Computational Biology and Bioinformatics
2023; 11(1): 1-12
http://www.sciencepublishinggroup.com/j/cbb
doi: 10.11648/j.cbb.20231101.11
ISSN: 2330-8265 (Print); ISSN: 2330-8281 (Online)

Bioinformatic System for Classification of Patient Response to Traditional and Modern Medicine Therapy in Niger Delta Region: A Machine Learning Approach

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To cite this article:

Imeh Umoren, Victoria Essien, Ifeyinwa Arize. Bioinformatic System for Classification of Patient Response to Traditional and Modern Medicine Therapy in Niger Delta Region: A Machine Learning Approach. *Computational Biology and Bioinformatics*. Vol. 11, No. 1, 2023, pp. 1-12. doi: 10.11648/j.cbb.20231101.11

Received: May 24, 2022; **Accepted**: July 4, 2022; **Published**: March 21, 2023

Abstract: The potential for Traditional Medicine (TM) to enhance human health and wellbeing is enormous. This facet of healthcare services is crucial. For mutual benefit, the systems of traditional medicine and western (modern) medicine must be combined. The main goal of merging biomedicals and healthcare information within the setting of primary health care services is to provide spaces for technology interchange in medical practice for data and knowledge-based development. As a result, a database for diseases and their likely causes, trigger patterns, and prospective treatments and cures will be created, facilitating faster access to healthcare and resulting in a more dependable and effective healthcare system. The integration of health data, information, and expertise is known as bioinformatics. Data is all about a particular patient history, such as symptoms, diagnoses, treatments, and results, are referred to as health information. In fact, practitioners of biomedical informatics put a lot of effort into spotting patterns in the data generated by bioinformatics in order to assess patients' health problems and develop effective healthcare procedures. Hence, it is crucial that the current healthcare system incorporate health bioinformatics. Traditional medicine (TM) needs solid, scientific evidence to support its effectiveness, it is significant to access perceptions and promotes the integration of both Traditional Medicine Practitioners (TMP) and Modern Medical Practitioners (MMP) in the society. Basically, this research paper adopts a quantitative research method through survey Questionnaire for perceptions and adoption of both TMPs and MMPs among practitioners in Akwa Ibom State, Nigeria. Correlation analysis was carried out on selected demographics variables using Spearman Correlation coefficient to test the information gathered about how traditional medicine and modern medicine interaction (drugs administration) in treatment of certain diseases. The research findings demonstrate that, the *Spearman coefficient* algorithm gave a 0.5% which indicating an average relationship which entails a requirement for further integration. Moreover, Machine Learning (ML) approach was adopted, the Linear Regression (LR) model was used to access the linear relationship existing within the number of visits (response) of patients on the four sickness that was identified in the statistical data obtained in order to do a comparison analysis of treatment length of time (tlot) based on weekly basis -Seven (7) days visits. The model enable prediction on future duration length of time of patient in (TMPs) health system given number of visits provided.

Keywords: Traditional Medicine Practitioners, Modern Medical Practitioners, Spearman Correlation Coefficient, Linear Regression, Efficacy, Bioinformatics

1. Introduction

Over time, a new field called bioinformatics has developed at the intersection of molecular biology, mathematics, statistics, computer science, and information technology. Information from emerging new technological systems such as DNA and genome sequencing, gene expression analysis, protein and RNA structure characterization, and bio-imaging drive the field of bioinformatics. Biological data, most frequently DNA and amino acid sequences, are acquired,

stored, analyzed, and disseminated in the field of bioinformatics, a branch of biology and computer science. Bioinformatics builds on and expands technology for data capture, administration, and integration, data analytics, computation, and communications to facilitate biological discoveries. According to certain definitions, computational biology is the use of these tools and methods to answer theoretical or practical biological questions, whilst bioinformatics focuses on the creation and application of techniques and software to collect, manage, analyze, and/or visualize biological data [18]. The synthesis of medical knowledge, data, and communication is known as bioinformatics. This medical record includes details on a person's medical background, such as symptoms, diagnoses, treatments, and results. On the other side, biomedical informatics uses data from bioinformatics to solve issues, improve clinical, cut expenses, and make clinical decision based on the biological information of a specific patient. Integrating health bioinformatics is crucial in today's healthcare system since practitioners in biomedical informatics concentrate on finding trends in data obtained through bioinformatics to examine patients' health states and the effectiveness of healthcare procedures. There is a lot of promise for traditional medicine (TM) to enhance people's health and wellbeing. It is a crucial, but frequently disregarded, aspect of medical care. There's no need for traditional and Western (modern) medical systems to conflict. They can work together harmoniously well within context of primary healthcare, utilizing the strengths of each system while also making up for some of its deficiencies. In a perfect world, a very well, population-centered health system that strikes a balance between curative services and preventive care would offer TM as an option, a choice. Traditional medicine (TM) is associated with knowledge, abilities, and procedures that are based on the theories, beliefs, and experiences peculiar to diverse communities and are employed in the maintenance of health as well as in the prevention, detection, improvement, and treatment of physical and mental illnesses. Giving TM its proper place in an integrated health system, assisting all clinicians in understanding its special and valuable point, and educating patients about what it can and cannot achieve are the challenges. However, we must update this valuable resource and cultural heritage in order to give it the respect it deserves in the modern world. Around the world, there are numerous different health systems, each with a unique organizational structure and history. Essentially, countries must create and build their health systems in line with their requirements and resources, however primary care and public health initiatives are common features in almost all health systems [25]. Planning for the healthcare system is shared among industry players in several nations. In other cases, coordinated efforts are made by governments, labor unions, nonprofits, religious institutions, or other coordinating groups to provide organized health care services that are specific to the populations they serve. However, rather from being revolutionary, national healthcare planning has frequently been characterized as evolutionary [22]. In order to improve coordination among a patient's numerous healthcare professionals, the phrase "health informatics" refers to the collection, storage, retrieval, and use of healthcare information. Health informatics focuses on the effective and optimal use of information to advance healthcare, public health, and biological research with the aid of technology [8]. In order to improve coordination among a patient's numerous healthcare professionals, the phrase "health informatics" refers to the collection, storage, retrieval, and use of healthcare information. Health informatics focuses on the effective and optimal use of information to advance healthcare, public health, and biological research with the aid of technology [5]. The classification and prediction system for efficient medical diagnosis support as an important element or indicator for management of complications in hypertension. The development served as optimal intelligence model to address of Classification and prediction of severity index of hypertension using Support Vector Machine (SVM) and General Logistic Model (GLM) [21].

The efficient implementation of these standards in reality has proven to be a difficult undertaking, and health information technology (HIT) has been suggested as a viable solution [10]. Although the focus of modern medicine is on a person's bodily and mental health, the person's spirituality is not taken into account. However, recent discussions on spirituality and health as well as study by scientists and others have proved that, disease and ill-health can result from not acknowledging a person's spiritual side, necessitating the use of holistic medicine [13, 6]. The World Health Organization defines traditional medicine as "the sum of the knowledge, skills, and practices based on the theories, beliefs, and experiences native to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness" [23]. The terms complementary and alternative medicine are frequently used interchangeably with traditional medicine. Traditional medical practices vary from one country to another because of things like history, culture, personal attitudes, and philosophy. Traditional medicine's main tenet is whether an illness is a supernatural occurrence ruled by a hierarchy of essential energies, starting with the most powerful deity and moving down to lower spiritual beings, spiritual beings, living creatures, plants, and other items [14]. These more powerful entities interact with each other and could either weaken or strengthen a person's power. Disease results from an imbalance, and natural substances derived from plants and animals can aid in the treatment of the illness. All herbal medicines is based on the knowledge that man is a part of nature and health is a question of balance, despite the fact that specific methods vary amongst various tribes [4]. The treatment of ailments is viewed by herbal medicine as requiring a holistic approach.

2. Related Literature

There is the need to travel long distances resulting from

shortage of primary healthcare providers such as paramedics and professionals' healthcare specialists and experienced nurses have posed a serious challenge to the healthcare sector. There are several instances in which both healthcare professionals or supervisors as well as healthcare client's experience critical insufficiency. On only one hand, healthcare managers are unable to perform their duties, while on the other hand, the poor masses who need healthcare services and other health care system consumers experience health issues and sometimes even pass away. There have been many deaths reported in hospital emergency rooms as a result of the critical challenge that has been documented in this area, which can be traced to the lack of critically needed medical consumables, including medical professionals like nurses and doctors. This problem is frequently caused by a variety of factors, one of which is a lack of a logistical framework for supply chain in the south-south of Nigeria [20]. Traditional medicine (TM) and biomedicine are both widely practiced and coexist. Such clinical diversity has occasionally been linked to unequal access to healthcare, and it also depends on etiological disease categories that distinguish between illnesses with a natural cause and those with a spiritual or psychosocial cause [7, 12, 24]. The discussion of the cohabitation of indigenous and biomedical health systems has frequently focused on this division and queried whether it would be practical or beneficial to combine the two systems. Researcher-led studies have examined and evaluated approaches for integrating health bioinformatics for both conventional healthcare providers and contemporary medical practitioners. The following presents a review of the study of various previous investigations.

Again, the geographically marshy nature of the south-south rural area of this region is a major trait. As a result, there are plenty of breeding ponds for mosquitoes there, which leads to a high malaria outbreak and more malaria-related deaths here than everywhere else in the nation [19]. Research into the chemical makeup of exudates from Dacryodes Edulis and Raphia Hookeri Mann and Wendl utilized in herbal medicine in South Eastern Nigeria is being proposed [16]. Their research was primarily focused on analyzing the chemical components of exudates from R. hookeri and D. edulis in order to see whether they would be beneficial as feed additives or pharmacological raw materials for drugs. The experiment was conducted in the Michael Okpara University of Agriculture's Chemistry Department in Umudike, Nigeria. Where the fresh leaves and fruits of R. hookeri and D. edulis, bearing the voucher numbers RH 206 and DE 311, respectively, were collected. However, the integration of practitioners of traditional and modern medicine in the provision of healthcare services was not taken into account in their research. The study in a paper published to investigated the use of herbal remedies among urban dwellers in Lagos, Nigeria [17], Their main goal was to determine the volume of use and general awareness of the advantages and safety of herbal remedies among urban dwellers in Lagos, Nigeria. Based on this, 388 participants were chosen, and the population size was taken into account for an interview-based questionnaire. The information gathered includes the respondents' demographics, the sorts of herbal medications they use, the justifications for doing so, as well as the sources, advantages, and disadvantages of the herbal medicines they take. Additionally, during the interview, information regarding the ingredients of the herbal medicines was acquired from the respondents who had used or still used herbal medicines. The brand names of the herbal items were gathered during the interview and the products were later purchased from the market for the respondents who had used or were still using natural medications refined into their packaged forms. The product label provided information about the herbal products' ingredients. Hence, from the findings, the respondents frequently use herbal medicine, but they don't seem to be aware of its potential side effects. Randomized trial studies may be required to assess the quality, safety, and efficacy of herbal medicines and related products. In their research article consideration were not put forward to the aspect of integration of herbal medicine practitioners and modern medicine practitioners for efficient healthcare delivery and no model was adopted in their proposed article [1]. Carried out research on the evaluation of the attitudes of traditional medicine practitioners in Lagos, Nigeria, with a view to incorporating TM into the National Health Care Scheme (NHCS). Their investigation revealed how well-versed in their techniques traditional medicine practitioners (TMPs) were. Additionally, it evaluated how willing they were to incorporate safety precautions into their procedures in preparation for eventual incorporation into the National Healthcare Scheme (NHCS). While this was going on, a descriptive survey was conducted utilizing a global health organization (WHO) standardized questionnaire to find out what 170 volunteer TMPs in Lagos, Nigeria thought about their practice. In their surveys, it was shown that most respondents, on average, thought that educational attainment may have an impact on TM habits and that they intended to raise their educational standing. The Paper in research on a comprehensive views of doctors in Lagos, Nigeria, toward the use of herbal medicine [2]. The primary goal of this study was to examine the incorporation of herbal medicine into the Nigerian healthcare system. To achieve this, it examined doctors' views on the use of herbal medicine in Lagos and identified potential barriers to their interest. By conducting a descriptive survey at Lagos University Teaching Hospital using a standard WHO questionnaire to get the opinions of resident doctors in different disciplines. None of the respondents to their survey believed that the amount of research into herbal medicine was adequate, and the majority of them believed that the education levels of herbal medicine practitioners were inadequate. Therefore, before complete inclusion into the medical system can be considered, extensive investigation into the ethno - medicinal preparations currently in use to ensure patient safety and reduce risk and an improved performance in education systems in the training of herbal medicine practitioners may be required. Nevertheless, there

was no machine learning model adopted in the incorporation of conventional medical techniques into the country's healthcare system. An index of the efficacy of herbal remedies is discussed in a work titled Traditional Medicine Policy and Regulation in Nigeria published by [15]. As this data may serve as a gauge of the safety of ethnomedicinal use in Nigeria, their study focuses on the evaluation of the policy and regulations governing herbal medicine in Nigeria. In order to get the thoughts of key players in the field of herbal medicine on the policy and regulation of traditional remedies in Nigeria, the researchers utilized a questionnaire method from the WHO. According to their findings, the majority of respondents tend to support national policy regarding traditional medicine (TM), with a smaller percentage objecting. They concluded from their research that the Federal Ministry of Health should collaborate with traditional medicine experts and hold workshops to unify the disparate views on traditional medicine and policy that were reported in this study. However, while their research had merit based on national policies and regulations governing the use of traditional medicine, it did not take into account how to effectively integrate traditional and contemporary treatment, leaving room for future research. Integrating herbal medicine into standard healthcare in Ghana: patients' acceptance, views, and disclosure of usage was the topic of a research article in [3]. In the meantime, from May to August 2015, a cross-sectional study was conducted with 500 randomly chosen patients who presented to the outpatient sections of the government hospitals in Kumasi. Structured questions were used to conduct interviews. In order to ascertain the impact of socio-demographic and facility-related characteristics on the likelihood of utilizing herbal medicine (HM) at the facility, a logistic regression analysis with backward selection was used. Their findings show that the integration of herbal medicine is possible and that it may eventually be widely accepted in Ghana as a legitimate kind of healthcare. However, their findings may provide a foundation for upgrading and improving the use of herbal medicine, which makes way for the adoption of a machine learning technique to the fusion of traditional and modern medical practices. The use of traditional, complement, and alternative therapies in Sub-Saharan Africa: a systematic review was examined, [11]. In the meantime, a thorough literature search was conducted using Medline, Cumulative Index to Nursing and Allied Health Literature, to find original articles examining Traditional Complementary and Alternative Medicine (TCAM) use in Sub-Saharan Africa (SSA) between 1 January 2006 and 28 February 2017. Additionally, a critical evaluation of pertinent literature describing a mixed- or quantitative-method design was done. Outcomes of the review shows that TCAM is used very often in SSA, both in the general population and for specific health issues, despite the variety and generally poor quality of the available research. When TCAM users and non-TCAM users were compared, TCAM users were more likely to be of low socioeconomic and educational class, and there were discrepancies in terms of age, sex, geographic area, and religion affiliation. However, the review only focused on using conventional alternative medicine (TCAM) in Post Africa (SSA). No thought was given to the integration of both traditional and modern medicine practitioners in the delivery of healthcare services, leaving space for further research on this topic worldwide.

3. Data Collection

The process of acquiring quantitative and qualitative information on selected factors with the intention of assessing results or gaining practical insights is known as data collection, in this seminar work, data was gathered through questionnaire in Akwa Ibom State, Nigeria in order to carry out a proper analysis on the perceptions and adoption of integrated health system, the data constitutes different perceptions of different healthcare practitioner. In other to obtain a sample of respondents knowledgeable on the subject and to be able to responds to the questionnaire; a non-probabilistic sample was used. Though this may be considered biased but it was necessary for the purpose at hand: that is convenience sampling. The primary data collection was implemented using highly structured questionnaires for health practitioners. The sample constitutes of individuals who are health practitioners, and other health institutions. The particulars of the respondents obtained from the questionnaires are presented in tables below;

Table 1 depicts a total of 40 questionnaires collected. Table 1 shows the social demographics of the respondents which constitutes the traditional and modern health practitioners. Based on the gender, male constitute a population of 75% while female was 25%, also their age ranges were 18-25 (12.5%), 26-33 (17.5%), 34-41 (55%), 42 and above 15%. All respondents held qualifications ranging from Basic education which constitutes 10% secondary education holders constituting 11% while holders of tertiary education 15% and others with no formal education was 25%. Again, years of experience range from 1-10 yrs 55%, 11-20 yrs 30%, and 21 and above 15% of the respondents.

Table 1. *Socio-Demographic Background of TMP and MMP.*

Variables	Traditional Medicine Practitioner	Modern (Scientific) Medical Practitioner	Total (40) 100%
Gender			
Male	14	16	30 (75%)
Female	6	4	10 (25%)
Age in Years			
18- 25	1	4	5 (12.5%)
26-33	4	3	7 (17.5%)

Variables	Traditional Medicine Practitioner	Modern (Scientific) Medical Practitioner	Total (40) 100%
34-41	10	12	22 (55%)
42 and above	5	1	6 (15%)
Education			
No formal	10	0	(25%)
Basic	4	0	(10%)
Secondary	6	5	11 (27.5%)
Tertiary	0	15	15 (37.5%)
Years of Experience			
1-10	7	15	22 (55%)
11- 20	8	4	12 (30%)
21 and above	5	1	6 (15%)

Table 2. *Specific Question for Traditional Medicine Practitioner.*

Variables	Traditional Medicine Practitioner	Total (20) 100%
Preferred Health System		
Traditional	8	40%
Medical	0	0
Both	12	60%
Critical situations encountered		
Frequently	0	0
On rare occasions	15	75%
None of the above	5	25%

Number of visits per month based on the below sickness.	Nil	1 to 5 times	6 to 10 times	Over 11 times
Nkwa Iyo (Herpes Zoster)	0	2	5	13
Ndukpi (epilepsy)	0	10	5	0
Akpabak (Syphilis)	0	0	5	15
Oyoidep (abdominal Abses)	0	2	0	18
Asited (Chronic Ulser)	0	0	3	17

Estimated duration of treatment of the sicknesses below.	Nil	1 to 5 wks	6 to 10 wks.	Over 11 wks.
Nkwa Iyo (Herpes Zoster)	0	10	8	2
Ndukpi (epilepsy)	0	17	3	0
Akpabak (Syphilis)	0	20	0	0
Oyoidep (abdominal abses)	0	15	3	2
Asited (Chronic Ulser)	0	0	5	15
Reasons for Acceptability of traditional medicine in Akwa Ibom State.				
Effective	15			75%
Cheap	1			5%
Lack of modern Healthcare	4			20%

Cases in months from modern health system based on the sicknesses below;	1 to 10 times	11 to 20 times	21 to 30 times	40 an above
Nkwa Iyo (Herpes Zoster)	4	1	15	0
Ndukpi (epilepsy)	20	0	0	0
Akpabak (Syphilis)	0	0	20	0
Oyo idep	0	0	19	1
Asited (Chronic Ulcer)	0	0	2	18
Combining Modern and traditional drugs in treatment				
Sometimes		9		45%
Always		1		5%
Not at all		10		50%
Knowledge of Computer				
No Knowledge	15			75%
Beginner	5			15%
Average	0			0%
Advanced	0			0
Expert	0			

Table 3. *Specific Question for modern Medicine Practitioner.*

Variables	Modern Medicine Practitioner	Total (20) 100%
Preferred Health System		
Traditional	0	0%
Medical	15	75%
Both	5	5%

Variables	Modern Medicine Practitioner	Total (20) 100%
Collaboration with traditional medicine practitioner		
Sometimes	4	20%
Always	7	35%
Not at all	9	45%
Treatment of patient that visited TMP		
Sometimes	6	30%
Always	14	70%
Not at all	0	0%

Number of visits per month based on the below sickness.	Nil	1 to 3 times	4 to 7 times	Over 8 times
Nkwa Iyo (Herpes Zoster)	0	15	5	0
Ndukpi (epilepsy)	5	15	0	0
Akpabak (Syphilis)	0	16	4	0
Oyo idep (Abdominal Ases)	1	19	0	0
Asited (Chronic Ulser)	2	17	1	0

Estimated duration of treatment for the sicknesses below.	Nil	1 to 5 wks	6 to 10 wks.	Over 11 wks.
Nkwa Iyo (Herpes Zoster)	1	15	4	0
Ndukpi (epilepsy)	1	19	0	0
Akpabak (Syphilis)	15	5	0	0
Oyo idep	2	6	0	12
Asited (Chronic Ulser)	2	4	6	8
Reasons for Acceptability of traditional medicine in Akwa Ibom State.	5			
Effective				25%
Cheap	9			45%
Lack of modern Healthcare	6			30%

Cases in months from traditional health system based on the sicknesses below;	1 to 10	11 to 20	21 to 30	40 an above
Nkwa Iyo (Herpes Zoster)	15	5	0	0
Ndukpi (epilepsy)	18	2	0	0
Akpabak (Syphilis)	13	7	0	0
Oyo idep	8	12	0	0
Asited (Chronic Ulser)	2	18	0	0
Combining modern drugs and traditional in treatment				
Sometimes	2			10%
Always	0			0%
Not at all	18			90%
Knowledge of Computer				
No Knowledge	2			10%
Beginner	3			15%
Average	15			75%
Advanced	0			0%
Expert	0			0%

3.1. Correlation Analysis

A statistical approach of the relation between two factors is correlation. The measure works best when there is a clear correlation between the variables. The spearman rank correlation coefficient will be used in this seminar. The intensity and direction (positive or negative) of an association between two variables can be summarized using Spearman's Rank correlation coefficient. The outcome will always fall between 1 and -1.

3.2. Spearman Rank Correlation

The non-parametric equivalent of the Pearson correlation coefficient is the spearman rank correlation coefficient, or rs. The originality, interval, and ratio of the data to be used must be guaranteed. An outcome from Spearman's ranges from -1 to 1. where:

+1 = a perfect positive correlation between ranks

-1 = a perfect negative correlation between ranks

0 = no correlation between ranks.

The formula for the Spearman rank correlation coefficient when there are no tied ranks is:

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)} \quad (1)$$

Where ρ = spearman's rank correlation coefficient

d_i =differences between the two ranks of each observation

n =number of observations

The work attempts to determine the collaboration (integration) index of both modern (scientific) medical practitioners and traditional medicine practitioners corelate together, in order to enhance effective healthcare service delivery using spearman correlation coefficient.

The paper intends using variables obtained in our data through questionnaire for both traditional Medicine practitioners (TMP) and Modern medical Practitioners (MMP) which are

depicted below in table 4;

Step 1: Data samples containing values for x-variable (MMP) and y-variable were collected again for work (TMP). Here, the data sample is presented in the table 3;

Table 4. *x and y data sample variables.*

Responses	Combining traditional medicine and modern drugs in treatment (TMP)%	Combining Modern and traditional drugs in treatment (MMP)%
Sometimes	45	10
Always	5	0
Not at all	50	90

Step 2: The ranks of each individual variable was search for by ordering the scores from highest to lowest; gave the highest score a rank of 1, the next highest rank of 2, and so forth:

MMP	Rank	TMP	Rank
45	2	10	2
5	3	0	3
50	1	90	1

Step 3: Add a third column, d, to our table in step 2. The d is the difference between ranks. In a fourth column, and then square our d column.

MMP	Ranks	TMP	Ranks	*D*	d^2
45	2	10	2	0	0
5	3	0	3	0	0
50	1	90	1	0	0

Step 4: Sum (add up) all of d-squared values. 0 + 0 + 0 = 0.

Step 5: Fill out the formula with the values. These rankings are not tied, hence the work is done using the equation's formula 2;

$$\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)} \quad (2)$$

= 1 – (6*0)/(3(9-1))

= 1 – 0/24

= 1-0

= 1

Hence, the correlation coefficient 1 indicates a high positive correlation between traditional medicine practitioner and modern medical practitioners which opens room for the integration of MMP and TMP in healthcare practices to enhance effective delivery of care to patient in the society, communities and country at large.

4. Model and Problem Definition

In this research seminar, a single variable regression is adopted, where are independent variable (Number of visits to traditional medicine practitioners for four diseases in the questionnaire) and our dependent variable being duration of treatment on weekly basics. We want to look at the linear relationship that exist with the number of visits of patients on the four sickness we identified earlier on our questionnaire has compare to the duration of treatment based on the weekly basis, so that we can used our model to predict future duration of patient in TMPs health system when only given number of visits.

The work achieved this by using linear regression model the *equation*

$$Y = mx+b \quad (3)$$

y is the output variable where. It is also considered as the dependent variable in data analysis or the target variable in machine learning. It represents the continuous value that we are trying to predict.

1) The input variable is x. X is known to as the characteristic in machine learning while the variable increases in statistics. It stands for the knowledge imparted to us at every given moment.
2) *b* is the *bias term* or y-axis intercept.
3) *m* or scale factor, is the regression coefficient. In terms of traditional statistics, it is the same as the slope on the best-fit straight line that is generated following the fitting of the linear regression model.

Step 1: Creation of table 5 for data, filling in the columns.

Table 5. *Data sets.*

S/n	No of visits to TMP in monthly basics (x)	Duration of treatment in weekly basics (y)	Xy	x^2	y^2
1	2	5	10	4	25
2	5	5	25	25	25
3	13	8	104	169	64
4	10	8	80	100	64
5	5	3	15	25	9
6	5	3	15	25	9
7	15	10	150	225	100
8	2	3	6	4	9
9	1	2	2	1	4
10	8	5	40	64	25
11	10	18	180	100	324
∑	76	70	627	742	657

Step 2: we use the following equations to calculate or linear regression

$$m = \frac{n(\sum xy) - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2} \quad (4)$$

$$b = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2} \quad (5)$$

Therefore,
m = (11(627)–(76×70))/(11(742)–5776)
=(6897–5320)/8162–5776
=1577/2386
= 0.66
b= ((70 × 742) – ((76× 627)) / 11 (742) – 5776)
4288 / 2386 =1.8

Hence, the regression equation y= mx +b now becomes y = 0.66x+1.8. Also figure 1 represents or regression analysis on the data using Mathlab where the regression line tries to fit the datapoints.

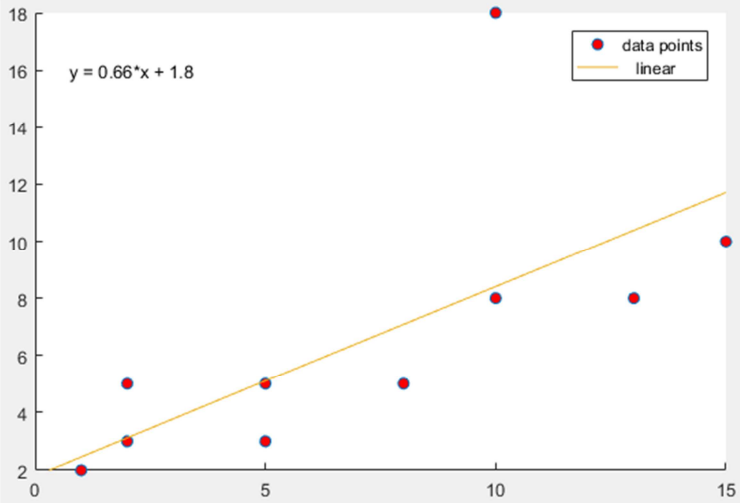

Figure 1. *Linear regression on TMP dataset.*

Table 6. *Predicted future values of y.*

No of visits to TMP in monthly basis (x)	Duration of treatment in weekly basics (y)	Predicted y
2	5	Mx+b*2
5	5	Mx+b*5
13	8	Mx+b*13
10	8	Mx+b*10
5	3	Mx+b*5
5	3	Mx+b*5
15	10	Mx+b*15
2	3	Mx+b*2
1	2	Mx+b*1
8	5	Mx+b*8
10	18	Mx+b*18

Furthermore, the work adopted regression equation to predict future values of y in table 6.

Table 7. *Predicted values.*

X	y-Actual	y-predicted
2	5	3.12
5	5	5.1
13	8	10.38
10	8	8.4
5	3	5.1
5	3	5.1
15	10	11.7
2	3	3.12
1	2	2.46
8	5	7.08
10	18	8.4

Therefore, with only 11 measured values to fit the line, our forecasts are not very accurate, but if the relationship between "Y-Actual" and "Y-Predicted" is sufficiently high, all series will move in the same direction. Here is a graph showing our prediction values. Figure 2 indicate linear regression Actual output vs Predicted.

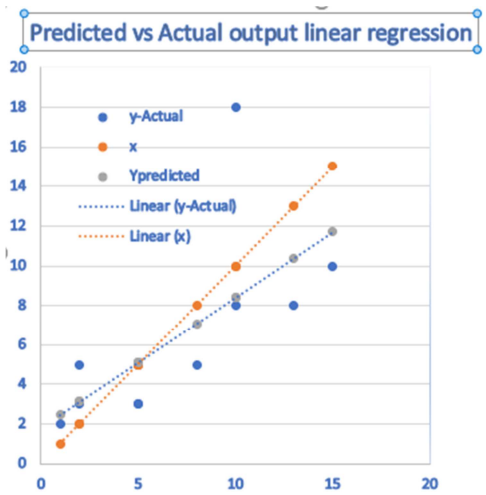

Figure 2. *Linear regression Actual output vs Predicted.*

5. Results Evaluation

Determining Whether a particular denotes a structured and objective evaluation of a current or completed research project. The goal is to evaluate the project's objectives for relevance, plan to transform, efficiency, relevance, and durability. Figure 3 and Figure 4 shows preferred health system has perceived by

the modern medical practitioners (MMP) and traditional medicine practitioners (TMP). Figure 4 shows a better result in the preference on the acceptance of both health system has compare to MMP which has a percentage of 5.

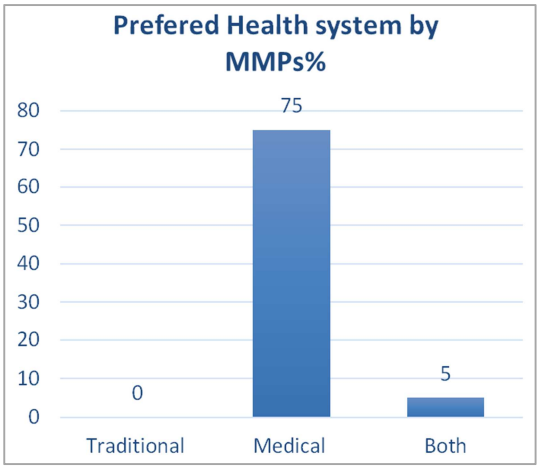

Figure 3. *Health system by MMPs.*

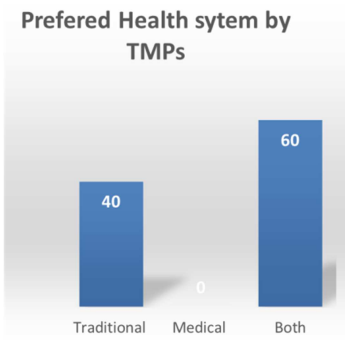

Figure 4. *Health system by TMPs.*

Furthermore, perceptions of both modern medical practitioners and traditional medicine practitioners were also considered from the questionnaire based on the combination rate of medication during treatment of patient illness. Results in figure 5 and Figure 6 shows that a greater number of MMP do not integrate traditional medicine in the treatment of illness. Also, a little segment of TMP always administered modern medication to their patient during treatment, this opens room for more research.

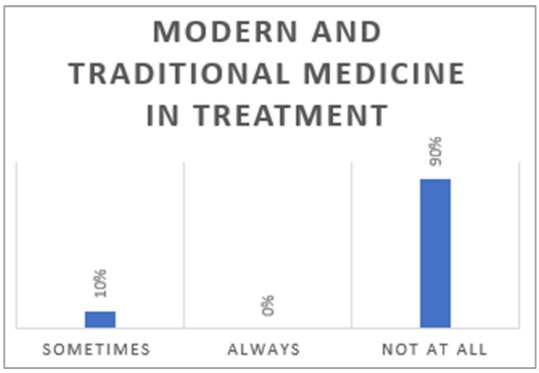

Figure 5. *MMPs Perceptions.*

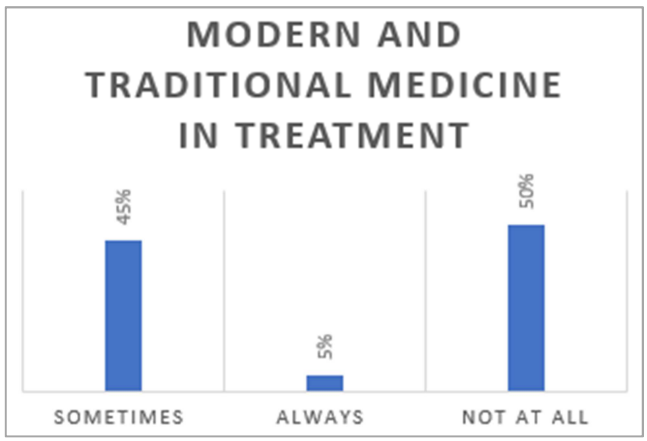

Figure 6. *TMPs Perceptions.*

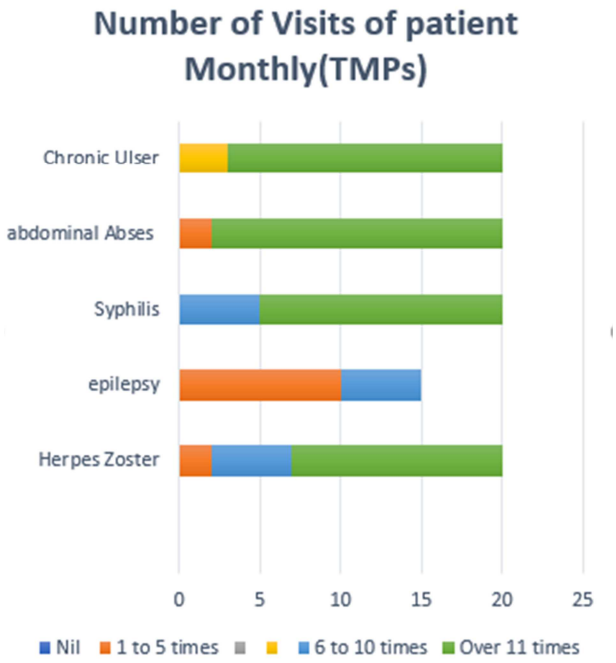

Figure 7. *TMPs Perceptions.*

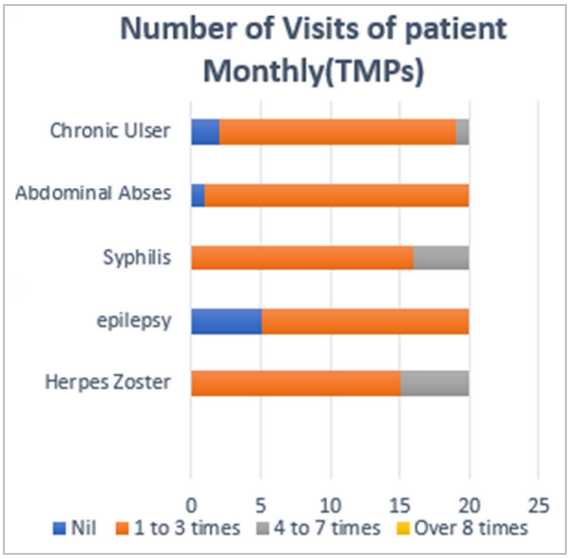

Figure 8. *TMPs Perceptions.*

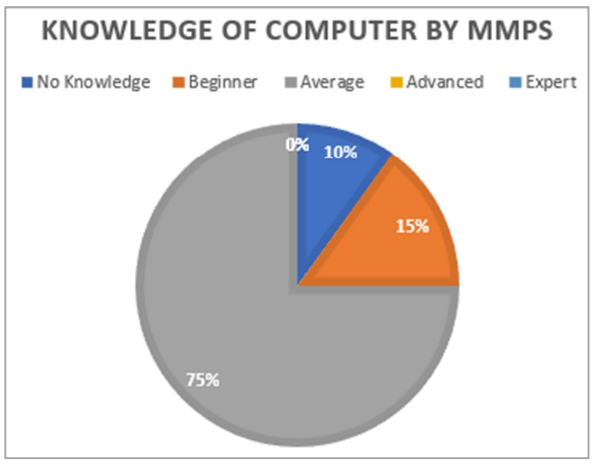

Figure 9. *MMPs Perceptions.*

Again, Figure 7 and Figure 8 shows the number of visits on monthly basis on the four diseases which are Chronic Ulser, Abdominal Abses, Syphillis and epilisey, results shows that chronic Ulser has the highest number of visits to the traditional medicine practitioners has compare to that of modern medical practitioner.

Furthermore, perceptions on the computer usage level of both the MMPs and TMPs were accessed depicted in figure 9 and Figure 10. Results shows that, there exists a high level of gaps which exists in the knowledge of computer between both practitioners hence there is a need for governments to organizes seminars and sensitizations for the both practitioners on a computer usage.

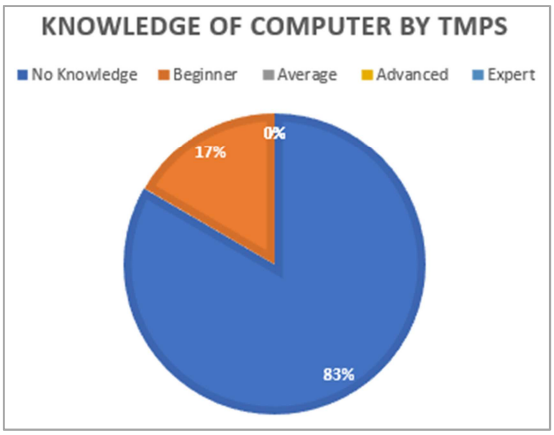

Figure 10. *TMPs Perceptions.*

Again, figure 11 depicts the distribution and correlation between Different aliment in months from traditional health system based on the sicknesses below which are Herpes Zoster, Syphilis, Chronic Ulser and epilepsy.

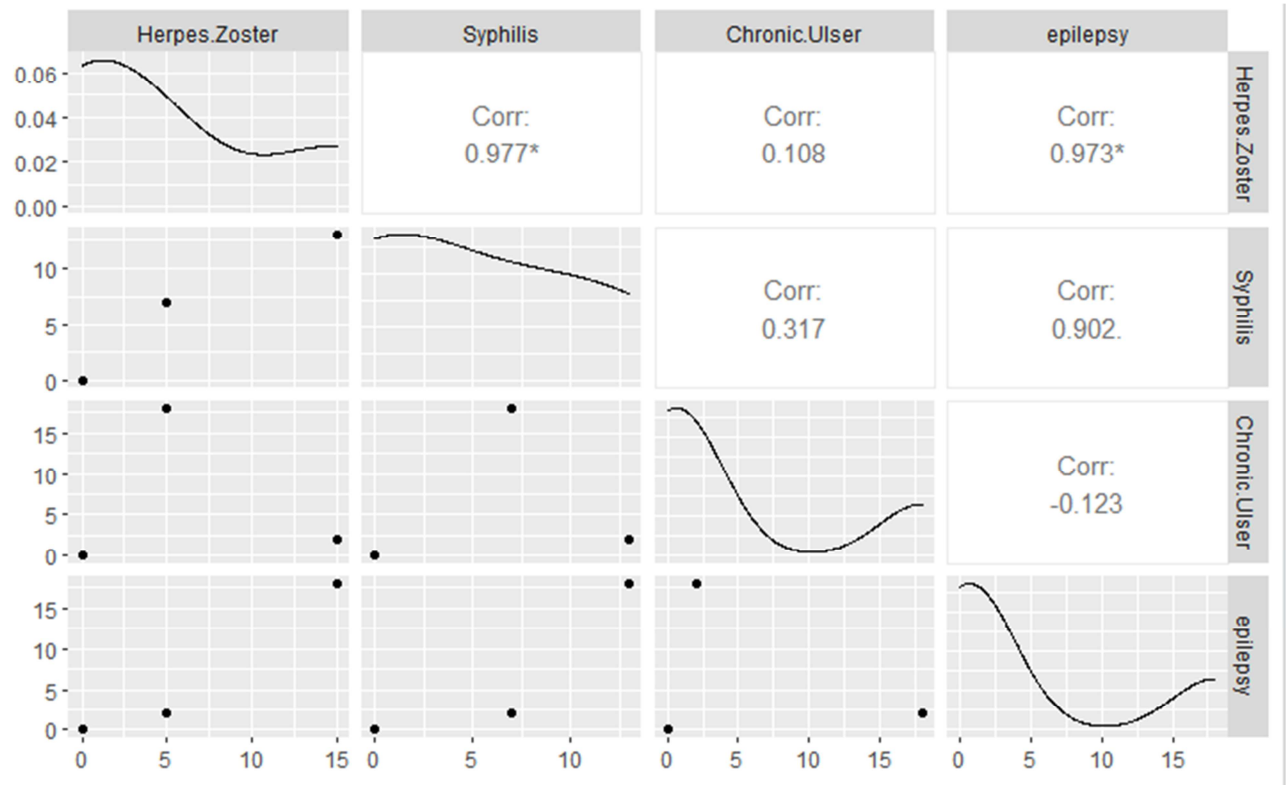

Figure 11. *Ailment Correlation between 4 Sicknesses.*

Furthermore, we carried out a parring in order to determine how individual ailment between each other based on their duration of treatment by traditional medical practitioners which is depicted in figure 12.

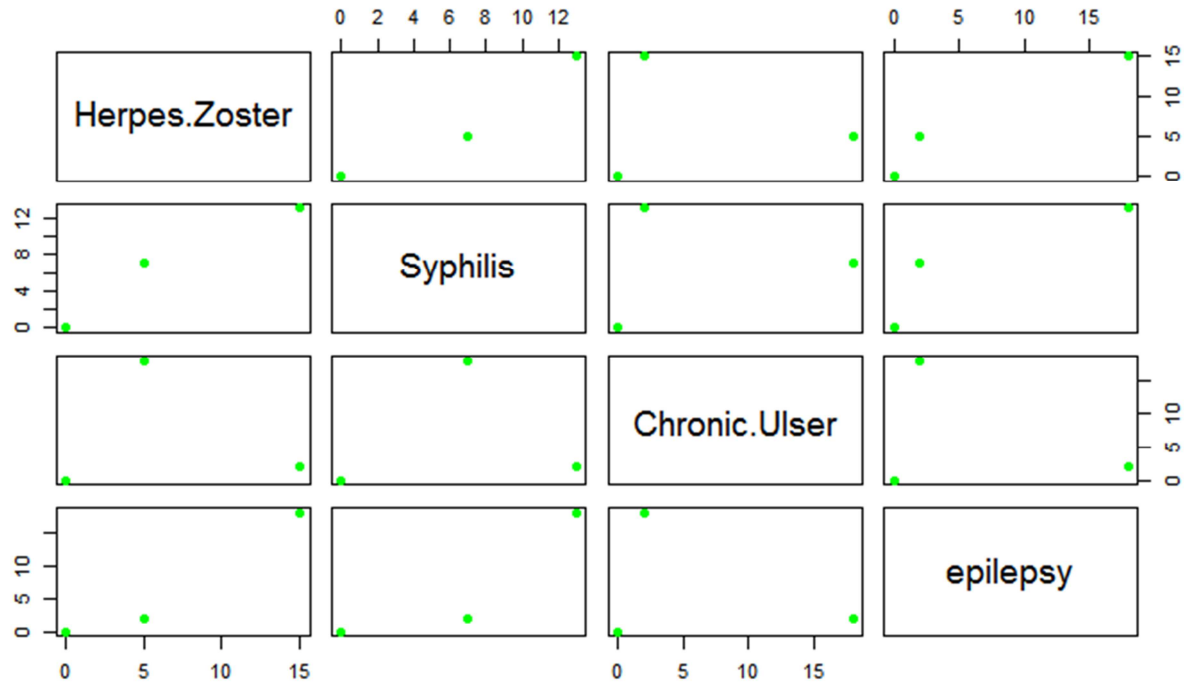

Figure 12. *Ailment vibration based on treatment duration.*

6. Conclusion

When combined with healthcare information data, the bioinformatics revolution will significantly improve the current healthcare system. Analytics will further support effective resource use by guaranteeing that the majority of individuals in need of healthcare get it. In order to maximize its potential for innovations, creativity, and improved patient care, researchers must focus more on the integration of the three (3) areas of specialization (bioinformatics, health informatics, and analytics). Integrating biomedicals and healthcare data is primarily done to create opportunities for technology interchange in medical settings for data- and experience and understanding development. As a result, a database for diseases and their likely causes, trigger patterns, and prospective treatments and cures will be created, facilitating faster access to healthcare and resulting in a more dependable and effective healthcare system. The development of analytics came to the rescue in the healthcare sector when it came to the vast volume of data collected electronically across disparate platforms. Analytics can produce insights that enhance physician diagnoses, save costs, minimize the problems, enhance outcomes, identify at-risk populations, and predict future healthcare requirements for patients. Furthermore, with the growing popularity of traditional medicine globally and within Akwa Ibom State, Nigeria, many patients now consider traditional healthcare services either for primary, secondary or complementary healthcare. Hence, the need for integration of traditional medicine with modern medicine is pertinent. The involvement of Modern Medical Practitioners (MMPs) and their collaboration with traditional counter parts has so far founded to be very limited. Mainly stem from persistent negative attitudes among the practitioners to one another, though the present research findings rather demonstrate the existence of some goodwill within both practitioners. Basically, the integration of both practitioners in health care service delivery is highly required.

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