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Analysing Attitude Data Through Ridit Schemes

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Abstract:

This paper addresses itself to methods of analysis for categorical variables of the sort utilized in attitude and human behaviour research. It recommends the adoption of a technique which has been successfully applied to epidemiological, clinical investigation, laboratory and microbiological data. It is known as ridit analysis. After reviewing some general attitude scaling methods and problems of analysis related to them, the ridit method is described. Application of ridit analysis to a recent study undertaken to assess health care service quality in Western North Carolina is presented. The technique is conceptually and computationally simpler than other conventional statistical methods. It is also a distribution free method. Basic requirements and limitations on its use are also indicated.

1. Introduction:

Measuring attitudes has been the subject matter of many researches in a variety of disciplines such as sociology, management, and political sciences. Attitude measurement generally means finding out where a particular attitude lies along a scale ranging from extreme favourableness to extreme unfavourableness. This is usually carried out through sample surveys where a collection of questions (statements) covering the various aspects of certain attitude are directed to every member of the selected sample. Responses to these questions (statements) are then appropriately scaled and combined into a meaningful whole defining the measured attitude. The applied scales may be of nominal, ordinal, interval, or ratio nature depending on the degree of sophistication the researcher wishes to introduce in his measurement, Moser and Kalton (1975).

The most commonly used approach for measuring the strength of a person's attitude is to assign numerical scores to possible answers to each question. The answers are usually of varying intensity, ranging, for example, from "strongly against" to "strongly in favour". Once a score is selected by the respondent his position on the cale continuum is indicated. The respondent's attitude is measured by his total score on all items. Average scores can be calculated for the total sample and for particular subsamples. These are then used as estimates for the overall attitude in the population in question and in subgroups of it.

Examples of such inquiries in the fields of marketing research and evaluation of banking and health care services may be found in Dimatteo et al. (1979), Schneider et al. (1980), Parasuraman et al. (1985), Kaplan et. al. (1986 and 1989), Al-Hamad and Al-Shoeib (1990), Soliman (1992), and Al-Haddad (1992).

Analysis of data acrued from such scoring systems is frequently based upon conventional statistical techniques such as the Normal, student or chi-square test and the analysis of variance. Such techniques necessarily require the fulfilment of certain theoretical assumptions which, in reality, may not be satisfied or at best may be in doubt. Moreover, the application of these techniques and the interpretation of their findings may not be an easy task for the unspecialised persons who are not fully aware of their problems.

This paper suggests the use of RIDIT technique as a substitute to conventional methods, for analysing attitude survey data. It is a simpler technique as far as conceptual as well as computational aspects are concerned. From the theoretical point of view, the technique does not require any assumption about the nature or the form of the distribution of the data under consideration, or any other theoretical requirement. The paper consists of six sections the first of which is this introduction. In section two some general techniques of attitude scaling and measurement are mentioned. Is section also discusses the problems inherent in data analysis based on existing techniques of attitude measurement. Section three describes the ridit analysis as an alternative technique for analysing attitude data. Section four provides an empirical example on the use of ridits. Section five discusses the technique, basic requirements and limitations. A summary of the work is given in the last section.

2. Attitude measurement techniques and problems of their data analysis:

The categorical variables of the sort utilized in attitude research can be classified under what Bross (1958) identified as "borderland" response variables. These fall between dichotomous classification variables of the type yes/no and refined measurement variables characterized by space-time stability. Moser and Kalton (1975) reviewed some general procedures of attitude scaling and measurement. A book edited by Summers (1977) titled "attitude measurement" contains a detailed description of these as well as of other procedures. In general, all attitude measurement techniques follow some common stages in forming an attitude scale. These stages summarize in the assembly of scale item pool, the choice from this pool of the items to be used in the final scale, and the checking of the validity and reliability of the formed scale. The most commonly used techniques are: Thurstone interval scale, Likert summated scale, Guttman scale, and the Semantic Differential Scale. These as well as other techniques attempt to represent response variables either by well ordered subjective scales or by numerical systems which are heavily dependent upon research protocols or technical skills of the investigators. As Fleiss (1981) argued, these numerical measurement systems have many drawbacks. They give the impression of greater accuracy than really exists. Also, the results obtained depend on the particular system employed; the choice of a numbering system is by no means a simple one. If, however, the mentioned techniques are considered individually the following observations may be noted. Thurstone scaling is criticised of its labouriousness and of the doubt as whether the interval measurement which the procedure attempts to produce is a true interval scale. Likert numbering system on the other hand is hard to justify since it implies that the differences between categories are equivalent to the distances between the numbers given to them. Guttman scale is also criticised of its analytical complexity and the difficulty of attaining item perfect scalability which, if achieved, may lead to a narrow universe of content. As regards the Semantic Differential scale and apart from the multidimentionality aspect characterizing it the validity of the scale is questioned when applied to sensitive topics of respondents because of the social desirability effects, Heise (in Summers, 1977, ch. 14).

Furthermore, the analysis of data resulting from such and similar scaling systems frequently includes the calculation of means and variances and the undertaking of significance tests between groups using the conventional chi-square and sudent t tests and/or the analysis of variance procedures. Use of such methods essentially requires the fulfilment of certain theoretical assumptions about the form of the parent population and related parameters. In many instances of real world situations, these assumptions[1-] are far from being satisfied. The data can be very skewed because of concentration of observations at one or two categories at either ends of the rating scale. As Bross (1958, p. 26) has argued, the analytical tool for data resulting from "borderland" response variables should preferably be distribution free as far as possible. The ridit analysis described in the following section has this desirable feature and is, therefore, suggested as a good substitute.

3. Ridit analysis as a substitute:

It was in 1958 when Bross introduced ridit as a new member of the "it" family which includes probits and logits. But unlike other members which are relative to theoretical distributions, ridits are relative to an indentified distribution (an empirical one).

1- Normality assumptions (for example, population data as well as error deviations are normally distributed and error deviations are homogeneous) are common requisites for such statistical procedures.

It is a simple, general purpose technique of analysis suitable to "borderland" variables. It does not attempt to quantify the categories of these variables but instead takes the advantage of the natural ordering between them. The only assumption made is that the discrete categories represent intervals of underlying but unobservable continuous distribution with no additional assumptions about normality or distributional form, Fleiss (1981). The technique has been successfully utilized for analysis of epidemiological and clinical investigations, and laboratory animal and microbiological experiments, Bross (1958, p.19).

In brief, the procedure begins with the selection of a reference (standard) group. From its frequency distribution, a ridit corresponding to each category is calculated. The mean ridit for any other comparison group is calculated as a weighted average of its frequency distribution with the reference group ridits being the weights. Assessment of group positions relative to the reference group, and between-group comparisons can be effected through mean ridits and conventional significance tests. The mathematical expressions for ridit calculations and their interpretations are given in the following paragraphs.

Let the reference and comparison groups be respectively symbolized by the letters s and c. The number of observations (frequency) lying in the ith category of the two groups are then denoted by:

f_i^s and f_i^c ; i = 1 , 2 , . . . K , where K is the number of categories in both groups.

Let also $\dot{f}_i^s$ denote the accumulated frequencies for the reference group but displaced one category downwards, i.e.,

$$\dot{f}_1^s = 0 \quad \ldots\ldots \qquad (1)$$

, and

$$\dot{f}_i^s = \sum_{j=1}^{i-1} f_j^s \quad , \; i = 2, 3, \ldots, K \qquad (2)$$

Ridits associated with the various categories of the reference group may be calculated by:

$$r_i^s = (1/N^s)(f_i^{s*} + 1/2\ f_i^s) \ldots \quad i = 1, 2, \ldots K \qquad (3)$$

, where N^S is the total number of observations in the reference group (the group size). Equation (3) provides a straightforward interpretation of the ridit of a category. It is the proportion of all observations falling below the lower ranking categories plus half the proportion falling in the given category. If the values are uniformly distributed within the category, the ridit is the proportion of all observations having a value at or below the midpoint of the category. As Bross (1958, p.21) indicated, this operation is a way of assigning numbers (weights or probabilities) instead of names to the ordered categories of the response variable. In this way, one would be able to carry out conventional statistical operations such as means, variances, confidence intervals, etc.

To compare some other group with the reference group, the mean ridit of the comparison group $\bar{r}^c$ may be calculated by:

$$\bar{r}^c = \frac{1}{N^c} \sum_{i=1}^{k} r_i^s f_i^c \quad , i = 1, 2, \ldots K \qquad (4)$$

, where N^C is the size of the comparison group.

The mean ridit of a group may be interpreted as the probability that an individual selected at random from the group is "worse off" or having a value indicating greater severity or seriousness than an individual selected at random from the reference group.[1] The mean ridit for the reference group is necessarily 0.5 by definition of a ridit, i.e.,

$$\bar{r}^s = \frac{1}{N^s} \sum_{i=1}^{k} r_i^s f_i^s \ , i = 1, 2, \ldots, K = 0.5 \qquad (5)$$

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1 Assuming that the categories represent increasing degrees of severity or seriousness as in cases of pains or accidents.

The standard error of the mean ridit for any comparison group, s.e. ($\bar{r}^c$), may be calculated by[1] :

$$S.e.(\bar{r}^c) + \frac{1}{2\sqrt{3N^C}}\sqrt{1+\frac{N^C+1}{N^S}+\frac{1}{N^S(N^S+N^C-1)}-\frac{\sum(f_i^s+f_i^c)^3}{N^S(N^S+N^C)(N^S+N^C-1)}} \quad (6)$$

$$, i = 1, 2, . . . , K$$

When N^S is very large relative to N^C, the standard error simplifies to:

$$S.e(\bar{r}^c) = \frac{1}{2\sqrt{3N^C}} \quad (7)$$

Without the need to define a new reference group, comparison between any two groups can be effected by virtue of an odds statement of the form:

$$OR = \frac{0.5+d}{1-(0.5+d)} \quad (8)$$

where d is the numerical difference between mean ridits of the two groups. This odds ratio is the chance of an individual from a given group is "worse off" than an individual from the other group. In this way, the mean ridit can not only tell us whether individuals in a certain group are "worse off" or "better off" than individuals in the other group, but also how much they are so, Bross (1958, p. 23). Notice that any comparison group can be used as a reference group for any other group, especially if the frequency distributions of the contrasted groups are widely different, yielding a probability (or odds) less than zero or greater than one.

The significance of the differences between two mean ridits $\bar{r}_1^c$ and $\bar{r}_2^c$ can be tested by the conventional Z statistic as:

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1 Equations (6) to (10) below are quotedfrom Fleiss (1981, pp. 154 and 55) with appropriate national adjustments.

$$Z = \frac{\bar{r}_2^c - \bar{r}_1^c}{S.e(\bar{r}_2^c - \bar{r}_1^c)} \qquad (9)$$

where,

$$S.e.\ (\bar{r}_2^c - \bar{r}_1^c) = \frac{\sqrt{N_1^C + N_2^C}}{2\sqrt{3N_1^C N_2^C}} \qquad (10)$$

Ninety five percent confidence intervals on ridit means can be approximated by adding $\pm 1/\sqrt{3N^C}$ to the calculated mean ridit. Graphing mean ridits along with corresponding confidence intervals is a useful means of summarizing data from many groups. Interesting relationships can than be detected and the effect of sampling variability can be evaluated.

4. Application of ridit analysis to an empirical "SERVQUAL" attitude inquiry:

A recent study was undertaken by Soliman to assess the quality of health service in medical practices in Western North Carolina, Soliman (1992). The study used a cross-sectional sample of 700 adults[1] aged 25 years and over randomized between private offices and clinics and among all physicians. The sample also included a number of city and state government offices as well as some businessmen. Both genders were represented in the sample. As Soliman summarized it "the sample seems to be older, Wealthier, female dominated, and more highly educated than the average population", Soliman (1992, p. 129).

The objectives of the study were: 1) to assess the overall quality of health care services as well as five of its dimensions as perceived by the sample, 2) to compare the perceived quality of the senior group with that of the younger group, and 3) to identify

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1 The number of returned questio9nnaires was 491 of which 463 were usable.

quality variables and dimensions that discriminate between the two age groups.

The basic study measuring instrument was a "SEVQUAL" scale, used by service organizations, which consists of two sets of statements each comprising 26 items. The two sets respectively represent perceptions of service delivery (P) and matching expectations of performance (E). Each item in both sets is measured using a 7-point Likert type scale where a score 1 represents "strongly disagree" and a score 7 represents "strongly agree". Service quality is measured by the difference between perception and expectation scores for all items, i.e., Q=P-E. It ranges between -6 and +6. Positive scores imply judgements of high quality and negative scores designate judgements of low quality. Five service quality dimensions were identified as: tangibles (4 items), realibility (5 items), responsiveness (4 items) , assurance (7 items), and empathy (6 items):; they are referred to in table (1). In analysing survey results, Soliman relied on several conventional statistical methods. They include calculation of mean scores and variances, undertaking of t and χ^2 tests, and of discriminate, correlation and multiple regression analyses.

Ridit analysis as explained in section 4 was undertaken for all the 26 variables of service quality. For any single variable or group of variables the following steps for ridit calculations are carried out.

(a) prepare the frequency distribution of the reference group (f_i^*), i.e., the number of observations at each category (or category code).

(b) divide each frequency by 2, i.e., $f_i^*/2$.

(c) calculate accumulated frequencies f_i^{**} using equations (1) and (2); displacing one category downwards.

(d) add corresponding numbers in steps (b) and (c)

(e) divide values in step (d) by total number of observations; the resulting numbers are the ridits f_i^*, equation (3)

(f) prepare the frequency distribution of any desired comparison group represented by $\overset{c}{f}_i$

(g) multiply reference group ridits r_i^s, step(e), by corresponding comparison group frequencies, add the products and divide the sum by the total number of observations in the comparison group, equation (4). The resulting number is the group mean ridit '

(h) calculate other statistics as required, using equations (5) to (10).

Frequencies for groups of variables constituting the defined quality dimensions were summed over and analysed by ridits as done for individual variables. Total frequencies for all the 26 variables were similarly calculated and analysed. This may not be the best way to represent quality dimensions or the whole quality continuum. The mere grouping of frequencies of relevant variables is likely to produce exaggerated and unrealistic numbers of cases. The aggregation procedure may, however, be valid if the aggregated frequency distribution is not very much different from the individual distributions. Goodness of fit tests, based on Kolmogorov - Smirnov one sample statistic, between aggregated distributions (theoretical) and individual distributions (empirical) supported the grouping. More than 82 percent of the tests showed insignificance, table (2). This procedure, however, needs to be further investigated before recommending it as a general procedure for it may not fit all types of data.

Ridit analysis was undertaken for each of the two age groups separately, considering the total sample as the reference group. Mean ridits, their standard errors, values of the Z statistic, and probability (odds ratios) are the main features of the analysis. The results are shown in table (1).

The main findings of the health care ridit analysis is now given. Considering first the overall service quality, it is found that the average quality rating is lower in the younger group and higher in the older group than it is in the reference group. The differences are statistically significant at the 0.05 level for the younger group and at the 0.01 level for the older group. The differences in ratings between the two groups are highly significant, see table (1). The odds ratio is 19:20 that an individual from the 25-65 age group rates service quality lower than an individual from the reference group. This chance is 6.:5 for the > 65 age group relative to the reference group. The chance is 5:4 that an individual from the older group rates quality higher than an individual from the younger group.

At all quality dimensions but tangibles the younger group judges quality as lower while the older group judges it as higher than does the total sample. The differences between younger group and total sample ratings are significant (at the 0.01 level) only for the assurance dimension. On the other hand, the differences between the older group and the total sample ratings are significant (at least at the 0.05 level) for all dimensions but tangibles. The differences in ratings between the two groups are statistically significant for at least four of the five quality dimensions.

5. Limitations on the use of ridits:

One important aspect of the ridit technique that distinguishes it from other techniques is the choice of some identified distribution acting as reference and on the basis of which other particular distributions may be compared. In this regards, Bross (1958, p.21) indicated that a key element in an intelligent choice of the baseline distribution is to try to achieve the space-time stability of the proposed refined measurement system. To do this, numbers that are repeatable from study to study in a continuous research program and numbers that are comparable from one program to another in multi-program phenomena should be selected.

Sometimes, a natural genuine choice is made of the sort employed in laboratory, clinical and biological investigations when a control (normal) sample is selected against the experimental (treated) sample. In some cases, the study series as a whole may be used as a reference group since it is representative of some larger population. This is exactly what has been done in the analysis of health care service quality when the total sample was considered the baseline for comparing young and old sub-samples. But such a choice should not be always taken for granted since the total sample may not be homogeneous and may not represent any particular population.

Other less important limitations exist in the use of ridits for analysing data on subjective or numeric "borderland" response variables. Though ridits possess certain properties [1] that may improve the space-time stability of "borderland" variable measurements, there is no guarantee that they can solve some of the deep-rooted problems inherent in these variables. Bross (1958, p.36) stated that no matter what the nature of the original observations may be, the distribution of ridits will be closely approximated by a "rectangular distribution". For the very skewed data (all observations falling into very few categories) the approximation of ridits by a "rectangular distribution" is going to be poorer and a correction is needed to reduce the variance.

The issues of ridits' variances and the types of data suitable for safe ridit analysis have been points of controversy. Mantel (1979) drew the attention to the improprieties that can arise in the formulation of a hypothetical variance of a uniformly distributed variable for a ridit and how they can affect the process of hypothesis testing about mean ridits. He also pointed out the insensitivity of ridit scores at either of the scale ends in certain types of data. For example, in studies involving severity of pain where there is high frequency of little or no pain and low frequency of severe or extreme pain, the results of ridit analysis are dominated by the data at the low end of the pain scale and are largely insensitive to data at what should be the important high end. Mantel (1979, p.27) summed up his criticism to ranking procedures in general and to ridit scaling in particular by noting that the user of ridit analysis has surrendered his right to select a reasonable, if imperfect, scaling to a method of analysis which has then forced a .... scaling on him.

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1 For example, consolidation or elaboration of the subdivisions of a subjective scale will have no effect upon the calculation of ridits.

6. Summary:

The main concern of this paper is to adopt a technique, which has been successfully used for analysing epidemiological and micro biological data, for the analysis of categorical variables designed to describe attitudes and human behaviour. The technique is known as ridit "relative to identified distribution" and was introduced by Bross in 1958. In attitude enquiries, a sample of questions (statements) covering the main aspects of the measured attitude are directed to a sample of individuals. Each question (statement) has possible answers of varying intensity. These possible answers are given numerical scores and a person's attitude is defined by his total score on all items. The main problem with such numerical measurements of categorical variables is that they assume that the differences between categories are equivalent to the differences between the numbers given to them which is hard to justify. In addition, a unique numbering system does not exist and the choice of a suitable system is not an easy task. Furthermore, the analysis of data resulting from such measurement systems rests upon conventional statistical methods which require the fulfilment of theoretical assumptions regarding the distributional forms of the variables.

Ridit analysis is a distribution - free method and is conceptually as well as computationally simpler than other conventional methods. It does not attempt to quantify the categories of subjective variables but takes advantage of the natural ordering between them. The technique begins with the selection of an empirically observed distribution as a reference. It calculates a ridit for each category in that distribution. This is just a way of assigning weights to the categories since a ridit for any category is the probability of having a value at or below the midpoint of the category. A mean ridit for any other comparison distribution may be calculated as a weighted average of its observed frequencies, using the ridits of the references distribution as weights.

Standard errors and confidence intervals for mean ridits can be calculated and hypotheses concerning differences between groups can be tested using the simple conventional Normal Variable distribution mathematical expressions of ridit analysis and their interpretations are given.

An application of the ridit technique to an empirical study undertaken in the United States in 1992 for assessing health care service quality is carried out. Comparison between original study findings and ridit analysis findings is not the aim of presenting the application. The purpose is, rather, to demonstrate the usefulness of the technique for analysing categorical data of the type obtained through attitude and behavioural research.

Interesting conclusions on how ratings of health care service quality differed between younger and older groups of the selected sample are made through ridits.

Some limitations on the use of ridit analysis are noted. They mainly relate to the underling assumption of ridits as uniformly distributed variables which affects the calculations of mean ridits' variances, their confidence intervals, and consequently the process of hypothesis testing. Such an assumnption is likely to be violated for particular sets of data (the very Skewed ones). A particular attention is drawn to the problem of selecting a suitable reference distribution. It is a crucial element in ridit analysis but, nevertheless, is not an unresolved question.

Table (1)

Ridit analysis for Perceived Quality of Health Care Data.

No.	Items & dimensions	Mean ridit		Standard error			Value of Z			Odds ratio		
		$\bar{r}_1$ 25-65	$\bar{r}_2$ > 65	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$
	<u>Overall rating:</u>	0.497	0.544	.00433	.00667	.00727	- 2.92**	6.60**	7.79**	0.951	1.193	1.256
	Tangibles:	0.506	0.479	.01092	.01677	.01850	0.55	- 1.28	- 1.48	1.024	0.918	0.896
1	Up-to-date equipment	0.481	0.569	.02109	.03247	.03728	- 0.92	2.11*	2.36*	0.925	1.318	1.427
2	Visually appealing facilities	0.512	0.456	.02225	.03448	.03702	0.56	-1.28	-1.53	1.051	0.838	0.797
3	Well dressed, neat Dr/Staff	0.503	0.489	.02114	.03238	.03742	0.14	- 0.33	- 0.37	1.012	0.958	0.947
4	Physical facilities appearance	0.528	0.401	.02230	.03411	.03702	1.25	- 2.89**	3.42**	1.118	0.671	0.596
	<u>Reliability:</u>	0.484	0.557	.00980	.01496	.01654	- 1.66	3.83**	4.46**	0.936	1.259	1.346
5	Fulfilling promises in time	0.489	0.538	.02238	.03452	.03683	- 0.49	1.10	1.33	0.957	1.165	1.217
6	Sympathetic & Reassuring	0.482	0.561	.02140	.03258	.03683	- 0.82	1.88	2.14*	0.932	1.280	1.375
7	Dependable	0.471	0.600	.02088	.03142	.03686	- 1.83	3.18**	3.50**	0.890	1.500	1.695
8	Providing Service in time	0.489	0.538	.02269	.03445	.03649	- 0.50	1.11	1.36	0.956	1.166	1.220
9	Accurate record keeping	0.481	0.569	.02130	.03281	.03792	- 0.90	2.11*	2.33*	0.926	1.321	1.429

No.	Items & dimensions	Mean ridit		Standard error			Value of Z			Odds ratio		
		$\bar{r}_1$ 25-65	$\bar{r}_2$ > 65	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$
	Responsiveness:	0.490	0.535	.01133	.01766	.01655	- 0.87	1.96*	2.39*	0.961	1.148	1.195
10	Telling patients exactly when services are performed	0.503	0.490	.02267	.03523	.03709	0.13	- 0.29	- 0.36	1.011	0.959	0 .948
11	Prompt service	0.486	0.548	0.2271	.03521	-03685	- 0.61	1.36	1.68	0.946	1.213	1.282
12	Willing to help patients	0.478	0.560	.02212	.03492	.03740	- 1.00	2.30*	2.74**	0.915	1.382	1.514
13	Prompt response to requests	0.494	0.522	.02295	.03565	.03703	- 0.28	0.62	0.77	0.975	1.093	1.121
	Assurance	0.473	0.593	.00795	.01204	.01398	- 3.35**	7.69**	8.54**	0.899	1.455	1.626
14	Feel secure with Dr. & Staff	0.469	-0.609	.02129	.03226	.03636	- 1.47	3.37**	3.80**	0.882	1.556	1.779
15	Trust Dr. & Staff	0.466	0.617	.02048	.03003	.03649	- 1.68	3.90**	4.15**	0.871	1.811	1.869
16	Feel safe with Dr. & Staff	0.463	0.630	.02102	.03197	.03702	- 1.74	4.05**	4.49**	0.883	1.699	1.995
17	Pleasant dealing with Dr. & Staff	0.493	0.524	.02140	.03279	.03683	- 0.32	0.74	0.85	0.972	1.102	1.133
18	Knowledgeable Dr. & Staff	0.468	0.612	.02058	.03163	.03163	- 1.54	3.53**	3.88**	0.880	1.576	1.808
19	Polite Dr. & Staff	0.475	0.589	.01994	.03032	.03702	- 1.26	2.93**	3.08**	0.904	1.433	1.591
20	Dr. & Staff get adequate Support to do work well	0.478	0.573	.02209	.03355	.03737	- 0.96	2.18*	2.53*	0.918	1.343	1.466

No.	Items & dimensions	Mean ridit		Standard error			Value of Z			Odds ratio		
		$\bar{r}_1$ 25-65	$\bar{r}_2$ > 65	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$	$\bar{r}_1$	$\bar{r}_2$	$\bar{r}_2 - \bar{r}_1$
	Empathy	0.489	0.536	.00924	.01438	.01523	- 1.15	2.49*	3.05**	0.958	1.154	1.205
21	Receiving individual attention	0.470	0.594	.02233	.03486	.03706	- 1.36	2.68**	3.34**	0.886	1.460	1.659
22	Receiving personal attention	0.484	.556	.02213	.03373	.03666	- 0.73	1.66	1.97*	0.937	1.252	1.337
23	They know what my needs are	0.506	0.477	.02276	.03595	.03785	0.28	- 0.64	- 0.77	1.025	0.912	0.889
24	They have my best interest at heart	0.474	0.591	.02167	.03335	.03705	- 1.20	2.74**	3.16**	0.901	1.447	1.613
25	Operating hours convenient to all patients	0.499	0.505	.02315	.03633	.03765	- 0.06	0.14	0.18	0.994	1.021	1.027
26	Waiting for a short time	0.500	0.499	.02307	.03616	.03768	0.01	- 0.02	- 0.03	1.000	0.996	0.995

Table (2)

Kolmogorov-Smirnov test of significance of differences between grouped frequency distributions (theoretical) and individual frequency distributions (observed)

Dimensions and variables	Total sample	25 - 65 age group	> 65 age group
D1: V1 - V4			
V1	S	S	N
V2	N	N	N
V3	N	N	N
V4	S	S	N
D2: V5 - V9			
V5	N	N	N
V6	N	N	N
V7	S	S	N
V8	N	N	N
V9	N	N	N
D4: V10 - V13			
V10	N	N	N
V11	N	N	N
V12	S	S	N
V13	N	N	N

Dimensions and variables	Total sample	25 - 65 age group	> 65 age group
D1: V14- V20			
V14	N	N	N
V15	N	N	N
V16	N	N	N
V17	S	S	N
V18	N	N	N
V 19	N	N	N
V 20	N	N	N
D5: V21 - V26			
V21	N	N	N
V22	N	N	N
V23	N	N	N
V24	S	S	N
V25	S	S	N
V 26	N	N	N

S: Significant at both the 0.05 and 0.01 levels.
N: Not significant at either of the two levels.

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