	36.4	0.6	5.8	1.9
19	29	M	9.94	4.33	273	58.9	30.9	0.5	7.0	2.7
20	25	F	7.55	5.02	239	61.1	30.7	1.0	3.9	3.3
21	35	M	6.60	5.77	441	53.0	39.0	0.6	5.4	2.0
22	18	F	8.09	4.80	307	57.1	32.7	0.9	6.2	3.1
23	27	F	6.92	5.43	255	61.1	30.5	0.0	4.4	4.0
24	19	M	9.97	4.97	235	53.3	36.9	0.8	5.3	3.7
25	50	M	6.44	5.75	392	60.0	30.8	1.0	6.0	2.2
26	17	M	7.80	6.00	212	52.9	39.5	0.5	4.1	3.0
27	8	F	9.00	5.02	265	55.3	36.8	0.9	5.1	1.9
28	65	M	7.51	4.99	178	68.8	24.2	0.6	4.2	2.2
29	80	F	8.39	4.21	253	54.2	37.7	2.0	3.1	3.0
30	25	M	9.81	4.76	422	53.0	38.5	0.9	4.9	2.7
31	20	M	6.44	5.77	443	56.7	32.7	0.8	6.0	3.8
32	10	M	5.03	5.94	157	66.6	23.1	1.0	7.9	1.4
33	51	M	6.70	5.01	160	59.7	31.4	0.6	5.8	2.5
34	57	M	7.21	4.99	150	54.3	37.7	0.0	5.0	3.0
35	25	M	9.95	5.80	218	52.7	36.6	0.7	6.1	3.9
36	33	M	6.55	5.37	377	55.5	34.8	0.8	4.9	4.0
37	44	M	7.21	5.49	239	60.0	33.0	0.0	5.7	1.3
38	62	M	7.85	4.44	402	58.8	32.4	0.0	6.9	1.9

Table 15: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Orodo Location in Mbaitoli LGA

1	29	F	7.31	5.50	370	52.3	42.5	0.0	3.2	2.0
2	33	M	8.60	5.91	233	54.0	40.1	0.0	4.0	1.9
3	40	F	9.94	4.80	222	52.7	40.9	0.0	5.1	1.3
4	12	M	6.80	4.27	404	55.3	36.4	2.0	4.9	1.4
5	45	F	5.39	4.41	425	70.0	20.2	0.9	6.0	2.9
6	14	M	6.50	5.30	175	58.4	35.0	1.0	4.3	1.3
7	51	F	6.20	5.00	155	68.1	24.5	2.0	3.3	2.1
8	27	M	7.80	5.81	187	55.2	36.8	0.8	6.0	1.2
9	39	M	9.10	4.39	193	53.7	37.7	0.6	5.1	2.9
10	60	M	8.80	4.89	265	56.0	36.2	0.5	4.1	3.2
11	14	F	7.30	5.03	244	52.2	39.2	0.9	3.9	3.8
12	44	F	5.05	5.71	403	54.1	39.0	0.6	3.3	3.0
13	20	M	6.32	6.00	441	57.2	35.8	0.5	4.3	2.2
14	39	M	7.65	4.33	255	60.0	30.4	1.0	4.9	3.7
15	23	F	9.79	4.71	219	67.1	24.2	0.0	5.7	3.0
16	43	F	7.44	5.89	169	54.3	36.8	0.8	6.0	2.1
17	11	M	6.62	4.33	152	52.8	38.3	0.7	6.7	1.5
18	41	M	8.00	4.21	171	55.9	35.4	0.6	5.9	2.2
19	18	M	5.40	4.47	263	52.5	39.2	0.0	5.0	3.3
20	50	F	6.10	5.37	412	55.3	35.3	0.6	7.3	1.5
21	25	M	8.80	5.00	399	50.3	39.2	0.9	6.9	2.7
22	23	F	9.96	4.91	291	54.2	36.6	0.7	5.5	3.0
23	52	M	7.71	4.83	277	68.1	22.6	0.9	6.1	2.3
24	15	M	6.88	5.66	175	67.9	22.6	1.0	7.0	1.5
25	55	M	6.25	4.89	228	54.2	37.7	0.6	5.4	2.1
26	24	F	7.21	5.09	422	53.0	40.8	0.0	4.9	1.3
27	40	M	8.70	4.33	233	58.9	33.3	0.7	4.2	2.9
28	18	F	9.92	4.36	159	61.1	30.0	1.0	5.9	2.0
29	37	M	5.29	4.21	215	55.3	36.6	0.6	6.3	1.2
30	40	M	6.80	5.19	399	51.7	36.3	2.0	7.0	3.0
31	14	M	6.01	5.88	412	55.0	35.5	0.0	5.8	3.7
32	39	M	7.90	4.99	235	53.9	36.9	0.5	6.2	2.5
33	22	M	9.20	5.61	287	61.1	27.8	0.8	7.0	3.3
34	33	M	5.39	5.03	177	55.3	36.7	0.6	4.7	2.7
35	10	F	5.02	4.89	233	50.9	41.4	0.8	5.1	1.8
36	19	M	5.10	5.01	420	68.3	25.6	0.0	4.0	2.1
37	41	M	6.60	4.28	400	58.9	32.5	0.5	5.1	3.0
38	28	F	7.99	4.47	230	56.0	33.8	0.0	6.3	3.9

Table 16: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Ogwa Location in Mbaitoli LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	14	M	8.70	4.79	240	55.1	35.0	0.7	5.2	4.0
2	50	M	9.93	5.71	420	61.3	32.7	0.8	3.1	2.1
3	28	M	9.94	5.93	430	60.0	32.9	0.5	5.3	1.3
4	30	F	7.70	4.29	158	55.1	34.5	0.6	6.9	2.9
5	09	M	6.50	5.01	179	52.7	37.6	0.7	7.0	2.0
6	29	M	6.80	4.81	241	54.0	40.7	0.8	3.3	1.2
7	40	F	9.00	5.19	277	50.9	41.5	0.0	4.9	2.7
8	16	M	7.70	4.95	220	54.3	35.6	0.9	6.1	3.1
9	47	F	6.30	5.92	447	68.8	21.5	0.5	7.2	2.0
10	71	M	5.20	5.51	183	69.0	24.5	0.6	4.5	1.4
11	10	M	6.61	4.31	301	54.1	38.3	0.9	3.7	3.0
12	50	M	7.81	4.46	355	52.2	41.7	0.0	4.8	1.3
13	27	F	8.03	5.13	233	55.8	34.8	0.8	5.7	2.9
14	18	F	9.11	5.82	401	63.7	25.8	0.9	6.4	3.2
15	60	M	8.95	5.09	437	57.1	36.6	0.6	3.8	1.9
16	33	M	7.61	5.44	160	53.2	38.7	0.1	5.0	3.0
17	39	M	8.53	4.37	228	60.0	32.8	0.6	3.3	3.3
18	15	F	8.34	5.00	265	53.1	36.1	0.8	6.1	3.9
19	50	M	9.75	5.98	310	51.0	39.7	0.0	5.3	4.0
20	12	M	9.92	4.71	157	54.2	35.9	0.7	7.0	2.2
21	40	F	6.35	4.45	191	69.5	22.2	0.9	6.0	1.4
22	27	M	7.81	5.95	299	58.0	33.6	0.8	5.1	2.5
23	54	M	8.85	4.86	255	54.4	37.6	0.7	4.3	3.0
24	61	F	9.91	5.83	433	70.0	24.8	0.8	3.0	1.4
25	29	F	7.50	5.99	248	53.3	38.6	0.0	5.9	2.2
26	47	M	8.61	5.03	231	50.3	42.6	0.5	3.3	3.3
27	13	M	9.93	5.29	185	56.0	36.6	0.0	4.7	2.7
28	20	M	9.97	4.88	179	61.1	29.0	0.7	6.1	3.1
29	29	M	7.11	4.22	301	53.2	35.0	0.8	7.0	4.0
30	40	F	5.84	4.39	259	51.2	40.0	0.7	5.0	3.1
31	10	M	5.09	4.61	230	61.1	31.4	0.6	4.2	2.7
32	50	M	6.11	5.95	388	56.2	34.3	0.7	6.9	1.9
33	15	M	7.44	5.70	179	67.7	24.5	0.5	5.8	1.5
34	49	M	8.53	4.93	310	54.9	37.6	0.9	4.4	2.2
35	27	F	9.90	4.77	433	58.1	35.0	0.0	5.2	1.7
36	16	M	6.40	5.64	150	54.2	35.9	1.0	6.0	2.9
37	72	M	6.62	5.13	172	61.0	28.2	0.0	7.1	3.7
38	49	F	7.66	5.98	243	53.3	34.9	0.8	8.0	3.0

Table 17: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Ogbaku Location in Mbaitoli LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	35	F	16.22	1.97	118	46.2	43.7	0.6	6.5	3.0
2	30	M	8.56	5.52	380	52.3	42.8	0.8	2.2	1.9
3	19	F	9.90	4.80	410	60.7	31.7	0.9	4.0	2.7
4	45	M	6.67	4.22	155	67.8	25.5	0.5	4.9	1.3
5	16	M	7.99	4.97	237	53.4	39.3	0.6	5.2	1.5
6	70	M	6.40	5.03	279	51.2	41.8	0.7	3.3	3.0
7	21	F	5.04	5.94	184	50.3	42.9	0.9	4.7	1.2
8	44	M	7.71	4.79	198	53.7	38.4	0.0	6.9	1.0
9	40	M	21.95	1.69	109	45.9	46.9	1.0	3.7	2.5
10	16	M	9.90	5.03	157	56.0	38.9	0.1	3.3	1.7
11	25	F	6.11	5.95	240	62.1	29.0	0.8	5.0	3.1
12	29	M	7.44	4.30	401	55.9	37.3	0.7	3.1	3.0
13	10	M	8.83	5.29	433	52.3	40.4	0.9	4.3	2.1
14	49	M	9.97	5.94	297	56.0	36.8	0.6	5.3	1.3
15	10	F	6.47	4.26	176	66.7	23.4	0.5	6.2	3.2
16	61	F	6.29	4.41	155	60.2	30.2	0.0	7.5	2.1
17	67	M	6.87	5.40	244	55.9	38.8	0.7	3.3	1.3
18	22	M	8.01	5.95	419	53.4	38.0	0.0	4.7	3.9
19	18	M	9.11	4.90	221	52.1	39.7	0.9	5.3	2.0
20	59	M	20.07	1.73	112	44.1	45.5	0.5	5.9	4.0
21	44	F	6.72	4.39	250	68.8	24.1	0.0	6.0	1.1
22	73	M	6.40	4.30	280	58.9	34.6	0.5	3.9	2.1
23	27	M	7.55	5.03	181	53.0	42.6	0.9	2.2	1.3
24	64	M	8.50	5.97	169	50.9	40.9	1.0	4.1	3.1
25	11	F	5.03	4.90	227	52.2	37.5	0.6	5.9	3.8
26	54	M	5.78	5.30	217	51.7	40.6	0.5	3.2	4.0
27	62	F	6.65	4.38	255	55.8	34.6	0.9	5.0	3.7
28	19	M	7.99	4.81	437	64.1	26.2	0.5	6.1	3.1
29	55	M	15.83	1.99	119	72.4	20.0	1.0	4.4	2.2
30	27	F	8.45	5.93	309	53.0	40.2	0.8	3.2	2.8
31	18	M	6.09	5.02	275	57.1	35.5	0.5	5.1	1.8
32	54	M	7.66	5.30	444	63.4	30.4	0.7	3.0	2.5
33	20	M	8.97	5.98	229	53.9	35.7	1.0	6.1	3.3
34	27	F	9.94	4.32	230	57.1	33.1	0.0	7.1	2.7
35	18	M	6.33	4.22	160	53.3	37.9	0.6	6.7	1.5
36	40	F	5.40	4.47	171	50.9	40.7	0.0	5.8	2.6
37	22	M	5.19	5.09	156	69.9	23.5	0.0	5.3	1.3
38	58	M	5.03	5.00	229	58.0	33.0	0.0	6.0	3.0

Note: Participants 1, 9, 20 and 29 may be leukaemic because of the clinical manifestations.

Table 18: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Okwelle Location in Onuimo LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	50	M	6.01	4.77	221	53.9	38.6	0.0	5.5	2.0
2	33	F	6.70	4.27	403	55.1	37.8	0.0	4.2	2.9
3	25	F	8.33	4.40	422	53.2	40.5	0.0	3.0	3.3
4	15	M	9.11	5.04	240	50.7	42.3	1.0	4.3	1.7
5	61	M	6.95	5.23	219	55.0	39.1	0.8	2.9	2.2
6	43	M	5.77	4.37	215	68.9	23.6	0.9	3.3	3.3
7	32	M	7.01	4.99	155	60.0	32.6	0.5	5.0	1.9
8	13	M	8.22	4.27	163	58.8	35.4	0.7	2.9	2.2
9	10	F	5.03	5.03	178	53.7	37.9	0.7	4.7	3.0
10	18	M	6.50	5.99	253	62.3	29.4	0.9	5.9	1.5
11	14	F	6.70	4.34	274	54.0	36.1	1.0	6.2	2.7
12	40	M	8.61	4.81	292	51.9	37.8	0.0	7.0	3.3
13	70	M	9.93	4.69	431	53.7	38.5	2.0	3.3	2.5
14	8	M	7.51	4.43	244	57.8	32.9	0.7	4.9	3.7
15	50	M	9.01	5.09	397	69.9	23.8	0.8	3.4	2.1
16	23	F	7.55	5.51	312	58.3	34.2	0.5	5.1	1.9
17	45	F	6.33	5.98	173	64.1	25.9	0.5	6.7	2.8
18	52	M	7.30	4.47	235	56.2	36.7	0.0	3.8	3.3
19	17	F	8.61	5.33	415	53.3	39.2	0.5	4.5	2.5
20	39	M	7.25	4.38	153	51.9	37.7	0.6	6.8	3.0
21	27	M	5.19	4.50	164	54.4	38.9	0.8	3.1	2.8
22	68	M	6.33	5.95	227	63.1	29.0	0.7	5.5	1.7
23	22	M	7.44	4.30	265	69.2	22.6	0.9	3.8	3.5
24	41	F	9.98	5.05	407	55.8	35.3	1.0	5.1	2.8
25	29	F	8.01	4.45	384	53.6	38.3	3.0	3.2	1.9
26	33	F	6.11	5.33	415	56.0	34.6	0.7	5.2	3.5
27	47	M	9.31	5.86	445	61.1	30.2	0.0	6.9	1.8
28	26	M	5.04	4.73	243	52.7	40.0	0.8	3.2	3.3
29	18	M	6.19	4.75	293	54.8	35.9	0.5	6.0	2.8
30	26	M	7.33	4.32	169	62.1	32.0	0.9	3.3	1.7
31	37	M	8.44	5.15	155	67.7	23.5	0.7	4.8	3.3
32	19	M	5.39	4.85	193	55.5	34.9	0.5	5.1	4.0
33	31	M	6.99	4.35	254	53.7	38.6	0.9	3.3	3.5
34	54	F	7.50	5.97	382	60.0	33.0	0.0	4.2	2.8
35	27	M	7.22	5.93	175	64.2	27.9	0.5	4.7	2.7
36	15	M	5.14	4.84	225	68.8	21.1	0.0	7.0	3.1
37	75	M	6.40	4.39	183	60.9	29.5	0.0	6.8	2.8
38	29	M	9.61	5.67	203	66.6	24.3	0.0	7.1	2.0

Table 19: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Alike Location in Onuimo LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	7	M	6.11	4.93	224	67.1	25.5	0.9	4.2	2.3
2	36	F	7.45	5.82	231	60.0	31.2	0.0	5.1	3.7
3	22	M	8.72	4.23	157	58.2	33.1	0.5	6.0	2.2
4	59	M	9.93	4.40	265	55.1	38.3	0.8	3.9	1.9
5	52	F	5.15	5.89	291	63.1	28.6	0.5	4.9	2.9
6	56	M	5.27	5.96	399	54.0	33.7	0.9	8.0	3.4
7	29	M	5.00	5.05	310	53.2	38.0	1.0	3.8	4.0
8	25	M	7.24	4.62	179	55.9	36.3	0.0	5.1	2.7
9	43	F	8.33	4.68	156	52.2	37.8	0.5	6.2	3.3
10	17	F	7.84	5.14	190	54.3	36.7	0.0	7.0	2.0
11	52	M	6.91	5.47	193	50.9	39.1	0.8	5.3	3.9
12	64	M	5.93	4.73	226	57.3	30.1	0.9	7.9	3.8
13	17	M	6.30	5.90	284	66.4	23.2	1.0	6.7	2.7
14	24	M	7.55	5.50	415	58.9	32.9	0.0	5.3	2.9
15	41	M	8.43	4.93	235	55.1	38.9	0.0	4.7	1.3
16	51	M	9.97	5.85	283	53.2	36.8	0.5	5.8	3.7
17	10	M	7.69	5.96	417	57.9	30.8	0.7	6.6	4.0
18	54	M	6.33	4.88	409	63.1	25.1	0.9	7.9	3.0
19	33	M	5.51	4.37	317	56.0	38.5	0.0	4.2	1.3
20	41	M	7.44	4.48	274	67.2	24.8	0.8	5.3	1.9
21	19	M	8.70	4.25	259	53.0	36.9	1.0	6.9	2.2
22	24	M	9.93	5.10	238	58.8	30.1	0.0	7.7	3.4
23	64	M	7.63	5.71	174	53.2	39.9	1.0	4.1	1.8
24	27	M	7.40	5.19	193	64.9	26.3	0.0	5.5	3.3
25	27	F	9.15	4.99	204	57.2	35.9	0.5	3.7	2.7
26	16	M	8.73	4.71	217	54.3	36.7	0.7	4.8	3.5
27	41	F	7.15	5.98	233	58.9	30.3	0.8	6.0	4.0
28	53	M	7.66	4.32	397	64.4	28.0	0.5	4.9	2.2
29	23	F	9.93	4.24	416	52.3	42.7	0.0	3.7	1.3
30	64	F	7.49	5.17	264	55.0	36.3	0.8	6.0	1.9
31	14	M	6.43	5.95	235	54.8	34.8	0.5	6.9	3.0
32	41	M	6.19	4.90	222	52.2	39.4	0.7	3.8	3.9
33	59	F	8.88	4.28	152	54.8	36.4	0.0	5.1	3.7
34	29	M	7.78	5.15	178	68.9	20.6	0.9	6.8	2.8
35	31	M	5.88	5.71	199	70.0	21.6	0.0	5.3	3.1
36	18	M	6.75	4.78	374	52.4	39.2	0.5	4.0	3.9
37	13	F	7.81	4.87	239	57.8	32.2	0.7	6.8	2.5
38	13	F	6.39	6.00	433	67.9	21.2	0.0	7.9	3.0

Table 20: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Umuna Location in Onuimo LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	10	F	5.02	4.71	164	52.3	42.6	0.9	3.1	1.1
2	20	F	6.12	5.72	173	57.1	31.4	0.5	7.0	4.0
3	60	M	6.30	4.99	229	67.7	24.7	0.7	3.2	3.7
4	18	M	7.60	4.33	250	55.3	36.2	0.8	4.9	2.8
5	51	M	8.81	4.23	411	53.0	40.9	0.9	3.3	1.9
6	53	M	7.71	5.10	435	51.9	40.0	0.0	5.1	3.0
7	61	M	7.80	5.97	242	54.7	35.5	1.0	6.6	2.2
8	14	M	9.11	5.81	212	68.1	23.2	0.7	4.2	3.8
9	49	M	5.19	4.89	285	60.0	31.9	0.9	5.3	1.9
10	12	M	6.30	5.97	167	53.3	37.1	1.0	6.1	2.5
11	25	M	6.70	5.03	178	55.7	38.2	0.0	2.8	3.3
12	35	F	9.90	5.15	392	58.8	35.3	0.5	3.7	1.7
13	20	F	8.61	5.97	425	65.2	26.7	0.7	5.0	2.4
14	61	M	6.44	4.20	245	57.3	31.9	0.9	6.8	3.1
15	54	M	6.01	4.94	220	50.7	41.3	0.0	5.1	2.9
16	19	M	5.13	5.25	279	53.9	36.1	1.0	7.0	2.0
17	32	F	6.30	4.89	294	55.8	37.3	0.5	3.3	3.1
18	29	M	8.70	5.88	167	53.3	37.0	0.7	5.0	4.0
19	70	M	9.93	5.90	227	66.6	22.9	0.9	6.7	2.9
20	24	M	7.55	6.00	274	60.9	29.2	0.0	7.9	2.0
21	52	M	7.85	4.85	445	59.7	34.7	0.5	3.8	1.3
22	15	M	9.65	4.27	378	55.5	36.7	0.9	4.9	2.0
23	23	F	6.32	4.39	394	59.2	31.2	1.0	5.5	3.1
24	41	M	6.11	5.94	432	52.1	38.9	0.6	4.9	3.5
25	16	M	7.79	5.72	204	65.3	27.9	0.8	3.2	2.8
26	27	M	9.98	4.33	219	52.7	39.1	0.9	5.5	1.8
27	61	M	7.60	4.80	377	54.1	34.8	1.0	6.8	3.3
28	43	F	6.33	5.93	270	61.1	27.7	0.0	7.3	3.9
29	61	F	7.40	5.74	208	53.0	35.6	0.6	7.8	3.0
30	21	F	7.88	4.84	237	60.0	31.9	0.0	6.0	2.1
31	74	M	8.91	5.08	407	53.3	37.7	0.0	5.3	3.7
32	53	M	7.55	4.97	211	51.7	37.9	1.0	6.6	2.8
33	8	M	6.22	5.27	178	58.3	34.7	0.7	3.2	3.1
34	10	M	5.34	5.35	255	58.8	33.7	0.8	4.7	2.0
35	6	M	6.60	5.55	220	50.7	40.0	2.0	5.8	1.5
36	40	M	7.11	4.24	212	67.8	24.9	0.7	3.9	2.7
37	12	M	8.44	4.22	168	61.1	32.8	0.6	2.0	3.5
38	44	F	9.81	5.93	245	52.7	37.9	0.9	5.7	2.8

Table 21: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Umuduru Location in Onuimo LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	44	F	7.50	4.77	215	54.8	40.0	0.0	3.1	2.1
2	60	F	6.44	5.72	264	53.6	39.1	0.0	4.0	3.3
3	20	F	8.61	4.88	433	55.3	37.0	0.8	5.3	1.9
4	25	M	9.34	5.94	439	68.2	24.7	0.5	3.2	3.4
5	63	M	7.44	5.03	380	61.1	32.0	0.7	4.9	1.3
6	19	M	8.73	4.33	211	53.7	38.2	0.9	3.3	3.9
7	51	M	6.11	4.40	157	54.9	36.8	1.0	4.2	3.1
8	25	M	7.55	4.49	159	64.5	29.7	0.0	2.9	2.9
9	30	M	7.91	5.81	174	55.9	36.9	0.0	5.1	2.1
10	10	F	5.12	5.97	187	52.3	37.3	0.0	6.7	3.7
11	33	F	6.10	4.92	228	54.0	39.2	0.5	4.2	2.1
12	44	M	7.50	5.19	405	65.6	25.4	0.8	6.9	1.3
13	23	M	7.71	4.42	265	52.9	41.1	0.5	3.3	2.2
14	64	M	8.92	5.33	283	54.3	36.1	0.7	5.2	3.7
15	22	M	9.98	4.25	221	69.3	24.1	1.0	3.7	1.9
16	61	M	7.65	4.90	450	55.9	34.8	0.0	5.5	3.8
17	14	M	8.84	5.04	290	53.1	37.9	0.7	6.2	2.1
18	60	F	7.55	4.95	189	67.2	22.2	0.6	7.0	3.0
19	20	M	6.11	4.84	164	61.1	29.0	0.5	5.5	3.9
20	59	M	7.24	5.65	167	53.7	39.3	1.0	4.7	1.3
21	15	M	8.35	5.86	235	62.1	31.0	0.0	3.8	3.1
22	54	M	9.73	4.30	400	53.3	37.4	0.7	5.9	2.7
23	33	M	6.51	4.81	220	68.1	23.3	0.5	4.8	3.3
24	45	M	6.30	5.09	315	52.7	39.6	0.0	3.7	4.0
25	13	F	5.19	4.38	374	57.1	36.3	0.0	4.4	2.2
26	17	F	6.22	4.25	250	68.8	24.6	0.8	4.0	1.8
27	21	M	7.44	5.20	410	54.9	37.2	0.1	5.1	2.7
28	53	M	8.61	5.93	171	53.7	40.0	0.7	3.8	1.8
29	51	M	8.39	6.00	190	54.8	36.9	0.8	5.3	2.2
30	29	M	7.88	4.35	230	67.7	21.8	0.5	6.7	3.3
31	12	M	8.02	6.00	433	52.2	40.5	0.8	4.8	1.7
32	30	M	6.74	4.41	405	58.0	33.1	0.9	5.5	2.5
33	19	M	6.10	4.78	432	53.3	35.9	0.8	6.7	3.3
34	25	F	8.73	4.30	169	67.1	27.0	0.7	3.7	1.5
35	35	M	7.55	5.33	182	69.0	22.7	0.6	4.9	2.8
36	66	M	6.11	5.96	194	54.1	37.1	0.0	5.1	3.7
37	9	F	9.97	4.93	230	53.3	39.2	0.5	3.9	3.1
38	20	M	10.00	4.24	315	55.5	37.0	0.0	4.2	3.3

Table 22: White Blood Cell, Red Blood Cell, Platelet and Differential White Blood Cell Counts from Okwe Location in Onuimo LGA

S/No	Age	Sex	WBC Count ($x\ 10^3/mm^3$)	RBC Count ($x\ 10^6/mm^3$)	Plt Count ($x\ 10^3/mm^3$)	N (%)	L (%)	B (%)	M (%)	E (%)
1	33	F	6.61	4.82	380	56.1	39.0	0.0	2.0	2.9
2	39	F	7.34	4.30	407	69.3	24.0	0.7	4.7	1.3
3	41	F	8.23	4.33	171	58.0	33.9	0.8	5.1	2.2
4	13	M	7.64	4.36	223	54.9	34.3	0.9	6.6	3.3
5	59	M	6.21	4.99	274	62.1	28.9	0.0	5.3	3.7
6	10	M	5.44	5.87	183	56.0	35.3	0.5	6.8	1.4
7	50	F	7.32	5.93	156	52.9	36.5	0.7	7.1	2.8
8	43	M	8.93	5.11	210	63.1	29.6	1.0	3.2	3.1
9	44	M	8.31	6.00	231	54.4	38.8	0.5	4.1	2.2
10	25	M	9.54	5.79	440	58.0	32.9	0.8	5.3	3.0
11	19	M	6.44	5.88	300	52.9	38.1	1.0	6.9	1.1
12	50	M	7.49	4.60	182	63.1	31.1	0.6	3.3	1.9
13	20	F	9.15	4.37	154	61.9	29.1	0.5	5.2	3.3
14	27	F	8.88	5.21	241	55.0	34.1	0.6	6.6	3.7
15	38	M	6.50	5.51	244	53.3	37.1	0.8	7.0	1.8
16	17	F	7.42	4.36	227	52.8	39.7	0.8	3.3	3.4
17	20	M	5.49	5.49	393	54.1	36.6	0.5	4.8	4.0
18	69	M	6.37	5.94	443	61.1	31.4	0.0	5.3	2.2
19	28	M	8.71	4.99	264	57.2	31.3	0.7	7.0	3.8
20	27	M	6.88	4.36	239	53.0	39.8	0.9	3.9	2.4
21	53	F	7.50	4.21	374	56.6	39.5	0.0	2.2	1.7
22	27	F	6.99	4.70	407	68.9	22.2	0.5	4.7	3.7
23	63	F	5.65	5.02	275	61.7	29.4	0.8	5.1	3.0
24	23	M	6.33	5.21	245	54.3	35.9	0.6	6.7	2.5
25	43	M	8.37	5.99	228	53.7	35.2	0.5	7.7	2.9
26	13	M	9.81	6.00	165	55.9	38.7	0.9	3.0	1.5
27	51	M	6.55	4.93	197	60.9	31.3	0.7	3.9	3.2
28	57	M	6.19	4.35	230	54.3	37.2	0.8	4.4	3.3
29	24	M	7.39	4.55	391	52.2	40.3	0.0	6.0	1.5
30	14	F	9.91	4.81	424	58.3	31.3	0.5	7.1	2.8
31	37	M	6.47	5.93	285	62.7	27.8	0.9	5.3	3.3
32	27	M	7.55	5.51	244	69.9	24.0	0.7	3.7	1.7
33	29	M	7.81	4.47	225	55.1	36.5	0.7	4.9	2.8
34	20	F	8.65	5.01	381	52.8	37.4	0.0	6.1	3.7
35	31	M	9.83	5.92	393	51.1	40.9	0.8	4.2	3.0
36	15	M	8.00	4.71	210	57.2	34.5	0.0	5.5	2.8
37	44	M	7.50	4.25	154	58.7	30.2	0.0	7.8	3.3
38	50	M	7.49	5.44	408	53.3	38.2	0.0	6.7	1.8