UNIVERSITY OF ILORIN

THE SEVENTY-NINTH INAUGURAL LECTURE

"THE CHOICE IS YOURS"

By

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My Lords Spiritual and Temporal,
Members of my family: nuclear and extended,
Distinguished Invited Guests,
Gentlemen of the Print and Electronic Media,
Great Unilorites,
Ladies and Gentlemen.

INTRODUCTION

The subject, Statistics, has a unique definition and it is known, these days, by almost everyone as they have to come across its use in one way or the other. However, what an inaugural lecture should do is to bring town and gown together; and that the forum should be of mutual benefit to the two groups. Statistics is a branch of Mathematics, the bedrock upon which the former is based. Since the position our society in general has taken with respect to Mathematics is well documented, I would try to describe the Mathematical procedures as simply as possible but without giving derivations. This is to ensure that both town and gown are together here today.

I want to start this lecture by providing some results from some statistical experiments in which I was involved. Mr. Vice-Chancellor sir, I thus seek your indulgence to depart slightly from the convention of inaugural lectures in this University.

1. LIFE SPAN OF SICKLE CELL PATIENTS IN NIGERIA

Data in respect of one thousand, two hundred and ninety-five sickle cell patients were collected and the mode of discharge noted after hospitalization. The modes of discharge that are relevant here are (i) discharged alive and (ii) discharged dead. Of these, ninety-five died in the hospital. Figures 1, 2, and 3 are the data presentation in histograms of the entire patients put together, those

discharged alive and those discharged dead respectively. Clearly, these histograms suggest identical underlying behaviours (distributions) having varying parameters. These parameters, which we derived from their means, are of importance to us. The mean for those that were discharged alive was 11.27 $\pm$ 8.0 years while that for those that died was 13.45 $\pm$ 9.4 years. These two were found to be significantly different ($p = 0.0015$). The distribution so suggested was found to fit the data sets very well ($p > 0.1$).

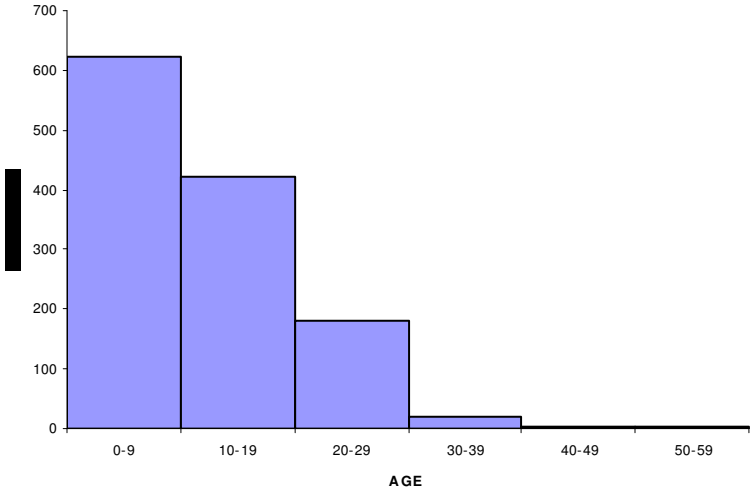


FIG 1. DISTRIBUTION OF ALL PATIENTS HOSPITALIZED FOR SICKEL CELL ANAEMIA BY AGE

Of more importance to this lecture is the behaviour of the life span of patients obtained from those that were dead in their last hospital admissions. Since the behaviour has been completely determined we can now describe the life span with great certainty. Specifically,

(i) thirty-one percent (31%) or approximately 1 in every 3 sickle cell patients died before five years of age.

(ii) only about sixteen percent (15.6% exactly) survived beyond age 25 years and

(iii) only five percent lived beyond forty years of age.

A closer look at the history of those who lived beyond forty years showed that the discovery of their heamoglobin genotypes was very early; (actually lower than five years). This behaviour is most likely to sustain. If so, this describes what the sickle cell patients in Nigeria are experiencing.

Sickle cell disease is characterized by anaemia: a painful condition for the patients. Again, going through the history of these patients, each patient experiences anaemic crises about five times a year with a current value of about ₦20,000 per crises. Furthermore, because they are generally fragile, they hardly engage in any strenuous past-time; so that they have enough time for what their

energies allow them to do. This explains why most of them are generally brilliant and excel very well academically. The anaemic condition keeps them out of school; yet they perform brilliantly in examinations with little school attendance.

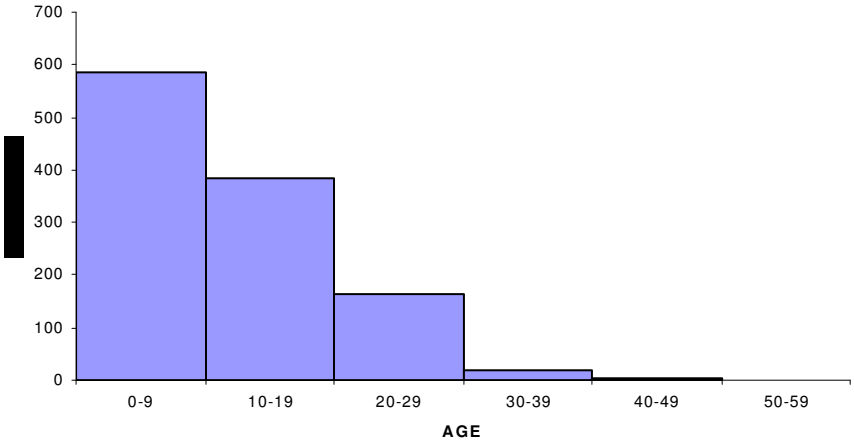


FIG 2: DISTRIBUTION OF PATIENTS HOSPITALIZED FOR SICKEL CELL ANAEMIA AND DISCHARGED ALIVE BY AGE.

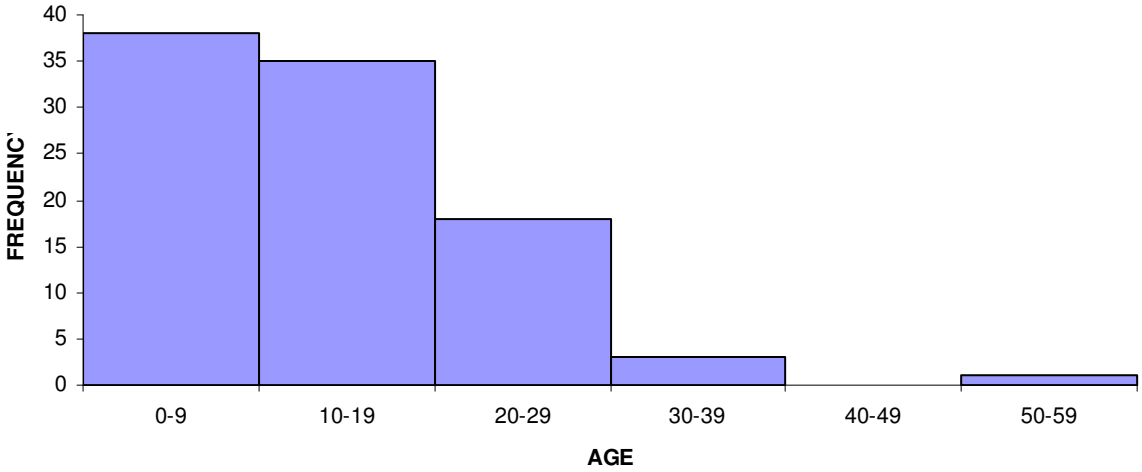
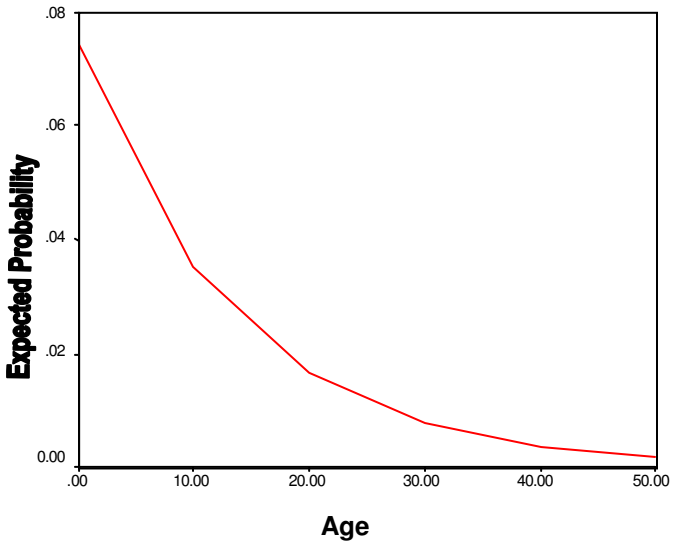
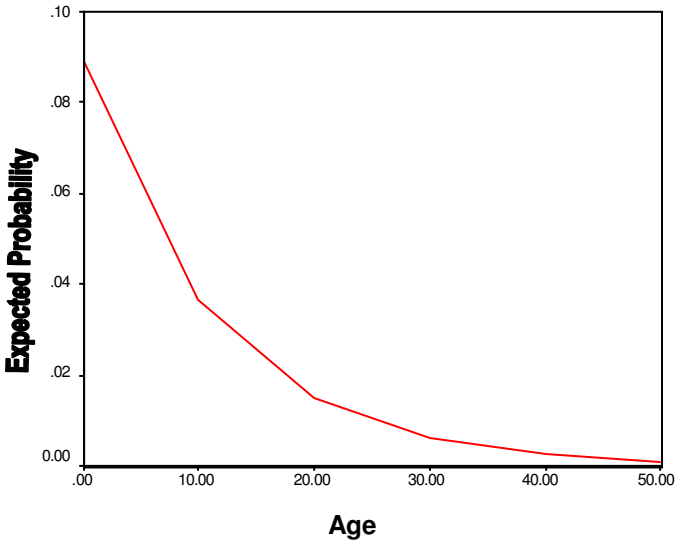


FIG 3: DISTRIBUTION OF DEAD PATIENTS AT THEIR LAST HOSPITALIZATION FOR SICKEL CELL ANAEMIA BY AGE.



GRAPH 1: SHOWING THE BEHAVIOUR OF PATIENTS DISCHARGED ALIVE



GRAPH 2: SHOWING THE BEHAVIOUR OF PATIENTS DISCHARGED DEAD

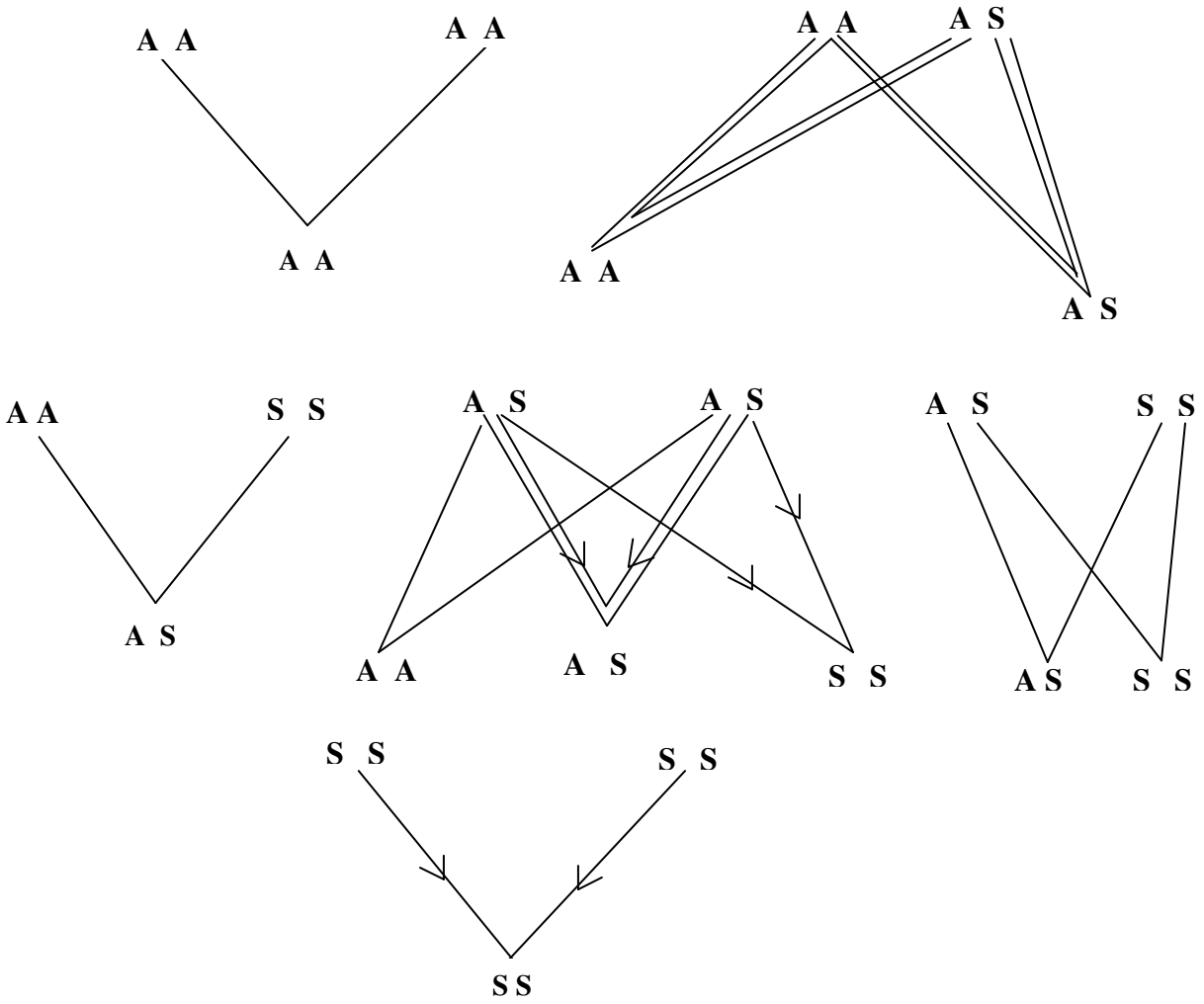


FIG. 4: POSSIBLE OFFSPRINGS OUTCOME FROM A COUPLE

Sickle cell condition is produced on an individual whose genotype is **"SS",** an **"S"** produced by each parent. Broadly speaking, there are three genotypes: **AA, AS and SS.** Figure 4 presents the possible offspring outcomes of a couple.

From the figure, it is clear that sickle cell can result from

(a) **AS – AS** marriage
(b) **AS – SS** marriage or
(c) **SS – SS** marriage

However, in a genotype screening cross-sectional data, we found that 58.7%, 26.4% and 14.9% were **AA**, **AS**, **SS** in our society respectively. This agrees well with the W.H.O.'s (1994) release of 60%, 25% and 15% relative frequencies respectively. Consequently, a careful choice of a marriage partner can be pursued such that the 40% of the society who can produce sicklers can be made to produce only **AA** or at worse **AS** genotypes.

Let us, for the moment, assume that the uncontrollable chance to produce any of **A** or **S** from a parent genotype to make the genotype of an offspring is equally likely (i.e. 50:50). This is currently being contested. A gambling and/or an ignorant parent would have the following chances to produce an offspring characterized by the specific genotype shown in the matrix of table 1.

		Offspring		
		AA	**AS**	**SS**
Parent	**AA**	½	½	0
	AS	¼	½	¼
	SS	0	½	½

TABLE 1: A GAMBLING AND/OR AN IGNORANT PARENT WITH THE CHANCES OF AN OFFSPRING HAVING VARIOUS GENOTYPES.

This matrix is called a probability transition matrix in stochastic processes. If the idea of gambling is sustained then a stationary state may be reached in which after a sufficiently large number of generations (in about 10 or more generations of gambling), the probability transition matrix, Table 2, is produced. This means that eventually relative frequencies (presence) of **AA, AS** and **SS** would be 25% (¼), 50% (½) and 25% (¼) respectively.

		Offspring		
		AA	**AS**	**SS**
Parent	**AA**	¼	½	¼
	AS	¼	½	¼
	SS	¼	½	¼

TABLE 2: THE LONG-TERM CHANCES OF A GAMBLING/IGNORANT PARENT.

An ignorant person is a pure gambler because they are guarded by the same chances. While ignorance is punishable in law, it is also equally punishable in nature. What God had prescribed as punishment for any person who does not listen to Him is the same for those who do not have knowledge and unknowingly takes a reckless step. It is therefore better, to seek knowledge and work by it, than walk in ignorance. Our forefathers would have several children but only a handful (sometimes less than 50%) would survive. Often times no witch or wizard had killed their children; but rather the children died as the consequence of the children being sicklers: a product of ignorance.

Mr. Vice-Chancellor sir, with this knowledge, it is therefore the choice of the person searching for a partner to desire whether to have or not to have an offspring who is a sickler. A person with an **SS** genotype should look for a partner with an **AA** genotype. Anything else could produce sicklers like himself or herself. In the same vein, a person with an **AS** genotype must also look for an **AA** genotype partner. There should not be love at first sight or, as they say, love is blind. Infact, Government should be involved in this genotype mating. However, if our Government does not, individuals must now put it into practice to conduct genotype mating before marriage. **The choice is yours**. It is yours as a parent to advice your children or as a would-be partner in marriage.

2. DRY SEASON FARMING

An experiment was conducted on an irrigation project of Niger Basin Authority located in Oke-Oyi, Ilorin, Kwara State. The aim was to determine the response of Okro plant to water stress from various regimes of irrigation. The water requirement of okro plant was determined from the calculated field capacity and permanent wilting point of the soil. Taking evapotranspiration into consideration, the levels of irrigation were then calculated. Application of water to plant for each level of irrigation was done by using watering can at calculated intervals.

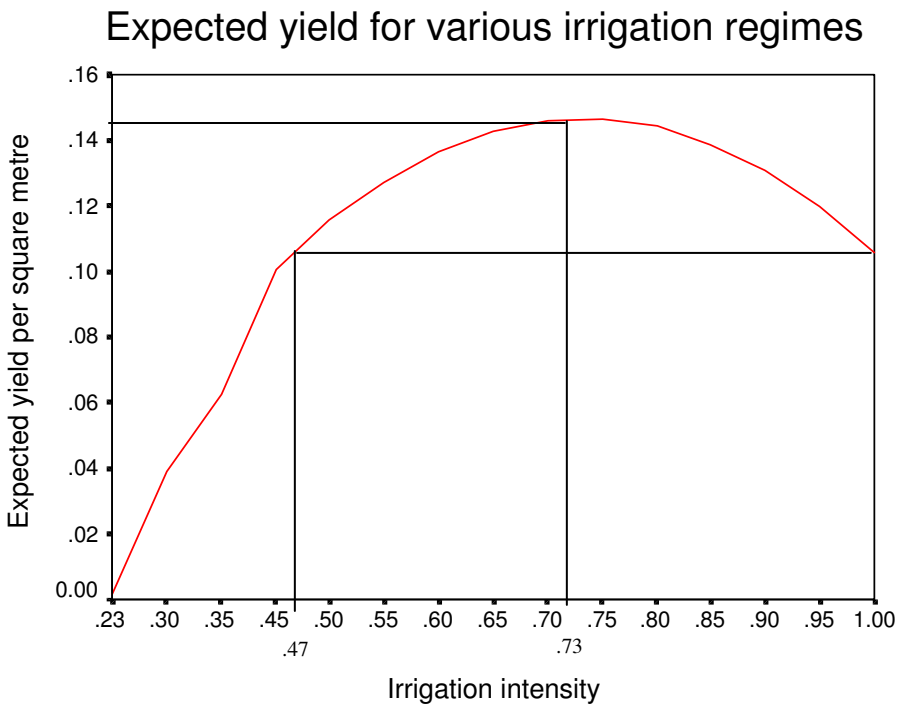


FIG. 5: EXPECTED YIELD OF OKRO AT VARIOUS IRRIGATION LEVELS

Data Source: Atoyebi (2000)

The weight of okro produced was used as the response for this lecture. Various other responses were taken. An examination of the data showed that there was a steady increase in weight as the level of irrigation increased. However, with a further increase in irrigation level, rather than the weight to increase, it actually decreased. With this phenomenon, an appropriate model which gave a yield for a given irrigation level was proposed.

The graph, figure 5, shows the expected yields of okro at various irrigation levels. This graph was considered best and representative for the expected yield by the residual analysis conducted. The graph also shows that the expected maximum yield was calculated to be 73.3% of irrigation level. However, to pick the best irrigation level, a revenue analysis was conducted whereby the cost of providing a particular irrigation level would have to be deducted from the expected sale of the yield. Table 3 shows the economic analysis for various regimes of irrigation of one hectare projection. Obviously, the best irrigation level would be 73.3% or below depending on the financial status of the farmer. In this regard, the information above must be a guard to a would-be dry-season farmer. It is not sufficient to see others going to farm and the interested just follows. Success in such a farming calls for concerted efforts and careful considerations. Gambling cannot pay in this trade.

Evidently, the "sales" produced by 100% and 80% irrigation could be reproduced by 46.7% and 66.5% regimes respectively, giving better gains, see Table 3.

Irrigation Level/Regime %

	100%	80%	73.3%	70%	66.5%	60%	46.7%
Overhead cost	42,350	42,350	42,350	42,350	42,350	42,350	42,350
Irrigation (water cost)	4882.5	3906	3578.9	3417.8	3246.9	2929.5	2780.1
Total cost	47,232.5	46256.0	45928.9	45767.8	45596.9	45279.5	44630.1
"Sales"	56026.4	76174.8	77697.0	77169.9	76,174.8	68,728.8	56026.4
Gain	8,793.9	29918.8	31768.1	31402.1	30577.9	23449.3	11396.3
% Gain relative to max. yield	27	94.2	100	98.8	96.3	73.8	35.9

TABLE 3: ECONOMIC ANALYSIS FOR REGIMES OF IRRIGATION OF ONE HECTARE PROJECTION.

Our women can testify to the fact that the costs of most food items in Nigeria are relatively high during the dry season. Given this background, many State Governments have launched dry season irrigation farming without providing optimal irrigation regimes for the soil types and crops that thrive in their localities. This amounts to gambling because while some crop yields would definitely be realised, such would be far from being the best.

Again, the choice is open. Do we need dry season farming? Evidently we do. If we do, then the results of experiments such as the one described above and used in this lecture should not be shelved or be made purely as an academic exercise. The results should be made available so as to aid our agricultural productions in this country. Fortunately now, many State Governments are subsidizing farmers' agricultural inputs by providing water pumps obviously for irrigation. Such Governments should not stop at that; but rather provide optimal irrigation regimes for the crops and soils intended. For any subsistent farming, therefore, the choice for optimal yield is ours.

3. PRINT MEDIA IN NIGERIA

The print media in Nigeria consists of those who print periodicals and daily newspapers. Of particular importance here, Mr. Vice-Chancellor sir, are those who print daily newspapers. Figure 6 shows fourteen newspaper houses and their average daily distributions. Some have weekend newspapers while some do not.

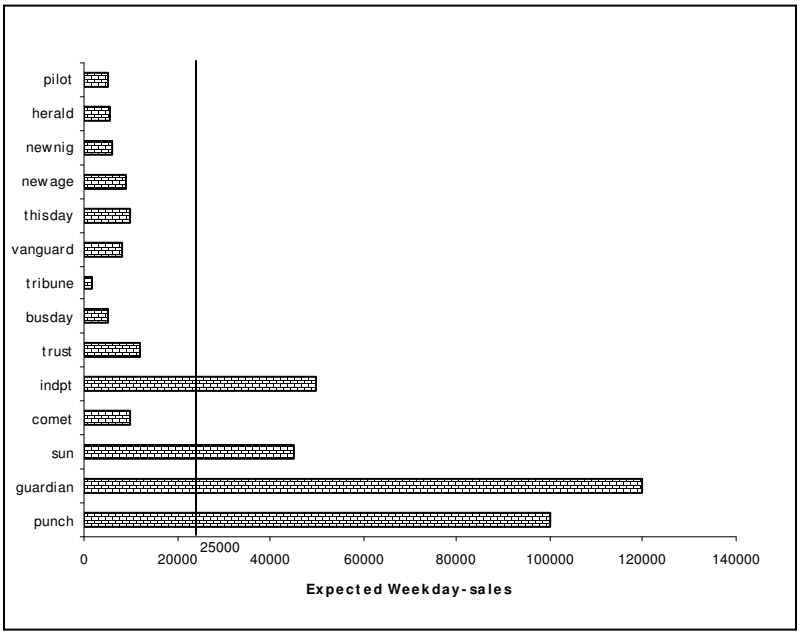
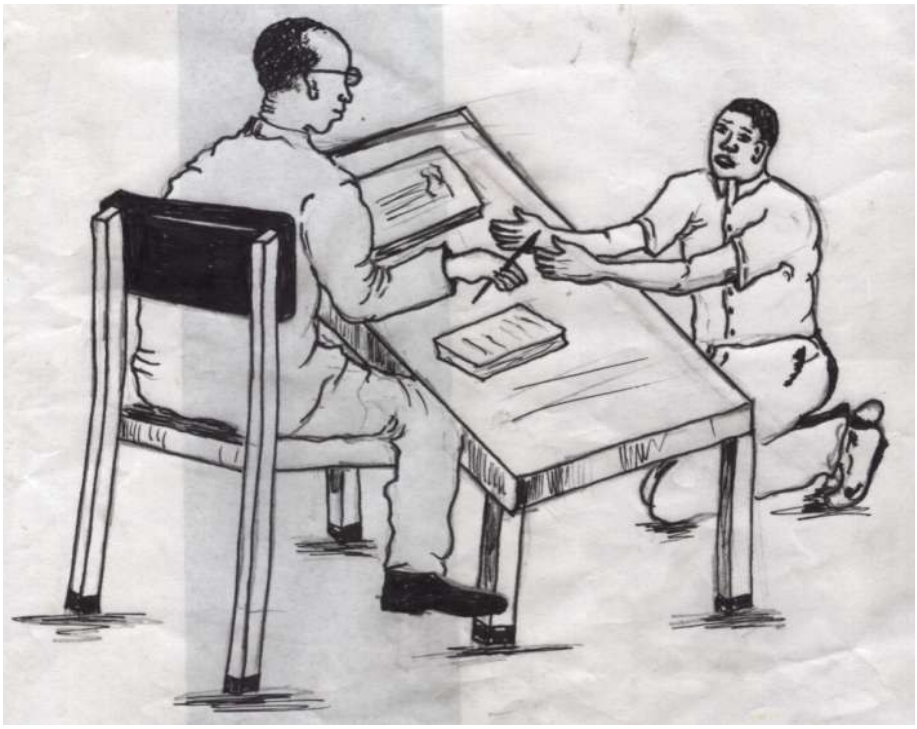


FIG. 6: BARCHART OF FOURTEEN NEWSPAPER HOUSES AND THEIR AVERAGE DAILY SALES

Based on overhead cost of printing materials and sustenance of the essential workers, a minimum circulation of 25,000 copies has been calculated and expected, if the media house is to break even. This is shown in the bar chart (Figure 6). Clearly, there are some media houses whose performances are below this minimum. A number of issues is now raised. First, as a media house, any one that does not meet this minimum requirement is not likely to sustain itself, possibly including paying the salaries of her workers. Such media houses hardly would engage in incentives such as annual salary increments or leave bonuses. Indeed, salaries of workers in such houses are characterized by irregularity. Infact, there would hardly be any month that the number of days in it would not be beyond 31. At times, there may be a need to source funds from outside the establishment; in form of bail-out funds.



HEAD OF A NEWSPAPER HOUSE BEGGING FOR BAIL-OUT FUNDS.

This results into gross compromise by the management and therefore engages in publishing materials which it does not even believe in or are totally false. Secondly, patronage of such newspapers would be low except if the media house is Government owned and the Government is directed to use the media house as its service provider point for its advertisements. This further dwindles the accompanying success story of such a media house. This explains immediately the "success" stories of the country's Government-owned newspaper houses.

A number of choices is therefore open to us. First, as a Mass Communication graduate desiring to excel in a Newspaper house, a good knowledge of the performance of the Newspaper houses is required. This knowledge should be made available intermittently. For such an individual, sampling of newspaper stands forms a good starting point to identify which newspapers can sustain itself. Second, there is need to identify which newspapers have good circulations for advertisement. There must be a balance of cost of advertisements and circulations. The cost of advertising is usually dependent on newspaper. However, this is also usually dependent on the circulation level of the newspaper. Without doubt, there exists the ease of referencing and retrieving materials in

newspapers. It is therefore true that print media advertisement is best. Thus, depending on the financial standpoint of the advertiser, a choice must be made to realize optimally from advertisements. Thirdly, should any Government dabble into newspaper printing, knowing fully well that Governments before now have not performed well in this area? **The choice is yours**.

4. EFFECT OF SMOKING

From the files of dead patients in University of Ilorin Teaching Hospital in 2004, a careful selection of three hundred and thirty-five patients were made; one hundred and ninety-nine had smoking-related causes of death while the rest were non-smokers. Figure 7 (a) and (b) show the distributions by age at death. The smokers had a mean life span of 49.6 $\pm$ 16 years but the mean life span for the non-smokers was 56.1 $\pm$ 17 years which was at least 6 years higher than that of the smokers ($p = 0.39$). These values do not contradict the estimated longevity of the Nigerian which is put at 52.4 years. The difference in longevity obtained here is even smaller than the difference obtained in Great Britain in 2004 where a difference of 10 years was found between smokers and non-smokers (British Royal Journal of Medicine, 2004). Yet, an examination of the group of smokers showed that there were some individuals who lived up to 80 years of age.

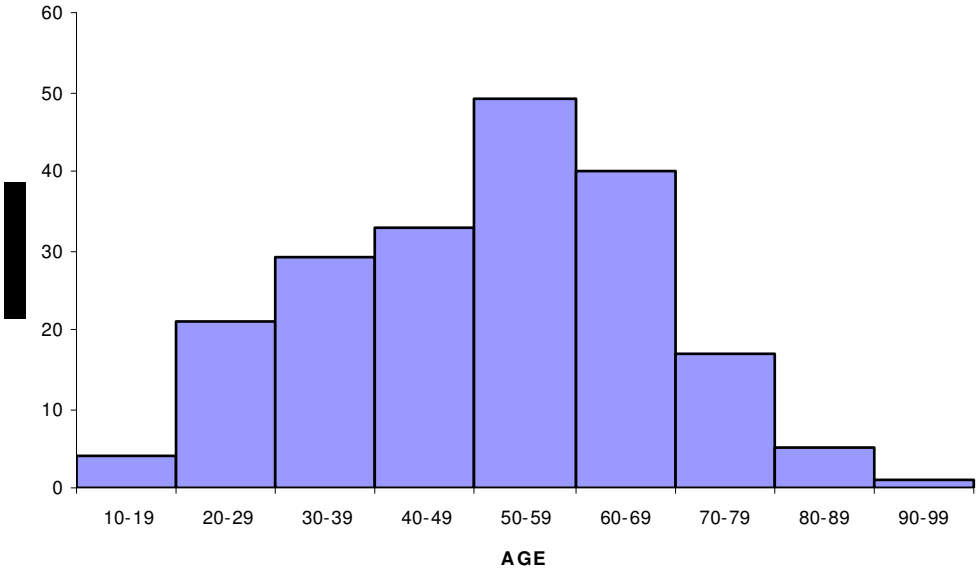


FIG. 7(a): DISTRIBUTION OF 199 SMOKERS BY AGE

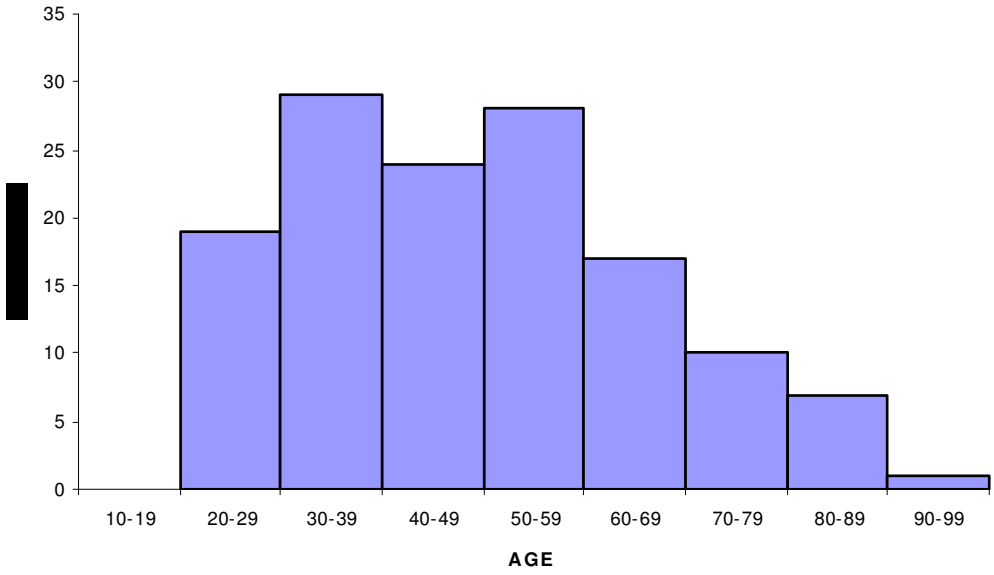


FIG. 7(b): DISTRIBUTION OF 134 NON-SMOKERS BY AGE

However, by the underlying models fitted to the age distributions of the two groups, the chance of a smoker surviving up to 80 years is 1 in every 33 of smokers compared to 1 in every 20 for non-smokers. It is instructive but unfortunate that any 80 year-old smoker or his likes would probably be known and heard of in his locality and beyond and hence be used to justify the claim that smokers also live long. Based on the evidence shown here, Mr. Vice-Chancellor sir, the choice is now ours: whether we wish to live long or not. I must add that when the various health hazards of smoking come, such affected individual would not only live a life shorter than that of the non-smokers, but would also spend more to combat the ailments that characterize smoking. Consequently it is not adequate to wish for long life, we must purpose in our minds and work for it. **The choice is yours**.

There is one single message these four examples have conveyed. Qualitative life and living are desirable by many. Various factors are known to affect this. Many of such factors are already identified but quite many are currently unknown. This is true in many areas of our endeavours. We must keep searching for the truth, and if we keep to the truth, the truth will set us free. Ignorance of the truth does not exclude us from the consequences of not abiding by the truth. Knowing the truth but inadvertently violating taking the path of living by the truth, or wishing that a wrong path of action when taken can be condoned is tantamount to being involved in gambling. The consequence may be disastrous.

In the first example, no love should be blind or think that because God does not do evil, He would not make a marriage partner seeker meet another whose genotype would produce sicklers if they marry. God has given us the planet and to subdue it; including some salient points such as this. Now that we have this knowledge we should therefore subdue this problem. A purposeful search must be made so that a mistake would not occur. A generation that produces sicklers would need up to four generations to clean up the mess it has created.

From the second example, it is clear that dry-season farming is an essential procedure we must take to be food sufficient in this country. However optimal yields can only be achieved if careful guides are provided for the farmers.

The third example shows that print media is widely acclaimed as a good vehicle to disseminate information. However, a careful consideration of the level of circulation of a newspaper is highly desirable to ensure good decision both by an employee seeking a job in media houses, or by a person requiring the services of a media house.

Lastly, example four shows that in spite of knowing or hearing of a smoker who has lived long is not sufficient and cannot be used as an example to take to or continue smoking. Longevity for smokers is shorter than for non-smokers.

All these are also true in all other endeavours of life; be it in Medical Science, Pure Science, Engineering and Technology, Agricultural Science, Education, Social and Management Sciences or the Humanities. We must continue to seek for factors affecting a practice or mode of life and when found we must carefully use them along in our life's pathway.

The choice is yours. Indeed, it is for you and for me to purpose in our hearts not to be ignorant because an ignorant person is a gambler. The results of gambling have not been rewarding in any way. We therefore need to seek after knowledge. Some facts are already known or written and can be obtained in relevant publications. It is thus necessary to read very widely and search for facts. Other facts are hidden and should be searched out for and be identified through properly guided researches. While Statistics is a service-providing subject, it is one of the cardinal cornerstones of carrying out a scientific research. A statistician must be present both at the beginning (planning stage) of an experiment so as to determine the proper assumptions that are desirable for a correct analysis and at the end to ensure that proper conclusions are derived from the experiment.

Many researchers involve the statistician only at the analysis stage. This is like involving a medical doctor when the patient is already gasping for breath. This turns the entire process of scientific research into a gamble. The statistician is needed right from the planning stage so as to provide the necessary guidance

that will ensure adequate sampling instrumentation and data collection. If data are not collected under an appropriate condition, the analysis may not produce the expected range of results. So, the statistician is needed at the various stages of planning, where the rules are laid down for successful collection of data, then the analysis stage, and finally, at the level of interpretation.

RESEARCH PLANNING

Any research that has statistical inputs is either experimental, survey or retrospective data retrieving in nature. In any of these, the underlying conditions for the research to be conducted must be known so that the effect of the factors of interest is not confused (confounded) with another which may mar the identification of the effect desired. Within each of these areas also, many research methodologies are available. For instance, in experimental research, designs such as completely randomized, randomized block, randomized incomplete block, various types of Latin squares and factorial designs and many more are available. Each one is used in different situations to conform to how the research is to be mounted and/or the observations are to be taken. Similarly, in a research involving surveys, schemes or methodologies such as simple, stratified, multistage, proportional allocation, systematic random sampling and many more procedures are available to be used.

ANALYSIS

Analysis of data is heavily weighted on what measurement is taken, the type of data collection scheme adopted and what the analysis is to achieve and/or accomplish. For instance, when the collection is done using measurement that are purely nominal or that are at most ordinal, the approach of analysis is peculiar, though most of such methods have parallels to methods under data obtained when measurements are continuous or quantitative. In the former, analysis based on proportions, log-linear modeling, logistic modeling, tests to examine existence of association using the relationship between association and independence comes handy. In quantitative data analysis such as Analysis of variance (ANOVA), correlation, survival, cluster and factor analyses and many more are available.

Based on this background, a number of options is open to the researcher. He may decide to do it alone; that is, he designs the research alone, without examining possible underlying assumptions that are relevant. Often, he may attempt to analyse the data alone; but when the result is not supporting a glaring inference, he now goes to a statistician; not mentioning that he has reached a brick wall. He must be gambling with his research. The statisticians when involved mid-way, may or may not be able to salvage the situation. Some researches are so poorly conducted that analysis is practically impossible, yet

the statistician is asked to remedy the situation. To such researchers I say, **the choice is yours**.

MY BACKGROUND

Born and bred in a typical Igbomina setting whose father had seen (in Lagos) how small boys especially expatriates would be commanding older people who were workers under them, I was made to go to the primary school very early, possibly to be a person that would not eventually be pushed here and there by others. Upon finishing First School Leaving Certificate, I was ready for Secondary School Programme. Just then, my sister's husband came home from Kano and informed my father that there was a school in Kano where they were paying only £6.00 (₦12) per year then. Without hesitation, my father resolved that I would go to Kano to attend that school. In my young days, father's pronouncements were laws: not to be contested against even by the wife. So I went to Kano for my Secondary School.

In those days also, the best five final year students in each Nigerian Secondary School were allowed to sit the examination for admission to attend Higher School in the four existing Federal Government Colleges then. I thank God that I was one of such. I was successful and admitted to Federal Government College, Sokoto. During HSC 2 year, the old students of the College returned from ABU, Zaria and informed us that Industrial Chemistry (now Chemical Engineering) would commence in Ahmadu Bello University that year. In reaction to this, I chose Quantity Survey as my first choice and Industrial Chemistry as my second. I was eventually admitted to read Industrial Chemistry. However, I knew that I was poorer in Chemistry than in any of Physics and Mathematics which constituted my HSC subject combination, and I consequently approached Prof. Iya Abubakar, then the HOD Mathematics and Dean of Science, ABU for a possible change. He looked at me and said, "Then change to Mathematics. Is that ok?" To this I replied in the affirmative. The Department of Mathematics, ABU housed Mathematics, Statistics and Computer Science. Everybody in the first year in the Department then had to do the same courses. I found out that I was performing well in Statistics, even though at first I could not pronounce the word properly. That was how God, in His infinite mercies, changed my profession to a course I did not know its existence until my latter part of HSC programme in Sokoto. Since then I have never regretted pursuing Statistics.

MY HUMBLE CONTRIBUTION

After my first degree in Statistics, I proceeded to the U.S for postgraduate work. By God's design I eventually found myself in the School of Public Health, The University of Michigan where, in my naïve thought, emphasis should be on Biology which I did not take in my secondary school days. This was how my

career in Biostatistics began. Biostatistics is a branch of Statistics that pays more attention to Medicine and Human quality of life. In Medical Science very many measurements are taken all of which are aggregated to score the individual qualitatively; such as being positive/negative(which is purely classificatory) or ranked into the existence of an ailment. In this regard, I specialize in data arising from qualitative (discrete) variables and their peculiar analysis simply tagged Categorical Data Analysis.

1. CATEGORICAL DATA ANALYSIS

a. One-dimensional Categorical data.

Categorical data are obtained when characteristics (variables) of interest is purely classificatory; either nominal or ordinal in nature. Data resulting from counts from a two-outcome characteristic are usually analysed or described simply by the proportions of outcomes. When the outcomes are classified beyond two outcomes however, description of the data may have to go beyond estimating the proportions only; especially where the outcomes are classified ordinally. Specifically if the classifications have regular intervals, a single model may be desirable to describe the behaviour of the data. Since such proportions vary very widely, the regular assumption of constant variance of outcomes breaks down. Based on this background, a model selection scheme for one dimensional multinomial was developed as found in Jolayemi (1986b and 1990d).

When the proportions are being made to depend on variables that are quantitative in nature, and the suggested model is non-linear, the iterative weighted least squared method would be appropriate (Jolayemi 1990b).

	Complications	No. of Maternal Death
(1)	Septicaemic Shock	48
(2)	Acute renal failure	14
(3)	Cardio Pulmonar arrest	21
(4)	Hepatic coma	6

TABLE 4: TERMINAL COMPLICATIONS IN 89 GENITAL SEPSIS PATIENTS ASSOCIATED WITH MATERNAL DEATH.

Table 4 arises from classification of 89 genital sepsis patients who died as a result of one of four complications as witnessed in the Maternity Wing of the University of Ilorin Teaching Hospital, Ilorin, Nigeria in 1987. These complications are septicaemic shock, acute renal failure, cardio pulmonary arrest and hepatic coma. Some interesting model as well as their adjusted R^2 - type statistics are given in table 5.

	Hypothesis	Estimate of Parameter(s)	X^2	d.f	λ
1.	Equiprobable	$\hat{P}_1 = 0.250$	44.798	3	14.933
2.	$P_1=3P_2$, $P_3=3P_4$	$\hat{P}_1 = 0.552$	0.306	2	0.153
3.	$P_1=3P_2=2P_3=8P_4$	$\hat{P}_3 = 0.228$	0.379	3	0.126
4.	$P_1=4P_2=3P_3=6P_3$	$\hat{P}_1 = 0.511$	1.980	3	0.660
5.	$P_1=4P_2=2P_3=8P_4$	$\hat{P}_1 = 0.571$	0.699	3	0.233
6.	$P_1=3P_2=2P_3=6P_4$	$\hat{P}_1 = 0.533$	0.663	3	0.221
		$\hat{P}_1 = 0.500$			

TABLE 5: SOME HYPOTHESES FOR TABLE 4

Model 3 has minimum λ and therefore is best to describe the data. In this regard, septaemic shock is the most common; accounting for more than half (51.1%) of deaths. This is followed by cardio pulmonary arrest accounting for about one – quarter (25.5%) while acute renal failure accounted for 17.1% and hepatic coma was least common; just 6.4%.

When the cell counts for one – dimensional multinominal can be predicted using a quantitative variable, the procedure is implemented as follows. Table 6 shows the distribution of 412 vagina bleeding pregnant patients by age recorded in the Maternity Wing of UITH, Ilorin Nigeria in 1987. The age interval here is regular. Consequently the age groups can be represented by 1, 2 and so on and because the distribution is asymmetric, the contesting models are as shown in table 7. This example shows that based on the test statistic X^2, Models 3 fits best. By the adjusted R^2 developed in Jolayemi (1986a) however, the best model was identified also to be Model 3 showing that when regular assumptions hold, this method would equally perform well.

Age	No. of Cases
15-19	29
20-24	94
25-29	142
30-34	101
35-39	36
40-44	8
45-50	2

TABLE 6: AGE DISTRIBUTION OF 412 VAGINA BLEEDING PATIENTS.

	Model	X^2	P-value	R^2_{adj}
1.	Equiprobable	291.486	0.000	Base
2.	$\beta_0 + \beta_1 i + \beta_2 i^2$	6.827	0.145	0.965
3.	$\beta_0 + \beta_1 i + \beta_2 i^{½}$	6.497	0.165	0.697
4.	$\beta_0 + \beta_1 i + \beta_2 i^{1/3}$	8.5671	0.0729	0.956

TABLE 7: POSSIBLE MODELS FOR TABLE 6.

Proportions which are derived from counts may be grouped to determine group differences if they exist. Again because the variance is dependent on the observations, special treatment is needed. This was done in Jolayemi (1988) when the effects are assumed to be fixed and Jolayemi (1987b, 1991b) when the effects are assumed to be random. When the error term is assumed to be autoregressive (of order one) in nature, Jolayemi (1989) shows what must be done to obtain reliable results.

b. **Multi-dimensional Categorical Data.**

Very often, however, there is need to observe more than one qualitative variable on individuals and then present data by counting individuals that have identical levels of the characteristics of interest. Such data are usually analysed by fitting various log-linear models and select the "most" appropriate one that describes the data best. To get this far, a number of assumptions have to be taken to allow the analyst assume an appropriate underlying distributions so that the test statistic (usually a chi-square statistic) has an asymptotic distribution.

Year	Males					Females				
	F, M	F, -M	-F, M	-F, -M	Total	F, M	F, -M	-F,M	-F,-M	Total
0-4	995	5	44	3	1047	983	5	45	3	1036
5-9	831	14	57	4	906	808	13	53	4	878
10-14	614	20	67	7	708	584	16	60	6	666
15-19	438	25	78	14	555	427	24	76	12	539
20-24	287	28	86	22	423	299	31	90	26	446
25-29	190	28	90	33	341	220	36	102	46	404
30-34	119	26	85	48	278	119	29	86	62	296
35-39	80	23	80	64	247	79	25	78	76	258
40-49	66	28	106	158	358	61	27	94	177	359
50-59	16	10	48	172	246	16	9	36	177	238
60-69	6	4	15	150	175	7	2	10	136	155
70+	4	1	4	121	130	6	1	3	113	123
Total	3646	212	760	769	5414	3609	218	733	838	5398

M Mother alive; -M Mother not alive; F Father alive; - F Father not alive.

TABLE 7: KENYA 1969 CENSUS DATA (IN THOUSANDS)

In many applications, the assumptions are inappropriate which makes the variability in the data to increase. In the data above, for example, none of the regular assumptions holds as the data are from a census. The chi-square statistic would not be able to reduce the log-linear model containing all interactions; thereby erroneously indicating some interactions to be significant when in fact they are not. To get round this, some methods were developed as found in Jolayemi (1982), Jolayemi & Brown (1984), Jolayemi (1986). The Cp-type statistic Jolayemi (1982, 1986), Jolayemi & Brown (1984) and the adjusted R^2-method Jolayemi (1982, 1988), (1986) were compared. It was found that both were equally effective, see Jolayemi (1984b, 1988).

ANALYSIS OF KENYA 1969 CENSUS DATA

Table 7 reports a subset of data from the Kenya 1969 Census. The data are cross-classified according to **A**ge (12 categories), **S**ex, **F**ather's status (alive or dead) and **M**other's status. The cell counts are in thousands. Since the data are from a census, the assumption that there is a super population from which the

sample has been taken has broken down. It is not surprising that Table 8 shows the existence of AMFS interaction.

k-Factor	df	G^2
1	95	19705.62
2	81	9446.63
3	45	66.88
4	11	1.47

TABLE 8: SIMULTANEOUS TESTS OF ALL INTERACTIONS WITH K OR MORE FACTORS (G^2 IN THOUSANDS)

Interaction	Df	Partial association G^2	Marginal association G^2
AM	11	1816.01	4425.67
AF	11	2041.55	4653.38
AS	11	12.14	10.17
MF	1	286.62	2898.52
MS	1	3.40	1.40
FS	1	0.00	0.06
AMF	11	61.20	60.95
AMS	11	1.30	2.83
AFS	11	0.81	1.29
MFS	1	0.87	0.16
AMFS	11	1.47	1.47

TABLE 9: TESTS OF PARTIAL AND MARGINAL ASSOCIATION (G^2 IN THOUSANDS)

When, however, the Cp-type statistic was used the FS, AMS, AFS and AMFS interactions were no longer significant but that the hierarchical log-linear model defined by the configurations AS, AMF, MFS fitted the data well. That fitted model is interpreted with the following consequences:

(i) because of the existence of AS interaction there existed structural gender differences by Age; so that if comparison such as mortality experiences should be made between males and females, standardization method must be used.

(ii) since AMF interaction was found to exist, this implies that survivability improved significantly when a child lost his/her father than his/her mother but worst when the child lost both. However this situation improved for the older child.

(iii) as for the existence of MFS interaction, the population had more males than females that had both parents but more females than males that had no parent at all.

c. The Square Contingency Data

Square contingency tables are formed from experiments whose qualitative variables are identical. Specifically a fallible measurement may be made as an alternative to an existing one; probably because of ease of use or of low cost. Often a particular sample size may be desirable to estimate relative frequency in multiple outcome situations. When a fallible measurement is solely made the estimates are not only bias but also inconsistent. To derive a better relative frequency estimations therefore, a sub-sample is made and the true measurements obtained.

	H.S.G.					
		1	2	3	4	**Total**
Laparoscopy	1	1	2	1	0	**4**
	2	0	10	1	1	**12**
	3	1	16	7	8	**32**
	4	0	5	1	2	**8**
Total		**2**	**33**	**10**	**11**	**56**

H. S. G. alone on the remaining 130 patients.

1	2	3	4	Total
47	56	25	2	130

1= Normal; 2= Tubal blockage; 3= Ovarian cysts; 4=Fibroids.

TABLE 10: H.S.G. AND LAPAROSCOPIC FINDINGS IN 186 PATIENTS

Between 1982 and 1987, the University of Ilorin Teaching Hospital recorded 186 infertile patients Table 10. Each of these patients was classified as either being (1) normal or (2) having Tubal blockade; (3) Ovarian cysts or (4) Fibroids using the procedure called Hysterosalping graphy (H.S.G) which is an x-ray method. Because this method is not totally reliable, 30% or 56 patients were re-examined by operation known as Laparoscopy. These 56 patients were cross – classified to form a 4 x 4 square Table. A statistical procedure (Jolayemi 1987c,1990b and Fagbule, Olaosebikan and Jolayemi 1991) was used to improve on the relative frequency estimations of the four outcomes for infertile patients. The results are as shown in table 14

Group	Estimation	Standard deviation
1	0.180	0.047
2	0.170	0.030
3	0.546	0.074
4	0.104	0.040

1=normal;2=tubal blockage;3=Ovarian cysts;4=Fibroids.
TABLE 11: UPDATED RELATIVE FREQUENCY ESTIMATIONS

Clearly, while x – ray alone would have indicated that Tubal blockage was the most common and followed by normal patients, the true most common cause of infertility was Ovarian cysts.

Square tables are also used to determine reliability/agreement or concordance index for two or more competing raters. Because there is bound to be a change of time, the same individual is also likely to differ, however little, based on improved experience. Thus a procedure to determine how reliable such raters are is essential. A procedure which utilizes the possible maximum variability that may exist in such a square table in calculating a rating index in excess of chance occurrence was developed in Jolayemi (1988, 1990a, 1991) and used in Araoye, Fakeye and Jolayemi (1997, 1998), Adebayo & Jolayemi (1997, 1998). This procedure has the advantage of not being dependent on any asymptotic distribution assumption, which is not known when many counts are too low.

The procedure could be used to determine the reliability of the x-ray (the H.S.G) procedure to identify causes of infertility against Laparoscopy. The τ-statistic Jolayemi (1990) gave a value of 0.257 which is quite low, suggesting that the x-ray (H.S.G) method was unreliable. This of course is not surprising based on the estimates that we got earlier. It is gratifying to note that a lot of improvement has been achieved in this area over the years now. The scanning procedure and the likes have greatly improved the situation.

The procedure was also used to investigate how predictable the final-year result would be using the first year result of some selected University of Ilorin graduates, Table 12. As pointed out in Adebayo & Jolayemi (1988, 1999),1st class is a rare event. Consequently, the proposed reliability index gave a

		Final Year Result					
First Year Result		1st Class	2^1	2^2	3rd	Pass	Total
	1st Class	0	2	0	0	0	**2**
	2^1	0	34	11	0	0	**45**
	2^2	0	9	63	9	0	**81**
	3rd	0	0	15	30	4	**49**
	Pass	0	0	0	5	1	**6**
	Total	**0**	**45**	**89**	**44**	**5**	**183**

TABLE 12: DISTRIBUTION OF 183 SELECTED UNILORIN GRADUATES USING FIRST YEAR RESULT AGAINST THEIR FINAL YEAR RESULT.

value of 0.57 which is considered to be a moderate agreement index. This means that the first year results can be used to predict the final year results fairly accurately. From the table, the following conclusions are therefore obtained.

(i) Seventy percent (70%) retained their first year academic classification on completion of their studies in the University.

(ii) Fifteen percent (15.4% actually) improved their first year result on completion.

(iii) Nearly fifteen percent also (14.6%) regressed.

This actually showed some improvement over the results we got seven years ago in 1998 where 80%, 5% and 15% were obtained respectively.

2. DOSE-RESPONSE CURVES

a. DRUG INTERACTION AND DOSE VALUE ESTIMATION.

Mr. Vice-Chancellor sir, distinguished ladies and gentlemen, my research in dose-response (pharmaceutical) studies first started in 1984 when I was invited by Prof. C. Wambebe, then in the Faculty of Pharmacy, A.B.U Zaria to help in the research mounted to determine the influence of dopamine on strychnine-induced seizures in mice. This experiment was to understand more about the mechanism of epilepsy which is a collective term for a class of chronic convulsive disorders, having in common the occurrence of brief episodes (seizures) associated with loss or disturbance of consciousness. A 2^2 factorial experiment, Jolayemi (1987a), was suggested using Haloperidol and L-dopa (the dopamine agent). The onset times of convulsion were assessed and eventually mortality observed. The analysis showed that onset time was practically unchanged with Haloperidol but mortality significantly increased. Thus proper working of L-dopa was found to be inhibited by Haloperidol.

The success of the above research gave me a recognition in the Faculty of Pharmacy, ABU and I was involved in many more. The one that gave me the greatest satisfaction then was the one where a consideration was made of the use of another dopaminergic agent that was to be used to avoid seizures in mice after strychnine administration. Most drugs are known to possess some levels of toxicity. This is also the case here.

In this regard, an optimal (in this case minimal) dose that achieved the desired result of no seizure was sought after. The dose value denoted here by d was required. The model in this case is a modified exponential curve which has an asymptote at the dose-value d. With the introduction of d, the model then becomes non-linear in nature and an iterative procedure was developed to obtain the value of d. The experiment was then repeated at the calculated value of d. It was gratifying that no seizure was observed at the use of the drug at the dose-level d, see Jolayemi (1989a, 1994).

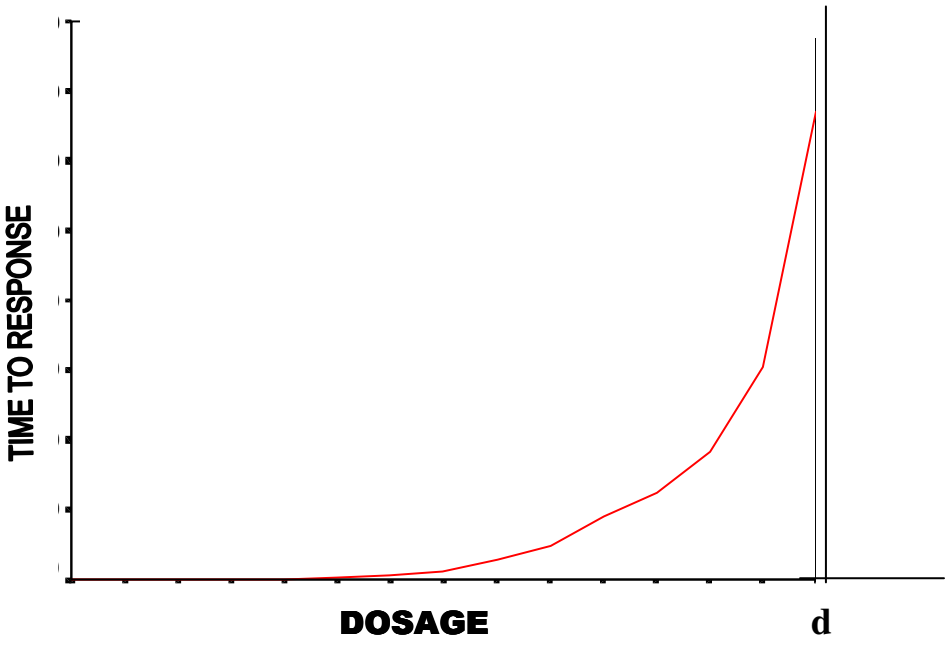


FIGURE 8: OPTIMAL DOSE ESTIMATION IN MODIFIED EXPONENTIAL RESPONSE CURVE

By far, the area I worked on most is the area of logistic dose-response curve. This curve is the sigmoid curve; obtained by observing response as the proportion of the number of positive outcome given different dose levels.

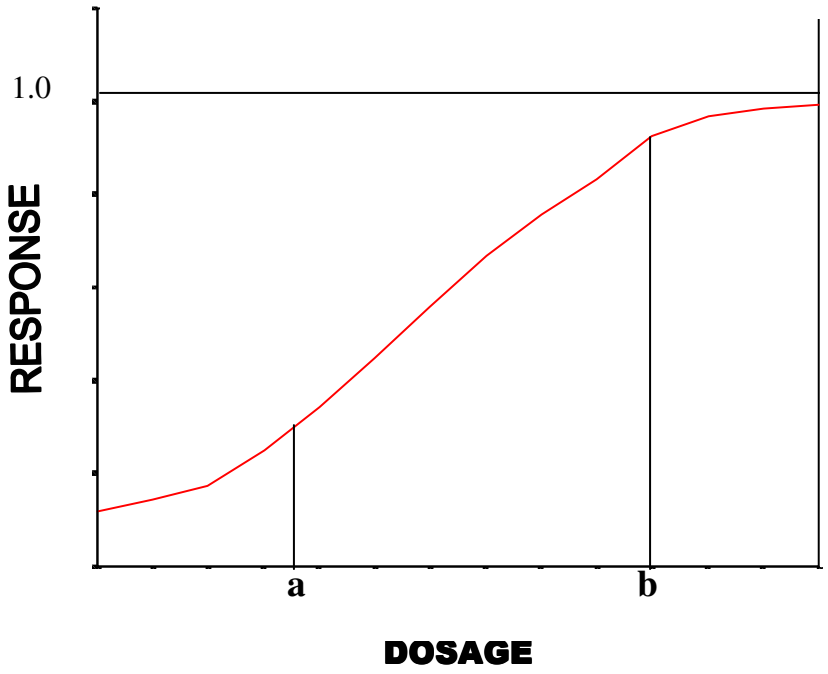


FIGURE 9: LOGISTIC DOSE-RESPONSE CURVE.

The graph, Figure 9, shows that the response increases with increase in dose. However, within the dose levels of *a* and *b* the increase is steady - that is, a straight line. The efficacy of any drug is assessed by looking for the dose which provides 50% positive response. This dose is called the LD_{50} or IC_{50}. The only method available historically was to check back and forth for LD_{50} usually along the straight path between *a* and *b*, which may not be. Later, when simple linear regression computer programme became available, the straight line portion between dose levels *a* and *b* was used to estimate LD_{50}. The first method described above was resource wasting and time consuming; yet producing inconsistent results. The second method, though it improved on the first, also produce biased and inconsistent results especially when the ends of the straight line portion fell outside 30% and 70% positive responses. However, since the sigmoid curve is non-linear in nature, parameter estimates using iterative procedures could do this. This was done producing startling results see Jolayemi & Okoro(1995), Jolayemi (1995b), Jolayemi & Okoro (1996), Jolayemi (1996a, 1996b) and Okoro et. al. (2001). Three mathematical procedures are possible here. These were compared and the best procedure identified in Jolayemi (1995a).

Our working on the sigmoid curve was not limited to the dose-response curve only. Realizing that the cumulative frequency (ogive) curve is in the sigmoid form, Oyejola & Jolayemi (1997), used this curve and slightly modified it to fit cumulative frequency curves of chick layer outputs. The curve was also used to examine farm produce yields as a function of weedy levels. The approach is

particularly useful for estimating the level of the predictor that would achieve a percentage level of the maximum response inherent in the model.

b. DRUG ANALYSIS AND SENSITIVITY

Several collaborations were done with colleagues in the Department of Medicine, College of Medicine, University of Ilorin. Special mention of Dr. E.O. Okoro must be made here who helped to broaden my horizon to the use of dose-response curves to explain some weird response results. For example, some drugs, especially in the treatment of hypertension, are called α-blockers, β-blockers, calcium channel blockers enzyme inhibitors and so on; each of which has its own working mechanism and that these may be totally different from one another. In this connection, some drugs may counter the working mechanism of another while some may aid it, producing what is called the synergistic effect. We used the idea of multicollinearity and simulated computer dose-response curves in Jolayemi (1999) and Adejumo & Jolayemi (2000) and found the following.

If two or more drugs cohabit in the body, that is, taken about the same time, the synergistic effect would depend on whether the working mechanisms are identical or different.

(i) If the working mechanisms counters one another the net effect would be counter productive, lower than the result of any of the drugs, apart from increasing the toxicity inherent in the drugs.

(ii) If the working mechanisms are identical, higher positive results may be achieved. However, toxicity of the drugs are not eliminated but compounded.

The consequence of this result is that except specifically suggested by the medical doctor, no two drugs should co-habit in the body of any patient. That is to say that if a drug has to be changed, a wash-out period should be observed between the drugs. The use of orthodox drugs and herbal preparations together is therefore seriously discouraged. The result here is not discouraging the use of herbal preparations. What we are saying is that drugs whose working mechanisms are unknown should not be used together. Most of the working mechanisms of herbal preparations are currently unknown.

Drugs, especially for children, must be mixed or coated with sweeteners so as to increase acceptability or be user-friendly. However, this increases the cost of drugs. Experiments to identify bitterness acceptance level and/or salt taste perceptions of various age groups were conducted and reported in Okoro & Jolayemi (1996), Okoro et. al (1997), Okoro, Uroghile & Jolayemi (1998) and Okoro, Oyejola & Jolayemi (2002). All these were directed at the possibility of reducing sweeteners in drugs for children and/or adults in this country.

The effectiveness of the treatment of postpartum cardiac failure in anaemic pregnant patients is assessed by the decrease in measure of the cardio-thoracic ratio. This ratio is the heart size against that of the lung. To identify a significant change resulting in an effective treatment, the distribution of such a ratio is required. The conditions upon which the usual standard normal test can be used were reported in Jolayemi (1992) which are based on the coefficient of variation and the correlation that exists between the sizes of the pairs of the heart and lung.

3. CATEGORICAL DATA TEST STATISTICS

There are several test statistics available in Categorical Data Analysis. The most appealing in this class of test statistics has been found to be the Pearson X^2, which is most robust than any other as reported in Sanni & Jolayemi (1997a, 1997b, 1998). In spite of this, however, it has been found in Sanni, Adebayo & Jolayemi (2002) that small expected cell counts increase the value of the Pearson X^2. Thus the approach of fitting the best model to categorical data producing expected cell counts close to the observed would be the only way out to eliminate the stringent property of rejecting a good model using X^2. This research result is particularly needed to ensure that the warnings usually accompanying analysis of categorical data with small cell counts could be discountenanced. For example, in analyzing diabetic in-patient data obtained from University of Ilorin Teaching Hospital, we used the following factors; **G**ender of the patient, **A**ge (3 groups), **S**easonal factor, **L**ength of hospitalization and **M**ortality experience arising as the outcome of hospitalization. The seasonal factor came into the analysis when it was recognized that some months had prevalence of diabetes higher than normal and, for the rest of the year, lower than normal. A 5-dimensional categorical data was then produced and the log-linear model was fitted. The best model has 56% of the cells smaller than 5, which made the Pearson X^2 test statistic to be stringent. However, because the statistic had been proved to have a value actually higher than it should have, the X^2 was still small enough to identify a best model. Thus a correct decision has been reached. This means that the final model so chosen can be interpreted with confidence as follows: while outcome of hospitalization is influenced variously by sex, age, time in the year of hospitalization and length of stay of the patient in the hospital, the result I want to emphasize here is the seasonal variation. We found that hospitalization increases immediately after the well celebrated festival occasions of Christmas, Easter, Id-el-Kabir and Id-el-Fitir.

4. POPULATION GROWTH IN NIGERIA

Population growth in Nigeria has been a concern to the Nigerian statisticians because of the erratic nature of such growth and because there has not been any meaningful policy to monitor it.

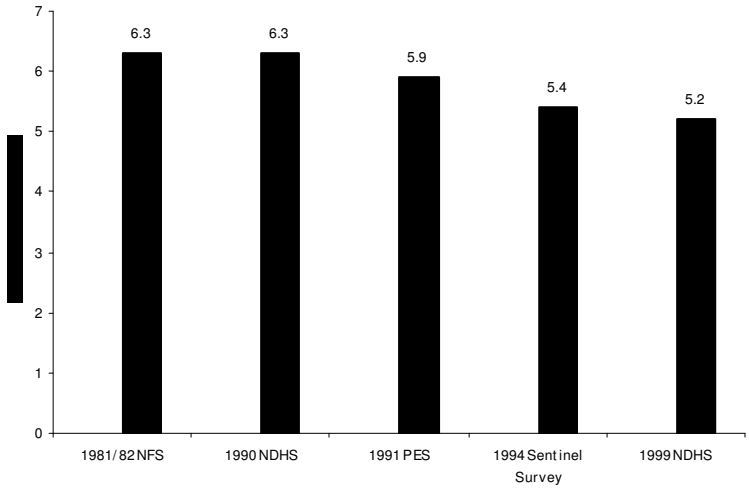


FIG. 10: TRENDS IN TOTAL FERTILIY RATES.
Source FOS 1992, NPC 1994, NPC 1998

The fertility values for the years shown in figure 10 are averages from both rural and urban settings, the rural values are actually higher than those of urban values. The next table, Table 13 shows the distribution of 744 women, believed to be above 15 years of age by the number of children they had. This was the outcome of a small survey in 2004 in three Nigerian cities. This gives a figure of 3.9 expected children per woman. Thus the correct value for Nigeria in 2004 would most likely be higher than this value.

In a small statistical survey conducted on the average age at marriage, we found that in 1980 females had a mean of 20 years while males had the mean of 22 years. This increased over the years and the gap became wider. As at 2001 the overall mean was 30 years. Let us assume this for now. Let us then examine some household setting passing through a span of not more than 60 years. First, let us examine a household of one husband and one wife whose expected number of children is four, that is the approximated value of 3.9

4 of children alive	0	1	2	3	4	≥ 5	Total
Frequency	11	37	84	121	130	361	744

TABLE 13: 744 WOMEN DISTRIBUTED BY THE NUMBER OF LIVE BIRTHS.

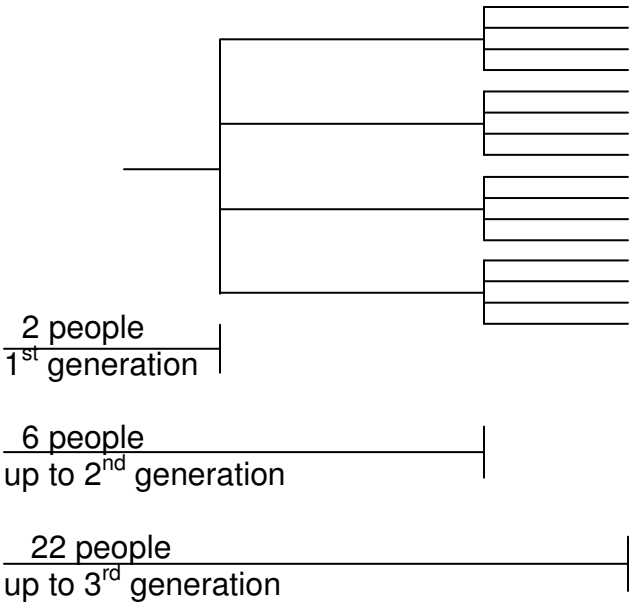


FIG. 11: BRANCHING PROCESS STARTING FROM A COUPLE UP TO 3 GENERATIONS USING FOUR EXPECTED NUMBER OF CHILDREN PER WOMAN.

The mean marriage age of 30 years would imply that by the age of the father, which is assumed to be higher than that of the wife, to be about 60 years, the third generation would have started and the size would be up to 22 people consisting of parents, children and grandchildren. On the other hands, a household of five people (a husband and four wives) would, by the 3rd generation, be up to 85 people consisting of parents, children and grandchildren.

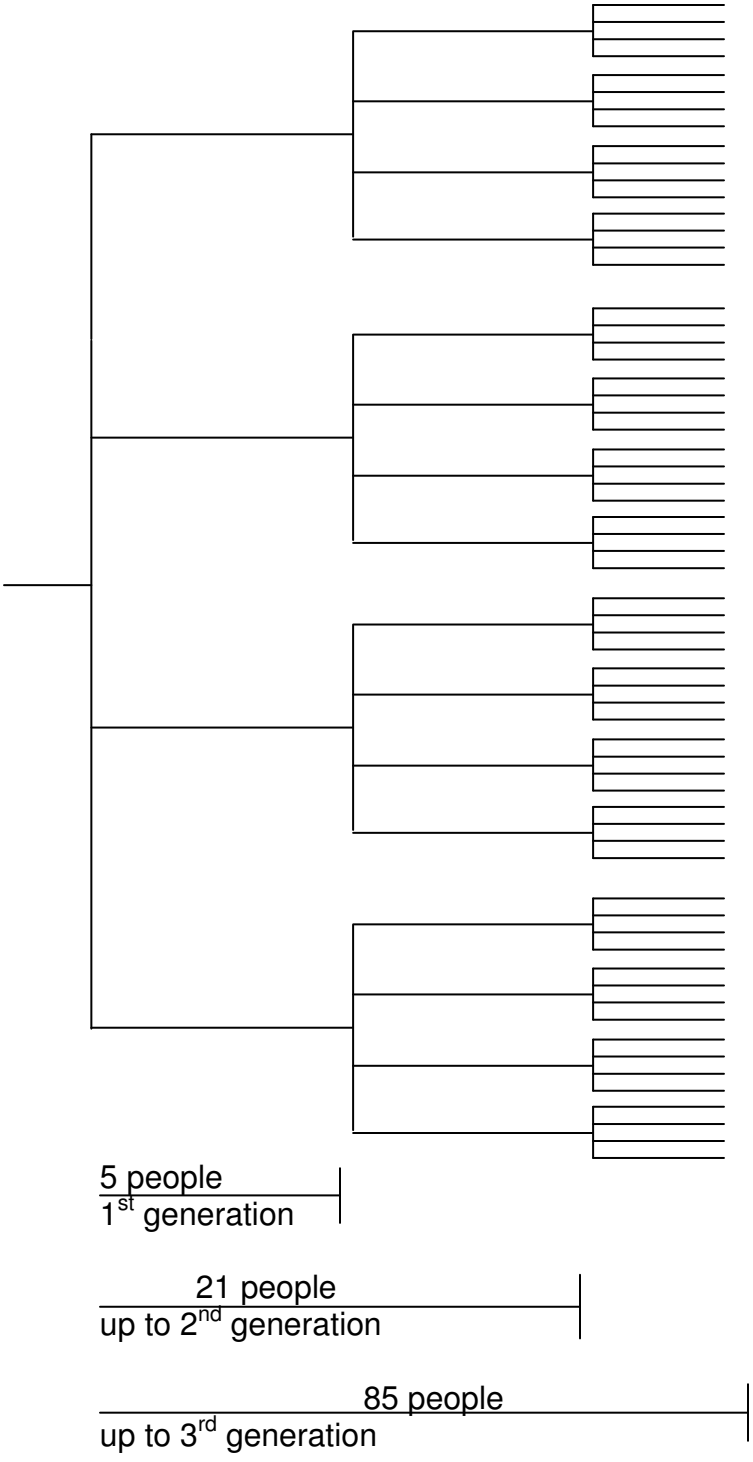


FIG. 12: BRANCHING PROCESS STARTING FROM A HOUSEHOLD OF FIVE PEOPLE UP TO 3 GENERATIONS USING FOUR EXPECTED NUMBER OF CHILDREN PER WOMAN.

Let us now examine a couple of one man and one woman having 2 children as the expected number of offsprings Figure 13. Clearly by the 3rd generation

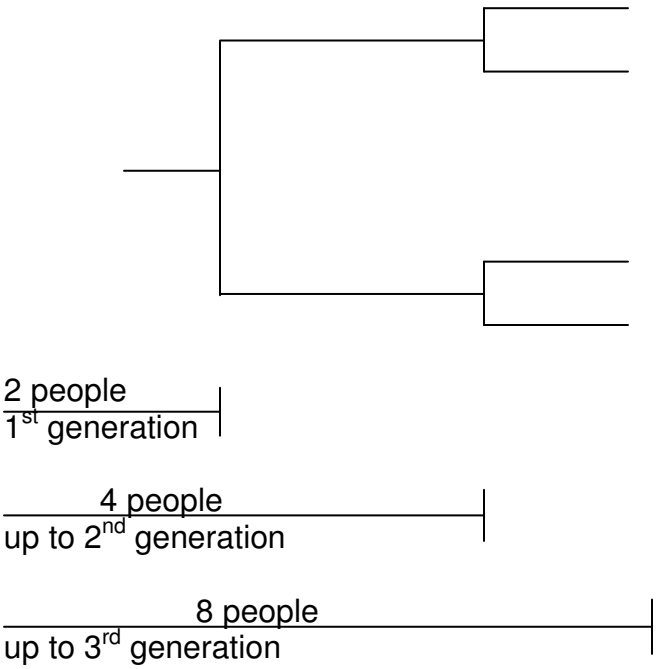


FIGURE 13: BRANCHING PROCESS STARTING FROM A HOUSEHOLD OF ONE MAN AND ONE WIFE UP TO 3 GENERATIONS USING TWO EXPECTED CHILDREN PER WOMAN.

there would be only a maximum of 8 people consisting of parents, children and grandchildren. The life styles described above have 3.7%,4.9% and 2.3% as maximum growth rates respectively (that is assuming zero mortality experience) within the 60 years. The population would then double in 19.08, 14.49 and 30.48 years respectively. The current growth rate for Nigeria is put at 2.8%, providing a period of 25.1 years for our population to double. Mr. Vice-Chancellor sir, are we prepared to double our population size of between 130 million and 140 million (the actual is currently not known) by 2030 or there about? The choice is ours.

CONCLUSION

Mr. Vice-Chancellor sir, distinguished ladies and gentlemen, from the selected research works highlighted in this lecture the following conclusions can be reached.

(1) It is possible to eliminate sickle cell as a disease in this country by following a guided matching system in marriage.

(2) We can improve our country's food sufficiency level by pursuing guided dry -season small-scale farming. Farming mainly in rainy season and supplemented by erratic and unguided dry-season farming in this country is grossly inadequate.

(3) Most Government-owned print media houses have not performed well.

(4) Smoking habit evidently and surely reduces longevity. Our dear country is not spared of this fact.

(5) Academic research must continually be supported and pursued vigorously. In particular, Faculties of Education in the Nigerian University System should pursue researches that would improve the knowledge of Mathematics in this country.

(6) The class of degree of most Nigerian university students are determined by their performance as early as at the end of their first year in the University.

(7) Except otherwise prescribed by a medical doctor, nobody should mix drugs for use; either through self medication or by the advice of any quark medical personnel.

(8) Hospitalization for diabetes increases after major festivities in Nigeria.

(9) Population growth rate of about 2.8% in this country is still very high.

RECOMMENDATION

I would like to restrict my recommendation on the findings that are reported in this lecture. As mentioned earlier, this is at variance with the norms of this University.

(1) Genotype identification must be made mandatory by the Federal Government. To avoid falsification, such information may be put in any identity card for the citizens. It must be considered in seeking marriage partner.

(2) Governments (State or Local) must pursue guided dry-season farming to improve the country's food sufficiency level. It is ridiculously low for now based on erratic or on unguided dry-season practices. This may reduce erratic changes in the cost of food items through the year round.

(3) All Government-owned media houses must be privatized to improve Government efficiency and proper divestment by the Governments from commercial ventures. Governments should face the provision of more beneficial social services for their citizens.

(4) Government should pursue the ban on smoking habit more vigorously. The current effort is still far from being adequate.

(5) The apathy being experienced in the knowledge and use of Mathematics must be fought head long. Presenting Mathematics as a friendly subject from the primary school level must be encouraged further. The idea of classifying some pupils as incapable of understanding Mathematics must stop forthwith.

(6) Our University students must be serious from the first day in the University as this determines their class of degree on completion of their courses. The idea of seeking a 2^2 class of degree or better even after the first year programme has been concluded is not and cannot be ideal.

(7) Self medication or patronage of quack doctor houses should be discouraged to avoid unexpected but often adverse effect of mixing drug use.

(8) A lot more discipline must be exercised during festive periods especially by diabetics to avoid hospitalization thereafter.

(9) The idea of a couple having only two children is encouraged and must be pursued by the Government so as to avoid population explosion in the near future.

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“Purposeful sailing or gambling through life: the choice is yours”.

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REFERENCES

Adebayo, S.B. & **Jolayemi, E.T.** (1997). "On the measure of Reliability for a Polychotomous variable" presented at the ***Annual Conference of Nigerian Statistical Association, Calabar, Nigeria***

.

Adebayo, S.B. & **Jolayemi, E.T.** (1998a). "On the Effect of Rare Outcome on Agreement Concordance Index" presented at the ***Annual Conference of Nigerian Statistical Association, Minna, Nigeria.***

Adebayo, S.B. & **Jolayemi, E.T.** (1998b). On the Effect of Rare Outcome on some Agreement/Concordance Indices. ***Nigerian Journal of Pure & Applied Sciences*****,** 13:718 – 723.

Adebayo, S.B. & **Jolayemi, E.T.** (1999). Effect of Rare Outcomes on the Measure of Agreement Index. ***Journal of the Nigerian Statistical Association***, 13:1 – 10.

Adejumo, A.O. & **Jolayemi, E.T.** (2000). A study of Multicollinearity effects on a Binary Response. ***Nigerian Journal of Pure and Applied Sciences,*** 15:1088 – 1093.

Atoyebi, T. O. (2000). Economic Evaluation of irrigated Okro in Oke-Oyi project in Kwara State, An unpublished Postgraduate Diploma project presented to ***Federal University of Technology, Akure, Nigeria.***

Araoye, M.O. & Onile, B.A. & **Jolayemi, E.T.** (1995). "Sexual behaviour, reproductive health and condom acceptance among Nigerian drivers" ***West Afri. Jour. Med.*** 15:6 – 10.

Araoye, M.O.; Fakeye, O.O. & **Jolayemi, E.T.** (1997). "Comparing Survey Methods for Sexual behavioural studies" ***Jour. Comm. Medicinist Primary Health Care;*** 9:18 – 25.

Araoye, M.O.; Fakeye, O.O. & **Jolayemi, E.T.** (1998). "Contraceptive method choices among adolescent in a Nigerian Tertiary Institution" ***West African Jour. Med.*** 17:227 – 231.

Fagbule, D.O., Olaosebikan, A., **Jolayemi, E.T.** (1991). "Mothers as agents of growth monitoring: Implications for widespread community growth monitoring" ***Ari. Jour. Medicine & Medical Sciences.*** 20:41 – 47.

Jolayemi, E.T. (1982) "A Cp- Method for Log-linear model" An unpublished Ph.D Thesis of ***The University of Michigan.***

Jolayemi, E.T. (1984). "A comparative study for some log-linear model building methods", presented at the ***XIIth International Biometric Conference in Tokyo.***

Jolayemi, E.T. (1986). "Adjusted R^2 method as applied to log-linear model "***Journal of the Nigerian Association***, 3:1 – 7.

Jolayemi, E.T. (1986). "Parameter estimates using iterative weighted least square method for linear models on proportions". ***Proceedings AMSE Conf. A:*** 106 – 110.

Jolayemi, E.T. (1987a). "A Statistical model for Survival rate from strychnine-induced convulsion in mice using a dopaminergic agent". ***Nig. Jour. Sci. Res.*** 1:83 – 86.

Jolayemi, E.T. (1987b). "Improving on the method for estimating Health indicators from incomplete data", presented at the ***11th Nig. Statistical Association Conference. Owerri, Nigeria.***

Jolayemi, E.T. (1987c). "Random effects in ANOVA with correlated errors", presented at the ***8th Nig. Soc. Conference, Zaria, Nigeria.***

Jolayemi, E.T. (1988a). "On a test for the rate of agreement between two raters", presented at the ***9th Nig. Math. Soc. Conference, Minna, Nigeria.***

Jolayemi, E.T. (1988b). "On ANOVA models when proportions are observations". ***AMSE Review*** 5 (4): 1 – 6.

Jolayemi, E.T. (1989a). "Estimation of an Optimal dose in a modified exponential distributed response", presented at the ***10th Nig. Maths Soc. Conference, Ibadan, Nigeria.***

Jolayemi, E.T. (1989b). "Selecting the best method of building log-linear models", ***Nig. Jour. Stat. Assoc.*** 14:90 – 102.

Jolayemi, E.T. (1990a). "On the Measure of Agreement between two raters" ***Biometrical Journal*** 32:87 – 93.

Jolayemi, E.T. (1990b). "Relative Frequency Estimator in Multiple Outcome Measurement with Misclassification" ***Biometrical Journal*** 32:707 – 711.

Jolayemi, E.T. (1990c). "ANOVA model under the autoregressive error of the 1st type", ***ABACUS*** 18:289 – 294.

Jolayemi, E.T. (1990d). "Sample size consideration in identifying differences in unequal outcome product multi-nomials", presented at ***XVth IBC Budaest, Hungary.***

Jolayemi, E.T. (1990e). "The Model Selection for one dimensional Multinomials", ***Biometrical Journal*** 7:827 – 834.

Jolayemi, E.T. (1991a). "A Multiraters Agreement Index for Ordinal Classification" ***Biometrical Journal*** 4:485 – 492.

Jolayemi, E.T. (1991b). "Autoregressive error situation for ANOVA models", presented on February 18th at the invitation of ***ICIPE, Nairobi, Kenya.***

Jolayemi, E.T. (1992). "On Hypothesis Testing about a Ratio: The case of Cardio-Thoracic Ratio" ***Nig. Jour. Stat. Assoc.*** 1:26 – 31.

Jolayemi, E.T. (1994). "Estimation of the optimal dose a modified exponentially disturbed dose response curve" ***Nig. Jour. Math & Appl.*** 6:69 – 74.

Jolayemi, E.T. (1995a). "A Monte Carlo Study on the methods of Parameter estimation of logistic model" ***Nig. Jour. of Pure & Applied Science***, 10:331 – 234.

Jolayemi, E.T. (1995b). "On the measurement of Drug Potency using a Non-Linear Model", presented at ***16th Annual Conference of Nigerian Mathematical Society, Ile-Ife, Nigeria***.

Jolayemi, E.T. (1996a). "A superior method of estimating mean response IC50 in a dose-response experiment" presented at the ***23rd Conference of West African Society for Pharmacology, Abuja, Nigeria.***

Jolayemi, E.T. (1996b). "Desirable dose estimation of some dose response curves" presented at the ***28th Annual Conference of Nigeria.***

Jolayemi, E.T. (1999). "Drug Interaction effects when response has the logistic function" ***6th SUSAN' 99 IBS Conference in Ibadan, Nigeria.***

Jolayemi, E.T., Brown, M.B. (1984). "The choice of a log-linear model using a Cp-type Statistic". ***Computational Statistics & Data Analysis,*** 2:159 – 165.

Jolayemi, E.T. & Okoro, E.O. (1995c). "On the estimation of Mean IC_{50}" ***Bioscience Research Comm.*** 7:175 – 178.

Jolayemi, E.T. & Okoro E.O. (1996). "Non-Linear Modelling to measure Drug Potency" presented at the ***28th Annual Conference of Nigerian Statistical Association, Oshogbo, Nigeria.***

Jolayemi, E.T. & Sheidu, S. (1996). "Child development process and breast feeding duration" ***Bioscience Research Comm.*** 8:237 – 240.

Okoro, E.O., **Jolayemi, E.T.** (1996). "Taste Preferences for Sweet, Sour, Bitter and Salt in a Group of Adolescent School Children in Rural Nigeria" presented at the ***25th Annual Scientific Conference of Nigerian Cardiac Society, Lagos, Nigeria.***

Okoro, E.O., Uroghile, G.E., **Jolayemi, E.T.** (1998). "Salt taste Sensitivity and blood Pressure in a group of Adolescent School Children in Southern Nigeria". ***East African Journal*** 75 (4), 196 – 200.

Okoro, E.O., Uroghile, G.E., **Jolayemi, E.T.**,George, O., Enobakhare, C.O. (1997), "Studies on taste thresholds in a group of adolescent children in rural Nigeria". ***Food Quality and Preference*** 9 (4) 205 – 210.

Okoro, E.O.,Oyejola, B.A.; **Jolayemi, E.T.** (2002). Pattern of salt taste perception and blood pressure in normatensive offspring of hypertensive and diabetic patients. ***Annals of Saudi Medicine*** 22:249 – 251.

Okoro, E.O.; **Jolayemi, E.T.**; Oyejola, B.A. (2001). Observations on the use of Low-dose hydrochlorothianzide in the treatment of Hypertension in Diabetic Nigerians. ***Heart Drug***1:83 – 88.

Oyejola, B.A. & **Jolayemi, E.T.** (1997). A Comparison of Some models studying Relationships of the Sigmoid Forum. ***Nigeria Journal of Science,*** 31:193 – 198.

Sanni, O.O.M. & **Jolayemi, E.T.** (1997). "On the use of Pearson X2 for Goodness-of-Fit-Statistics" presented at the ***Annual Conference of Nigerian Statistical Association, Calabar, Nigeria.***

Sanni, O.O.M. & **Jolayemi, E.T.** (1997b). On the use of some Categorical Test Statistics on Sparse Contingency Tables. ***Nigerian Journal of Pure and Applied Sciences,*** 12:509- 514.

Sanni, O.O.M. & **Jolayemi, E.T.** (1998). Robustness of some Categorical Test Statistics in Small Sample Situations. ***Journal of the Nigerian Statisticians*** 3:29 – 35.

Sanni, O.O.M. & **Jolayemi, E.T.** (2003). On the Selection of an Optimal Model Using AIC Approach. ***Journal of the Nigerian Statisticians***

Sanni,O.O.M., Adebayo, S.B. & **Jolayemi, E.T.** (2002). On the Use of Pearson Chi-Square to Evaluate Goodness-of-fit. ***Journal of the Nigerian Statistical Association,*** 15:58 – 65.