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Afya Jumuishi : towards Interprofessional collaboration between traditional and modern medical practitioners in the Mara Region of Tanzania

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CHAPTER VII ANALYSES OF INTERPROFESSIONAL COLLABORATION IN HEALTH CARE

Since this study in the Mara Region also includes research aiming at analysing relations and correlations between independent, intervening and dependent variables, it seeks to explain related events, conditions and behaviours in order to make predictions of how one variable might predict another (Moore *et al.* 1986). This study examines how different variables such as predisposing, enabling, trustworthiness, organisational and intervening variables might predict interprofessional collaborative behaviour between traditional and modern medical practitioners.

By use of SPSS 20.0 statistical software, also now known as *Predictive Analytics Software* (PASW 20.0), statistical analyses are presented in this chapter showing behavioural patterns related to knowledge, beliefs and practices between traditional and modern medical practitioners in the way in which they collaborate in the delivery of health services.

The chapter first describes the way in which data as measurable phenomena have been organised and recoded into variables. With the exception of a few variables, most indicators have been measured by more than one question. The recoding of variables has been carried out either directly by using the responses or through calculations.

Paragraph 7.2 presents the quantitative analysis of all independent, intervening and dependent variables of the seven blocks of variables as shown in the analytical model in Paragraph 2.4.5. The general descriptive analysis which provides impressions of the correlation among variables is explored through cross tabulation while examining the *Chi-square*, *Cramer's V* and *Kendall's tau-b* values of significance and strength of the correlation. The general interpretation or possible inferences are given for each significant correlation in the bivariate analysis.

A multivariate analysis of variables is then computed by the use of an optimal scaling technique, which in turn provides results of the *Non-linear Canonical Correlation Analysis* (CCA) known as *OVERALS*. The *OVERALS* technique searches for what is common among sets of variables on the same concept (*cf.* Kettenring 1971; Van der Burg & De Leeuw 1983; Van der Burg 1994). *OVERALS* results reveal the structural interaction among the independent, intervening and dependent variables, which refer to the collaborative behavioural patterns among the two types of medical practitioners.

Lastly, the two step *OVERALS* analysis is presented; firstly as a total set of variables from all blocks as separate sets, and secondly as one-to-one blocks of variables showing the relative strength of the interactions between them in a multiple (categorical) regression analysis by use of *Eigenvalue* as a multivariate measure of interaction of all variables. This, in turn, shows a clear picture of the way in which independent and intervening variables interact with dependent variables. All variables with strong effects in their interaction are identified as to be able to develop and complete the ultimate analytical model. While the general assessment of the level of interprofessional collaboration in the region is given in Paragraph 7.2.1, the overall interactions and interpretation of results of the quantitative analysis are presented in Paragraph 7.2.4.

7. 1 Preparation of the Data Set

Data are collected as measurable phenomena explained in the operationalisation of the concepts from the survey carried out by administering structured questionnaires to both practitioners of the traditional and modern medical system, followed by organising the data into PASW 20.0

data editor, and then cleaning them accordingly. The cleaning is conducted by correcting misspelled words, unwanted marks or inconsistencies. Responses falling into the answer category ‘other’ have been incorporated into the intended category. Some renaming of the *type*, *values* and *measure* of the variables has been completed in accordance with the nature of the variable.

The coding of responses into the intended variables has been carried out in either one of the following three methods; a non-computed recoding of data which includes the direct transfer of responses from the original answers as in Table 7.1; a qualitative recoding of responses into a specific variables as presented in Table 7.2; or a computed recoding of data (recalculation) into specific variables as presented in Table 7.3.

7.1.1 Non-Computed Recoding of Variables

Three directly transferred variables – ‘district name’, ‘religion’ and ‘highest formal education’ are entered into a coded PASW editor without changes, as indicated in Table 7.1.

Table 7.1 Direct Transferred Variables (no recoding) into PASW 20.0 Data Editor

Concept	Variable	PASW name
Socio-demographic Variables	District name	District
Socio-demographic Variables	Religion	Religion
Socio-demographic Variables	Highest Formal Education	Formed

Source: Fieldwork survey (2006)

The variable ‘district’ shows the administrative area where the practitioner serves (service area). ‘Religion’ tells the practitioner’s faith affiliation and ‘formed’ gives the maximum achieved level of the practitioner’s formal education.

While peoples’ culture and level of development in a particular district can have a notable effect in the way in which workers live in general, ‘religion’ would instil strong belief systems which link humanity to spirituality, and, in turn, such beliefs and religious teachings may also prescribe what is or is not acceptable in health care practices and products. The level of ‘formal education’ may differentiate practitioners’ knowledge and skills, which influences their worldview and habits of promoting a healthy life and managing different illnesses. Most traditional medical practitioners reported their non-formal education through indigenous modes of learning.

Nineteen variables obtained from responses by the respondents did not fulfil the intended categories and required to be recoded quantitatively to achieve the respective concepts used. Table 7. 2 which follows presents the recoded variables quantitatively to match the respective concepts which are used. This recoding is necessary to turn the original raw data into new codes or names. Table 7.2 presents all such variables and their subsequent explanations in the way which they were recoded.

Status in Organisation (‘orgstat’)

Worker’s organisational status (‘orgstat’) shows the hierarchical position of the employees which consideration to the organisation structure where they work. The different levels where they belong and their attached responsibilities, powers and authorities which can have an influence in the way an employee interact with others.

Table: 7.2 Variables Measured by a Single Question Recoded by Qualitative Methods

Concept	Variable	PASW name
Socio-demographic Variables	Status in the organisation	‘orgstat’
Socio-demographic Variables	Age	‘age’
Socio-demographic Variables	Organisation type based on service	‘orgserv’
Socio-demographic Variables	Organisation size	‘orgsize’
Socio-demographic Variables	Professional group	‘profgrup’
Psycho-Social Variables	Perceived possibility of future work relationship	‘percwrel’
Psycho-Social Variables	Belief on future positive impact of collaboration	‘belimpac’
Psycho-Social Variables	Belief about disease system specificity	‘belidses’
Psycho-Social Variables	Awareness of successful collaborative efforts	‘awasucce’
Psycho-Social Variables	Intra-professional collaboration within the same system	‘intracol’
Psycho-Social Variables	Experience with Traditional Medicine (TM) goods and services	‘extmsev’
Psycho-Social Variables	Experience with Modern Medicine (MM) goods and services	‘exmmsev’
Enabling Variables	Government and community efforts on collaboration	‘gocoefot’
Enabling Variables	Communication linkages with other places	‘comlink’s
Trustworthiness Variables	Level of trusting MM practitioners	‘mmtrust’
Trustworthiness Variables	Level of trusting TM practitioners	‘tmtrust’
Organisational Variables	Organisational inputs in terms of available resources	‘orginput’
Organisational Variables	Organisation efforts towards anti-groupthink	‘orgthink’
Intervening Variables	National and international collaborative project involvement	‘projeinv’

Source: Fieldwork survey (2006)

Based on the status of the respondent in the organisation, the ‘owners’ category is merged into ‘top leadership’, because owners, shareholders or governing board members, typically policy makers, are all regarded as part of the top management or top leadership of the organisation. In the case of Traditional Medicine (TM) where most businesses are sole proprietorships, the owners are also the leaders or managers. The new value is therefore renamed ‘top leadership’.

Age (‘age’)

The individual age of the workers carries experience both in their practice and in their behaviour to others within and outside the profession. Since all respondents are adults, ages are grouped into three intervals of common social groupings. The group ranges are based on the actual data collected and labelled as indicated in Table 7.3.

Table 7.3 Age Grouping of Respondents

Value	Label	Age group included (years)
1	Young adult	20 - 39
2	Middle adult	40 - 59
3	Old adult	60 - 79

Source: Fieldwork survey (2006)

Type of organisation based on services ('orgserv')

Data on the variable of the type of organisation based on services ('orgserv') is grouped into four major categories: modern health services, modern allied health services, traditional health services, and traditional allied health services. Allied health services are differentiated from health services based on the definition of the World Health Organisation (2000), which differentiates between non-medical, and non-nursing health services as they are recognised in a particular national medical system. Therefore, the recoding has been done as indicated in Table 7.4.

Table 7.4 Categorisation of the Type of Health Services Offered by Medical Practitioners

Value	Label	Organisational services included
1	Modern health services	Hospital; health centre; dispensary; reproductive and child health centre
2	Modern health allied services	Laboratory of disease investigation; community-based health project; nursing school; clinical officer's Tr. School; pharmaceutical shop; HIV/AIDS voluntary counselling and testing centre; district prevention health department; village health committee,
3	Traditional health services	Traditional Medicine (TM) health centre; clinic for bone setting; individual stationary and mobile Traditional Medicine (TM) healing services; traditional midwifery services; group and individual faith healing, individual stationary and mobile circumcision services,
4	Traditional allied health services	Individual and family Traditional Medicine (TM) vending; individual and clinic of fortune telling and predicting

Source: Fieldwork survey (2006)

In order to focus on a clear distinction between the two medical systems in this study, the variable has been further recoded by combining the values 1, 2, 3 and 4 separately. This recoding is required to achieve clear understanding of the type of organisations based on the services which they offer; either modern or traditional health services.

Organisational size ('orgsize')

The *International Standard Industrial Classification* (ILO 1993) of the size of enterprises is related to either the number of workers, the value of fixed assets and/or the turnover. Due to the difficulties to ascertain the latter two criteria, the number of workers is used in this study. Based on the Tanzanian classification of the size of organisations (enterprises) as defined in the *Small and Medium Enterprise Development Policy* (2002), and the business profile of the actual distribution of the health facilities in the Mara Region, the following standard is used for categorisation of responses, the renaming and recoding of the variable of the size of organisation ('orgsize') as indicated in Table 7.5

Table 7.5 Categorisation of the Size of Organisations where Medical Practitioners Work

Value	Label	Number of workers
1	Small Organisation	Up to 10
2	Medium Organisation	11 - 90
3	Large Organisation	91 and above

Source: Fieldwork survey (2006)

Professional group ('profgrup')

The variable of the cadre of the respondent ('cadre') is renamed into the professional group ('profgrup') based on the common naming in Tanzania. A professional group, which combines all health cadres presented in this survey, is known to offer certain similar or closely related health services as its general aim. The professional grouping differentiated in accordance with the system are indicated in Table 7.6.

Table 7.6 Different Medical Related Cadres of Practitioners

Value	Label	Cadres included from the research population
Modern Medical System		
1	Doctor	Surgeon, Medical Officer, Asst. Medical Officer, Clinical Officers Tutors
2	Clinician	Clinical Officer, Dental Officer, Asst. Clinical Officer
3	Nurse	Nurse Tutor, Nursing Officer, Nurse / Midwife,
4	Allied Health Worker	Practitioners in Pharmacy, Radiography, Laboratory, Orthopaedic, Technologist
5	Community Health Worker	Community Health Volunteer, Village Health Worker, Health Officers, HIV/ AIDS Counsellor
6	Support Workers	Medical Attendants, Nurse Students, Clinical Officers Students
Traditional Medical System		
7	Healer	Traditional Healer, Herbalist, Bonesetter
8	Traditional Midwife	Traditional Midwife / Birth Attendant
9	Male Circumciser	Male Circumciser
10	Faith Healer	Spiritualist, Sheikh, Prayer Warrior
11	Fortune Teller and Predictors	Fortune Teller, Astrologer, Soothsayer
12	Medicine Vendor	Traditional Medicine (TM) Vendor

Source: Fieldwork survey (2006)

Perceived possibility of good future work relationship ('percwrel')

In his Model of Transcultural Health Care Utilisation, Slikkerveer (1990) substantiates that the psycho-social variables, which include beliefs, attitudes, perceptions, knowledge, and cultural values, are among the strongest variables interacting with the utilisation of health services by patients. This result is also confirmed by Fogg (2000) who underscores that these psycho-social variables act either as a *motivation* to evaluate future results of interprofessional collaboration, as an *ability* to engage in interprofessional collaboration, or as *triggers* reminding practitioners of the need to collaborate with practitioners of the other medical systems. Perceived possibility of future good work relationship ('percwrel') is one of the psycho-social variables. Responses on 'percwrel' related to the two medical systems are recoded from five into three categories, as indicated in Table 7.7.

Table 7.7 Categories of Responses on the Perceived Possibility of Good Future Work Relationship between Modern and Traditional Medical Practitioners

Value	Label	Included
1	None	Don't know, No possibility
2	Little	Little possibility
3	Substantial	Medium to Greater possibility

Source: Fieldwork survey (2006)

Belief on future positive impact of collaboration ('belimpac')

The belief on the future positive impact of collaboration ('belimpac') is recorded as indicated in Table 7.8.

Table 7.8 Categories of Responses on the Belief on Future Positive Impact of Collaboration between Tradition and Modern Medicine Practitioners

Value	Label	Included
1	Minor	Don't know, No impact
2	Medium	Medium impact
3	Major	Major impact

Source: Fieldwork survey (2006)

Belief about disease system specificity ('beldses')

The belief that diseases are medical system specific ('beldses') is recorded as indicated in Table 7.9.

Table 7.9 Categories of Responses on the Belief if Diseases are Medical System Specific

Value	Label	Included
1	Low	Don't know, Strongly disagree, Disagree
2	Medium	Agree
3	High	Strongly agree

Source: Fieldwork survey (2006)

Awareness of successful collaborative efforts ('awasucce') is a variable which investigates if practitioners are aware of successful collaborative endeavours between the two medical systems. Neither recoding nor recalculation has been necessary.

Intra-professional collaboration within the same system ('intracol')

The extent of intra-professional collaboration ('intracol') practitioners are involved within their medical system is recorded as indicated in Table 7.10.

Table 7.10 Categories of Responses on the Extent Practitioners are involved in Intracollaborative Endeavours with other Cadres within their Medical System.

Value	Label	Included
1	Low	No collaboration, Low level of collaboration
2	Medium	Medium level of collaboration
3	High	High level of collaboration

Source: Fieldwork survey (2006)

Experience on effects of goods and services received ('extmsev' and 'exmmsev')

The experience on general, appropriate effects or efficacy of goods and services of Traditional Medicine (TM) and Modern Medicine (MM), (labelled 'extmsev' and 'exmmsev' respectively) have been recoded as indicated in Table 7.11.

Table 7.11 Categories of Responses on the Experience on Efficacy of Goods and Services Received from either Traditional or Modern Medicine System

Value	Label	Included
1	Poor	No experience, Poor
2	Medium	Medium
3	High	High

Source: Fieldwork survey (2006)

Government and community efforts towards collaboration ('gocoeot')

The variable government and community efforts towards collaboration of the two systems abbreviated as ('gocoeot') has been recoded on the basis of the regrouping pattern of responses, as indicated in Table 7.12.

Table 7.12 Categories of Responses on the Level of Government and Community Efforts Towards Collaboration of the two Systems

Value	Label	Included
1	Little effort	Don't know, No effort, Minimal effort
2	Medium effort	Some effort
3	Much effort	A lot of effort

Source: Fieldwork survey (2006)

Communication linkages with other places ('comlinks')

The variable measuring the infrastructural capability of the respondents' vicinity is named into communication linkages with other places ('comlinks') and has been recoded directly with the responses of *poor*, *fair* or *good* communication linkages.

National or international collaborative project involvement ('projeinv')

Intervening variables concerning the level of practitioner's involvement in national or international project on collaboration ('projeinv'), have been recoded directly from the responses.

Level of trust for practitioners in Traditional Medicine (TM) and Modern Medicine (MM) ('tmtrust' and 'mmtrust')

Two variables concerning the level of trust for practitioners of Traditional Medicine (TM) and Modern Medicine (MM) ('tmtrust' and 'mmtrust') have been recoded from the original responses with categories of *low*, *medium* or *high*, as no calculations have been required. The '*don't know*' responses have been by implication considered as a low level of trust.

7.1.2 Computed Recoding of Variables

Some of the concepts encompass more than one variable, as some variables also need more than one measurable phenomenon to be defined. This renders it necessary that either some of the variables or responses (answer categories) of more than one question from the questionnaire have to be combined through computations to arrive at and recode an intended variable in a certain operationalised concept. The recoding executed by the use of the *additive scaling technique* as elaborated by De Heus *et al.* (1995) and Leurs (2010) through the following steps:

Table 7.13 Guidelines on the Way the ‘don’t know’ response were treated

Variable	Treatment of the ‘don’t know’ response
Perceived Possibility of Future Work Relationship (<i>percwrel</i>)	Interpreted to denote either not having the experience to tell or predict, or not being interested in the question asked. Thus considered as a missing value. Therefore the PASW software option ‘ <i>Exclude cases pair wise</i> ’ has been used as the default option in the analysis.
Belief on Future Positive Impact of Collaboration (<i>belimpac</i>)	
Belief about Disease Medical System Specificity (<i>belidses</i>)	
Organisational Inputs in Terms of Available Resources (<i>orginput</i>)	
Experience on Traditional/ Alternative Medicine Goods and Services (<i>extmsev</i>)	Interpreted to denote not having the knowledge on the question asked. Thence assigned a zero score.
Experience on Modern Medicine (MM) Goods and Services (<i>exmmsev</i>)	
Knowledge about the Health Services (<i>knosect</i>)	
Government and Community Efforts on Collaboration (<i>gocoefot</i>)	Interpreted to denote not having witnessed any substantial level of efforts. Thence assigned a low level.
Communication Linkages with other Places (<i>comlinks</i>)	
Level of Trust of MM Practitioners (<i>mmtrust</i>)	
Level of Trust of TM Practitioners (<i>tmtrust</i>)	
Organisational Culture Towards Collaboration (<i>orgcutur</i>)	
Organisation Efforts Towards anti-Groupthink (<i>orgthink</i>)	

Source: Fieldwork survey (2006)

1. to check for data outliers and determine if some data can be treated as missing values. If there are no data which can be considered as missing values, Step 2 is skipped to follow Step 3;
2. to exclude any question which has a missing value, and therefore formulate new variable, which counts the number of questions per each respondents in a specific intended new variable;
3. to formulate a new variable through computation by adding together all scores of each set of questions. In case of missing values, the same computation is done but overall divided by the new variable formulated in Step 2;
4. to determine from the sample population (not a theoretical scale), the lowest and highest frequency of the new variable formulated in Step 3;
5. to recode values into the intended categories of variables. The computed values in Step 3 are recoded into 3 based on the score in interval obtained by subtracting the lost value from the highest value of frequency scores determined in Step 4.

It should be noted that any recoding of answers from different sets of questions measuring different aspects of one concept or variable is only possible if the answers in all concerned sets have been made with the same measurement level and if their contents are compatible.

Treatment of the ‘don’t know’ answer category

Despite the researcher’s objective to collect complete information from every respondent on the subject matter, it has not always been possible, and a response of ‘*don’t know*’ had to be recorded. Despite careful consideration to the prevailing concepts, every specific question and statistical implication in the final analysis below stands the base of treatment of any ‘*don’t know*’ response for every relevant variable, as indicated in Table 7.13.

Knowledge on the medical systems (‘knowsect’)

A re-calculation to combine four variables (‘tmprac’, ‘mmprac’, ‘tmtech’, ‘mmtech’) has been carried out to obtain one variable (‘knowsect’) to represent the level of knowledge of the medical systems through scores counted from each respondent. The ultimate recoding has the values and labels, as indicated in Table 7.14.

Table 7.14 Assigned Values, Labels and Respective Scores of Variable ‘knowledge’

Value	Label	Included
1	Low Knowledge	0 - 6 scores
2	Medium knowledge	7 - 13 scores
3	High knowledge	14 – 20 scores

Source: Fieldwork survey (2006)

Computation on three variables (‘knowsect’, ‘knowact’, and ‘knowhow’) is carried out to obtain the new variable ‘knowsect’, which stands for knowledge on the medical systems.

Socio-Economic Status (SES)

Seven variables related to the indicators of the socio-economic status in the Mara Region have been adjusted to obtain the medium indications of the Socio-Economic Status (SES) of respondents. The consolidated original variables include: income (‘income’), type of house building materials (‘hsemat’), type of house roof (‘hseroof’), size of farm (‘land’), type of transportation means (‘transport’), and total value of domesticated animals (‘animals’). All variables first had to be recoded in a range of: *low level*, *middle level*, or *high level* of socio-economic position in common usage, and then translated into *poor*, *medium*, or *rich* status respectively.

Organisational input capability (‘orginput’)

Six variables had the same range of categories, namely organisational capability on amount of required staff (‘orghr’); organisational capability on finance (‘orgfin’); organisational capability on relevant data and information (‘orgdata’); and organisational capability on skills (‘orgskil’); organisational capability on required materials (‘orgmat’); organisational capability on availability of space for work (‘orgspac’). These categories have been computed to obtain one variable, renamed as the organisational input capability (‘orginput’). The range and labels of the original categories have been translated into new categories, as indicated in Table 7.15.

Table 7.15 Level of Organisational Input Capability of Where Practitioners Work

Original Value	Original Label	New Value	New Label
1	None of what it needs	1	Low capability
2	Almost none of what it needs	2	Medium capability
3	Some of what it needs	3	High capability
4	Most of what it needs		
5	All of what it needs		

Source: Fieldwork survey (2006)

The organisational culture ('orgcutur')

Three variables, all related to the organisational value and norms towards collaboration, are combined to obtain a new variable, known as the organisational culture ('orgcutur'). It is achieved by the computation and recoding to the new variable of the three original variables names, as follows:

1. Organisational effectiveness in informing about the other system ('orginfo');
2. Organisational effectiveness in motivating workers in collaboration ('orgmotv');
3. Organisational tolerance to different opinions and worldviews ('orgtorel').

Anti-Groupthink ('orgthink')

The anti-groupthink syndrome is a variable ('orgthink') which evaluates the organisation's purposeful efforts to respect different opinions and views about the other medical system. Responses are recoded directly without any computations, indicating different categories such as *low*, *medium* and *high* levels of efforts to curb this syndrome.

Behavioural patterns of exchange of resources ('colexch')

This is the first dependent variable of the analytical model ('coloexch'). Originally, the level of interprofessional collaboration by exchange of resources has been measured through the inquiry of both the traditional and modern medical practitioners concerning their personal corresponding levels of engagement with the other medical system regarding the exchange of ideas and giving and receiving material resources, as recorded over the period of 24 months prior to the survey. The five categories of choices are *none*; *once in 2 months' time*; *once in 1 months' time*; *once in 2 weeks' time*; and *more than once in 2 weeks' time*.

Three variables, namely the frequency of collaboration by exchange of ideas ('ideaexch'), the frequency of collaboration by giving out material resources ('givemat'), and the frequency of collaboration by receiving material resources ('getmat'), have been computed into a new variable. The new variable has been changed and recoded from five to three categories, renamed as *low level*, *medium level*, and *high level*.

Behavioural patterns of working jointly ('colwork')

This is the second dependent variable of the analytical model ('colwork'). Originally, the level of interprofessional collaboration by working jointly has been measured through the inquiry of both the traditional and modern medical practitioners concerning their personal corresponding levels of engagement with the other medical system regarding the referring of clients and patients, receiving referred clients and patients, having meetings/workshops together, and giving health services together, as recorded over the period of 24 months prior to the survey.

The five categories of choices of the original rating have been: *none*; *once in 2 months' time*; *once in 1 months' time*; *once in 2 weeks' time*; and *more than 1 in 2 weeks' time*.

Five variables, namely, frequency of collaboration by referring out clients and patients ('refeout'); frequency of collaboration by receiving referred clients and patients ('refein'); frequency of collaboration by receiving health services from the other system ('getsevout'); frequency of collaboration by having meetings/workshops together (*meetogt*), and frequency of collaboration by giving health services together ('servtogt'), have been computed into a new variable of behavioural patterns of working jointly ('colwork'). The new variable has been changed and recoded from five to three categories, renamed as *low level*, *medium level*, and *high level*.

Preparation of other collected data for qualitative exploration

Some data have been not used in correlation analysis but have been referred to in the general exploratory and qualitative analysis of the sample population. This includes data on the various ethno-cultural groups which have been brought together into five major ethnic groups in the Mara Region, which can be identified through their unique traditions and cultures. The variable has been renamed *ethnic group*.

The ethnic groups have been recoded on the basis of the socio-demography of the Mara Region as follows:

- Kurias – Kuria, Ngoreme, Kiroba and Simbiti
- Zanaki – Zanaki, Ikizu, Sizaki and Kabwa
- Jitas – Jita, Ruri and Kwaya
- Ikomas – Ikoma, Issenye, Natta and Taturu
- Luos – Luo
- Others – Sukuma

7.1.3 Outlying Variables

Outlying variables are variables which deviate distinctly from other respondents in the sample in which they occur. By the use of the *univariate* analysis on every single variable to explore the level of measurement and the resulting distribution frequencies and central tendencies, two variables have been identified as outliers. These are: 'respondent's place of childhood' and 'marital status', both of which have been excluded from further analysis as they have been very much skewed. While the 'respondent's place of childhood' counted +1.173, which shows a positive skew (skewed to the left) where the mass of distribution is concentrated on the right, 'marital status' counted -1.649, showing a negative skew (skewed to the right) where the mass of distribution is concentrated to the left. The actual data shows that 65.3% of respondents spent their childhood in *village* areas as compared to all other four remaining options: 'place with less status than a village', 'town', 'municipality', or 'city'.

The actual data show about 72.5% of respondents has been 'married' as compared with the other three remaining options 'unmarried', 'divorced/separated', and 'widow/widower'. As 'sex' is much related to the sociological gender roles which are constructed and defined in a particular society, and by nature of professional cadres which exist especially in Traditional Medicine (TM), some categories of practitioner, such as the 26 traditional birth attendants, consisted of only females, while the 31 traditional circumcisers in the sample population were all males.

The inevitable over-representation in such cadres has necessitated an exclusion of the variable of 'sex' from the analysis. However, the explorative analysis shows the distribution between the 'respondent's cadre' and 'sex', as presented in Table 7.16.

Table 7.16 Distribution of Respondents based on their sex in Mara Region (N=193)

Cadre	Male		Female		Total	
	N	%	N	%	N	%
Community Health Volunteer	1	33.0	2	67.0	3	100.0
Village Health Worker	1	33.0	2	67.0	3	100.0
Medical Attendant	7	50.0	7	50.0	14	100.0
Nurse	5	50.0	5	50.0	10	100.0
Nurse Midwife	2	25.0	6	75.0	8	100.0
Nursing Officer	4	67.0	2	33.0	6	100.0
Nursing Student	1	50.0	1	50.0	2	100.0
Nurse Tutor	0	0.0	2	100.0	2	100.0
Assistant Clinical Officer	1	100.0	0	0.0	1	100.0
Clinical Officer's Student	1	100.0	0	0.0	1	100.0
Clinical Officer	14	74.0	5	26.0	19	100.0
Clinical Officer's Tutor	0	0.0	1	100.0	1	100.0
Assistant Medical Officer	9	90.0	1	10.0	10	100.0
Medical Officer	1	50.0	1	50.0	2	100.0
Laboratory Technician	3	100.0	0	0.0	3	100.0
Laboratory Assistant	4	57.0	3	43.0	7	100.0
Pharmacist	1	100.0	0	0.0	1	100.0
Pharmaceutical Technician	1	50.0	1	50.0	2	100.0
Pharmaceutical Assistant	2	100.0	0	0.0	2	100.0
Public Health Nurse	0	0.0	4	100.0	4	100.0
Health Officer	3	60.0	2	40.0	5	100.0
HIV/AIDS Counsellor	5	100.0	0	0.0	5	100.0
Orthopedic Technologist	1	100.0	0	0.0	1	100.0
Dental Officer	1	100.0	0	0.0	1	100.0
Traditional Midwife	0	0.0	9	100.0	9	100.0
Traditional Bonesetter	0	0.0	1	100.0	1	100.0
Traditional Medicine Apprentice	1	100.0	0	100.0	0	100.0
Herbalist	9	64.0	5	36.0	14	100.0
Traditional Healer	12	57.0	9	43.0	21	100.0
Traditional Male Circumciser	10	100.0	0	0.0	10	100.0
Sheikh	0	0.0	1	100.0	1	100.0
Chaplain	1	50.0	1	50.0	2	100.0
Soothsayer	1	100.0	0	0.0	1	100.0
Astrologer	1	50.0	1	50.0	2	100.0
Traditional Medicine (TM) Vendor	5	36.0	9	64.0	14	100.0
Faith Healer	4	100.0	0	0.0	4	100.0
Total	112	58.1	81	41.9	193	100.0

Source: Fieldwork Survey (2006)

7.2 Quantitative Analysis and Interpretations

7.2.1 The General Level of Interprofessional Collaboration

The general outcome of the level of interprofessional collaboration between practitioners of the two systems is still low. The bivariate analysis shows that the level (frequency) of collaborative behaviour of exchange of resources ('collexch') by both types of traditional and modern practitioners combined (N=193) is: 61.7% at a low level, 31.6% at a medium level and only 6.7% at a high level. The collaborative behaviour of working jointly ('collwork') is 64.8% at a low level, 32.1% at a medium level, and only 3.1% at a high level. This result confirms that there is a real problem of low interprofessional collaboration, while the majority of both types of medical practitioners continue to provide health services to their clients and patients in isolation. This practice need to be improved through the health system reform package.

Further scrutiny, (*cf.* Table 7.17, Table 7.18 and Figure 7.1, Figure 7.2 respectively) with regard to the level of collaboration in the two types of medical practitioners per the two ways of collaboration shows that traditional medical practitioners score a higher level, albeit only by a small margin, than the modern medical practitioners in taking the lead in the exchange of resources.

The frequent scores of the extent of exchange of resources by traditional to modern medical practitioners are respectively: 7.5% to 6.2% at a high level; 32.5% to 31.0% at a medium level, and 60.0% to 62.8% at a low level. The scores in the category of collaborative behaviour in working jointly again favour traditional medical practitioners in taking the lead as compared to modern medical practitioners. The frequent scores on the level of working jointly for the same client with health problems between traditional and modern medical practitioners is as follows: 3.8% to 3.1% at a high level; 37.5% to 32.1% at a medium level, and 58.8% to 64.8% at a low level, respectively.

Such results validate the qualitative findings, which also recognise a practical trend where in general, traditional medical practitioners seemingly would be willing to participate in collaborative endeavours such as referring their clients and patients to the modern medical practitioners more readily without much resistance than their counterparts the modern medical practitioners.

Table 7.17 Distribution of the Level of Interprofessional Collaboration in Exchange of Resources over the Two Medical Systems Separately

Level of interprofessional collaboration	Medical system of the practitioner					
	Traditional medical system		Modern medical system		Total	
	N	%	N	%	N	%
Low	48	60.0	71	62.8	119	61.7
Medium	26	32.5	35	31.0	61	31.6
High	6	7.5	7	6.2	13	6.7
Total	80	100	113	100	193	100.0

Source: Fieldwork Survey (2006)

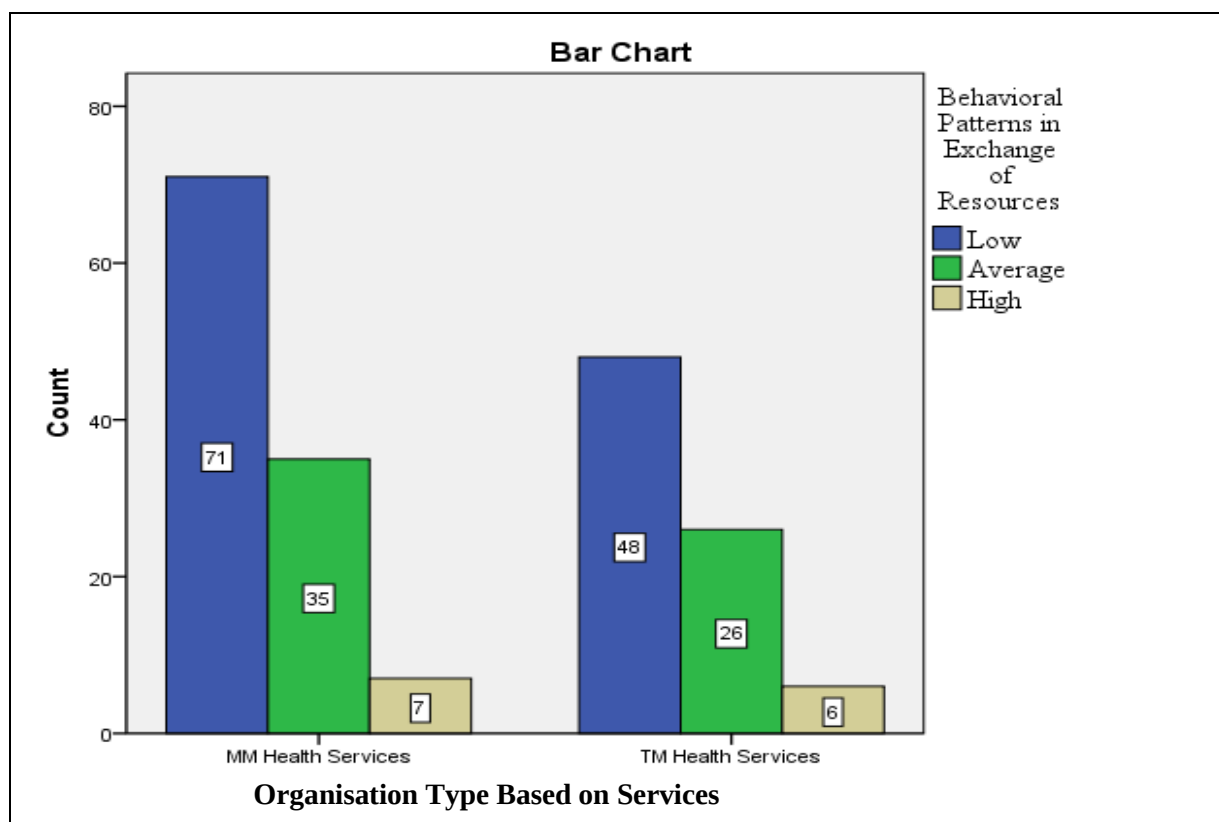


Figure 7.1 Distribution of interprofessional collaboration through exchange of resources over the practitioners of the traditional and modern medical system.
Source: Fieldwork Survey (2006)

With regard to the two modes of collaboration - exchange of resources and working jointly - it is shown that overall the modern medical practitioners are relatively more willing to exchange resources such as information, ideas and providing referrals to clients and patients (58.4%) than the traditional medical practitioners (41.6%), while both traditional and modern medical practitioners are equally willing to work together (50.0% versus 50.0%).

The explanation may lie in the educational aspect of modern medical training, while traditional medical practitioners tend to protect their indigenous medical knowledge and practice as part of the specific cultural heritage of the healers. While the willingness to exchange resources among modern medical practitioners scores the highest percentage (59.7%) at the low level of interprofessional collaboration, in contrast, the willingness among the traditional medical practitioners in this respect scores the highest percentage (46.2%) at the high level of interprofessional collaboration.

A similar result is found with regard to interprofessional collaboration in working together: while the willingness to work together among modern medical practitioners scores the highest percentage (62.4%) at the low level of interprofessional collaboration, in contrast, the willingness among the traditional medical practitioners in this respect scores the highest percentage (50.0%) at the high level of interprofessional collaboration.

Thus, practitioners of both medical systems may feel at ease in allowing their clients and patients to visit other medical systems available in the region as they wish, since it is the right of their clients and patients to make their own choices in health care.

Table 7.18 Distribution of the level of interprofessional collaboration in working together over the two Medical Systems Separately

Level of interprofessional collaboration	Medical system of the practitioner					
	Traditional medical system		Modern medical system		Total	
	N	%	N	%	N	%
Low	47	58.8	78	69.1	125	64.8
Medium	30	37.5	32	28.3	62	32.1
High	3	3.7	3	2.6	6	3.1
Total	80	100.0	113	100.0	193	100.0

Source: Fieldwork Survey 2006

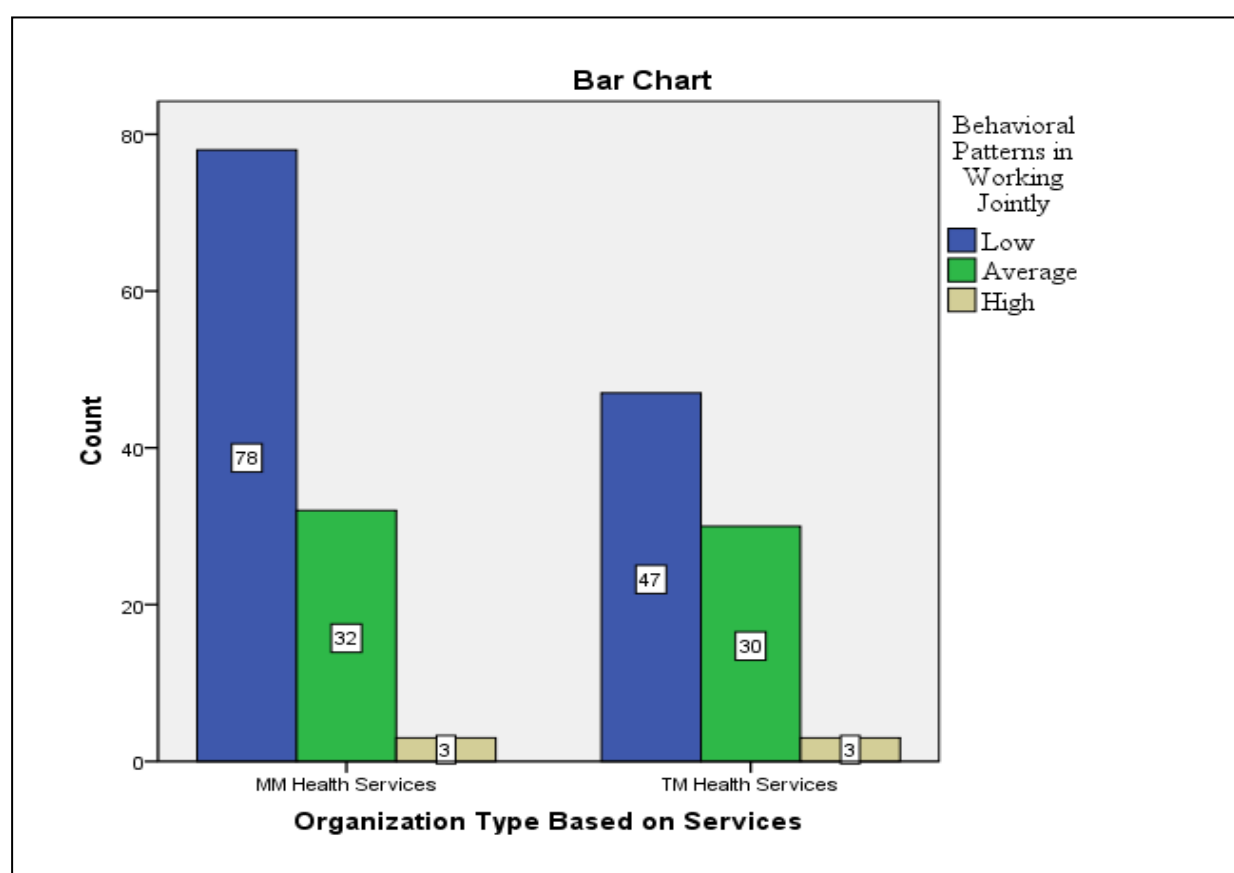


Figure 7.2 Distribution of interprofessional collaboration by working jointly over the practitioners of the traditional and modern medical system.
Source: Fieldwork Survey (2006).

7.2.2 Bivariate Analysis of Variables

As a preliminary statistical correlational exploration, a *bivariate* analysis among pairs of dependent and independent variables has been carried out before undertaking a more complex multivariate analysis. As Gibbons (1993) explains, correlational research examines the possible existence of a correlation with the caution of not jumping to conclusions.

Certainly, a particular variable could cause something to happen, but it might also cause something else to happen, too. *Predictor* variables, also known as *independent variables*, are variables which could predict the *criterion* variables, also known as the *dependent variables*.

The type of data of this research is mainly non-parametric, which does not necessarily meet all assumptions of parametric tests. The assumptions are; data being normally distributed, having homogeneous of variance, being interval data and being independent. With such data, which are also known as categorical data, the statistical options available for cross tabulations are the Pearson's Chi-square (χ^2), Phi, Cramer's V, Kendall's tau-b, Gamma and the Spearman Correlation. In this study, the Pearson's Correlation and Pearson's Rho could not be examined because the type of data obtained is not continuous, but discrete, and they are not categorised as scale interval and ratio values.

A continuous variable is one which can assume a variety of all possible values between each point, such as weight, height, etc. The Pearson's Correlation and Pearson's Rho tests are used in linear relationships of computations as explained by Field (2005). With the *chi-square* test for independence, the expected frequency in any case should be five or more. Pallant (2007) recommends the expected frequency to be at least 10. The correlation is considered as *significant* when the computed significant value is 0.05 or smaller. However, the implementation of a classification of values of the chance of deviation can at times be differentiated in case that the relationships are assessed between the categories of values of the chance of deviation.

The range of χ^2 - exact significance is defined to fall between the following values of the results:

- .15 to .10 (indication of significance);
- .10 - .05 (weakly significant);
- .05 - .01 (strongly significant);
- .01 - .0 (very strongly significant);
- < .001 (most strongly significant).

The degree which has recently been introduced by Agung (2005); Djen Amar (2010) and Ambaretnani (2012) into the advanced statistical concept of significance extends beyond the rigid *yes* or *no* significance in order to allow better understanding of the correlations among various independent variables in relation to dependent variables as introduced into the analytical model of correlations (cf. Figure 2.11).

The *Phi* (ϕ) correlation is used when both the predictor and criterion are nominal variables with natural dichotomies (two categories), but *Cramer's V* can be used with all nominal categorical variables. *Kendall's tau* (t) correlation is used when both the predictor and criterion variables are rankings. *Gamma* (γ) is a symmetric measure which produces the same coefficient value, regardless of the independent (column) variable. In terms of its interpretation and computation, *Gamma* is more similar to *Kendall's Tau* than *Spearman's Rho*. The *Gamma* statistic is, however, preferable to *Spearman's Rho* and *Kendall's Tau*, when the data contain many tied observations. While the *Pearson's Chi-square* shows a sign of correlation, the other tests - *Phi*, *Cramer's V*, *Kendall's tau-b*, *Gamma* and *Spearman Correlation* - disclose the strength of correlation, if any, between the various interacting variables in the model.

Statisticians including Gibbons (1993); Pallant (2007) and Norusis (2010) may have similar but slightly different scales for the interpretation of the observable strength of the correlations. However, the generally accepted value scale for the tests of the strength of the correlations quoted in this study, i.e. *Cramer's V* (for nominal) and *Kendall's tau-b* (for ordinal) are as

follows: less than + or - 0.10 (very weak); + or -0.10 to 0.19 (weak); + or - 0.20 to 0.29 (medium) and + or - 0.30 or above (strong).

The bivariate analysis is presented below with percentages, observed counts and relevant tests of statistical independence and measures of correlations for pairs of variables in the analytical model.

The multivariate model on variables interacting with the collaborative behaviour between tradition and modern medical practitioners is explained in Paragraph 2.5, which forms the base from which all variables are computed in order to establish their possible correlation. The presented tables concerning the distribution of the independent variables over the dependent variables show a bivariate analysis which can be interpreted either to show levels of significance of possible correlation between the two variables involved, or the trend of the level of interprofessional collaborative behaviours in view of different independent variables. The interpretation of the results of the bivariate analysis is presented in segments of cross-tabulation of blocks of independent variables to the dependent variables as follows:

1. socio-demographic variables
2. psycho-social variables
3. enabling variables
4. trustworthiness variables
5. organisational variables
6. intervening variables

These are all independent and intervening variables which could interact with the dependent variables of the collaborative behavioural patterns among the traditional and modern medical practitioners in terms of *exchanging resources* and *collaborative working jointly* in the Mara Region of Tanzania.

i. Socio-demographic Variables and Interprofessional Collaboration

The socio-demographic and psycho-social variables are collectively known as the *predisposing variables*, as explained in Paragraph 2.4.6, where the concepts are operationalised and the analytical model is presented. In the analysis, the socio-demographic variables include variables such as: district name ('district'), work status in the organisation ('orgstat'), age ('age'), highest formal education ('formed'), religious affiliation ('religion'), organisation type based on services ('orgserv'), professional group ('profgrup') and organisational size ('orgsize'). However, only 'districts' and 'age' variables are statistically significant in determining the interprofessional collaboration.

District variable and interprofessional collaboration ('district')

It is indicated from the socio-demographic factors that in the case of 'districts' variable, a marked deviance of this general picture of distribution appears remarkably that district Serengeti has the highest relation (7.3%) to high exchanges of resources while district Bunda and Tarime were the lowest exchanges of resources (68.6% of Bunda district and 69.6% of Tarime district which are higher than the general picture of low exchange of resources of 61.7%). This picture also consistently shown in relation to working jointly where Serengeti tends to be the highest proportion (19.5%) on the working jointly whereas Bunda and Tarime districts are the lowest proportion to working jointly. Each of these districts has 66.7% of proportion and 65.6% of proportion which are higher than the general picture of low working jointly (64.8 %).

Table 7.19 Distribution of *Socio-Demographic* Variables over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources and Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of Mara region (N=193)

Socio Demographic Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
District ('district')																
Bunda	39	69.6	17	30.4	0	0.0	56	100.0	43	76.8	12	21.4	1	1.8	56	100.0
Musoma	28	56.0	20	40.0	2	4.0	50	100.0	33	66.0	17	34.0	0	0.0	50	100.0
Serengeti	20	43.9	13	48.8	8	7.3	41	100.0	18	48.8	20	31.7	3	19.5	41	100.0
Tarime	32	69.6	11	28.3	3	4.3	46	100.0	31	67.4	13	23.9	2	6.5	46	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(6)= 18.678, p=.004$ Cramer's V= .220								$\chi^2(6) = 14.301, p=.023$ Cramer's V= .192								
Age ('age')																
Young Adult	52	72.2	14	19.4	6	8.3	72	100.0	48	66.7	22	30.6	2	2.8	72	100.0
Middle Adult	50	56.2	35	39.3	4	4.5	89	100.0	56	62.9	30	33.7	3	3.4	89	100.0
Older Adult	17	53.1	12	37.5	3	9.4	32	100.0	21	65.6	10	31.3	1	3.1	32	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(3)= 8.781, p=.066$ Kendall's tau-b = .136								$\chi^2(3) = .268, p=.988$ Kendall's tau-b = .019								

Source: Fieldwork Survey (2006)

Age variable and interprofessional collaboration ('age')

It is indicated from the socio-demographic factors that in the case of 'age' variable, a marked deviance of this general picture of distribution appears remarkably that 'young adult' respondents have relation low exchange of resources (72.2%) whereas the high exchange of resources are related to the 'older adult' group of respondents. was the higher in relation to the exchange of resources (9.4%). This figure consistently apply on the relation to the working jointly where 'young adult' group of respondents has low relation to the working jointly. However, this consistency did not apply with the older 'adult' group where 'middle adult' group was the one who has high relation to working jointly.

ii. Psycho-Social Variables and Interprofessional Collaboration

Psycho-social variables are other pre-disposing variables beside socio-demographic in determining its relation to the interprofessional collaboration among Traditional and Modern Medical Practitioners by looking at their behavioural patterns in exchange of resources and working jointly. Among all psycho-social variables involved in the analytical model, only two variables are omitted from the analysis as they are not statistically significant. The two omitted variables are 'believe in positive impact' and 'believe in disease'. Table 7.20 shows the results.

Perceived possibility of future good work relationship and interprofessional collaboration ('percwrel')

There is a very strongly significant correlation between the perceptions of future good relationships ('percwrel') of interprofessional collaborative behaviour in exchanging of resources ($\chi^2 = .009$). It is indicated from the psycho-social factors that in the case of 'Future Good Relations' variable, a marked deviance of this general picture of distribution appears remarkably that a substantial perceived future good relations has high relation to the exchanges of resources (12.7%) in the interprofessional collaborations. The more the medical practitioner perceives substantial good future work relations between traditional and modern health workers, the more likely is the exchange of ideas, information, materials, and referrals of clients and patients with the counterparts in the other medical system. There is, however, a non-significant correlation between the perceptions of future good relationships ('percwrel') of interprofessional collaborative behaviour in working together ($\chi^2 = .235$).

Awareness of successful collaborative efforts and interprofessional collaboration ('awasucce')

There is a most strongly significant correlation between the awareness of successful collaborative efforts ('awasucce') of interprofessional collaboration, both in the exchange of resources ($\chi^2 = .000$) and in working together ($\chi^2 = .002$). It is indicated that in the case of 'awareness of successful collaborative efforts' variable, a marked deviance of this general picture of distribution appears remarkably that the more people have awareness to the successful collaborative efforts, the higher the correlation is to the exchange of resources in the interprofessional collaboration.

It is shown that 76.9% of respondents who responded with no awareness of successful collaborative efforts, have a correlation to low exchange of resources. This is consistent that 10.8% of respondents who have awareness of successful collaborative efforts have a correlation to a high exchange of resources. This indication also consistent in the working jointly where 76.9% respondents who have no awareness of successful collaborative efforts, have a relation to low behavioural patterns in working jointly whereas 5.6% of respondents who have an awareness of successful collaborative efforts have a correlation to high behavioural patterns in working jointly.

Knowledge of medical systems and interprofessional collaboration ('knowsect')

There is a most strongly significant correlation between the level of knowledge ('knowsect') of both traditional and modern medical systems of interprofessional collaboration in exchange of resources ($\chi^2 = .000$). Although the statistical measurement is not as strong as the behavioural patterns of exchange of resources, there is also an indication of significance of interprofessional collaboration in working jointly ($\chi^2 = .139$). The data shows that knowledge level of medical systems has a correlation to the interprofessional collaboration of behavioural patterns, either in exchange of resources or working jointly.

It is indicated that a low level of knowledge of medical systems has a correlation to the low behavioural patterns of exchange resources (79.1%) whereas the high level of medical systems knowledge has a correlation to high behavioural patterns of exchange resources (28.0%) compared with average percentages, respectively. This indication is consistent with the behavioural patterns of working jointly where low level of medical systems knowledge has a correlation to low behavioural patterns of working jointly (73.1%) whereas high level of medical systems knowledge has a correlation to high behavioural patterns of working jointly in the interprofessional collaboration (4.0%) compared with average percentages, respectively.

Table 7.20 Distribution of Psycho-Social Variables over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of Mara region (N=193)

Psycho Social Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Perceived Future Good Relations ('percwrel')																
None	38	79.2	10	20.8	0	0.0	48	100.0	36	75.0	11	22.9	1	2.1	48	100.0
Little	45	60.8	25	33.8	4	5.4	74	100.0	42	56.8	28	37.8	4	5.4	74	100.0
Substantial	36	50.7	26	36.6	9	12.7	71	100.0	47	66.2	23	32.4	1	1.4	71	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 13.362$, p= .009 Kendall's tau-b = .222								$\chi^2(4)= 5.630$, p=.235 Kendall's tau-b = .038								
Awareness of Successful Collaboration ('awasucce')																
No	70	76.9	19	20.9	2	2.2	91	100.0	70	76.9	20	22.0	1	1.1	91	100.0
Yes	49	48.0	42	41.2	11	10.8	102	100.0	55	53.9	42	41.2	5	4.9	102	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 18.040$, p= .000 Kendall's tau-b = .297								$\chi^2(4)= 11.684$, p=.002 Kendall's tau-b = .242								
Level of Knowledge ('knowsect')																
Low	53	79.1	14	20.9	0	0.0	67	100.0	49	73.1	16	23.9	2	3.0	67	100.0
Average	59	58.4	36	35.6	6	5.9	101	100.0	65	64.4	33	32.7	3	3.0	101	100.0
High	7	28.0	11	44.0	7	28.0	25	100.0	11	44.0	13	52.0	1	4.0	25	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 33.631$, p= .000 Kendall's tau-b = .331								$\chi^2(4)= 6.966$, p= .139 Kendall's tau-b = .158								
Intra-professional Collaboration ('intracol')																
Low	40	67.8	16	27.1	3	5.1	59	100.0	45	76.3	13	22.0	1	1.7	59	100.0
Average	36	75.0	12	25.0	0	0.0	48	100.0	35	72.9	10	20.8	3	6.3	48	100.0
High	43	50.0	33	38.4	10	11.6	86	100.0	45	52.3	39	45.3	2	2.3	86	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 12.454$, p= .013Kendall's tau-b = .175								$\chi^2(4)= 14.283$, p=.005 Kendall's tau-b = .201								
Experience on Effectiveness Level of TM ('extmsev')																
Poor	34	70.8	13	27.1	1	2.1	48	100.0	40	83.3	8	16.7	0	0.0	48	100.0
Average	66	63.5	34	32.7	4	3.8	104	100.0	66	63.5	35	33.7	3	2.9	104	100.0
High	19	46.3	14	34.1	8	19.5	41	100.0	19	46.3	19	46.3	3	7.3	41	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 15.471$, p= .004 Kendall's tau-b = .183								$\chi^2(4)= 14.802$, p=.005 Kendall's tau-b = .255								
Experience on Effectiveness Level of MM (exmmsev')																
Poor	19	100.0	0	0.0	0	0.0	19	100.0	14	11.2	4	6.5	1	16.7	48	100.0
Average	61	59.2	38	36.9	4	3.9	103	100.0	71	68.9	31	30.1	1	1.0	104	100.0
High	39	54.9	23	32.4	9	12.7	71	100.0	40	56.3	27	38.0	4	5.6	71	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 18.324$, p= .001 Kendall's tau-b = .195								$\chi^2(4)= 6.169$, p=.181 Kendall's tau-b = .135								

Source: Fieldwork Survey (2006)

Intra-professional collaboration and interprofessional collaboration ('intracol')

There is a very strongly significant correlation between the intra-professional collaboration ('intracol') in exchange of resources ($\chi^2 = .013$), while there is also an indication of very strong significance between the intra-professional collaboration in working jointly ($\chi^2 = .005$). The data in Table 7.21 shows that in the case of the 'intra-professional collaboration' ('intracol') variable, a marked deviance of this general picture of distribution appears remarkably in the category of 'high intra-professional collaboration' in relation to 'high exchange of resources' (11.6% in comparison with 6.7%). This indication also confirmed by the behavioural patterns of working jointly where low level of intra-professional collaboration has high relation to higher behavioural patterns of working jointly (76.3% in comparison to 64.8%, respectively). This deviance would merit our comment on this significant variable as follows:

It is remarkable that respondents with a high level of intra-professional collaboration also report a significantly high form of collaboration in the exchange of resources. This phenomenon can be explained by the fact that healers who have a high level of intra-professional collaboration will have higher opportunities for the exchange of resources. A similar case occurs with the indication that a low level of inter-professional collaboration has a low relation to the behavioural patterns in working jointly.

Experience on Traditional Medicine (TM) goods and services and interprofessional collaboration ('extmserve')

There is a very strongly significant correlation between experience on effectiveness level of Traditional Medicine (TM) goods and services ('extmserve') of interprofessional collaboration in exchange of resources ($\chi^2 = .000$). There is, however, a non-significant correlation of interprofessional collaboration in working jointly ($\chi^2 = .139$).

It is indicated that in the case of the 'experience on Traditional Medicine (TM)' variable, a marked deviance of this general picture of distribution appears remarkably in the category of 'high experience in TM' in relation to 'high exchange of resources' (19.5% in comparison with 6.7%), and 'poor experience in TM has relation to 'low exchange of resources' (70.8 % in comparison with 61.7%, respectively). This indication is also confirmed by the behavioural patterns of working jointly where 'poor level of experience in TM' has a relation to 'low behavioural patterns of working jointly and 'high experience in TM' has a relation to 'high behavioural patterns of working jointly' (83.3% in comparison to 64.8% and 7.3% in comparison with 3.1%, respectively). This deviance would merit our comment on this significant variable as follows:

It is a remarkable confirmation that respondents with a high level of high level of experiences in TM also report a significantly high form of collaboration in the exchange of resources and vice versa. This phenomenon can be explained by the fact that healers who have a high level of experiences in TM will have higher opportunities in exchange of resources. The similar case goes to the indication that poor level of experiences in TM has low relation to the behavioural patterns in working jointly.

Experience on Modern Medicine (TM) goods and services and interprofessional collaboration ('exmmsev')

In the case of 'experience in Modern Medicine (MM), a marked deviance of this general picture of distribution appears remarkably in the category of 'poor experience in MM' in relation to 'low exchange of resources' (100% in comparison with 61.7%, respectively).

The same goes for the fact that ‘high experience in MM’ is related to ‘high exchange of resources’ (12.7% in comparison with 6.7%, respectively).

There is an interesting indication that in terms of working jointly, ‘poor experience in MM’ is related to a ‘high level of working jointly’ as indicated by 16.7% compared with 3.1%, respectively. However, in terms of statistical measurement, this indication is not statistically significant with $\chi^2 = .181$.

iii. Enabling Variables and Interprofessional Collaboration

In terms of enabling variables as indicated in Table 7.22, three variables are examined in their correlation to the interprofessional collaboration behavioural patterns of exchanging resources and working jointly among traditional medical practitioners by respondents in the Districts of the Mara Region. The variables are individual Social Economic Status (SES), Government and Community Efforts towards collaboration, and Community Linkages. However, with the significance level of $\chi^2 = 0.638$, the community linkages variable is omitted from the analysis because of its insignificance.

Socio-Economic Status (‘SES’) and interprofessional collaboration (‘ses’)

There is a weakly significant correlation between the individual Socio-Economic Status (‘ses’) and interprofessional collaboration in exchange of resources ($\chi^2 = .083$). There is, however, a non-significant correlation of interprofessional collaboration in working jointly ($\chi^2 = .616$). Although the level of significance is not strong statistically, the data indicated remarkably figures where ‘low individual social economic status has relation to ‘low exchange of resources’ indicated by 66.1% in comparison with 61.7% whereas ‘high level of individual economic status’ is related to ‘high exchange of resources’ as indicated by 11.1% in comparison with 6.7%. A similar situation applies to the behavioural patterns of working jointly where ‘high level of individual economic status’ is related to ‘high behavioural patterns of working jointly’.

Government and community efforts towards interprofessional collaboration (‘gocoefot’)

There is a very strong significant correlation between government and local community efforts (‘gocoefot’) and interprofessional collaboration in both the exchange of resources ($\chi^2 = .000$) and in working jointly ($\chi^2 (4) = .000$). It is indicated that in the case of the ‘government and community efforts’ variable, a marked deviance of this general picture of distribution appears remarkably in the category of ‘major government and community efforts’ in relation to ‘high exchange of resources’ (54.5% in comparison with 6.7%), and ‘none of efforts by government and community’ in relation to ‘low exchange of resources’ (82.8% in comparison with 61.7% respectively). This indication is also confirmed by the behavioural patterns of working jointly where the ‘major efforts by government and community’ variable is related to ‘high behavioural patterns of working jointly’ and ‘none efforts by government and community’ has relation to ‘high behavioural patterns of working jointly’ (9.1% in comparison to 3.1% and 83.6% in comparison with 64.8% respectively). These interesting findings show that government and community efforts play important roles in interprofessional collaboration.

Table 7.21 Distribution of *Enabling Variables* over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of the Mara Region (N=193)

Enabling Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Individual Socio-Economic Status ('ses')																
Low	80	66.1	35	28.9	6	5.0	121	100.0	78	64.5	39	32.2	4	3.3	121	100.0
Midle	37	58.7	20	31.7	6	9.5	63	100.0	41	65.1	21	33.3	1	1.6	74	100.0
High	2	22.2	6	66.7	1	11.1	9	100.0	6	66.7	2	22.2	1	11.4	71	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4) = 8.073$, $p = .083$ Kendall's tau-b = .140																
$\chi^2(4) = 2.650$, $p = .616$ Kendall's tau-b = -.008																
Government and Community Efforts towards Collaboration ('gocoefot')																
None	96	82.8	20	17.2	0	0.0	116	100.0	97	83.6	19	16.4	0	0.0	116	100.0
Minor	22	33.3	37	56.1	7	10.6	66	100.0	27	40.9	34	51.5	5	7.6	66	100.0
Major	1	9.1	4	36.4	6	54.5	11	100.0	1	9.1	9	81.8	1	9.1	11	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4) = 88.644$, $p = .000$ Kendall's tau-b = .556																
$\chi^2(4) = 51.673$, $p = .000$ Kendall's tau-b = .492																

Source: Fieldwork Survey (2006)

iv. Trustworthiness Variables and Interprofessional Collaboration

This Paragraph shows the research's result on the 'trustworthiness' variable where the following Table 7.22 shows the summary of the figures.

Level of trusting modern medical practitioners and interprofessional collaboration ('mmtrust')

There is a mostly-significant correlation between trusting Modern Medicine (MM) practitioners ('mmtrust') and interprofessional collaboration in the exchange of resources ($\chi^2 = .000$). However, there is a very strong significant correlation between trusting modern medical practitioners ('mmtrust' and interprofessional collaboration in working jointly ($\chi^2 = .003$). It is indicated that in the case of 'level of trusting MM' a marked deviance of this general picture of distribution appears remarkably in the category of 'high level of trusting MM practitioners' in relation to 'high exchange of resources' (17.9% in comparison with 6.7%).

It is remarkable that respondents with a high level of trusting MM also report a significantly high form of collaboration in the exchange of resources. This phenomenon can be explained by the fact that healers who have a high level of trusting modern medical practitioners also collaborate high in exchange of resources as that is not only beneficial for clients and patients, but also for the status of both categories of practitioners in the community. The similar figure goes to the case of 'working jointly' where 'low level of trusting MM' is related to lower opportunities of working jointly among Traditional and Modern Medical Practitioners (77.5% in comparison with 64.8% respectively).

Table 7.22 Distribution of *Trustworthiness Variables* over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Modern and Traditional Medical Practitioners by Respondents in the Districts of the Mara Region (N=193)

Trustworthiness Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Level of Trusting MM ('mmtrust')																
Low	80	78.4	20	19.6	2	2.0	102	100.0	79	77.5	20	19.6	3	2.9	102	100.0
Average	22	42.3	26	50.0	4	7.7	52	100.0	25	48.1	25	48.1	2	3.8	52	100.0
High	17	43.6	15	38.5	7	17.9	39	100.0	21	53.8	17	43.6	1	2.6	39	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 31.472$, p= .000 Kendall's tau-b = .339								$\chi^2(4)= 16.315$, p=.003 Kendall's tau-b = .230								
Level of Trusting TM ('tmtrust')																
Low	70	68.0	27	26.2	6	5.8	103	100.0	79	76.7	23	22.3	1	1.0	103	100.0
Average	32	53.3	23	38.3	5	8.3	60	100.0	29	48.3	29	48.3	2	3.3	60	100.0
High	17	56.7	11	36.7	2	6.7	30	100.0	17	33.3	10	33.3	3	10.0	30	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 3.863$, p= .433 Kendall's tau-b = .113								$\chi^2(4)= 19.173$, p= .001 Kendall's tau-b = .239								

Source: Fieldwork Survey (2006)

Level of traditional medical practitioners and interprofessional collaboration ('tmtrust')

There is a non-significant correlation between trusting traditional medical (TM) practitioners ('tmtrust') and interprofessional collaboration in the exchange of resources ($\chi^2 = .433$). However, there is a very strong significant correlation between trusting traditional medical practitioners ('tmtrust') and interprofessional collaboration in working jointly ($\chi^2 = .001$).

It is indicated that in the case of 'level of trusting TM', a marked deviance of this general picture of distribution appears remarkably in the category of 'high level of trusting TM practitioners' in relation to 'high working jointly (10.0% in comparison with 3.1%, respectively). It is remarkable that respondents with a high level of trusting TM also report a significantly high form of collaboration in working jointly.

This phenomenon can be explained by the fact that healers who have a high level of trusting traditional medical practitioners also collaborate highly in working jointly, as this is not only beneficial for clients and patients, but also for the status of both categories of practitioners in the community.

v. Organisational Variables and Interprofessional Collaboration

In terms of organisational variables, there are three variables examined: level of organisational inputs, level of organisational culture, and level of anti-groupthink in the organisation. Each variable shows significant and insignificant statistical measurements as shown in Table 7.23. The level of organisational input was omitted from the analysis considering the insignificant correlation to the dependent variables.

Organisational culture and interprofessional collaboration ('orgcultur')

There is a weakly significant correlation between organisational culture ('orgcultur') and interprofessional collaboration in the exchange of resources ($\chi^2 = .022$). It is indicated that in the case of 'level of organisational culture' a marked deviance of this general picture of distribution appears remarkably in the category of 'weak level of organisational culture' in relation to 'low exchange of resources' (87.5% in comparison with 61.7%, respectively). The data also show that 'fair and strong level of organisational culture' is related to a 'high exchange of resources' (7.5% and 7.0% in comparison with 6.7%, respectively).

It is remarkable that strong organisational culture reports a significantly high form of collaboration in the exchange of resources and vice versa. However, there is a non-significant correlation between organisational culture ('orgcultur') and interprofessional collaboration in working jointly ($\chi^2 = .596$).

Anti-group culture and interprofessional collaboration ('agroupthink')

There is a very strongly significant correlation between an anti-group culture ('agroupthink') and interprofessional collaboration in the exchange of resources ($\chi^2 = .005$). It is indicated that in the case of 'level of anti-groupthink in the organisation', a marked deviance of this general picture of distribution appears remarkably in the category of 'high level of anti-groupthink in the organisation' in relation to 'high exchange of resources' (25.0% in comparison with 6.7% respectively).

It is remarkable that a strong level of anti-groupthink in the organisation reports a significantly high form of collaboration in the exchange of resources and vice versa. However, there is a non-significant correlation between anti-group culture ('agroupthink') and interprofessional collaboration in working jointly ($\chi^2 = .447$).

Table 7.23 Distribution of *Organisational Variables* over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of the Mara Region (N=193)

Organisational Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Level of Organisational Culture fostering collaboration ('orgcultur')																
Weak	14	87.5	2	12.5	0	0.0	16	100.0	12	75.0	3	18.8	1	6.3	16	100.0
Fair	86	64.2	38	28.4	10	7.5	134	100.0	87	64.9	42	31.3	5	3.7	134	100.0
Strong	19	44.2	21	48.8	3	7.0	43	100.0	26	60.5	17	39.5	0	0.0	43	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 11.521, p= .022$ Kendall's tau-b =.207									$\chi^2(4)= 4.045, p= .596$ Kendall's tau-b = .051							
Level of Anti-Group think in the Organisation ('agroupthink')																
Low	29	85.3	5	14.7	0	0.0	34	100.0	25	73.5	7	20.6	2	6.3	16	100.0
Average	84	57.1	53	36.1	10	6.8	147	100.0	92	62.6	51	34.7	4	3.7	134	100.0
High	6	50.0	3	25.0	3	25.0	12	100.0	8	66.7	4	33.3	0	0.0	12	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0
$\chi^2(4)= 16.224, p= .005$ Kendall's tau-b =.226									$\chi^2(4)= 3.519, p= .447$ Kendall's tau-b = .051							
Source: Fieldwork Survey (2006)																

Source: Fieldwork Survey (2006)

vi. Intervening Variables and Interprofessional Collaboration

The following Table 7.24 shows the role of intervening variable in relation to the interprofessional collaboration among traditional medical practitioners and modern medical practitioners in the behavioural patterns of exchange of resources and working jointly. There is only variable examined in this analysis: the extension of personal involvement in collaborative project which involves national and international collaborative projects.

National or international collaborative project involvement and interprofessional collaboration ('projinv')

There is a very strongly significant correlation between national or international collaborative project involvement ('projinv') and interprofessional collaboration in the exchange of resources ($\chi^2 = .009$). It is indicated that in the case of 'the extended personal involvement in collaborative project(s)', a marked deviance of this general picture of distribution appears remarkably in the category of 'high level of the extended personal involvement in collaborative project(s)' in relation to 'high exchange of resources' (10.4% in comparison with 6.7% respectively) and vice versa.

It is remarkable that the more often personal involvement in collaborative project(s) is extended, the higher exchange of resources, as would be the case in collaboration and vice versa. However, there is a non-significant correlation between national or international collaborative project involvement ('projinv') and interprofessional collaboration in working jointly ($\chi^2 = .447$).

Table 7.24 Distribution of *Intervening Variables* over Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of the Mara Region (N=193)

Intervening Variables	Behavioural Patterns in Exchange of Resources								Behavioural Patterns in Working Jointly							
	Low		Average		High		Total		Low		Average		High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
None	27	77.1	7	21.1	1	2.9	35	100.0	27	77.1	6	17.1	2	5.7	35	100.0
Rare	62	44.8	24	44.8	5	10.4	91	100.0	61	67.0	28	30.8	2	2.2	91	100.0
Often	30	44.8	30	44.8	7	10.4	67	100.0	37	55.2	28	41.8	2	3.0	67	100.0
Total	119	61.7	61	31.6	13	6.7	193	100.0	125	64.8	62	32.1	6	3.1	193	100.0

$\chi^2(4) = 13.394$, $p = .009$ Kendall's tau-b = .238

$\chi^2(4) = 7.299$, $p = .116$ Kendall's tau-b = .145

Source: Fieldwork Survey (2006)

By using the range of an χ^2 significance level which has been used by Agung (2005), Djen Amar (2010), as well as by Ambaretnani (2012), all the determining variables are classified as shown in Table 7.25. Variables which are classified as non-significant are not analysed further. The same applies to variables which has 'indication of significant' which statistically not strong enough to be analysed in explaining the correlation among variables. Those variables are omitted for the bivariate analysis.

Thus, the general distribution of the exchange of resources and working together in the interprofessional collaboration behavioural patterns over the three levels is respectively about

two-thirds for the low level (61.7%), about one-third for the medium level (31.6%) and less than one-tenth for the high level (6.7%) for the exchange of resources, and more than two-thirds for the low level (64.8%), more than one-third for the medium level (32.1%) and less than one-twentieth for the high level (6.7%) for working together.

Table 7.25 Distribution of Determining Variables Based on their Significancy Levels on the Interprofessional Collaboration Behavioural Patterns among the Traditional and Modern Medical Practitioners over the Exchanging of Resources and Collaborative Working Jointly in the Mara Region (N=193)

Variable name	Pearson χ^2	Level of significance for exchange of resources	Pearson χ^2	Level of significance for working together
‘district’	.004	‘strongly significant’;	.023	‘strongly significant’
‘religion’	.876	‘non-significant’	.003	‘most strongly significant’
‘orgserv’	.917	‘non-significant’	.329	‘non-significant’
‘orgstat’	.776	‘non-significant’	.289	‘non-significant’
‘profgrup’	.711	‘non-significant’	.289	‘non-significant’
‘age’	.066	‘weakly significant’	.988	‘non-significant’
‘formed’	.143	‘indication of significance’	.170	‘non-significant’
‘orgsize’	.329	‘non-significant’	.339	‘non-significant’
‘percwrel’	.009	‘very strongly significant’	.235	‘non-significant’
‘belimpact’	.604	‘non-significant’	.554	‘non-significant’
‘belidises’	.173	‘non-significant’	.169	‘non-significant’
‘awasucce’	.000	‘most strongly significant’	.002	‘most strongly significant’
‘knowsect’	.000	‘most strongly significant’	.139	‘strongly significant’
‘intracol’	.013	‘very strongly significant’	.005	‘very strongly significant’
‘extmserve’	.000	‘most strongly significant’	.139	‘indication of significance’
‘exmmserve’	.001	‘very strongly significant’	.181	‘non-significant’
‘ses	.083	‘weakly significant’	.616	‘non-significant’
‘gocoefot’	.000	‘most strongly significant’	.000	‘most strongly significant’
‘comlinks’	.683	‘non-significant’	.252	‘non-significant’
‘mmtrust’	.433	‘non-significant’	.001	‘most strongly significant’
‘tmtrust’	.433	‘non-significant’	.001	‘most strongly significant’
‘orginput’	.139	‘indication of significance’	.596	‘non-significant’
‘agrouphthink’	.005	‘very strongly significant’	.447	‘non-significant’
‘projinv’	.009	‘very strongly significant’	.116	‘non-significant’

Source: Field Survey 2006

7.2.3 Multivariate Analysis of Variables: OVERALS

For the quantitative analysis of the data from this research it is appropriate to implement Categorical Components Analysis with optimal scaling for data reduction when variables are categorical (nominal and ordinal with only small numbers of values, each of which corresponds to specific category value/label). Moreover, categorical data cannot be normally distributed, because they are not continuous (*cf.* Field 2005).

Categorical Component Analysis is concerned with identifying the underlying variables from the set of variables while maximizing the amount of variance accounted for in those items by the principal components. The analysis fits in as it does not assume linear correlations among numeric data nor does it require assuming multivariate normal data. In optimal scaling, it is advantageous as the researcher specifies the chosen level of measurement. The reduction technique run in PASW 20.0, mainly in two dimensions with the exception of one variable, requires multiple runs in a block of variables as shown in the analytical model.

The multiple sets (multivariate analysis) are done by optimal scaling. Nonlinear Canonical Correlation Analysis, known as OVERALS has been developed by the Data Theory Scaling System Group (DTSS) of Leiden University in The Netherlands. The same has been appropriately used in a number of analyses of categorical nature, such as by Slikkerveer (1990), Agung (2005), Ibui (2007), Leurs (2010), Djen Amar (2010) and Ambaretnani (2012). As in multiple regression as well as in canonical correlation analysis, OVERALS deals with the relationship of sets of variables which are independent to each other. The OVERALS component loading values, corresponding *eigenvalues* in available dimensions, and component loading plots are obtained as results of the proceeding analysis of this study. Six blocks of independent variables (Socio-demographic, Psychosocial, Enabling, Trustworthiness, Organisational and Intervening) are used with one dependent variable (Interprofessional Collaboration), which has two variables in the canonical correlation analysis for a total of 27 variables.

Table 7.26 shows the distribution of the component loading with two dimensions in the OVERALS analysis. The grey shaded variables are the ones which appear strong, as they have a value of 0.5 or above (both negative and positive), while those in bold without shading have medium strength with values between 0.3 to 0.5 (both negative and positive). The table shows a distribution of the component loadings of 27 variables in sets of 193 respondents. Whenever there are no missing data, the component loadings are equivalent to the Pearson correlations between the quantified variable and object scores. Considering the outcome of individual variables in every block, it is shown that among the socio-demographic variables, the type of professional group ('profgroup') is the strongest in terms of correlation rate (0.730 on Dimension 2).

The negative or positive experience of a respondent or his or her close person/relative with experience with Traditional Medicine (TM) goods and services ('extmsev') is the leading variable (0.564 on Dimension 1) in the rather crucial psycho-social variables. In the enabling variables, government and community efforts to encourage collaboration ('gocoefot') take the lead (0.641 on Dimension 1).

Table 7.26 Distribution of the Component Loadings of the 27 Variables Interprofessional Collaboration Behavioural Patterns of Exchanging of Resources & Working Jointly among Traditional and Modern Medical Practitioners by Respondents in the Districts of the Mara Region (N=193)

Set	Variable			Dimension1	Dimension 2
1	District ^{a,b}	Dimension	1	.349	.187
			2	.340	.232
	Religion ^{a,b}	Dimension	1	.191	.011
			2	-.213	.338
	Orgserv ^{a,b}	Dimension	1	.520	-.587
			2	.520	-.587
	Profgrup ^{a,b}	Dimension	1	.546	-.496
			2	-.459	.730
	Orgstat ^{c,d}			-.526	.461
	Age ^{c,d}			.348	-.199
	Formed ^{c,d}			-.345	.620
	Orgsize ^{c,d}			-.406	.281
2	Percwrel ^{c,d}			.369	.223
	Belimpac ^{c,d}			.217	.185
	Belidses ^{c,d}			.350	-.109
	Knosect ^{c,d}			.281	.460
	Awasucce ^{c,d}			.382	.222
	Intracol ^{c,d}			.234	.383
	Extmsev ^{c,d}			.564	-.307
	Exmmsev ^{c,d}			.041	.386
3	SES ^{c,d}			.197	.230
	Gocoefot ^{c,d}			.641	.326
	Comlinks ^{c,d}			-.008	-.213
4	Mmtrust ^{c,d}			.518	.205
	Tmtrust ^{c,d}			.303	-.434
5	Orginput ^{c,d}			-.069	.529
	Orgcutur ^{c,d}			.242	.303
	Orgthink ^{c,d}			.437	-.002
6	Projeinv ^{c,d}			.219	.399
7	Colexch ^{c,d}			.657	.410
	Colwork ^{c,d}			.563	.136

a. Optimal Scaling Level: Multiple Nominal

b. Projections of the Multiple Quantified Variables in the Object Space

c. Optimal Scaling Level: Ordinal

d. Projections of the Single Quantified Variables in the Object Space

Source: Computations based on Field Work Survey (2006)

The individual's level of trusting modern medical practitioners ('mmtrust') took a lead (0.518 on Dimension 1) in the variables concerning trustworthiness. Among organisational variables, the level of required resources such as human, finance, materials, data, workspace ('orginput') took the lead (0.529 0.641 on Dimension 2). Between the two dependent variables, collaborative behaviour through exchange of resources ('colexch') has more correlations (0.657 0.641 on Dimension 1) than the collaborative behaviour on working jointly ('colwork') for clients and patients (0.563 0.641 on Dimension 1).

In the overall values of component loading, it is evident the dependent variables both have dominant interchangeability between Dimension 1 and Dimension 2. While in the first dimension, 'colexch' scores highly with 0.657, and is medium, 0.410, in the second dimension. 'colwork' scores strongly with 0.563 in the first dimension and least by 0.136 in the second dimension. Isolating those variables with strong and medium rates; the strong (0.5 or greater) and medium (between 0.3 and 0.5) independent and intervening variables on the first and the second dimension in OVERALS analysis which are based on their component loading value, are indicated in the Table 7.26 above.

Table 7.27 below shows the distribution of the rank order of these variables from the highest values to the lowest ones. With regard to interprofessional collaborative behaviour, six variables appear strongly in the interactions on the first dimension, and include 'gocoefot', 'extmsev', 'profgrup', 'orgstat', 'orgserv', and 'mmtrust', while there are also four strong variables on the second dimension, namely 'profgrup', 'formed', 'orgserv', and 'orginput', all in descending order of their strength. There are nine variables with medium rates of interactions on the first dimension, namely 'orgthink', 'orgsize', 'awasucce', 'percwrel', 'beliefs', 'district', 'age', 'formed', and 'tmtrust', while on the second dimension there are ten variables, which, in descending order of strength, include 'orgstat', 'knowsect', 'tmtrust', 'projeinv', 'exmmsev', 'intracol', 'religion', 'gocoefot', 'extmsev', and 'orgcutur'.

Only eight variables show either a strong or medium rate of interaction within the component loading analysis of both the first and second dimensions. These are 'gocoefot', 'extmsev', 'profgrup', 'orgstat', 'orgserv', 'formed', 'district' and 'tmtrust'. It shows how significant (in terms of interactions) certain variables are in interprofessional collaboration in a pluralistic configuration between traditional and modern medical systems.

These variables are: 'government and community efforts on collaboration'; 'positive or negative experiences with Traditional Medicine (TM) goods and services'; 'practitioner's professional group', 'practitioner's status in the organisation'; 'type of health services involved'; 'practitioner's level of formal education'; 'district where each practitioner comes from'; and 'practitioner's level of trusting traditional medical practitioners'. The dependent variable is the collaborative behaviour of exchange of resources between practitioners of the two systems, *i.e.* traditional and modern.

Component loadings of all variables is presented graphically in a centroid plot (Figure 7.3). The distance from the origin to each variable point approximates the importance of each variable. Either the relationships or direction scores among variables can be explored as they appear in the plot. When there are no missing data, the component loadings are equivalent to the Pearson correlations between the quantified variables and the object scores. The two dependent variables are plotted with a different marker from the others, *i.e.* independent and intervening variables.

Table 7.27 Distribution of the rank order of variables based on their component loadings (N=193)

Dimension 1		Dimension 2	
Gocoefot	.641	Profgrup	.730
Extmsev	.564	Formed	.620
Profgrup	.546	Orgserv	-.587
Orgstat	-.526	Orginput	.529
Orgserv	.520	Orgstat	.461
Mmtrust	.518	Knosect	.460
Orgthink	.437	Tmtrust	-.434
Orgsize	-.406	Projeinv	.399
Awasucce	.382	Exmmsev	.386
Percwrel	.369	Intracol	.383
Belidses	.350	Religion	.338
District	.349	Gocoefot	.326
Age	.348	Extmsev	-.307
Formed	-.345	Orgcutur	.303
Tmtrust	.303		

Source: Fieldwork Survey 2006

Both dependent variables ‘colexch’ and ‘colwor’ are in the same quadrant, showing strong interaction with each other in the same direction. This suggests the higher the practitioners’ exchanges of views, ideas, client or patients referrals, medical supplies and equipment, as well as information resources ‘colexch’, the more likely the pattern of working jointly in giving health services to their clients and patients ‘colwork’.

It is further observed that the variables ‘SES’, ‘district’, ‘percwrel’, ‘mmtrust’, ‘orgcutur’, ‘intracol’, ‘awasucce’, and ‘belimpac’ are highly interacting in strength and direction as is also true between variables ‘belidses’ with ‘age’ and between variables ‘projeinv’ with ‘awasucce’ due to the fact they appear to be close to each other and in the same quadrant.

However, the variables ‘religion’ and ‘tmtrust’, as well as ‘formed’ and ‘orgserv’, make pairs of variables which are almost equal and opposite to each other diagonally, therefore suggesting a negative correlation. Following the categories in the questionnaire on religion, it substantiates that the more one is a Christian or Muslim, the less likely one is to trust traditional medical practitioners as compared to being an affiliate of the African Traditional religion. The same negative (inverse) correlation can be observed between high formal education levels and serving in the traditional medical system. Both of these inverse correlations reaffirm the fact which has been described in Chapter V on the challenges facing the traditional medical system since the advent of the colonialists who discredited traditional medical practitioners and their services as the result of the spread of Christianity by missionaries who adopted erroneous hermeneutical expositions and teachings which alluded to Bantu traditional medicine as equal to witchcraft, an abomination to God. It is therefore not a quirk that the old Swahili term *kienyeji* (of indigenous, local), as used in *dawa ya kienyeji* (indigenous medicine) or *mganga wa kienyeji* (indigenous healer), has later been misused as a derogatory qualification to mean ‘something for uneducated people’ and not accepted by other major religions such as Christianity and Islam.

7.2.4 Multiple Regression Analysis of Blocks of Variables

After measuring the extent of the correlations between one variable and another in the bivariate analysis and the interactions among variables in the multivariate analysis, the stepwise analysis is further undertaken to compare the various blocks of variables in the model with each other in order to determine the relative strength of interaction, known as the multiple regression analysis.

A stepwise multiple regression analysis by the use of the 'eigenvalue' as a multivariate measure of interaction among all the variables concerned is conducted in PASW 20.0 as a result of the Dimension Reduction-Optimal Scaling technique. The optimal scaling of two blocks of variables is scaled in different levels and an optimally quantified component loading number (cl) with dimensions. Non-linear relations among variables can be deduced.

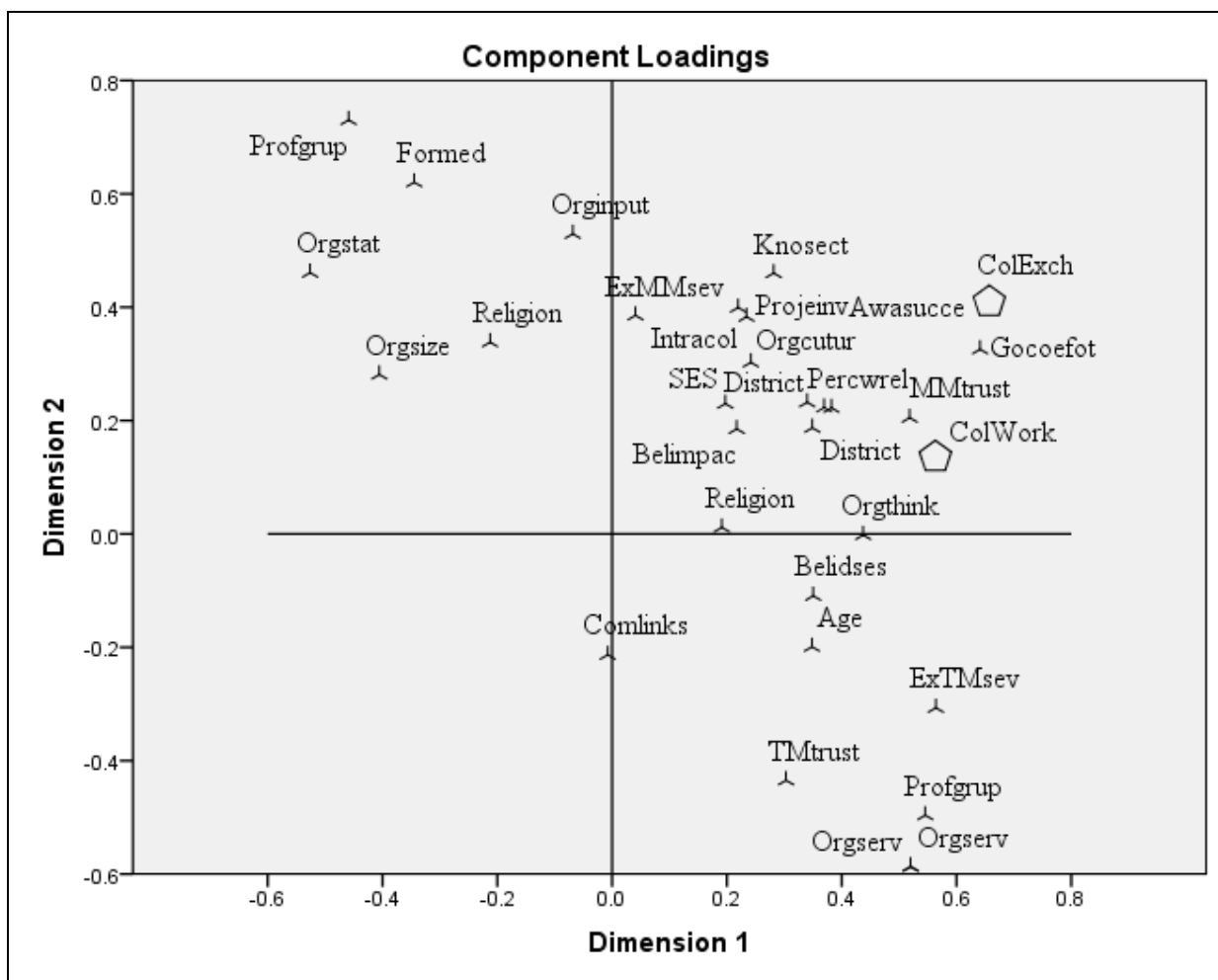


Figure 7.3 The plot of Component Loading Analysis (OVERALS) of interprofessional collaborative behaviour between traditional and modern medical practitioners.
Source: Fieldwork Survey 2006

The results of this analysis are presented in Table 7.28 with 21 pairs of sets, showing both the two strongest variables on Dimension 1 and Dimension 2. The table has four columns, with the two on the left representing the two strongest variables of the OVERALS analysis on the first dimension, while those of the second dimension are presented on the right. Results show that on Dimension 1, ‘government and community efforts towards collaboration’ (‘gocoefot’) is one of the enabling variables from Block 3 which shows the overall highest strength of interaction (cl. 0.892) with the ‘practitioners’ collaborative behavioural pattern of exchange of resources’ (‘collexch’) from Block 7.

On Dimension 2, ‘organisational inputs in terms of the available resources’ (‘orginput’) such as human, finance, materials, working space and information from the organisational variables from Block 5 has the highest strength (cl. 0.819) over the others when interacting with a place where the practitioner works (‘district’) from Block 1. The overall assessment shows that there is a relatively significant interaction among all seven blocks of variables both in Dimensions 1 and 2.

Table 7.28 Distribution of Strongest Variables of the Two Sets of OVERALS Analysed on Two Dimensions

Blocs	Two Strongest Variables Dimension 1		Two Strongest Variables Dimension 2	
	Name	Value	Name	Value
1↔2	Orgserv	-.838	ExTHsev	-.651
1↔3	Age	-.594	SES	-.586
1↔4	TMtrust	-.884	Profgrup	-.663
1↔5	Orginput	.779	Formed	.659
1↔6	Projinv	.830	Religion	-.385
1↔7	ColWork	-.715	ColExch	-.715
2↔3	Gocoefot	.722	Knosect	.669
2↔4	MMtrust	.635	TMtrust	.587
2↔5	Orgthink	.722	ExTMsev	.591
2↔6	Projectinv	-.821	ExMMsev	-.599
2↔7	ColExch	-.867	Knosect	-.637
3↔4	MMtrust	.806	Gocoefot	.790
3↔5	Orgcutur	.792	Comlinks	.655
3↔6	Projeinv	.815	Gocoefot	.719
3↔7	Gocoefot	.892	Collexch	.827
4↔5	MMtrust	-.775	Orgthink	-.720
4↔6	Projeinv	.777	MMtrust	.772
4↔7	ColExch	.748	MMtrust	.735
5↔6	Projeinv	.802	Orgcutur	.563
5↔7	ColExch	.725	Orgthink	.651
6↔7	Projeinv	.797	ColExch	.774

Source: Computations based on Fieldwork Survey (2006)

The resultant component loading numbers of all independent and intervening variables per each interaction with block seven, which include the dependent variables concerning the level of interprofessional collaboration, are observed and compared. Independent variables with the highest component loading numbers interacting with dependent variables are presented in Table 7.29.

Further results show that upon the analysis of individual variables in the dependent and intervening variables in the descending order of strength the interaction starts with is the extent in which both the government and community puts practical efforts on the collaborative behaviours ('gocoefot') (cl. 0.892). Then, in Dimension 1, there is the level of individual practitioner's involvement in either national or international collaborative project or programmes ('projectinv') (cl. 0.797); the level of trusting modern medical practitioners ('mmtrust') (cl. 0.735); the amount of knowledge a practitioner has about health services in the plural medical system ('knowsect') (cl. -0.637); the level of anti-groupthink which exists in the practitioner's organisation or work place ('orgthink') (cl. 0.568); and the district where the practitioner works ('district') (cl. -0.537). In Dimension 2, the strongest interactions refer to the of the individual practitioner's ('SES') (cl. 0.740); followed by the organisational input level of the in terms of available resources ('orginput') (cl. -0.685); the level of trusting traditional medical practitioners ('tmtrust') (cl. -0.654); the perceived possibility of future good working relations ('percwrel') (cl. 0.477) and the professional group in terms of the cadre where the practitioner belongs ('profgrup') (cl. -0.395).

Table 7.29 Distribution of Strongest Component Loading of Independent Variables with Dependent Variables

Block Number and Factor	Strongest Variable (Dimension 1)	Strongest Variable (Dimension 2)
1. Social demographic	District (-.537)	Profgrup (-.395)
2. Psychosocial	Knosect (-.637)	Percwrel (.477)
3. Enabling	Gocoefot (.892)	SES (.740)
4. Trustworthiness	MMtrust (.735)	TMtrust (-.654)
5. Organisational	Orgthink (.568)	Orginput (-.685)
6. Intervening	Projeinv (.797)	

Source: Computations based on Fieldwork Survey (2006)

From the multiple (categorical) regression as the result of Dimension Reduction-Optimal Scaling, the multiple correlation co-efficients between the block of variables are obtained as a function of the *eigenvalue*. As Van der Burg (1988) explains, it can be calculated by the use of the general canonical correlation formulae: $pd = ((K \times Ed) - 1) / (K - 1)$, where d is the dimension number, K is the number of sets, and E is the *eigenvalue*. In this study with two sets of independent and dependent variables, the specific formula is therefore: $pd = (2 \times Ed) - 1$, where; pd is the multiple correlation co-efficient, Ed is the *eigenvalue* and 2 represents the (number) 2 variable sets of the independent and dependent variables in the analysis.

Table 7.30 shows the multiple correlation coefficients on both the first and the second dimension, which are used to predict the ultimate analytical model (Figure 7.4).

The ultimate analytical model with five blocks of dependent variables, namely, socio-demographic, psycho-social, enabling, trustworthiness and organisational variables as well as one block of an intervening variable and one dependant variable is the interprofessional collaborative behaviour as presented in Figure 7.4. The representation of the model shows that the calculated multiple correlation co-efficients predict the correlation between the independent and dependent variables as well as correlation among interrelated variables.

All the variables have been adapted from the analytical model of Slikkerveer (1990), as discussed in Chapter II as the most appropriate model for the analysis of human behaviour for this kind of complementary qualitative and quantitative research.

Table 7.30 Calculated Multiple Correlation Co-efficients of the OVERALS Analysis from Blocks of Variables of the Analytical Model

Blocks	Multiple Correlation Coefficient on Dimension 1 (ρ_1)	Multiple Correlation Coefficient on Dimension 2 (ρ_2)
1↔2	$(2 \times 0.789) - 1 = 0.578$	$(2 \times 0.720) - 1 = 0.440$
1↔3	$(2 \times 0.704) - 1 = 0.408$	$(2 \times 0.695) - 1 = 0.390$
1↔4	$(2 \times 0.793) - 1 = 0.586$	$(2 \times 0.654) - 1 = 0.308$
1↔5	$(2 \times 0.763) - 1 = 0.526$	$(2 \times 0.643) - 1 = 0.286$
1↔6	$(2 \times 0.688) - 1 = 0.376$	
1↔7	$(2 \times 0.686) - 1 = 0.372$	$(2 \times 0.679) - 1 = 0.358$
2↔3	$(2 \times 0.752) - 1 = 0.504$	$(2 \times 0.657) - 1 = 0.314$
2↔4	$(2 \times 0.711) - 1 = 0.422$	$(2 \times 0.598) - 1 = 0.196$
2↔5	$(2 \times 0.758) - 1 = 0.516$	$(2 \times 0.700) - 1 = 0.400$
2↔6	$(2 \times 0.675) - 1 = 0.350$	
2↔7	$(2 \times 0.772) - 1 = 0.544$	$(2 \times 0.661) - 1 = 0.322$
3↔4	$(2 \times 0.662) - 1 = 0.324$	$(2 \times 0.580) - 1 = 0.160$
3↔5	$(2 \times 0.726) - 1 = 0.452$	$(2 \times 0.593) - 1 = 0.186$
3↔6	$(2 \times 0.665) - 1 = 0.330$	
3↔7	$(2 \times 0.841) - 1 = 0.682$	$(2 \times 0.585) - 1 = 0.170$
4↔5	$(2 \times 0.607) - 1 = 0.214$	$(2 \times 0.582) - 1 = 0.164$
4↔6	$(2 \times 0.604) - 1 = 0.208$	
4↔7	$(2 \times 0.858) - 1 = 0.716$	$(2 \times 0.796) - 1 = 0.592$
5↔6	$(2 \times 0.642) - 1 = 0.284$	
5↔7	$(2 \times 0.673) - 1 = 0.346$	$(2 \times 0.519) - 1 = 0.038$
6↔7	$(2 \times 0.635) - 1 = 0.270$	

Source: Computations based on Fieldwork (2006)

The aim of this study has been to document, analyse and explain to what extent the independent and intervening variables correlate and interact with the dependent variable. In other words, it provides an assessment of the possibilities of interactions among these blocks vis-à-vis the block of the dependent variables, which represent the behavioural pattern of interprofessional collaboration between traditional medical practitioners and modern medical practitioners. The available multiple correlation co-efficients on every block indicate the combined interaction among all the variables of the analytical model. As a result, the multiple (categorical) regression analysis in this study produces the ultimate analytical model, from which the following observations and interpretations can be made.

1. With the adapted definition from the Centre for Advancement of Collaborative Strategies in Health (2003), interprofessional collaborations as part of synergy formation have two components; the sharing of resources, ideas, materials and clients and patients, represented in the variable 'colexch' and the working jointly under some sort of unified management for a customer in need of health services represented in the variable 'colwork'. Both these dependent components (variables) interact significantly with Pearson's correlation (χ^2) of .424 at 0.01 level, as indicated in the bivariate analysis.

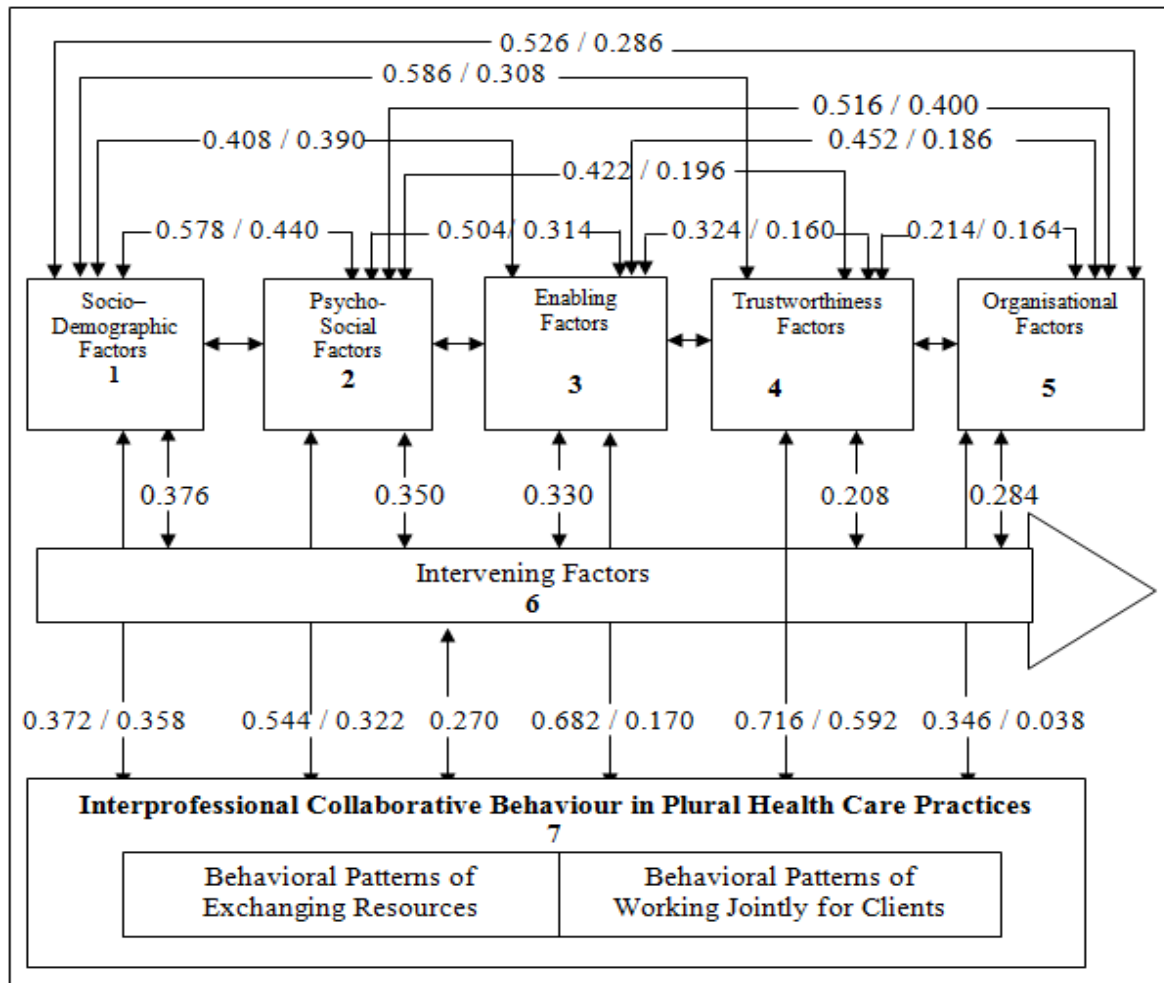


Figure: 7.4 The Ultimate Analytical Model (with calculated multiple correlation co-efficients) between blocks of variables which affect collaborative behaviours between Modern and Traditional medical practitioners.
Source: Adapted from Slikkerveer (1990); Computations based on Fieldwork (2006)

2. Trustworthiness co-varies more strongly in the first dimension than all other variables with interprofessional collaborative behaviour ($\rho_1 = 0.716$). In other words, the more practitioners have trust and confidence in each other, the more likely they are to collaborate as supported both in the theory of reasoned action and the behavioural models. As noted above, trustworthiness includes both the capability of being depended upon (being reliable and responsible) as well as being worthy of credibility or authoritative in a subject matter. Specifically addressing this result is of high importance for what practitioners and health planners ought to think and to do in order to improve confidence in traditional medical practitioners and in the services and products of Traditional Medicine (TM) in general.
3. The second in strength of interaction are the enabling variables ($\rho_1 = 0.682$) in Dimension 1. These variables, such as the individual social economical status and government plus community efforts to enhance collaboration, have substantial influence on the way in which both traditional and modern medical practitioners collaborate. When one thinks of interprofessional collaboration, there is a need to address the political will and creation of an environment conducive to interprofessional collaboration between Traditional Medicine (TM) and Modern Medicine (MM) as well as Complementary and Alternative Medicine (CAM), both at the local and national level. This notion supports the required institutional and legal support under the Parliamentary Act No. 2 of 2002, which governs traditional medicine and practitioners in Tanzania.
4. The psycho-social variables rank third for their multiple correlation coefficients ($\rho_1 = 0.544$). Variables such as good experience of the goods and services of Traditional Medicine (TM); awareness of successful traditional and modern collaborative projects; perceived possibility of good future working relations in pluralistic medicine; and belief in disease specificity of medical systems, which cause practitioners and clients and patients to be convinced that certain diseases are better managed by Traditional Medicine (TM) while others by Modern Medicine (MM); and that the attitude, education and awareness of what entails health services are important if interprofessional collaboration is to be encouraged. This is in agreement with the research results of Caboury *et al.* (2011), wherein both awareness in terms of interprofessional exposure and expected results have been observed among major variables affecting collaboration.
5. From the model it can be observed that at least all the remaining independent variables, *i.e.* the socio-demographic and organisational variables, show a certain medium notable influence on the interactions ($\rho_1 = 0.372$ and $\rho_1 = 0.346$ respectively). Within the socio-demographic block of variables, the practitioner's professional group ('profgrup') and the practitioner's work status ('orgstat') are medium significant with regard to the extent in which practitioners would collaborate. In the organisational block of variables, the organisation efforts towards anti-groupthink, ('orgthink') and the level of organisational culture fostering collaboration ('orgcutur') influence significantly the way in which traditional and modern medical practitioners would collaborate. Therefore, the more the organisations are open to accommodating different views and encouraging creative and critical thinking, the higher the likelihood is for practitioners to be involved in collaborative behaviours with practitioners from the other medical system.

6. The analysis shows that the intervening variables in this study have minimal influence on the behavioural patterns of collaboration among traditional and modern medical practitioners. This phenomenon could be the result of a relatively small number of respondents who had actually participated into national or international programmes which support integration between traditional and modern medical systems.
7. The overall results of this study provide ample evidence to the central theoretical framework, which defines interprofessional collaboration as a behavioural act which can be analysed through the measurement of the influence the knowledge, beliefs and practices on particular type of collaborative behaviour of the of practitioners. The adapted *knowledge-belief-practice complex* has been widely applied as an interactive behaviour model by various researchers, such as Kohn and White (1976); Cox and Claus (1984); Slikkerveer (1990, 1995); Agung (2005); Ibui (2007); Leurs (2010); Djen Amar (2010) and Ambaretnani (2012). The model takes into consideration the all-inclusive variables on both the individual level of the medical practitioners and the institutional level of the society. To this end, governments, local authorities, health facility owners, medical practitioners, researchers and all health services stakeholders - including clients and patients - ought to respond to all significant interactive variables which influence motivation, abilities and triggers for interprofessional collaboration with the various types of medical practitioners through their indigenous and modern domain of knowledge, beliefs and practices.