Evaluating Rural-Urban Difference in Environmental Concern in Guyana using Log-Linear Analysis

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Abstract

To investigate differences in environmental awareness among urban and rural residents of the Republic of Guyana, 1062 randomly selected field questionnaires were examined. Field assistants interviewed residents of urban, and rural areas, in three counties of Guyana (Essequibo, Demerara and Berbice) with the purpose of discovering major environmental concerns, and factors affecting a person's concern for the environment. The interrelationships underlying the categorical data on environmental concern were analysed using both graphical and statistical techniques, this technique being log-linear analysis. Results revealed that there are differences between rural and urban residents in environmental concern, and that education plays a part in a person's concerns for the environment.

By creating and analysing four- and five-dimensional multi-way frequency tables with log-linear analysis, it was found that residents of both rural and urban areas, and all educational attainment levels are concerned about the environment, but these concern levels differ. The best model found with log-linear analysis reveals relationships between educational attainment and environmental concern and location and environmental concern. This analysis revealed that those respondents with 15 or more years of education were more concerned about the environment than respondents with lower levels of education. It was also revealed that those who live in urban areas are more concerned about the environment. An analysis of the relationships between male and females also results in differences for concern about the environment. It seems that women, at higher levels of education, are more concerned about the environment and that men in urban areas are slightly more concerned than women. However, the differences between the genders were very small and insignificant.

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I also wish to thank my mother (Marlene Ronald) and my grandmother (Doris Manley) for their concern, support and interest in my studies.

Dedication

A special dedication goes to my late grandmother (Mary Francis Ronald) who was very proud of me.

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1.0 Introduction

The natural environment and its systems are essential to the survival of the human race. However, it is evident that the ecosystems and natural resources that serve as humankind's life support system are being jeopardized (Dwyer *et al.*, 1993). Today we find ourselves in the midst of an environmental crisis as we at last have come to recognize that there are limits to humankind's disturbances and manipulations of ecosystems (Mungal and McLaren, 1991).

Accompanying world wide environmental changes are increasing public concern for the environment. Several empirical studies on public concern for environmental quality have emerged. Many have investigated the economic and social-psychological factors of environmental concern, and as a result some progress has been made in identifying factors affecting public concern and support for environmental quality. For example, results often show that those who are young and well-educated are more concerned about the environment (McStay and Dunlap, 1983). Nonetheless, spatial interactions such as rural-urban differences have received little attention. The question of whether or not there are differences among urban and rural residents in environmental concern deserves more attention. McStay and Dunlap (1983) correctly stated that improvements in environmental quality require public cooperation and commitment, and information on potential sources of public support.

Possible solutions for today's environmental problems must rely on physical technology and various political and economic instruments, but this is not enough. Individual environmental concern is an important factor (Schahn and Holtzer, 1990). The dynamics of individual concern must be understood. The purpose of the proposed study is to determine rural-urban differences in environmental concern in Guyana.

2.0 Review of the Literature

Although there are advances in knowledge about environmental problems, degradation of the earth occurs. To understand how people view the environment many social scientists are conducting sample survey studies of environmental perceptions using demographic, social, and economic factors. Factors affecting environmental concern will be discussed in relation to the following areas: a) gender, b) ethnicity, c) age, d) income, e) education, f) residence (population size of settlement/ location), g) occupation, h) perceptions, and i) rural-urban differences. However, these topics will be discussed chronologically.

2.1 Empirical Studies

In an article by Tognacci *et al.* (1972), the relationship between demographic variables (socioeconomic status, level of formal education, age, and sex) and environmental concern was examined. A total of 141 randomly selected subjects who were residents of Boulder, Colorado, constituted the sample used in this study. Correlations determined that the degree of concern about ecological issues was negatively related to age and positively associated with both socioeconomic status and amount of formal education. That is, younger respondents were more concerned, and those with higher status and education were more concerned. Gender had no effect.

Antunes and Gaitz (1975) hypothesized that members of disadvantaged ethnic groups have higher levels of participation than persons of the same social class who are members of the dominant social group, where higher levels of participation means greater involvement

in social activities, environmental projects etc. Data taken from a survey in Houston, Texas of 1,441 respondents partially supported this hypothesis. The sample was stratified on the basis of six age groups, three ethnic groups, and two levels of occupation. These variables were controlled and analysis of variance was used. This revealed that there were significant ethnic differences in levels of participation and that ethnicity accounted for more variance than either social class or age. Blacks were more active than whites and whites were more active than Mexican-Americans.

Buttel and Flinn (1978) examined the effects of education, income, occupation, age, and size of settlement on the awareness of environmental problems in the state of Wisconsin. Five-hundred and forty-eight questionnaires, collected in 1974, revealed a distinct correlation between education and environmental awareness. The correlations indicated that those with post-graduate education were more aware than those with less education. Age was found to be a major predictor of awareness where correlations revealed that age groups between 18 and 25 were more aware of environmental problems than those over 66. In addition, age appeared to account for more variance in environmental attitudes than education, income, or occupation. Income and occupation of household head revealed no relationships. Size of settlement proved to be the best predictor of awareness of environmental problems where correlations showed that areas with larger populations have greater environmental awareness. Those areas with a population over 100,000 showed greater awareness than those under 2,500. The effects of age, education, income, occupation, and size of settlement on support for environmental protection were also examined. Results revealed the same findings for all variables except residence, where support for environmental reform was meagre.

Buttel (1979) provided evidence in a study on the relationship among age, education and environmental values of 548 residents of Wisconsin. Two indicators of environmental attitudes, awareness of environmental problems and support for environmental reform, were used. Multivariate analysis revealed that age exhibited moderate sized correlations with awareness of environmental problems and support for environmental reform. Younger respondents were more aware of problems and showed much stronger support for environmental reform. In addition, age proved to be more strongly related to environmental concern than education. Correlation results revealed that those with more formal education were more aware and showed greater support for reform. There was also a high association between age and education, where younger respondents were more educated. In addition, the total and direct effects of age revealed that this variable exhibited major relationships to environmental attitudes, whereas education did not.

McStay and Dunlap (1983) examined the relationship between sex and environmental concern using several multi-item scales to measure concern for specific environmental issues. For example, an eight item personal behaviour scale measured the frequency with which respondents engaged in a series of behaviours aimed at improving and protecting environmental quality. Partial correlations were derived from a sample of 806 (57% males, 43% females) residents of Washington state. Partial correlation analysis indicated that women were more environmentally concerned than men, however, the relationship was modest. This result persisted, even after controls for age, education, income and residence were introduced. It was also shown that women were slightly less likely to engage in public behaviours than men, and significantly more likely to engage in personal behaviours than

men.

Arcury *et al.* (1987) examined differences in concern and knowledge for both women and men about the environmental issue of acid rain. Through the use of 516 telephone surveys in the state of Kentucky, two hypotheses were examined. The first hypothesis, that women would be more concerned about acid rain, was examined using multi-item scales. For example, in the category of relative concern the respondents were asked to compare their concern about acid rain to their concern with six other non-environmental problems (rising utility rates, etc.). Results showed that men were more concerned about acid rain, but this relationship was weak. The second hypothesis stated that there would be differences by sex in knowledge about acid rain. Twelve questions, designed to examine the respondents level of knowledge, were examined using correct/incorrect responses. Linear regression analysis revealed that males had significantly more knowledge about acid rain than females.

Mohai and Twight (1987) used a national stratified sample survey of 7,010 U. S. residents in order to determine the effects of age, education, place of past residence, and place of current residence on environmental concern. Correlations of a national survey revealed age as the variable most strongly related to environmental concern, where younger respondents were more concerned. This is followed by education, where those who had more formal education were more concerned. Place of residence was found to be non-significant when the direct and indirect effects were determined.

Samdahl and Robertson (1989) analysed the effects of size of settlement (i.e. population size of the settlement/location), education, age, and income on three types of environmental concern, namely perceptions of environmental problems, support for

environmental regulations, and ecological behaviour. The data, drawn from a 1978 survey of 2,131 residents in the state of Illinois, revealed the socio-demographic variables which were significant in predicting the above three measures of concerns. Findings suggested that the size of settlement, education and income significantly predicted people's perceptions of problems and support for regulations. In these cases, it was found that those in a larger place of residence would be more perceptive of environmental problems and have greater support for regulations. Those with lower education and less income where able to perceive problems better and had greater support for regulations. Perceptions of problems and age were also found to significantly predict support for regulations, where age was positively associated with regulation. Results also indicate that age and income predicted ecological behaviour. The study revealed that older respondents and those with lower incomes showed stronger positive ecological behaviour. However, size of settlement, education, and perception of environmental problems did not predict ecological behaviour.

Mohai (1990) studied the extent of American Black and White differences in concern for environmental quality and perception which was assessed from a sample of 7,010 respondents. Data were derived from the "Survey of Public Attitude toward Soil, Water, and Renewable Resources Conservation Policy". Multiple regression revealed that differences between the two groups were not statistically significant on three environmental indicators, these being perceptions about seriousness of environmental problems, perceptions about shortages of environmental amenities, and assessing the relative importance placed on environmental concern. Therefore, the degree of concern among Blacks was virtually identical to Whites. Difference in participation, however, were substantial where there was

a ratio of 1 Black to 3 Whites.

Schahn and Holzer (1990) dealt with the interplay of environmentally relevant knowledge and attitudes, as well as gender differences in environmental concern. In a sample of 167 Western German adults, the researchers found that knowledge and gender moderated the relationship between attitudes. Women were more environmentally concerned in those areas that refer to household behaviour, whereas men knew more about environmental problems. Findings also revealed which variables were correlated with environmental concern. The significant predictor variables were the internal attribution of responsibility for environmental problems (i.e. self-reported actual commitment, SAC), and the perceived severity of environmental problems. The most important demographic variables were gender (women had higher SAC values), and age (older respondents had higher SAC values).

Freudenburg (1991) studied the effects of occupation among four communities, which were facing the prospect of a large scale development of fossil fuels, in Western Colorado. A random selection of adults was used, resulting in a sample size of 579 questionnaires. It was hypothesized that farmers would show less environmental concern than the occupations of ranchers, business, and coal mining, thereby welcoming development. However, deviations from the mean revealed that farmers felt worse about the condition of the environment than all other occupations, thus expressing greater concern. In the case of support for local development, farmers showed lower-than-average support than other occupations.

In a study by Stern *et al.* (1993), attitudes toward the environment were evaluated by

looking at egoistic, humanistic, and biospheric value orientations through the use of regression techniques. A survey of 349 college students, in New York state, revealed that all three values independently predicted willingness to take political action. However, the beliefs about consequences beyond the egoistic value were much weaker in terms of willingness to pay. When the three values were evaluated for the effects of gender, it was shown that gender had a significant effect with women seeing environmental quality as having consequences for personal well-being, social welfare, and the health of the biosphere. However, there was no direct effect of gender on either political action or willingness to pay.

Krause (1993) designed a questionnaire to examine levels of consciousness, concern, attitudes, and knowledge about the environment in America. The questionnaire included variables of ethnic group, gender, income, education, and residence. More than 50% of the 300 respondents in this study indicated that they were environmentally conscious. However, when asked if they had a positive or negative impression about 10 environmental organizations (which was used as an indicator of environmental consciousness), people generally knew little about these groups as indicated by a "no opinion" category. For example, 69.5% of the respondents had no opinion for the environmental organization known as Ducks Unlimited.

The findings indicated a strong, and consistent concern for environmental issues when respondents were asked to rate their concern about problems on a scale of 0 to 5 (5 being strong). As an example, hazardous waste had a score of 4.47, and for lake and river pollution the score was 4.23. This study also found that, for both concern and consciousness, there was consistency across ethnic, income and gender groups, as well as across education.

Krause (1993) also examined people's willingness to change their lifestyles as a measure of attitude toward the environment. It was found that the more difficult the proposed change is, the less willing people were to make that change. In this sample, 91.5% of the respondents were willing to separate garbage, but only 38% would restrict use of private autos. Differences in residence and ethnicity were also found. It was revealed that suburbanites were more reluctant to reduce the use of automobiles, and that blacks were more willing than whites.

Finally, this study asked 10 questions designed to examine the respondents level of understanding (knowledge) on important environmental issues. This was done by using a correct/incorrect response to these questions. It was generally found that there was a low level of understanding. When asked, for example, do cattle and rice add to the greenhouse effect, only 34% of the respondents were correct in their response. Therefore, a low level of knowledge about environmental issues was reported.

Adeola (1994) addressed the issue of hazardous wastes and associated health problems in a study of East Baton Rouge, Louisiana, by examining socio-demographic variables in differences in environmental concern of 213 respondents. This study indicated that most of the people interviewed were pro-environmentalist and revealed that the respondents were quite aware of the problems facing their area. In response to items asking about the seriousness of environmental problems in Baton Rouge, 82.2% of the respondents chose extremely to very serious, and 79.4% gave similar responses to toxic waste. In addition, 92.5% of the respondents agreed that citizens need to be willing to work towards good environmental quality, and 85.4% agreed that citizens need to actively participate in

solving ecological problems.

Respondents were also able to perceive environmental hazards and health problems due to toxic waste. Air pollution was mentioned as the most serious source of environmental hazards by 79.8% of the respondents, followed by water pollution (73.7%), waste disposal sites (66.7%), and petrochemical facility waste (62.4%). In terms of health, 79.7% agreed/strongly agreed that high concentration of toxic wastes represents a significant threat to the health of Baton Rouge residents. For example, the majority of the respondents identified lung cancer (93.9%) and fetus deformation (79.3%) as being related to high levels of toxic waste in the Baton Rouge environment.

Finally, findings revealed that ethnicity was not significantly related to environmental behaviour or environmentalism. In addition, it was revealed that younger respondents showed more environmental concern and those with more formal education had greater concern. Residence location and sex were not statistically significant in predicting environmental concerns.

Bloom (1995) analysed public opinion data on environmental issues collected in two major surveys in order to examine environmental consciousness, concern and knowledge of developing (DC) and industrialized (IC) nations. The two surveys involved were a Gallup 1992 with 29,618 respondents in 24 countries, and a Harris 1988/89 survey with 8,325 respondents in 16 countries. The surveys revealed substantial, though not overwhelming, concern about the environment in both groups. For example, twelve percent of the Gallup population viewed the environment as the most important problem facing their nation, with 37% expressing a great deal of environmental concern.

In terms of local problems, developing country respondents rated their local environmental quality lower than industrial respondents did. For example, in industrialized countries, only 19% of the respondents felt poor water quality was a problem, whereas 45% of the respondents in developing countries felt this was a problem. However, both groups rated global environmental quality about the same. Problems of acid rain (DC=71%, IC=78%), global warming (DC=46%, IC=52%), ozone depletion (DC=46%, IC=60%), and loss of rainforests (DC=60%, IC=64%) are generally perceived to be very serious by more than half of the developing and industrial country respondents. Perceived causes, in both developing and industrial countries, include business and industry (DC=65%, IC=61%), lack of knowledge (DC=58%, IC=40%) , and individual wastefulness (DC=54%, IC=61%).

Wall (1995) studied environmental concerns in Edmonton, Alberta, by using questionnaire surveys collected in 1990. Based on a random sample of 448 residents, the variables age, income, and education were examined using two measures of concern: specific and general. It was shown that the only variable that had statistically significant effects on environmental concern, at both measures, was education. It was concluded that higher levels of education results in greater environmental concern. Age and family income did not have statistically significant effects on environmental concern.

A paper by Adeola (1996) uses a public opinion survey conducted in Nigeria in order to explore public perceptions, attitudes, and awareness of seriousness of environmental problems at the local, national, and international levels. The study shows only 1% of the 1,195 respondents identified the environment as the most important problem facing the nation. Nevertheless, environmental concerns and attitudes are found among the poor.

Environmental problems are rated by 45% of the respondents as very serious for Nigeria, and 87% rate their personal level of concern as "a great deal/fair amount". The findings also reveal that perceptions of local problems are much stronger than global environmental problems. Respondents feel that high cost of living (95%), hunger and homelessness (85%), poor health care (75%), water pollution (65%), and inadequate sanitation (52%) are more important than global problems. In fact, a sizable amount of the respondents have little or no opinion on global problems. For example, only 39% of the respondents feel that global warming was a problem.

Adeola (1996) also reports that 61% of the population are involved in an environmental group, and 63% avoid using products known to be harmful to the environment. Finally, this study reveals that the respondents are aware that agents contributing to environmental degradation are lack of environmental education (64%), domestic business (61%), government inattention (51%), waste by individuals (52%), and overpopulation (55%).

Arp and Kenny (1996) studied differences in environmental concerns among 330 residents of two different communities, Alsen and Homer, Louisiana. In Alsen, there was a high concentration of hazardous industries. In contrast, none existed in Homer, but one was being proposed. Multiple regression analysis was used to investigate the question of whether Black environmental concerns were greater in response to a proposed facility or when some accumulation of hazardous industry had occurred. A dummy variable was used which was coded 1 if the respondents lived in Homer, and 0 if in Alsen. It was found that respondents living near the community of Homer felt that pollution was a less serious

problem in their community, and felt less upset about having industry placed near their community. It therefore appears, from these results, that there is a spatial difference and that experiences of living near hazardous industry turn individuals against it. However, there was no spatial difference in general environmental concern. The coefficient of the Homer dummy variable is small and insignificant, indicating that Homer residents are no more or less concerned about protecting the environment than Alsen residents. It was also revealed that the demographic variables age, income, and unemployment had relatively little explanatory power. However, education was a significant factor, where those with more formal education had higher environmental concern.

In addition to socioeconomic variables, researchers also have studied the effects of residence. Althoff and Greig (1977) studied socioeconomic variables of 471 respondents in rural and urban areas of Kansas in order to determine differences in attitudes toward environmental protection. Overall, 57% of the respondents reported that they were personally committed to solving the pollution problem. Percentage scores revealed that those more concerned about environmental issues, more dedicated to environmental protection, and more committed personally to aid in solving the pollution problem reside in urban areas, were younger, possessed higher levels of education, and had higher incomes. However, the opposite was found in rural areas where respondents were less concerned, older, possessed lower levels of education and had lower incomes.

Tremblay and Dunlap (1978) studied public attitudes toward environmental problems in Oregon by using a Harris questionnaire of 866 respondents collected in 1970. Three hypotheses were evaluated at the state and community levels for four types of settlements:

rural, small town, urban fringe, and urban. The first hypothesis, which stated that rural residents would be less concerned with environmental problems, received partial support. In general, rural and small town residences were similar in their levels of pollution concern, and both differed considerably from residents of urban fringe and urban areas, who are likewise similar in concern. However, this hypothesis was supported much more strongly at the community level. This also lends strong support for the second hypothesis which stated that rural-urban differences would be stronger at the community level. For example, at the state level, 54.2% of rural area, 45.5% of small town, 52.3% of urban fringe, and 59.7% of urban area residents showed water pollution as very serious. These percentages are 22.2%, 21.8%, 51.6% and 52.5% respectively at the community level. The third hypothesis stated that rural farmers would rank lower than rural non-farmers, but both would rank lower than urban residents, and was supported. In addition, the differences were larger at the community level. As an example, perceptions of water pollution at the state level were 54.2% for rural farm, 54.2% for non-rural farm, and 56.7% for urban. These values for the community level were 4.0%, 23.8%, and 52.1% respectively.

Lowe and Pinhey (1982) used data derived from a U. S. General Social Survey of 9,038 respondents in order to determine rural-urban differences in environmental concern and protection. Analysis of variance techniques showed that urban people had the highest environmental concern, and this continued when standard demographic variables were considered. Correlations also revealed that age had a substantial independent effect, where younger respondents were more concerned, and education showed a very slight positive association. Findings also revealed that persons connected with agriculture, mining, or

polluting industries showed lower support for environmental protection than those of other industries, but this is weak. This is also true of urban non-metropolitan residents. Table 1 is a summary table showing the variables which were found to be significant by the above researchers.

2.2 Problems with the Literature Review

There are many problems with the above literature review. First, many of the studies are contradictory in nature, since opposing views have been found, and many have focused on socio-demographic variables rather than spatial aspects. Of the studies that do deal with spatial aspects, many are from the late 1970s and early 1980s. In addition, the studies are overly representative of the United States, and other parts of the globe are not sufficiently represented. Finally, many researchers have evaluated variables through the use of percentages or simple statistical analysis and have not been able to assess associations or interactions among the variables. It is with these problems in mind that this study is being carried out in Guyana.

Table 1: Variables Found to be Significant by Authors

Author	Gender	Ethnicity	Age	Income	Education	Residence (size)	Occupation	Rural/ Urban
Tognacci *et al* (1972)			-		+			
Antunes and Gates (1975)		•						
Althoff and Greig (1977)			-	+	+			•
Buttel and Flinn (1978)			-		+	+		
Tremblay and Dunlap (1978)								•
Buttel (1979)			-		+			
Lowe and Pinhey (1982)			-		+		-	•
McStay and Dunlap (1983)	♀							
Arcury *et al* (1987)	♂							
Mohai and Twight (1987)			-		+			
Samdahl and Robertson (1989)			+	-	-	+		
Mohai (1990)		•						
Schahn and Holzer (1990)	♀		+					
Freudenburg (1991)							+	
Stern *et al* (1993)	♀							
Adeola (1994)			-		+			
Wall (1995)					+			

Signs and their meanings:

Gender: ♀ female more concern, ♂ more concern
Age: - younger are more concern, + older are more concern
Income: - less income more concern, + higher income more concern
Education: - lower education more concern, + more formal education more concern
Residence: + larger populations are more concern
Occupation: - rural occupations reveal less concern, + rural occupations reveal more concern

Source: Ronald, 1997

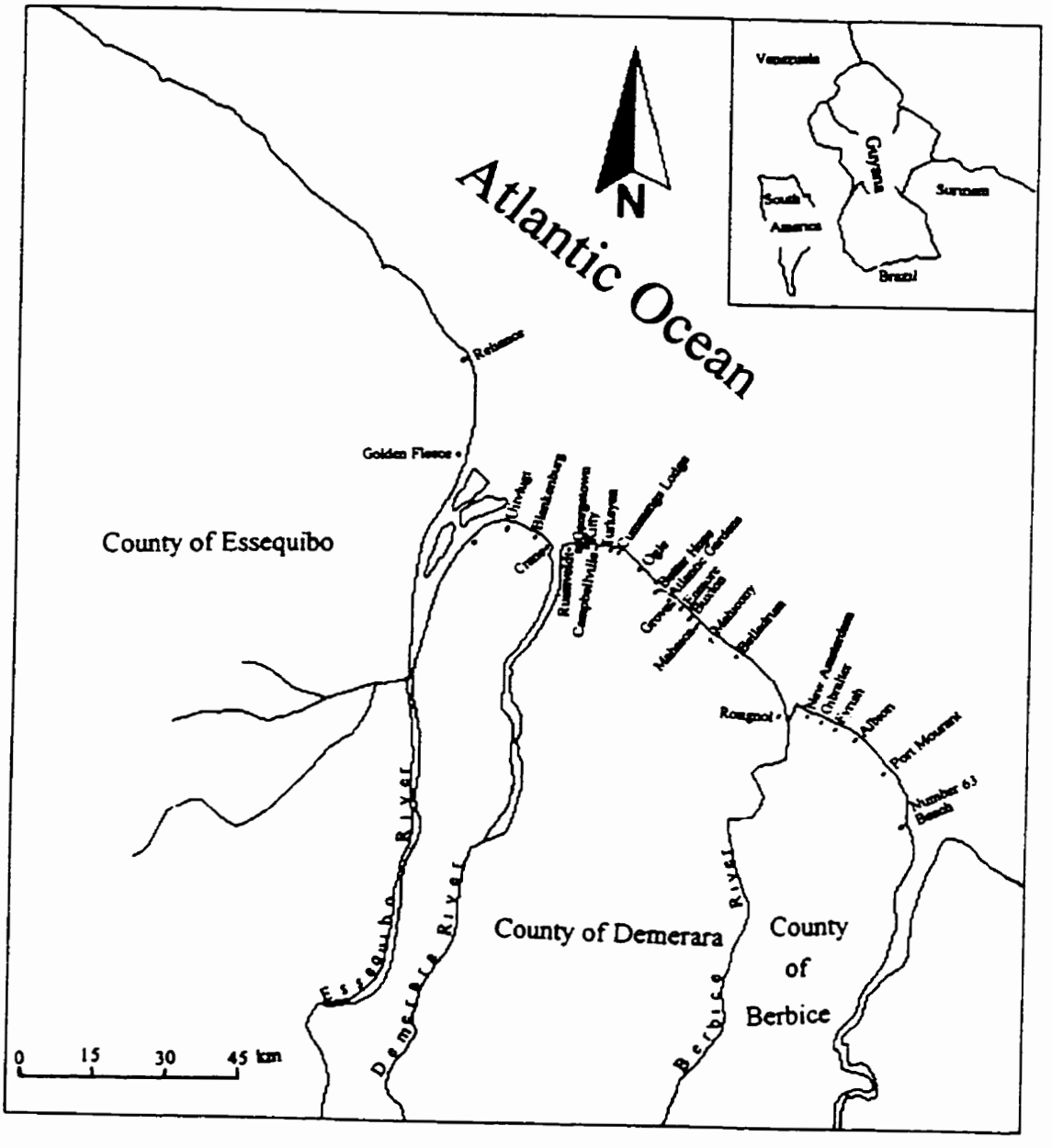
3.0 Study Area

Guyana (Figure 1), formerly British Guiana, is located North of the equator on the northeast coast of South America between 0^0 41' N and 8^0 33' N and 56^0 32' W and 61^0 22' W. With an Atlantic coastline of about 435 kilometres, the country is bounded by Surinam in the east, Venezuela in the west, and Brazil in the south. Guyana is approximately the size of Great Britain with an area of about 214,970 square kilometres, extending 807 kilometres north to south and 436 kilometres east to west.

The country can be divided into several ecological regions ranging from savannas to tropical rainforests. It can also be divided into three distinct geographic regions, one being the low-lying, narrow, coastal belt, the area under study. The coastland is comprised of a flat, low-lying swampy strip varying in width from about 10 miles in the west to 40 miles in the east, and is about 1-1.5 metres below sea level. This low elevation requires an elaborate sea defence and drainage system consisting of seawalls or dykes to prevent flooding. Secondly is the mountain region, consisting of a sandstone plateau more than 2,750 metres above sea level. Finally there is the intermediate region east and south of the coastal mountain regions, consisting of forest and jungle (Guyana News and Information, 1997; The Commonwealth on Line 1997; Shorelands Travel Health on Line, 1997). There are four principle rivers in Guyana. From east to west these are the Corentyne, Berbice, Demerara and Essequibo. Between these rivers are smaller rivers such as the Mahaica. The largest of these rivers is the Essequibo, 965 kilometres, which drains more than half of the country (Kurian, 1992).

Settled in the early eighteenth century by the Dutch, Guyana was finally ceded to the

Figure 1 Study Area



Source: Maps of South America (1996)

British in 1812. Ethnicity in Guyana is a product of historical development where colonialism resulted in a variety of ethnic groups. The principal ethnic groups found in Guyana are the Amerindian, Black, Indian, Chinese and Portuguese (Smith, 1962) who are descendants of Africans, Asians and Europeans. The expansion of settlements occurred principally on the coastlands. Today, more than 90 percent of the country's 900,000 people live on the coastal plain (Lakhan, 1994). Along the coastal plain there are several urban centres and numerous rural communities (many of which grow sugar and rice). Ever since the country was settled the environment and resources of Guyana have been indiscriminately exploited.

Examples of resource exploitation include the coastal plain which, when well drained, is very fertile, with deep soils rich in organic matter. By the end of the nineteenth century, coastal plantations producing sugar, cotton, coffee, bananas and citrus were common (Blouet and Blouet, 1997: 320) using up the fertile soil. Today, other resources which are being exploited include natural resources such as diamonds, gold, bauxite and manganese which are both mined and processed in Guyana (The Commonwealth on Line, 1997). Trees are also exploited for dye woods and hard timber (Blouet and Blouet, 1997), and these (especially mangrove forests) are now disappearing (Lakhan, 1997). This problem is compounded by a growing market in Europe, North America and Japan for hard woods (Blouet and Blouet, 1997).

Pollution in the country occurs in both urban and rural areas, but is far worse in the cities where there is much sewage due to a lack of landfills. Pollution of rivers also occurs due to mining. For example, cyanide runoff for the Omai Gold Mine contaminated the

Essequibo River (Word, 1997). Because of this pollution problem, wells are also contaminated and this affects everyone.

4.0 A Priori Model

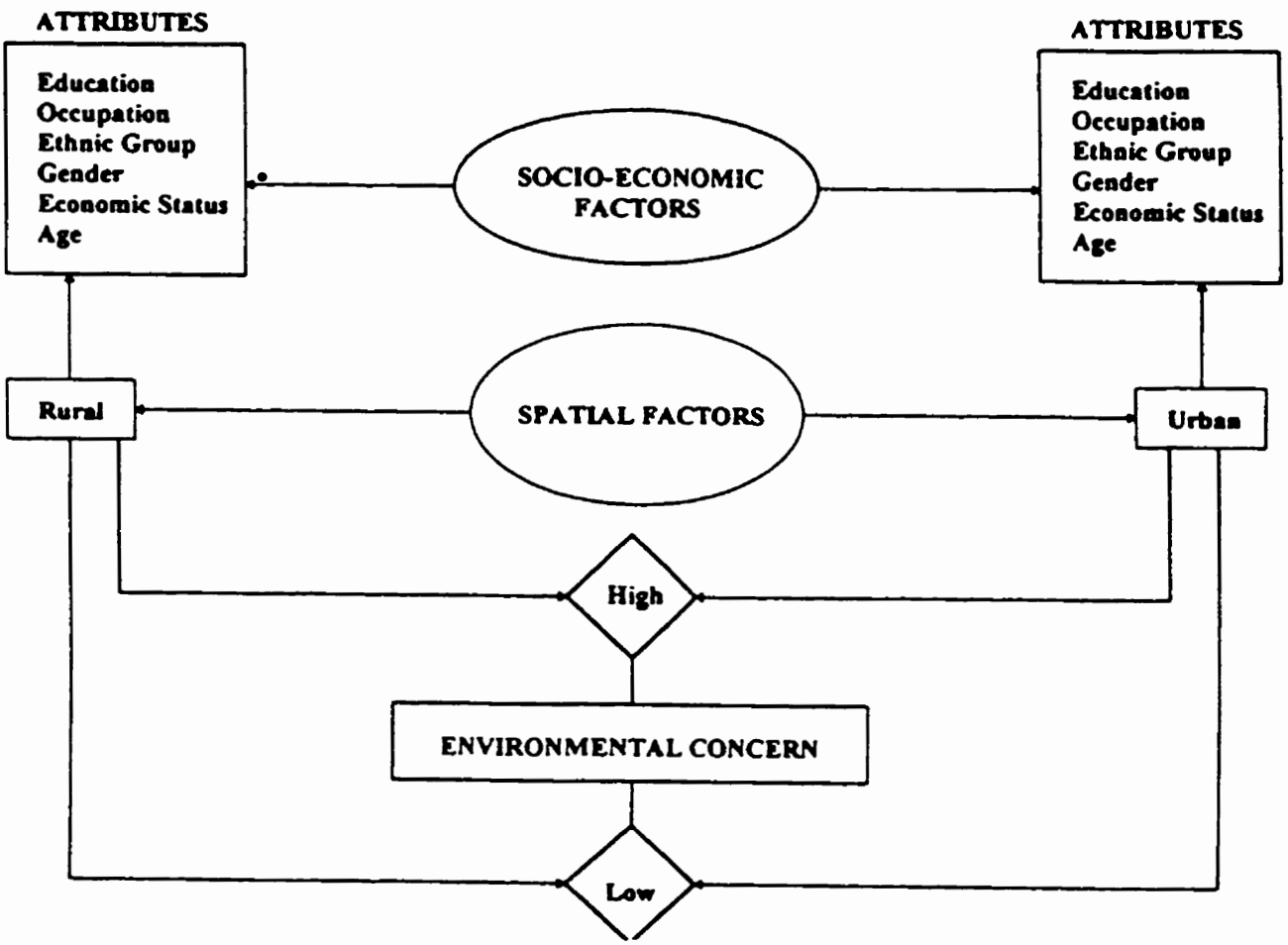
The development of an a priori model requires an understanding of the factors which may affect environmental concern. The a priori model presented in Figure 2 illustrates the relationship between these factors (socio-economic and spatial), environmental concern, and each other. Place of residence can reveal either a high or low concern. Socio-economic factors can affect the degree of concern in rural and urban areas respectively.

Rural and urban differences can be studied by examining the following variables: education, occupation, ethnic group, gender, socioeconomic status, and age. The affluent, highly educated and urban sectors of society appear to possess the greatest concern for the environment (Lowe *et al.*, 1980). However, other factors also apply.

Investigations have shown that those with a post-graduate education have a higher awareness of environmental problems (Buttel and Flinn, 1978; Wall, 1995). It is easier for those with higher education to assess and process information resulting in greater awareness and less confusion about the seriousness of the issues and their consequences. According to O'Riordan (1976) those with little education reveal little interest in the environmental problems and demonstrate little knowledge of political alternatives discussed. It is a well documented fact that environmental issues draw the greatest support from the well-educated middle class (Wall, 1995).

There are rural-urban differences in occupation. Rural occupations (lumbering, mining, agriculture) are based on the exploitation of nature which leads to utilitarian attitudes towards the environment. Such attitudes often result in less concern for environmental quality. In contrast, urban occupations typically do not involve direct exploitation of the

FIGURE 2: A PRIORI MODEL



Source. Ronald, 1997

natural environment. They are thus less likely to hold utilitarian attitudes toward the environment leading to a greater concern for the environment (Tremblay and Dunlap, 1978).

There have been many theories and hypotheses to account for ethnic differences in environmental concern. However, the two most prominent are the hierarchy of needs and subculture (ethnicity). According to the hierarchy of needs theory, environmental issues are luxury items that can be considered only after basic needs are met. Therefore, sacrificing of environmental health for economic satisfaction is seen as a necessary trade-off among certain groups. Therefore, environmental attitudes are a consequence of values and experiences that are distinct and unique (Taylor, 1989).

A number of writers (for example, Arcury *et al.*, 1987; Freudenburg, 1991; McStay and Dunlap, 1983; Stern *et al.*, 1993) have suggested a link between sex-role socialization and orientation toward the physical environment. This link is based on the proposition that women, because of the strength of their socialization to the roles of mother and nurturer, will be more concerned and more aware of human action for others and the environment. Alternatively, because of their socialization to emphasize the scientific and technological, men will be less concerned (Arcury *et al.*, 1987; Stern *et al.*, 1993). Men may also be more likely to show concern about the economy than about environmental problems (Freudenburg, 1991).

The social class/environmental concern issue has important implications for environmental concern. Studies (for example, Adeola, 1994; Buttel and Flinn, 1978) reveal that there are rural-urban differences in economic satisfaction. Those in the lower classes may be concerned. However, satisfaction of basic needs takes precedence over the

environment resulting in less concern for the environment (Adeola, 1994). In contrast, the middle-upper classes have largely solved their basic material problems and can devote interest to the environment, resulting in greater concern (Buttel and Flinn, 1978).

Age also affects environmental concern. In North America, the young have been found to be disproportionately pro-environmental, presumably because environmentalism is an appropriate outlet for youth's low commitment to the social order (Mohai and Twight, 1987). This concern tends to weaken as students become workers and parents. It also has been found, and perhaps a reason for youth's greater concern, that the young are well-educated (Buttel and Flinn, 1978; Mohai and Twight, 1987).

Place of residence may also have an influence on concern. In general, residents of urban areas are more often exposed to instances of environmental degradation than are rural residents, thereby causing greater levels of concern for the environment. In addition, rural residents typically have utilitarian attitudes toward the environment due to the exploitative aspects of rural occupations. This often makes rural residents less concerned with environmental quality (Lowe *et al.*, 1980). Nevertheless, socio-economic factors can affect the degree of concern for those people residing in either rural or urban areas, which may reveal a different pattern in some areas.

5.0 Rationale of Hypotheses

Although there has been a large number of studies on environmental attitudes, a relatively small proportion (in this study only 14.3%) have examined rural-urban differences. In addition, the evidence concerning the residence-environmental concern relationship is ambiguous. However, given differential exposure to environmental problems and differential attitudes toward the environment, one would expect rural and urban residents to differ in their concern with environmental quality.

Tremblay and Dunlap (1978) stated that there is some evidence that public concern with environmental problems is related to the actual levels of such problems. Urban residents are typically exposed to more serious environmental problems than rural residents. One would therefore expect rural residents, who are generally exposed to lower levels of pollution, to be less concerned with environmental problems than urban residents.

Since rural occupations (for example, farming) often involve the direct use of natural resources (Hines *et al.*, 1975), it has also been argued that rural residents are more likely to hold utilitarian attitudes toward the environment. Such attitudes are presumed to make them less concerned with environmental quality. Therefore, rural occupational requirements are likely to lead to lower levels of environmental concern.

In addition to locational differences, socio-economic variables may also affect a persons concern for the environment. According to Gbadegesin (1996), females, in developing countries, attempt to conserve and improve the state of the environment more than men do. Some women are farmers, homemakers and suppliers of fuel and water, they therefore interact more closely with the environment than do men. In the rural areas of

developing countries women provide over 70% of the labour force in agriculture and spend several hours in search of water and fuelwood, in addition to their domestic responsibilities (Kendie, 1996; Rodda, 1993). In urban areas women make use of the area around them, depend on it for their survival and are affected by its degradation. They are often responsible for securing building materials and are still responsible for domestic duties (Rodda, 1993).

Age also appears to have an impact on environmental concern. Researchers such as Fiallo and Jacobson (1994) found that the older a person is, the less concern that person has for the environment. Young people were found to be very concerned about the environment. These results are supported by many researchers (for example, Adeola, 1994; Schahn and Holtzer, 1990, Samdahl and Robertson, 1989; Mohai and Twight, 1987).

Education has been identified as a major variable affecting environmental concern. Several investigators (Buttel and Flinn, 1978; Wall, 1995, for example) found that those with a post-graduate education reveal greater concern for the environment. However, those with little education have little interest in the environment (O'Riordan, 1976).

Based on the foregoing rationale for attitudes toward the environment, the following hypotheses are advanced:

1) Rural-urban residence will be related to environmental concern, with urban residents having higher levels of concern.

2) Gender will have an effect on environmental concern, with women being more concerned than men.

3) Age will be related to environmental concern, with those who are younger revealing greater concern.

4) Educational attainment levels between rural and urban residents contribute to differences in environmental concern.

6.0 Methodology

Determining the main factors which contribute to the awareness of environmental problems requires a methodology that will consider, and identify the most significant from a multitude of factors that can affect peoples' environmental concern. To fulfil the research objective, and to test the aforementioned hypotheses, data collected by the Canada Caribbean Research Group (1996), which obtained information from representative samples of residents from various communities in Guyana, was used. The questionnaires collected all essential information on the attributes affecting environmental concern.

6.1 Data Acquisition

After examination of Guyana's census data and the rural household database, the Canada Caribbean Research Group (1996) decided to randomly select coastal communities. To balance time and cost, but still collect a representative random sample, data were collected from the urbanized communities of Georgetown, Kitty, Cummings Lodge, Turkeyen, Ruimveldt, Campbellville, and New Amsterdam. Samples were also collected from the non-urban and rural communities of Ogle, Better Hope, Atlantic Gardens, Mahaica, Mahicony, Rosignol, Gibraltar, Fyrish, Albion, Port Mourant, Uitvlugt, Grove, Enmore, Crane, Reliance, Golden Fleece, Number 63 Beach, Belladrum, Buxton, and Blankenburg. At each location adults were approached and asked if they would complete a questionnaire. By using random and stratified random sampling techniques field personnel, in 1996, assisted with the completion of 1062 questionnaires from the aforementioned communities (Canada Caribbean Research Group, 1996).

6.2 Statistical Analysis

To understand how respondents' location and socio-economic variables affect their environmental concern, log-linear statistical analysis were utilized because interactions and interrelationships underlying categorical survey data can be analytically highlighted (Lakhan *et al.*, 1995). Log-linear techniques also were used to define the levels and the strengths of the relationships between the dependent and various combinations of independent variables. Log-linear models (LLMs) are designed to describe association patterns (i.e relationships) between categorical variables that form a contingency table with more than two dimensions (Gilbert, 1981; Kennedy, 1983). Technically speaking, when sample frequencies occupy the cells of a table, one has a contingency table.

Other than being more efficient than chi-square analysis and standard cross-tabulation methods, log-linear analysis allows modelling of relationships between several variables (Singh, 1992). In addition, Kennedy (1983) pointed out that log-linear analysis allows choosing the most parsimonious model to describe data from categorical responses, making log-linear analysis applicable for this study.

Aufhauser and Fischer (1985) identified two classifications of LLMs: conventional and unconventional. However, only conventional models will be discussed here since these are the models of interest to this thesis. Conventional models are hierarchical and contain saturated and unsaturated LLMs. Essentially, the saturated LLM can be considered as the baseline model for all other members of the family of conventional models, and perfectly reproduces the frequencies in the multi-dimensional contingency table.

Saturated log-linear models can be expressed in additive formulation as:

$$lnm_{rst} = u + u_r^A + u_s^B + u_t^C + u_{rs}^{AB} + u_{rt}^{AC} + u_{st}^{BC} + u_{rst}^{ABC}$$

$$r=1,...,R;\ s=1...,S;\ t=...,T$$

(Aufhauser and Fischer, 1985) where the structure of the multi-dimensional contingency table is represented by a set of parameters containing the overall effect u; the main or first-order interaction effects, u_r^A, u_s^B, u_t^C; the second order-interaction effects, $u_{rs}^{AB}, u_{rt}^{AC}, u_{st}^{BC}$; as well as the third-order interaction effect, u_{rst}^{ABC}. The superscripts refer to the variables involved, and the subscripts to the categories of the variables (Aufhauser and Fischer, 1985). Therefore, a saturated model represents the cell frequencies of a cross-tabulation as a function of the effects for the general mean (u), each variable, and their interrelationships. Saturated models make use of all the observed tabular data. Therefore, elementary cell frequencies produced by this model are identical to the expected cell frequencies, producing a perfect fit (Knoke and Burke, 1980; Gilbert, 1981; Kennedy, 1983; Aufhauser and Fischer, 1985).

According to Bishop *et al.*, (1975) and Aufhauser and Fischer (1985) all other conventional models can be derived from the saturated model by deleting parameters, so that the model has fewer parameters than the number of data cells. Such models are termed unsaturated LLMs. Unsaturated LLMs, also referred to as hierarchical LLMs, are useful, and beneficial, to use because once a higher order interaction is included in a model all lower-order effects of that interaction must be included. Therefore, these models proceed from the most restricted (most parsimonious) to the least restricted (least parsimonious) model, where the more restricted models become subsets of the more complete models. Unsaturated

models also achieve a parsimonious representation of the data by using fewer parameters (Knoke and Burke, 1980).

In this study, four and five dimensional contingency tables were utilized to cross-classify data. The four dimensional model was constructed with the data for the variables location [L], educational attainment of the respondent [E], gender [G], and environmental concern [C]. The categorical data for the four variables were input into a file for processing in the Statistica Log-linear module (Statistica, 1995). The five dimensional table adds a fifth variable, that of age [A]. These variables were also put into a file for the five-dimensional table for processing in Statistica. The five-dimensional table was used to see if the addition of the variable age adds anything to the relationships found.

Since, from a four dimensional table, it is possible to have 166 different hierarchical models that need to be tested for significance, selection strategies (i.e. statistical tests) to limit the number to be evaluated will be required (Brown, 1976; Dillon and Goldstein, 1984). The measure of marginal and partial association procedures described by Brown (1976) and Dillon and Goldstein (1984) were used to choose and examine a subset of models arising from the four and five dimensional tables. In addition, Dillon and Goldstein (1984) and Goodman (1978) use stepwise methods of which there are two types, that of forward selection and backward elimination. These tests are used in order to choose the most parsimonious log-linear model.

6.3 Measures of Marginal and Partial Association

Measures of Marginal and Partial association allows for a screening of effect terms

so that only a limited number of LLMs need to be considered when attempting to find the most parsimonious model (Dillon and Goldstein, 1984). Effect terms are the effects which the variables have on cell frequencies (Gilbert, 1981). For each effect term, two statistics are computed, marginal and partial association. These tests, which indicate the order of magnitude of the change in the goodness-of-fit produced by entering or deleting an effect from a model, are used to categorize the effects by importance (Brown, 1976). Marginal and partial association tests ultimately provides a summary table from which, upon examination, effects can be classified into definitely needed in the model, definitely not needed in the model and those effects requiring further examination.

The results for both partial and marginal association tests were obtained by following a sequence of steps. Partial association tests that the partial association between a set of variables in a effect term is zero (Brown, 1976; Dillon and Goldstein, 1984). In other words, the effect of a set of variables is being examined to see whether or not that relationship exists. The test for partial association uses, for example, the entire four-way multi dimensional frequency table and compares a log-linear model with all possible interactions of the same order with a log-linear model that excludes the interaction under consideration (Brown, 1978). In this process, models were fitted omitting each of the main effects in sequence. So, in effect, this test is obtained as the differences between nested models (Dillon and Goldstein, 1984). For example, to test the significance of the effect CE, the log-linear model containing all possible two-way interactions, [CE][CG][CL][EG][EL][GL], would be compared with the log-linear model that excludes CE. This being [CG][CL][EG][EL][GL]. Each of the two-way effects for all of the six terms would then be tested in sequence.

However, it does not really matter which effects are removed first.

Likewise, to test for the interaction terms CEG, CEL, CGL, EGL the log-linear model containing all possible interactions among the variables, [CEG][CEL][CGL][EGL], would be used and compared to other models excluding each of the interactions in sequence. For example, to test for CEL, the model [CEG][CGL][EGL], which omits CEL is compared to the base model [CEG][CEL][CGL][EGL]. The significance level, degrees of freedom and log-likelihood ratio statistic (G^2) are determined. The significance level is determined by finding the differences between the two G^2 values and the degrees of freedom is found by subtraction.

Marginal association tests that the marginal association between a set of variables in an effect term is zero (Dillon and Goldstein, 1984). This is, like the partial association test, testing for the absence of a relationship. The marginal association tests were also done in stages, using the corresponding marginal table from the four-dimensional contingency table. For the two term effects, the corresponding two variable marginal tables would be tabulated. The model where the two term effect equals zero, the equivalent of all possible main effects, would then fitted (Brown, 1978; Singh, 1992). For example, in order to test for the effect CE, the marginal table for CE would be tabulated and then the model [C][E][G][L] would be fitted. Therefore, the model [C][E][G][L] would be compared to the model containing the two way effect CE, [CE][G][L]. If the fit of the model is significantly improved, then that term is considered to be significant and would probably be included in the final log-linear model. This procedure would be done for all the two-way interaction terms in sequence. The G^2 value, the degrees of freedom, and the significance level were then noted.

The tests of marginal and partial association differ since the partial association test uses the full four- or five-dimensional contingency table and must remain hierarchical, whereas the marginal association tests do not. Partial association tests the difference in fit between two models which differ only in the effect being tested, maintaining a hierarchical model (see above). Marginal association, by limiting the number of variables, only uses a part of the full four- or five-dimensional contingency table. It uses marginal tables derived from the full multi-way frequency table by collapsing over variables, and is indexed only by the factors under consideration (Brown, 1976). For example, for the three-term effects, the corresponding three-variable marginal table is tabulated (collapsing over the fourth variable), and the model is fitted.

Here, the closer the probability p is to 0.00, the more significant it is. The further p is form 0.00, the less significant it is. It is generally taken that a p value between 0.00 and 0.05 is significant. From this process it is possible to categorize u-terms into (1) those which should be included in the model, (2) those which should not be included, and (3) those which warrant further examination. A further description and examples can be found in the analysis section of this thesis.

6.4 Stepwise Selection Procedures

In this thesis, marginal and partial association tests were used in order to gain an idea of which variables may be included in the final model. Stepwise selection was also used as a supplement to the measures of marginal and partial association. Details of stepwise selection procedures can be found in Goodman (1978) and Dillon and Goldstein (1984).

Two types of stepwise selection procedures are forward selection and backward elimination. In this study the approach of backward elimination was used. Backward elimination begins with a complex model and successfully eliminates the least significant effect at each step. A more detailed discussion of the process of backward elimination is provided in chapter 7 of this thesis.

7.0 Analysis of the Results

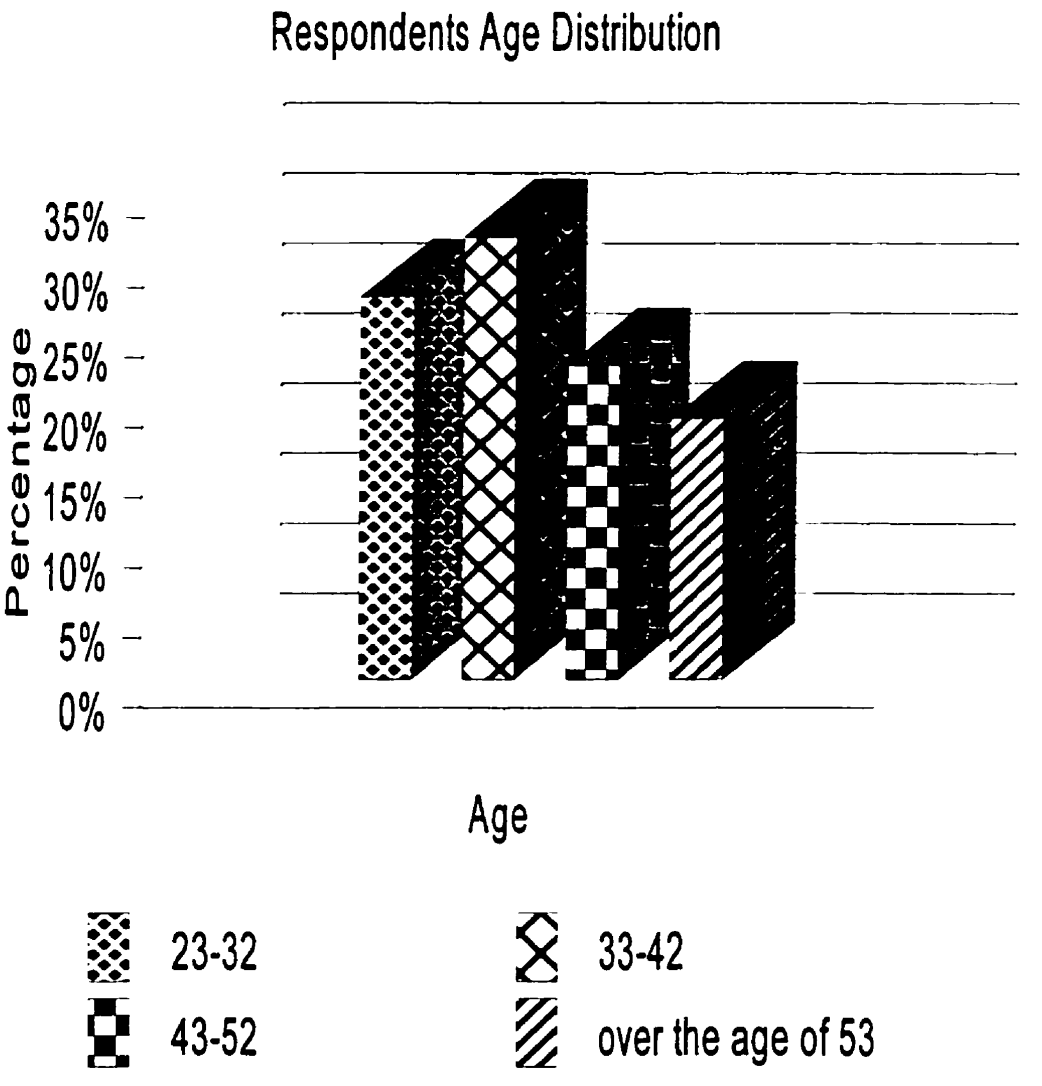
7.1 General Observations

The results from the 1062 survey questionnaires (600 male and 462 female) permit an assessment of the relationships found among socio-economic factors, spatial factors and environmental concern. Before log-linear modelling techniques are used to assess the relationships underlying the categorical data, some general observations from the questionnaire data are presented.

The data from the questionnaires reveal that respondents can be divided into different age groups, with more than 58 percent of the respondents being less than 43 years old (Figure 3). It can also be seen, that 65.5% of the respondents have more than 11 years of education (Figure 4). Therefore, it is evident that more than half of the respondents are young and/or have more than a primary school education. This is not surprising since rice farming (a vast rural occupation) was a large industry, especially during the 1950's and early 1960's when rice farming was a profitable industry. During this time, children would often finish school at the primary level in order to assist in the rice fields. Today, many youth see no future in the rice farming industry and are staying in school in order to obtain a job outside of planting rice (Singh, 1992).

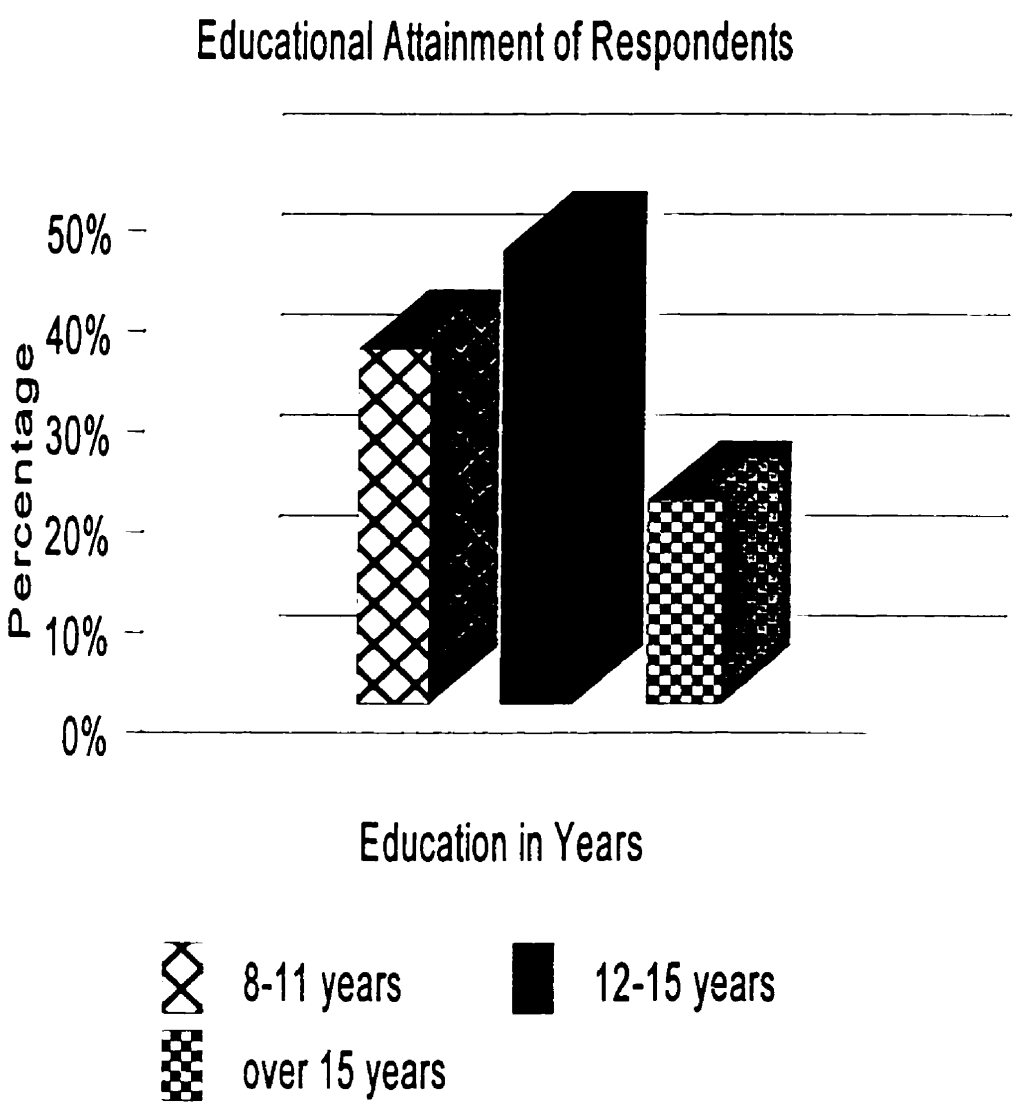
Respondents also live in either rural or urban areas. It can be seen that 56.2% of the respondents living in urban areas reveal a higher level of concern for the environment while only 32.4% of the respondents living in rural areas are highly concerned (Figure 5). It is not surprising that those in urban areas would be more concerned. In these areas residents are

Figure 3



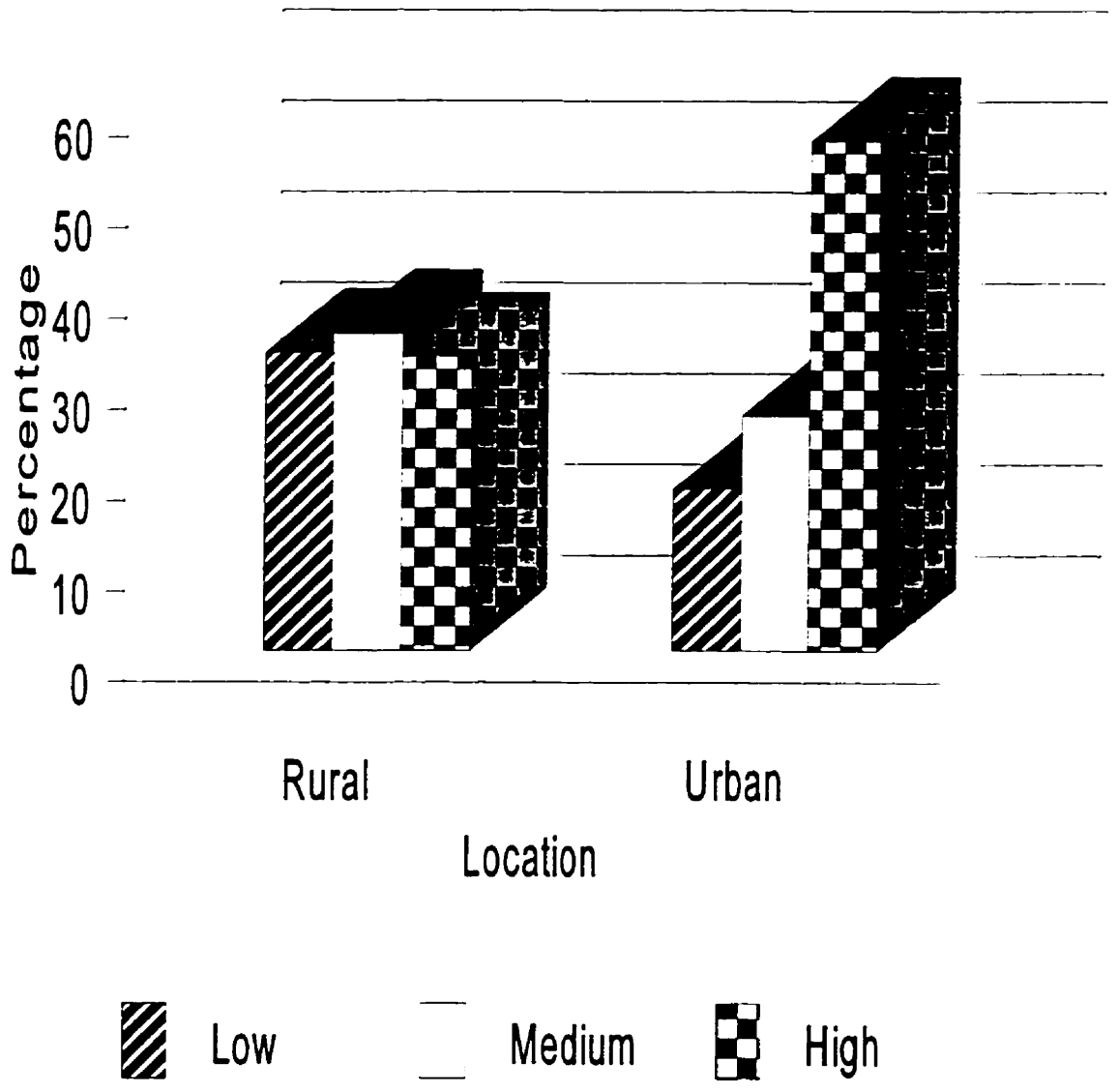
Source: Survey Questionnaires, Canadian Caribbean Research Group, 1996.

Figure 4



Source: Survey Questionnaires, Canadian Caribbean Research Group, 1996.

Figure 5

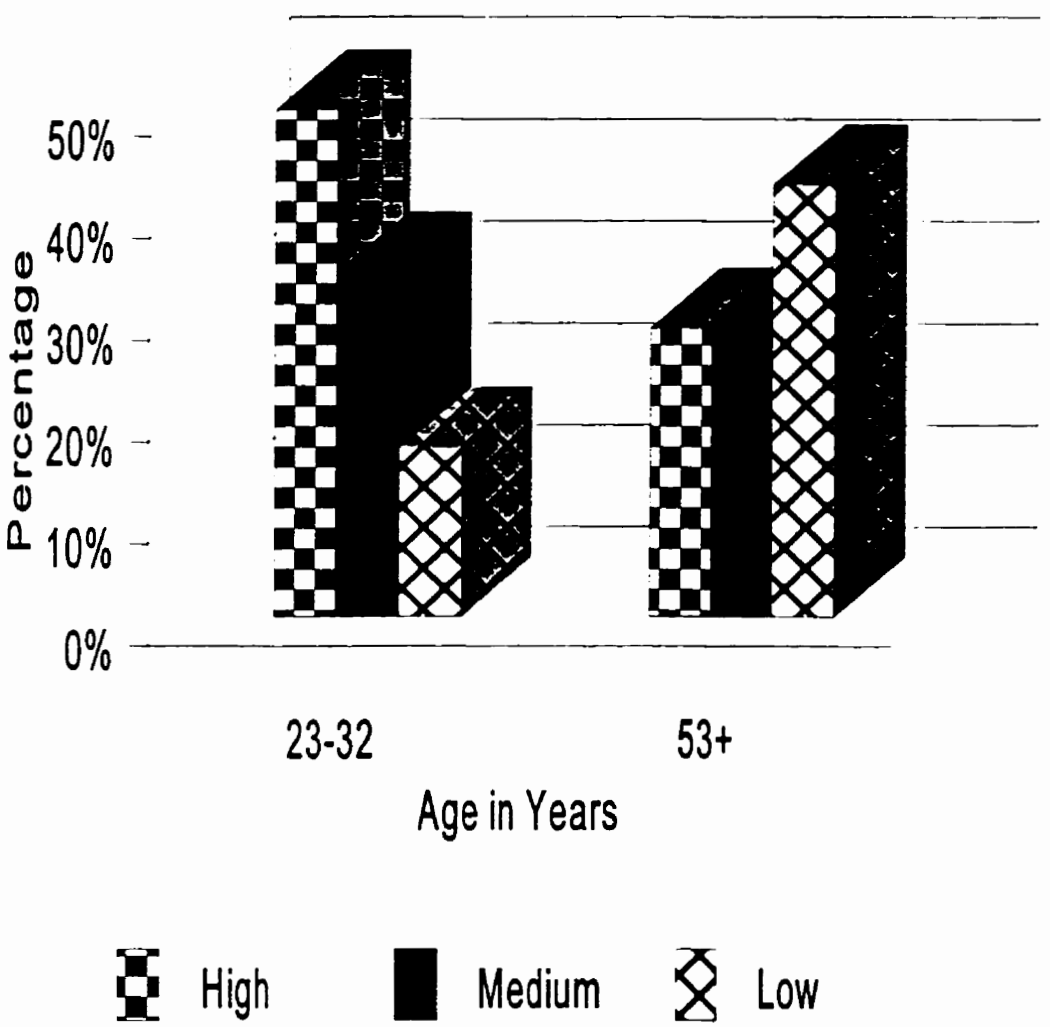


Source: Survey Questionnaires, Canadian Caribbean Research Group, 1996.

exposed to greater instances of environmental degradation. For instance, there is the presence of much garbage due to a lack of landfills resulting in an inadequacy of public sanitation. Respondents of rural areas are not subject to such deterioration.

Finally, the questionnaires reveal that the younger the respondent is, the more environmentally concerned that respondent will be. For example, Figure 6 shows that 49.7% of the respondents aged 23-32 are highly concerned. However, only 28.3% of the respondents over the age of 53 are highly concerned.

Figure 6



Source: Survey Questionnaires, Canadian Caribbean Research Group, 1996.

7.2 Log-Linear Analysis of Four-Dimensional Multi-Frequency Table

To assess the sample population's concern for the environment, a four-dimensional multi-way frequency table was constructed. The four variables are shown in Table 2, together with the choices for each variable, and the letter code which will represent that variable in the following log-linear analysis. The goal of the analysis will be to determine whether concern for the environment (C) is dependent on the respondents' education (E), gender (G) and/or location (L).

Table 2: Variables Used in the Four-Dimension Table

Variable Name	Description	Available Choices	Letter Code
CONCERN	Concern for the Environment	High Concern Medium Concern Low Concern	C
EDUCATION	Education (number of years)	8 to 11 years 12 to 15 years Over 15 years	E
GENDER	Gender	Male, Female	G
LOCATION	Location	Urban, Rural	L

In order to create the multi-way frequency table, the dependent variable, environmental concern (C), was cross-tabulated with the independent variables, education (E), gender (G) and location (L). Table 3 summarizes the information found in the four-way multi-dimensional frequency table. The four-dimensional table was put into a file for processing, and analysed, using the log-linear module in the Statistica program (Statistica,

Table 3: Cross-classification of the Four-Dimensional Table

Case Name			High Concern	Medium Concern	Low Concern
Urban	Male	8-11	16	30	46
		12-15	112	26	8
		15+	58	12	6
	Female	8-11	18	24	34
		12-15	74	48	6
		15+	48	10	4
Rural	Male	8-11	10	40	66
		12-15	56	44	18
		15+	26	16	10
	Female	8-11	6	22	54
		12-15	40	40	8
		15+	18	6	2

Source: Cross-tabulation of Surveys, Lakhan (1997)

1995).

The goal of log-linear analysis is to find the most parsimonious model that will adequately describe the observed data. The first step was to find a model to serve as a starting point. This allows one to get an idea of what types of interactions can be expected to be included in the final model. Table 4 shows the results of fitting all K-factor interactions to the observed data and is used as a guide to determine what kind of interactions (i.e., two-way, three-way) may be expected in the final log-linear model.

For each K-factor in Table 4, the probability p of both the maximum likelihood chi-square statistic and the Pearson chi-square statistic is given, along with the degrees of freedom. The chi-square statistics were used to determine the probability that a log-linear model fits the data, and the program default value, that a log-linear model fits the data if

Table 4: Results of fitting all K-factor Interactions

K-factor	Degrees of Freedom	Max. Lik. Chi-square	Probab. p	Pearson Chi-square	Probab. p
1	6	198.4961	0.000	240.9369	0.000
2	13	418.8831	0.000	426.6646	0.000
3	12	16.9345	0.152	16.6725	0.162
4	4	2.7744	0.596	2.7593	0.598

*A K-Factor is the number of interactions in the model.
K-Factor of 1 - models containing one-way interactions
K-Factor of 2 - models containing two-way interactions
K-Factor of 3 - models containing three-way interactions
K-Factor of 4 - models containing four-way interactions

Source: Log-linear Module, Statistica (1995)

$p > 0.10$, was used. In statistical analysis, the probability p would ordinarily be chosen to have a value between 0.01 to 0.05 to minimize Type I error, rejecting a true hypothesis. However, when using such a low p value, some models that explain the data may be rejected. When choosing a higher p value there is the possibility of a type II error, accepting a hypothesis which is false. To minimize the Type II error, the range of Type I error may be kept between 0.10 and 0.35 (Singh, 1992; Lakhan *et al.*, 1995). The saturated model would have a p value of 1.0, indicating a perfect fit.

K-factors 1 and 2 have a probability *(p)* equal to 0.00, meaning that these k-factors are highly significant (Table 4). This indicates that two-way interactions would be included

in the model. K-factor 3 has probabilities of 0.15 and 0.16, and is not significant. This would thus indicate that the final log-linear model would most likely not contain any three-way interactions, but would be somewhere in between a model that contains all one-way and all two-way interactions.

Tests of Marginal and Partial Association

Marginal and partial association tests for each of the possible effects that can be included in the log-linear model is shown in Table 5. For each effect term, the degrees of freedom and the chi-square value is given for both the partial and marginal association, together with their respective p values. An examination of Table 5 reveals that every main effect is significant and would most likely be included in the final log-linear model. For the two-way interactions, the effects CE and CL are significant and may be included in the final log-linear model. Also, the two-way interaction effect, EL, is significant in the marginal association test (p=0.000) and non-significant in the partial association test (p=0.451). This effect thus requires further examination. The three-way interaction effect, CEG will also need to be examined further since the significance level is approximately 0.01 for both the marginal and partial association tests. Table 6 is a summary table showing the effects that would be expected to be included and excluded, as well as those requiring further examination. Table 5, and therefore measures of partial and marginal association, can be used to understand the kind of effects that may be included in the final log-linear model. Stepwise selection procedures use partial association to test the significance of effects.

Table 5: Tests of Marginal and Partial Association

Effect	Degrees of Freedom	Partial Ass. Chi-sqr.	Partial Ass. p	Marginal Ass. Chi-sqr.	Marginal Ass. p
C	2	70.454	0.000	70.454	0.000
E	2	101.456	0.000	101.456	0.000
G	1	17.618	0.000	17.618	0.000
L	1	8.905	0.000	8.905	0.000
CE	4	328.792	0.000	347.138	0.000
CG	2	2.705	0.259	2.519	0.284
CL	2	46.004	0.000	63.532	0.000
EG	2	0.880	0.644	1.054	0.590
EL	2	1.592	0.451	19.483	0.000
GL	1	3.468	0.063	2.825	0.093
CEG	4	12.001	0.017	12.330	0.015
CEL	4	0.204	0.995	0.301	0.990
CGL	2	3.857	0.146	3.196	0.202
EGL	2	0.906	0.636	0.938	0.626

Source: Output from Log-linear module, Statistica (1995)

Table 6 Summary Table of Effects

Both Partial and Marginal Significant Tests are Significant	Both Partial and Marginal Tests are NOT Significant	Significant Level on tests are Either Partial or Marginal Tests
Include	**Exclude**	**Reserve Judgement**
[C][E][G][L] [CE][CL]	[CG][EG][GL] [CEL][CGL][EGL]	[EL][CEG]

Source: Table modified from Singh (1992)

Backward Elimination

The log-linear module in Statistica uses the backward elimination procedure in order to select the best, and most parsimonious model, from those models under consideration. In stepwise selection procedures various effects are tested in sequence. Here, a log-linear model fits the data if the significance level (i.e. *p* value) is greater than 0.10. A second significance level is used, this being 0.05, in order to test for the significance of an effect. If the significance of an effect is greater than 0.05, then that effect is eliminated from consideration. The first step in this procedure requires that the researcher test for the goodness-of-fit of models of uniform order (Dillon and Goldstein, 1984). Table 7 shows the selection of the starting model that will be used in the backward elimination procedure. Here, three base models were initially examined to determine the best starting model. These base models include one model with all possible three-term effects, one with all possible two-term effects and one with all main effects. Based on a significance level of 0.01 to 0.35, it can be seen that the model which includes all two-way interaction effects ([CE][GC][CL][EG][EL][GL]) is the best initial model. Therefore, the final log-linear model will be somewhere between [C][L][E][G] and [CE][GC][CL][EG][EL][GL].

The next step in the backward elimination procedure is to drop out each two factor effect and assess the adequacy of the resulting fit (Dillon and Goldstein, 1984). Therefore, it was necessary to fit six models, each with five two-term effects. The resulting models were then compared with the initial model to determine whether the difference in G^2 and degrees of freedom is significant or not. For example, to test the effect of GL, the model [CE][GC][CL][EG][EL], which omits GL, is compared to the initial model

Table 7: Selection of an Initial Log-linear Model

Model	Chi-square	Degrees of Freedom	Prob. p
[C][E][G][L]	438.592	29	0.000
[CE][CG][CL][EG][EL][GL]	19.709	16	0.234
[CEG][CEL][CGL][EGL]	2.774	4	0.596

Best Starting Model is: [CE][CG][CL][EG][EL][GL]

Source: Log-linear module, Statistica (1995)

[CE][GC][CL][EG][EL][GL]. The best fitting model (i.e. the model resulting from the removal of the least significant effect) is chosen as the base model for the next step in backward elimination. By following this procedure subsequent models, each with two term effects, are fitted and evaluated.

Table 8 shows the backward elimination of effects of the models considered. This table demonstrates the results of using the two significance levels mentioned above, where 0.10 is the significance level shown in the table and refers to the fit of the log-linear model. The models in Table eight are grouped to show the backward elimination process.

a) The first group of models in this table are models 1 to 6, which test each of the two-way interaction terms in sequence. Model 4, which omits the effect EG and has a p of 0.301, is selected for the next step because it best fits the data.

b) The next step in the backward elimination process, models 7 to 11, uses model 4 as the tarting model. In these models each of the remaining four two-way interactions is tested for significance. Here, model 7 (p=0.337) best fits the data. This model omits the two-way interaction terms, EG and EL, and retains the remaining four two- way effects.

c) Model 7 is used in this step as the base model. Note that, once again, EG, and now EL, are eliminated in all models, since they were both successfully eliminated in the previous steps. At this stage, the sequential elimination of three of the four-two-way interactions are shown in models 12 to 14. (The three two-way interactions are CG, CL and GL). In

Table 8: Log-linear Models Considered Using Backward Elimination

No.	Model	Chi-square	Degrees of Freedom	Effect(s) Omitted	Probab. p
1	[CE][CG][CL][EG][EL]	23.176	17	GL	0.144
2	[CE][CG][CL][EG][GL]	21.301	18	EL	0.265
3	[CE][CG][EG][EL][GL]	65.713	18	CL	0.000
4	**[CE][CG][CL][EL][GL]**	**20.589**	**18**	**EG**	**0.301**
5	[CE][GL][EG][CL][EL]	22.415	18	CG	0.214
6	[CG][CL][EG][EL][GL]	348.501	20	CE	0.000
7	**[CE][CG][CL][GL]**	**22.058**	**20**	**EG, EL**	**0.337**
8	[CE][CG][EL][GL]	66.632	20	EG, CL	0.000
9	[CE][CG][CL][EL]	23.934	19	EG, GL	0.199
10	[CE][CL][EL][GL]	23.627	20	EG, CG	0.259
11	[CG][CL][EL][GL]	349.714	22	EG, CE	0.000
12	[CE][CG][GL]	86.111	22	EG, EL, CL	0.000
13	[CE][CG][CL]	25.403	21	EG, EL, GL	0.230
14	**[CE][CL][GL]**	**25.097**	**22**	**EG, EL, CG**	**0.293**

Table 8 Continued

No.	Model	Chi-Square	Degrees of Freedom	Effect(s) Omitted	Probab. P
15	[CL][CG][GL][E]	396.196	24	EG, EL, CE	0.000
16	**[CE][CL][G]**	**27.922**	**23**	**EG, EL, CG, GL**	**0.219**
17	[CE][GL]	88.629	24	EG, EL, CG, CL	0.000
18	[CL][GL][E]	372.23	26	EG, EL, CG, CL	0.000
19	[CE][CL]	45.603	24	EG, EL, CG, GL	0.005
20	[CE][CL][CG]	25.403	21	-	0.230
21	[CE][CL][EGL]	21.476	16	-	0.161
22	[CE][C][CEG]	12.316	15	-	0.655

Source: Output from log-linear module Statistica (1995)

this step the effect, CE, is retained in all three models and it can be verified that any log-linear model that omits this effect does not fit the data. Model 14 was selected as the base model for the next step.

d)The final stage of backward elimination involves models 15 to 19 which test for various effects. In order to test for the effect of CE, model 7 was used. Model 15 verifies that adding the main effect, E, does not improve the fit of the model when the effect CE is omitted. Model 15 also accounts for all the variables by adding the main effect, E. Model 16 , which removes the effect GL from model 14 fits the data. However, adding the variable G, once again, accounts for all of the variables. Model 17 tests for the effect CL and does not fit the data. Model 18 does not fit the data even though all the effects are included. Model 19 does not include the effect, G (found in model 16), and does not fit the data. For this reason, model 16 is considered to be the best log-linear model.

Based on the partial and marginal association tests, the effects CE and CL would be expected to be included in the final log-linear model. Model 16, [CE][CL][G], the best model found through the process of backward elimination, demonstrates that there is a relationship between environmental concern (C) and education (E), as well as a relationship between environmental concern (C) and location (L). The main effect, gender (G), is required to adequately fit the model to the data. However, whether gender is truly related to environmental concern still needs to be determined. Table 8 tests gender by fitting model 20, [CE][CL][CG], to the data. Model 20 does not significantly improve the fit of the data. It is also a more complex model containing three two-way interaction effects as opposed to the two two-way interaction effects, and one main effect, found in model 16. The interaction between the independent variables of education, gender, and location (EGL) is beyond the scope of this study. This interaction was, nevertheless, tested in model 21 to verify that it has no significant impact. Model 21 does not improve the fit of the data and is also a more complex model than model 16 (Table 8) due to the inclusion of the three-way interaction effect. Also, the effect CEG required further investigation, since it appeared to be significant but three-way effects were not in consideration. Model 22 shows that the three-way interaction, CEG, does improve to the fit of the model. However, since three-way effects were eliminated from consideration in the testing of K-factors, and since model 16 in backward elimination is a simpler model, model 16 was accepted as the best, and most parsimonious, log-linear model.

From Table five it was determined that two effects (EL and CEG) required further examination. Some comments are made here. Firstly, in the present study, there is no focus

on the interaction between education and location. This effect, EL, was also eliminated in Table 8 when model 7 was tested. The effect CEG was not in consideration since the starting model did not include any three-way interaction effects. However, it can be stated that the final log-linear model did incorporate the two lower-order effects CE and G.

7.3 Log-linear Analysis of Five-Dimensional Multi-Frequency Table

The previous four-dimensional table was extended by one variable, AGE (A), in which there were four categories: 23-32 years, 33-42 years, 43-52 years, and 53+ years. Therefore, a new multi-way table was created incorporating this fifth variable, and Table 9 is a summary of this table. The saturated model which reproduces the data is [CEGLA], and the model indicating that there are no relationships among the five variables is [C][E][G][L][A]. The five-dimensional multi-way frequency table, consisting of 144 cases, is more complex than the four-dimensional table, consisting of 36 cases. Table 10 shows the results of fitting all k-factor interactions relating to the five-dimensional table. It can be established that the final log-linear model will contain three-way and/or four-way interactions (Table 10).

Partial and Marginal Associations

The tests of marginal and partial association for the five-dimensional table are displayed in Table 11. It was determined that the final log-linear model will be composed of three- and/or four-way interaction effects (Table 10). Upon examination of Table 11, it was determined that the four-way effect, EGLA, is significant for both partial and marginal

Table 9: Cross Classification of the Five-Dimensional Table

Case Name				High Concern	Medium Concern	Low Concern
Urban	Male	8-11	23-32	0	6	12
			33-42	6	10	4
			43-52	6	4	14
			53+	4	10	16
		12-15	23-32	24	8	0
			33-42	26	6	4
			43-52	44	4	2
			53+	18	8	2
		15+	23-32	18	6	0
			33-42	24	4	4
			43-52	6	2	2
			53+	10	0	0
	Female	8-11	23-32	8	6	12
			33-42	6	8	4
			43-52	4	6	8
			53+	0	4	10
		12-15	23-32	12	12	0
			33-42	36	16	6
			43-53	16	12	0
			53+	10	8	0
		15+	23-32	10	6	0
			33-43	30	4	2
			43-53	4	0	2
			53+	4	0	0
Rural	Male	8-11	23-32	8	18	10
			33-42	2	12	14
			43-53	0	6	16
			53+	0	4	26
		12-15	23-32	22	10	2
			33-42	24	14	4
			43-53	6	8	4
			53+	4	12	8
		15+	23-32	14	8	0
			33-42	6	6	0
			43-53	4	0	4
			53+	2	2	6

Table 9 continued

Case Name				High Concern	Medium Concern	Low Concern
Rural	Female	8-11	23-32	0	4	12
			33-42	0	8	8
			43-52	4	6	20
			53+	2	4	14
		12-15	23-32	18	12	0
			33-42	8	16	2
			43-52	12	6	4
			53+	2	6	2
		15+	23-32	10	2	0
			33-42	6	4	2
			43-52	2	0	0
			53+	0	0	0

Source: Cross-tabulation of Surveys, Lakhan (1997)

Table 10: Results of Fitting all K-Factor Interactions

K-Factor	Degrees of Freedom	Max. Lik. Chi-square	Probab. p	Pearson Chi-square	Probab. p
1	9	227.369	0.000	286.488	0.000
2	31	514.564	0.000	584.995	0.000
3	51	92.191	0.000	89.908	0.001
4	40	60.905	0.018	43.544	0.323
5	12	16.584	0.166	31.731	0.002

• A K-Factor is the number of interactions in the model.
K-Factor 1 - models containing one-way interactions
K-Factor 2 - models containing two-way interactions
K-Factor 3 - models containing three-way interactions
K-Factor 4 - models containing four-way interactions
K-Factor 5 - models containing five-way interactions

Source: Log-linear module, Statistica (1995)

association tests (p=0.001 and 0.040 respectively). Two four-way effects, CGLA and CELA, are only significant for the partial association test (p=0.001 and 0.035 respectively). At this preliminary stage it can be expected that the effect, EGLA, would most likely be included in the final log-linear model.

Four of the ten three-way effects, CEG, CEA, CLA and GLA, are significant in both the marginal and partial association tests. Taking into account the hierarchial nature of log-linear models it can be seen that the effect, CEG, is the only significant three-way effect that is not a lower order effect of one of the significant four-way effects (CELA, CGLA, and EGLA). While this is only a preliminary stage, Table 10 reveals that the two (CEGL and CEGA) four-way effects that incorporate the three-way effect, CEG, are not significant. Therefore, the effect CEG is not expected to be a part of the final log-linear model.

Table 11 verifies that all of the significant two-way effects are lower order terms of the significant four-way effects or three-way effects. The significant two-way effects are CE, CL, CA, EA, LA. Two two-way effects, EL and GA, are significant in only one of the tests and therefore require further examination. The effect terms EL and GA are both lower order effects of the significant 4-way effects (CELA, CGLA and EGLA). All main effects are significant. Table 12 is a summary table of effects included and excluded.

Table 11: Tests of Marginal and Partial Association

Effect	Degrees of Freedom	Partial Ass. Chi-square	Partial Ass. p	Marginal Ass. Chi-square	Marginal Ass. p
C	2	67.154	0.000	67.154	0.000
E	2	96.318	0.000	96.318	0.000
G	1	16.836	0.000	16.836	0.000
L	1	8.480	0.004	8.480	0.004
A	3	38.578	0.000	38.578	0.000
CE	4	290.305	0.000	326.827	0.000
CG	2	2.817	0.245	2.404	0.301
CL	2	47.244	0.000	60.966	0.000
CA	6	48.832	0.000	66.663	0.000
EG	2	1.071	0.585	0.869	0.648
EL	2	2.167	0.338	18.194	0.000
EA	6	30.717	0.000	50.083	0.000
GL	1	3.166	0.075	2.625	0.105
GA	3	12.444	0.006	12.093	0.071
LA	3	10.148	0.017	8.471	0.037
CEG	4	10.370	0.035	11.007	0.027
CEL	4	0.498	0.974	0.222	0.994
CEA	12	26.124	0.010	24.648	0.02
CGL	2	3.245	0.197	3.065	0.22
CGA	6	3.561	0.736	4.227	0.646
CLA	6	22.863	0.001	23.337	0.001
EGL	2	0.111	0.946	0.713	0.701
EGA	6	5.563	0.463	7.434	0.283
ELA	6	6.540	0.365	8.484	0.205

Table 11 continued

Effect	Degrees of Freedom	Partial Ass. Chi-square	Partial Ass. p	Marginal Ass. Chi-square	Marginal Ass. p
GLA	3	11.148	0.011	12.994	0.005
CEGL	4	3.111	0.539	2.412	0.660
CEGA	12	6.667	0.879	4.062	0.982
CELA	12	22.258	0.035	20.264	0.062
CGLA	6	21.720	0.001	10.889	0.092
EGLA	6	23.617	0.001	13.200	0.040

Source: Output from Log-linear Module, Statistica (1995)

Table 12: Model Selection using both Partial and Marginal Association Tests

Both Partial and Marginal Tests are Significant	Both Partial and Marginal Tests are NOT Significant	Significant level on either Partial or Marginal Tests
INCLUDE	EXCLUDE	RESERVE JUDGEMENT
[C] [E] [G] [L] [A] [CE] [CL] [CA] [EA] [LA] [CEG] [CEA] [CLA] [GLA] [EGLA]	[CG] [EG] [GL] [CEL] [CGL] [CGA] [EGL] [EGA] [ELA] [CEGL] [CEGA]	[EL] [GA] [CELA] [CGLA]

Source: Format from Singh (1992)

Selection of the Best Initial Model

As with the four-dimensional table, the next step is to select the best model to use as the base model in the backward elimination procedure. Table 13 shows the selection of the best initial model. Here, four base models were initially examined in order to determine the

best starting model. These base models include one with all possible four-term effects, one with all possible three-term effects, another with all possible two-term effects and one with all main effects. The best initial model is the one that contains all possible four-way interactions, [CEGL][CEGA][CELA][CGLA][EGLA], with a *p* of 0.167.

Table 13: Selection of an Initial Log-linear Model

Model	Chi-Square	Degrees of Freedom	Probab. p
[C][E][G][L][A]	684.244	134	0.000
[CE][CG][CL][CA][EG] [EL][EA][GL][GA][LA]	169.679	103	0.000
[CEG][CEL][CEA][CGL][CGA][CLA] [EGL][EGA][ELA][GLA]	77.483	52	0.013
[CEGL][CEGA][CELA][CGLA][EGLA]	16.552	12	0.167

Best starting model is: [CEGL][CEGA][CELA][CGLA][EGLA]

Source: Log-linear module, Statistica (1995)

Stepwise, Backward Elimination

Table 14, which is divided into groups, depicts the backward elimination procedure used to find the best, and most parsimonious model for the five-dimensional frequency table.

a) The model which contains all four-way interactions was used as the base model for the first step in this process. Model 4, was selected as the base model for the next step.

b) Models 6 to 9 tests each four-way interaction in model 4 in sequence, and adds a three-way effect that is derived from the excluded four-way effect. The main effect L is excluded from the fitted three-way effect for all models. The effect L is already included in the remaining four-way effects and therefore does not need to be in the tested. Model 9 was selected as the base model for the next step.

Table 14: Log-linear Models Considered Using Backward Elimination

No	Model	Chi-square	Degrees/ Freedom	Effect(s) Omitted	Probab. p
1	[CEGL][CEGA][CELA][CGLA]	40.200	18	EGLA	0.002
2	[CEGL][CEGA][CELA][EGLA]	38.299	518	CGLA	0.004
3	[CEGL][CEGA][EGLA][CGLA]	38.837	24	CELA	0.028
4	**[CEGL][EGLA][CELA][CGLA]**	**23.246**	**24**	**CEGA**	**0.505**
5	[EGLA][CEGA][CELA][CGLA]	19.686	16	CEGL	0.235
6	[CEGL][EGLA][CELA][CGA]	42.276	30	CGLA, test CGA	0.068
7	[CEGL][EGLA][CGLA][CEA]	42.644	36	CELA, test CEA	0.207
8	[CEGL][CGLA][CELA][EGA]	44.369	30	EGLA, test EGA	0.044
9	**[CGLA][EGLA][CELA][CEG]**	**25.389**	**28**	**CEGL, test CEG**	**0.607**
10	**[CGLA][EGLA][CELA]**	**34.814**	**32**	**CEG**	**0.336**
11	[CGLA][EGLA][CEG][CEL] [CEA]	43.934	40	CELA test CEL,CEA	0.309
12	[CGLA][CELA][CEG][EGL] [EGA]	46.999	34	EGLA, test EGL,EGA	0.069
13	[CELA][EGLA][CEG][CGL] [CGA]	43.557	34	CGLA test CGL,CGA	0.126

Table 14 continued

14	**[CGLA][EGLA][CEL][CEA]**	**54.298**	**44**	**CELA test CEL,CEA**	**0.138**
15	[CGLA][CELA][EGL][EGA]	55.863	38	EGLA test EGL,EGA	0.031
16	[CELA][EGLA][CGL][CGA]	54.651	38	CGLA, test CGL,CGA	0.039
17	[CGLA][EGLA][CEL]	82.567	56	CEA	0.012
18	**[CGLA][EGLA][CEA]**	**55.646**	**48**	**CEL**	**0.209**
19	[CGLA][CEA][CEL][EGL][EGA] [ELA]	76.727	50	ELA, EGA, EGL	0.009
20	[EGLA][CEA][CEL][CGL][CGA] [CLA]	74.662	50	CGA, CLA,CGL	0.014
21	[CGLA][EGLA][CE]	83.173	60	L in CEL	0.026
22	[CGLA][CEA][EGL][EGA][ELA]	77.486	54	CEL from model 19	0.099
23	[EGLA][CEA][CGL][CGA] [CLA]	75.427	54	CEL from model 20	0.029

Source: Output from Log-linear module, Statistica (1995)

c) Models 10 to 13 include three-way interactions which are derived from the excluded four-way effects. Model 10 is chosen as the base model for the next step.

d) Model 14 was chosen as the base model for the next step.

e) Models 17 and 18 test each of the three-way effects from model 14. It can be seen that model 17, eliminating the three-way effect CEA, does not fit the data. However, model 18 with a p of 0.209, does fit the data and eliminates the effect CEL. This model is used as the base model in the next step of backward elimination.

f) Since models 17 and 18 contain two four-way effects in common (CGLA and EGLA), one of the four way effects was excluded while retaining both three-way effects, CEL and CEA. At the same time, three-way effects, derived from the excluded four-way effect, were added. This process is shown in models 19 and 20 and neither fits the data.

g) In a test to incorporate a two-way effect, model 21 uses model 17 as the base model, and excludes the main effect, L. Model 21 does not fit the data.

h) Models 22 and 23 attempt to exclude a four-way effect by including possible three-way interactions but neither model fits the data. The conclusion is that model 18, [CGLA][EGLA][CEA], best fits the data.

From examination of Table 11 it was expected that the four-way effect, EGLA, would be included in the final log-linear model. However, the marginal association was not significant for either CEA or CGLA (Table 11), making it unclear if these effects would be included in the model. The effect, CELA, was eliminated when model 14 was tested during the backward elimination procedure.

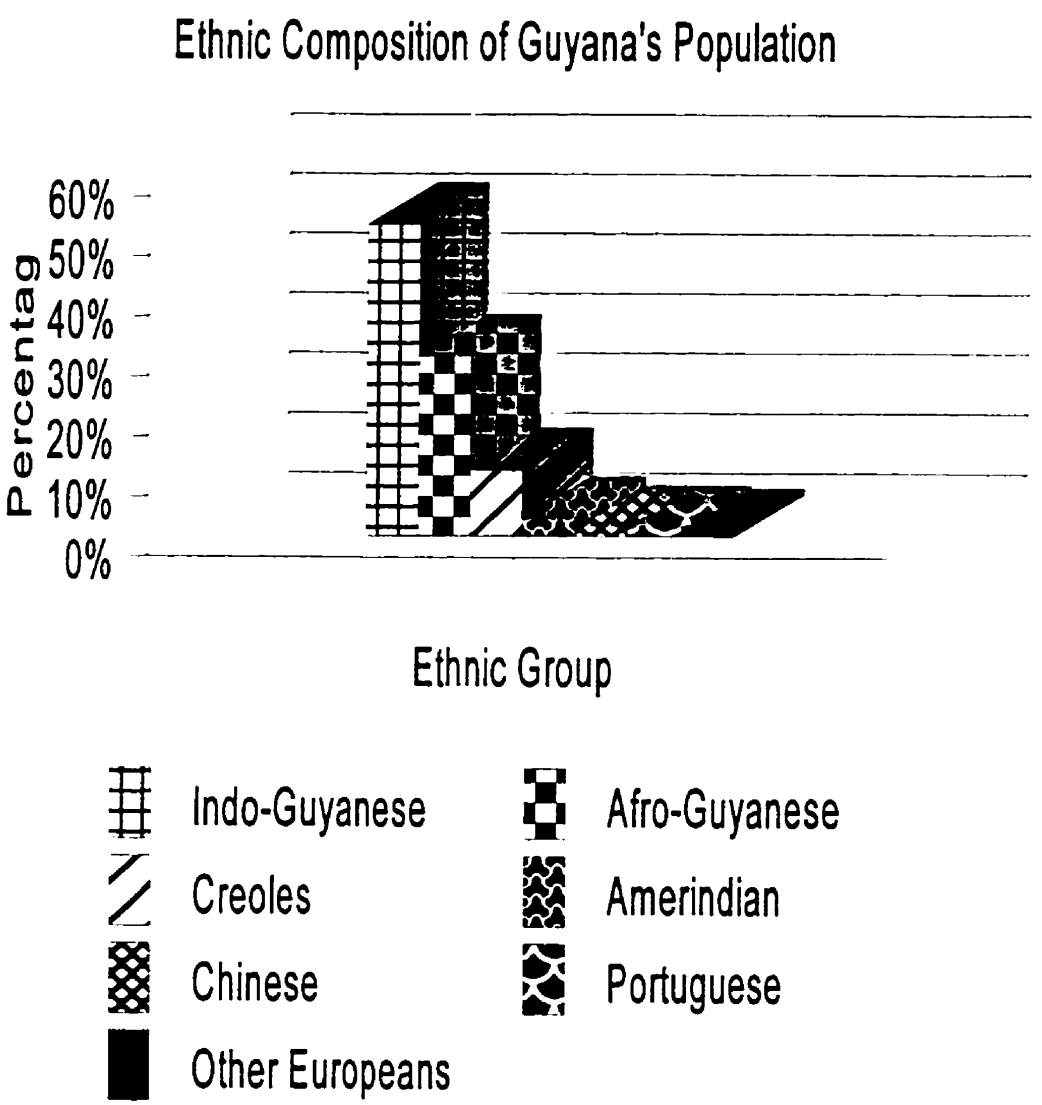
The log-linear model, [CGLA][EGLA][CEA], indicates that environmental concern is related to gender, location and age. Environmental concern is also related to education and age. Although the relationship among education, gender, location and age is beyond the scope of this study, it is required in order to fit the model to the data. It must be made clear that for a five-dimensional table, the saturated log-linear model, [CEGLA] fits the data perfectly. This is because the relationship among the five variables explains the observed data exactly. The log-linear model, [CGLA][EGLA][CEA] is the most parsimonious model in this case, but is not a simple model. Note that adding the variable E to the first four-way effect results in the saturated model, while adding the variable C to the second four-way effect also results in the saturated model.

8.0 Discussion of the Results

Guyana, often called the land of six races, has distinct ethnic groups reflecting the history of its colonialism (Figure 7). Colonialism was based on a pluralist society which states that given separate cultural groups, one must be in control if the society is to be maintained in its present form (Smith, 1974). In colonial Guyana, this model envisions a society made up of Indian, Black and European subcultures dominated by the European monopoly of power. Remnants of this society remain today, but the effect is lessening (Barber and Jeffrey, 1986). There is also a residential preference where ethnic groups live in distinct communities (Lakhan, 1997). For example, almost half (45%) of Blacks live in urban areas whereas the rest live in small villages (Barber and Jeffrey, 1986). These factors may affect the outcome of the following results. However, because ethnicity was not examined, how it reflects the results cannot be determined.

The four-dimensional table cross-classifying environmental concern of the respondents [C], the educational attainment of the respondents [E], their location [L] and gender [G] does not include the variable age, and adequately describes the data. It is also a simpler model than that found with the five-dimensional table. The resulting model, [CE][CL][G], reveals relationships between educational attainment and environmental concern [CE] and location and environmental concern [CL]. Also, the fit for the main effect, G, is good between the table of observed frequencies and the table of fitted frequencies. The *p* value for this variable in the tests of marginal and partial association was 0.00, and it was accepted in model 16 of the stepwise, backward elimination procedure.

Figure 7

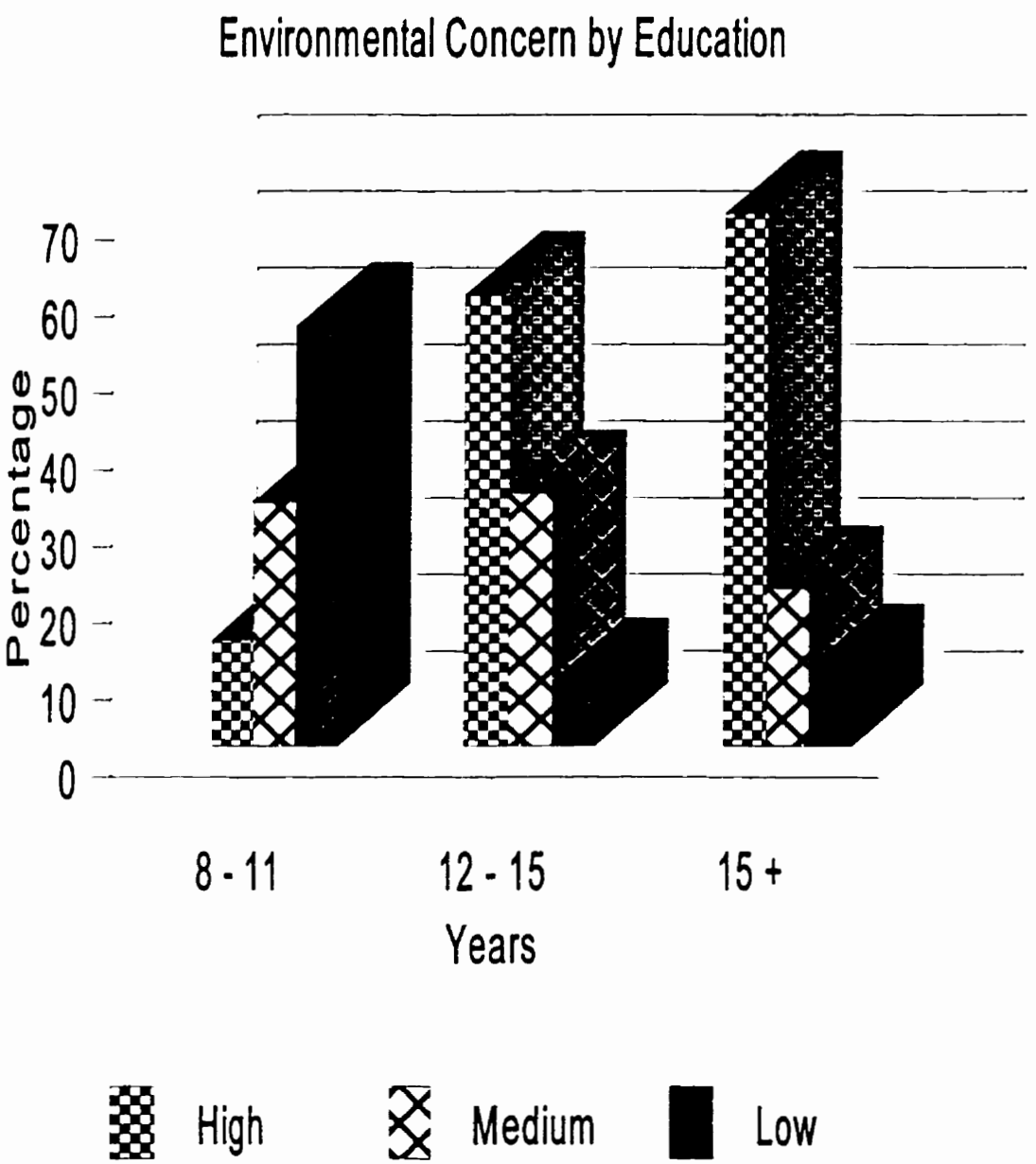


Source: Lakhan, 1990

Firstly, the model emphasized that the respondents location [L] and educational attainment level [E] has a statistically significant partial and marginal association with environmental concern [C]. The *p* values of both the partial and marginal association tests are 0.00 for both effect terms, [CE] and [CL]. Hence, it appears that the level of environmental concern of a respondent is determined by their educational attainment (level obtained) and if they live in either a rural or urban area. These findings are extremely significant and indicate that both education, and location, play an important role in the level of a person's environmental concern. The log-linear model result, and figure 8, reveals that the more formal education a person has, the greater their level of concern where 69.4% of those with more than 15 years of education have a higher level (degree) of concern for the environment while only 13.7% of those with 8-11 years of education are highly concerned about the environment. This is not surprising since many studies have found that those with higher education are more concerned. In Guyana more and more people are remaining in school, making them more aware and knowledgeable of their conditions and surroundings. This, in turn, may make them more conscious of the environment. Pauda (1994), in a study of Brazilian parks, found that students became more knowledgeable about the region in which they live leading to concern about environmental conditions. Those without education remained unaware of the importance of the resources allowing the destruction of the area's parks to continue unabated.

In Guyana, environmental education is an integral part of all curriculum, from nursery to primary school all the way through to university. Courses such as, for example, social science, science, geography and history incorporates environmental education. The

Figure 8



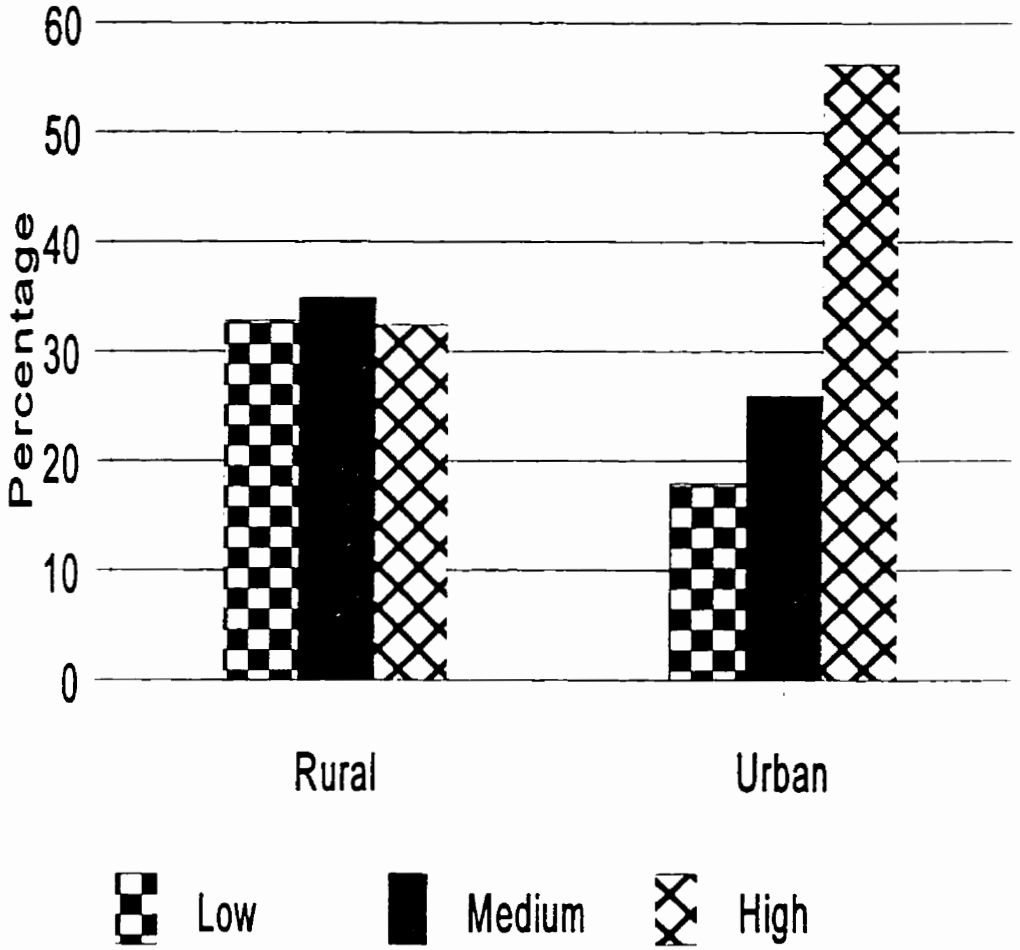
Source: Survey Questionnaires, Canada Caribbean Research Group (1996).

University of Guyana has an environmental program which includes how to preserve the environment. Here, students are likely to learn causes of environmental degradation and preservation measures. This is perhaps one reason why those with a university education are more concerned about the environment than those with only a primary or secondary school education (Goolsarran, 1997). Therefore, the hypothesis that educational attainment levels between rural and urban residents contribute to differences in environmental concern is valid.

From the model for the four-dimensional table, it also seems that the respondents' location affects their environmental concern where those persons in urban areas are more concerned. Figure 9 reveals that 56.2% of urban residents are highly concerned about the environment and only 32.4% of rural residents are highly concerned for the environment. Figure 9 also reveals that 32.8% of the rural residents are not very concerned about the environment while only 17.7% in urban areas have little concern. It is not surprising that those in urban areas would be more concerned. In these areas residents are exposed to greater instances of environmental degradation. For instance, there is the presence of much garbage in urban areas due to a lack of landfills which results in an inadequacy of public sanitation. Respondents of rural areas are not subject to such deterioration. Therefore, the hypothesis that rural-urban residence will be related to environmental concern, with urban residents having higher levels of concern is valid.

In rural areas, the environment is generally more healthy and less polluted. Urban areas produce huge amounts of solid and liquid waste leading to environmental health damage. Due to a lack of infrastructure and services - piped water supplies, sewage connections, garbage collection - these pollutants are released into the water and soil, finding

Figure 9 Concern and Location



Low	32.8	17.9
Medium	34.9	25.9
High	32.4	56.2

Source: Survey Questionnaires, Canada Caribbean Research Group (1996).

their way into the human body as result of breathing, eating and drinking. Untreated, this leads to diseases such as cholera (Hardoy and Satterthwaite, 1991; Rodda, 1993).

Urban residents are also concerned about the impacts of mining, whereas rural residents are not. One example of an impact of mining is when, in 1995, the tailings pond next to the Omai Gold Mine gave way and spilled and estimated 3.2 million cubic metres of cyanide-tainted waste into the Essequibo River. This environmental disaster killed many fish and animals in addition to making many people sick. Today this mine is still in operation and the government is allowing a constant level of cyanide run-off into the river. Cyanide is lethal in large doses, and long-term exposure to lower levels can cause mental retardation (Word, 1997).

The graphs also reveal that there is little difference between the three environmental concern levels for rural residents with 32.4%, 34.9% and 32.8% for high, medium and low concern respectively. A reason for this could be because many rural residents are farmers (especially rice farmers) and the concerns for all individuals are similar which include flooding, saltwater intrusion, loss of mangrove vegetation, and water contamination. It appears that rural residents seem to be more concerned about what affects their livelihood, and since they all rely on farming and mangrove forests, there is little difference in the concern levels.

Gender is a main effect included in the model [CE][CL][G]. However, it is apparent that gender has no relationships with any of the other variables. Table 5 reveals that gender is not related to environmental concern since the p value is 0.269 for the partial association and 0.284 for the marginal association. Therefore, this effect was insignificant and excluded

from the final model. Also, gender is not related to either education or location because of its insignificance in the partial and marginal association tests. These two associations were eliminated in the stepwise selection procedures at models 4 and 16 respectively. It can be speculated that the numerical difference between the males and females in the sample was sufficient to have gender appear as a main effect in this model. That is, although the differences in responses between males and females was small, it was still large enough to have an effect in the model.

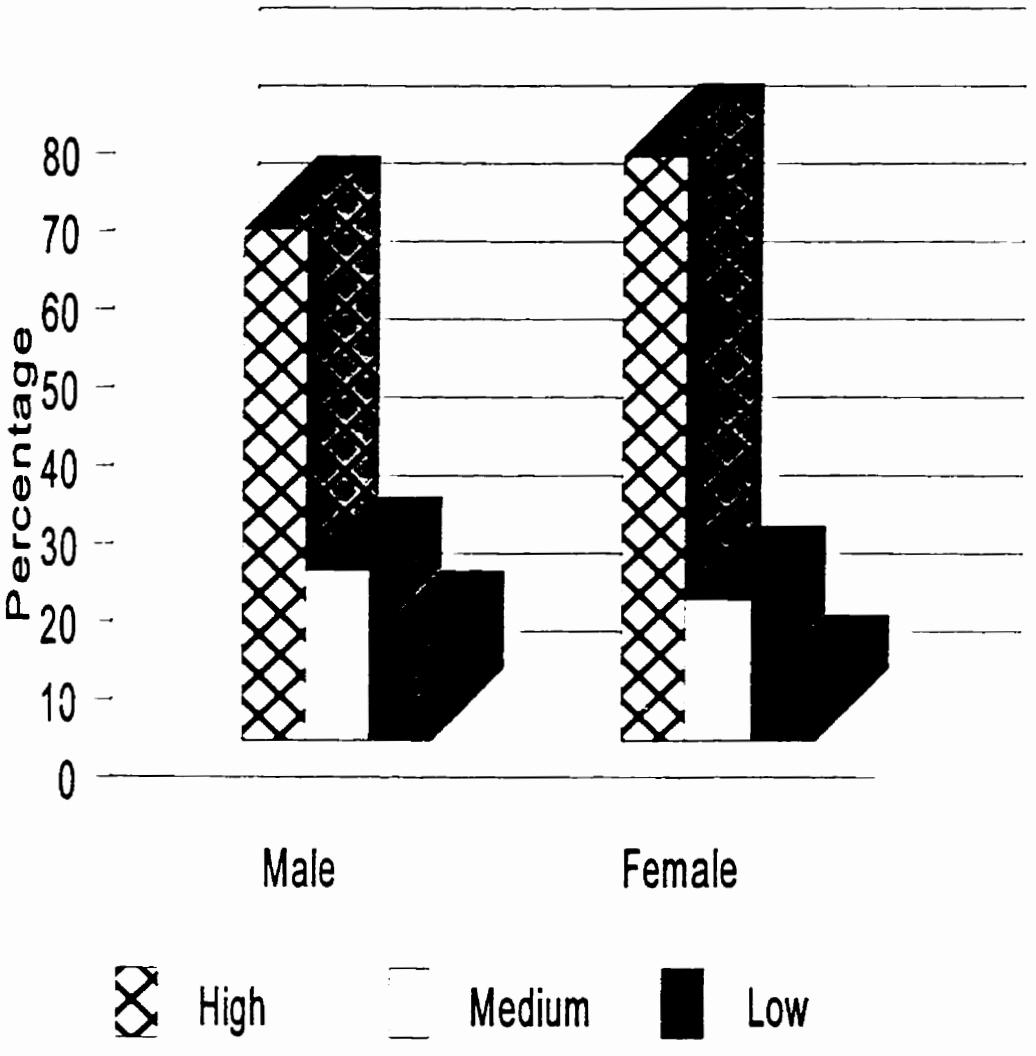
The goal of log-linear analysis is to determine the most parsimonious model which still adequately describes the data, and the inclusion of gender in the model indicates that this variable plays some role in environmental concern. To explain why the variable gender is included as a main effect, the associations, [CE] and [CL], will be examined separately for both women and men, respectively. Within each category (i.e. women and men) one will not find all the respondents being either highly concerned, mildly concerned, or have little concern. Instead, these results will be mixed causing interactions between the variables under study. The profiles of the responses will differ within the groups.

Results reveal that the hypothesis that gender will have an effect on environmental concern, with women being more concerned than men, was not supported in this study. This investigation found that women with 15 or more years of education are slightly more concerned about the environment than men with 15 or more years of education, at 75% and 65.6% respectively (Figure 10). Figure 10 provides a clue as to why gender is included as a main effect. Here, there is a larger proportion of women who are highly concerned about the environment, and a smaller proportion who have little concern for the environment at this

level of education. Therefore, it appears that gender may affect a persons' environmental concern. However, it must be kept in mind that a main effect has no relationship to any of the other variables. Figure 10 shows that the difference between the genders is not large, and, therefore, not significant.

Figure 10

Concern for those with more than 15 Years of Education



Source: Survey Questionnaires, Canada Caribbean Research Group (1996).

Interactions also occurs between environmental concern and location. Figures 11 and 12 reveal that men, in urban areas, are slightly more concerned about the environment than are women in urban areas. However, as with education, there is little difference between the genders. Therefore, in this study, gender has no relationship to environmental concern. A reason for this apparent lack of interaction with any of the other variables is that many residents of Guyana are exposed to environmental courses which may cause a lack in differences among the genders relating to environmental concern.

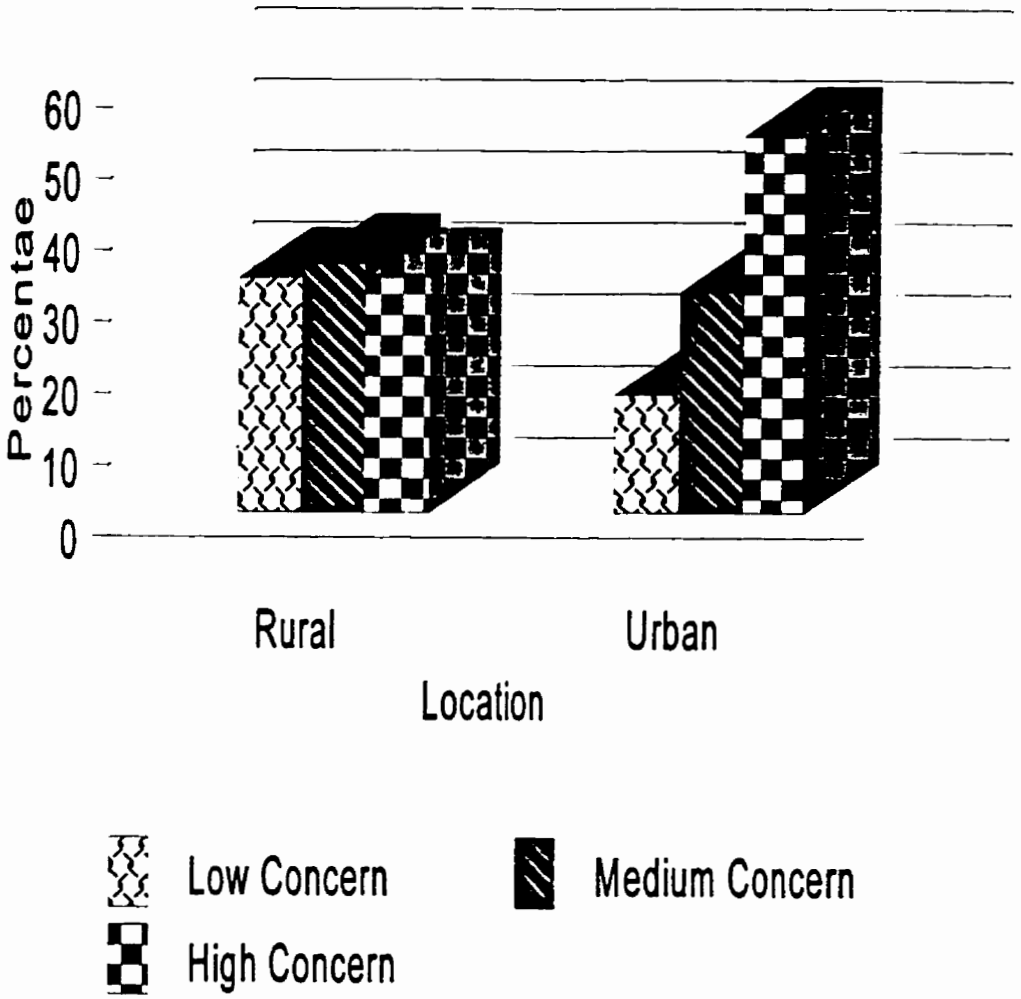
From the five-dimensional model relating the variables environmental concern [E], gender [G], educational attainment of the respondent [E], location of the respondent [L] and age [A] it is evident that there are relationships between environmental concern, gender, location and age [CGLA]. There are also relationships between education, gender, location and age [EGLA]. However, it should be noted that any relationship between the latter variables is not the focus of this thesis. One final relationship is that of environmental concern, education and age [CEA]. Therefore, it can be seen that the variable age leads to a complex relationship.

The difference between the four-dimensional table and the five-dimensional table is the addition of the variable age which may have changed the relationship among the variables. In some cases a table of higher dimensions does not explain the data as adequately as a table of lower dimensions (Lakhan, 1997). The five-dimensional table results in a log-linear model with two four-way effects. These effects are not very desirable and are often difficult to interpret (Gilbert, 1981).

The model [CGLA][EGLA][CEA] does not adequately fit or describe the data.

Figure 11

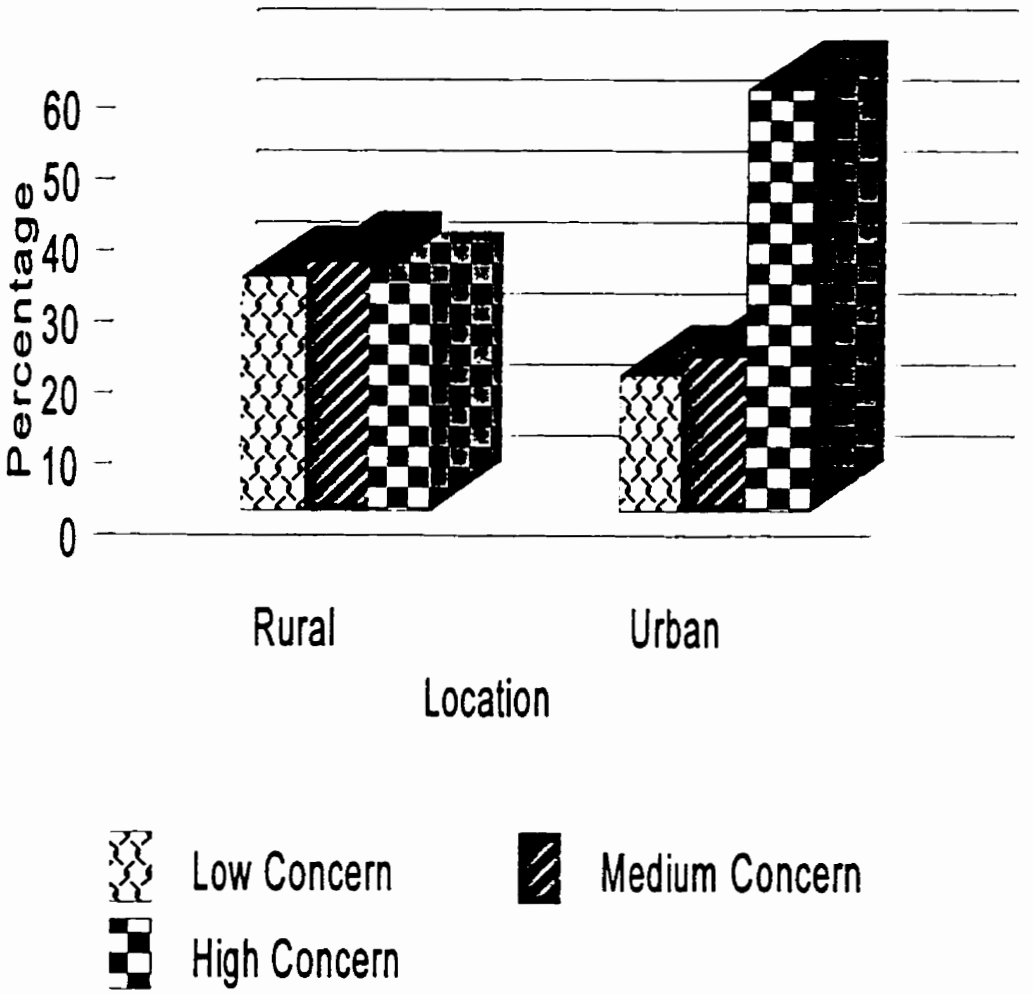
Concern Versus Location for Female Respondents



Source: Survey Questionnaires, Canada Caribbean Research Group (1996).

Figure 12

Concern Versus Location for Male Respondents



Source: Survey Questionnaires, Canada Caribbean Research Group (1996).

Firstly, a four-way interaction ([EGLA]), showing a relationship which is beyond the scope of this study, is present in the model. This provides an inadequate fit to the data in terms of the relationships of interest, these being how the independent variables of location, education, gender and age affect the dependent variable of concern. Also, in this data set age seems to have a strong association with all of the variables (since it is found in all of the interactions). This would suggest that the sample size, for the variable of age, does not include a representative portion of each age group in the population surveyed. Figure 3 reveals there is an over representation of younger (ages 33-42) respondents at 31.6%, and an under representation of older (over 53 years of age) respondents at 18.6%. This could potentially cause a relationship to appear in the frequencies which, in reality, is not there. Thirdly, the variable gender needs to be included so that the model provides a good fit with the data. However, this variable does not add anything to the relationship found in either four-way interactions. If anything, it appears to weaken the relationships between the remaining variables. Finally, four-way interactions provide complex relationships which may change the dynamics of the interactions. Complex interactions are not desirable in log-linear analysis (Gilbert, 1981) and should be avoided if possible.

Since no conclusions can be made about the variable age in this study, the hypothesis that age will be related to environmental concern, with those who are younger revealing greater concern, cannot be accepted. Therefore, in this study, nothing can be concluded about the variable age (which may or may not have an effect) and results in an inadequate fit of this model to the data. In addition, the four-dimensional table is more parsimonious than the five-dimensional table, describes the data better and produces a better fit with G^2 of

27.922, d.f equal to 23 and a p of 0.219.

9.0 Conclusions and Recommendations

9.1 Conclusion and Uniqueness of Study

Log-linear analysis provides a useful technique for determining and understanding a multitude of interactions among factors which may affect environmental concern. The investigations carried out in this thesis provide results on factors which affect environmental concerns. From the log-linear models and graphical analysis of the variables C, G, L, E, and A, it is evident that residents of Guyana are concerned about the environment, and that their place of residence (either urban or rural), and their educational attainment level contribute to the degree of this concern. Gender and age may or may not affect environmental concern in Guyana.

This investigation has a unique setting since few studies have been carried out in Guyana, and studies on environmental concerns have not been attempted in Guyana. In addition, log-linear analysis is used to determine relationships among the variables. Previous studies often used simple statistical analysis or percentages in order to determine what factors affect environmental concern. Researchers (Buttel and Flinn, 1978; McStay and Dunlap, 1983, for example) often analysed two variables, losing the ability to study interactions involving more than two variables. Therefore, valuable information, which can be brought out through log-linear analysis, is often lost (Dillon and Goldstein, 1984). Finally, many studies deal with three or four-dimensional tables, and tables of higher dimensionality are rarely attempted (Lakhan, 1997; Kennedy, 1983).

The obtained results are in general agreement with other studies for the variables of

education and location. Two major relationships were determined, these being that those residing in urban areas are more concerned, and those who obtained higher levels of education are more concerned. These finding are supported by many researchers. For example, Tremblay and Dunlap (1978), Althoff and Greig (1979) and Lowe and Pinhey (1982) discovered that those residing in urban areas are more concerned about the environment than those respondents residing in rural areas. This is supported by the statement that urban residents are exposed to greater instances of environmental degradation whereby immense amounts of solid and liquid waste are produced leading to environmental health damage (Hardoy and Satterthwaite, 1991; Rodda, 1993).

Researchers have also found that those respondents with more formal education were highly concerned about the environment, while those with less education had little concern. Studies by Tognacci *et al.* (1972), Adeola (1994) and Arp and Kenny (1996), for example, reveal this result. Fiallo and Jacobson (1994) discovered that the acceptance of Machalila National Park, Ecuador (a park established for protection and conservation) was greater with an increase in a persons' level of education. According to Harrison (1980), the uneducated may not know, or understand, basic matters such as the causation of disease and how to prevent erosion. An educational television program in Africa, along the shores of Banco Bay, educated the population on the need for clean water, how to keep the water supply from becoming contaminated etc. Once these people understood, they were able to perceive their surroundings and were more concerned. The purpose of education is to teach a person to analyse their own situation. In so doing, they are able to perceive their surrounding resulting in greater concern (Harrison, 1980). In regards to the variables gender and age, this thesis

was not able to determine whether gender or age has an effect on environmental concern. In reference to gender, the literacy rate in Guyana is 98% (The Commonwealth on Line, 1997), and since the majority of students are exposed to environmental courses, there may not be any major differences between the genders. No relationships between age could be determined in this study since there was an uneven sample size resulting in a strong association of age with the other variables.

Although a persons' location and education may affect their concern, it should be mentioned that environmental concern can also be affected by other variables as well. These variables being ethnicity, size of household, size of the community, income, occupation and socio-economic status. These variables should be considered for future studies.

9.2 Problems with the Study

This study is not without its problems. Firstly, the sample size was too small (inadequate) for use with a five-dimensional multi-way frequency table, resulting in many cells having a very low number of respondents or none at all. To correct this problem, a larger sample size (such as collected by the Canada Caribbean Research Group, 1996) is needed. There was also an uneven distribution of respondents for the category of age, which may also be corrected with a larger sample size. Finally, not all of the variables which may affect environmental concern were examined. One such variable is the family size, which, from analysis of the questionnaires, appears to be a significant variable.

9.3 Recommendations

It is recommended that the government of Guyana look at the factors which contribute to environmental concern, as well as their interrelationships. The results from this study may be useful for policy planning in terms of allowing the government of Guyana to implement an Environmental Protection Plan which will improve the quality of life, and the environment of Guyana. In addition, it is also recommended that this study be carried out with a larger sample size, since this may reveal relationships for the variables gender and age which were not found in this study. A larger sample size may also allow for a more representative sample of the category age.

Appendix A

Environmental Survey Questionnaire
(Partial List of Questions used by the
Canada Caribbean Research Group)

Environmental Survey Questionnaire

HELLO:

My name is_____. I am working for the Canada Caribbean Research Group and we are conducting a national survey of environmental issues and environmental concerns in Guyana. As part of the research survey we are trying to learn about the environmental issues facing Guyana, and also to find out your concerns for the environment. The results of the survey will be used by various environmental agencies in the country and help Guyana to formulate better environmental protection plans. I would, therefore, greatly appreciate it if you could please take some time to answer a few questions.

Many thanks for your cooperation.

CANADA CARIBBEAN RESEARCH GROUP
PROJECT 31A, 1995-1996
ENVIRONMENTAL SURVEY QUESTIONNAIRE

Date:_____

Name of Community: _____

Name of Respondent (optional): _____

Lot No./Home: _____

I. SOCIAL INFORMATION-GENERAL

1. Sex

Male	_____
Female	_____

2. Age (in years)

23-32	_____
33-42	_____
43-52	_____
Over 53	_____
Does not know (D.K.)	_____
Will not answer (W.A.)	_____

3. Martial status, Are you:

Single	_____
Married	_____
Widowed	_____
Divorced/separated	_____
W.A.	_____

4. How may children and others are you responsible for?

(I)	under 5 years	_____
(ii)	5-15 years	_____
(iii)	Others	_____

5. If employed, what is your occupation? _____

II. EDUCATIONAL BACKGROUND

1. What standard at school did you reach? _____

2. At what level did you stop going to school?

Primary 1 to 4	_____
Primary 5 or more	_____
Secondary 1 to 4	_____
Secondary 5 or more	_____

3. Have you received any other training?

Agricultural	_____
Technical	_____
Post Secondary	_____
Training from Government Agricultural Extension Office	_____
University	_____
Other (specify)	_____

4. What is the time period you spent undergoing training?

Hours	_____
Days	_____
Weeks	_____
Months	_____
Years	_____

5. How many years of schooling do you have in total?

8-11	_____
12-15	_____
Over 15	_____

III. ENVIRONMENT

1. Now let's turn our attention to the environment. When we say environment, we mean your surroundings - both natural environment - the air, water, soil, land, plants, animals - as well as streets, roads, seawalls, draining ditches and the like. Overall, how would you rate the quality of the environment in Guyana?

   Very good _____
   Fairly good _____
   Fairly Bad _____
   Very bad _____

2. What do you think is the most important environmental problem facing Guyana today? (OPEN_ENDED)

   _____

3. I am going to read a list of issues and environmental problems facing many countries. For each one, please tell me how serious a problem you consider it to be in Guyana.

ISSUE	Very serious	Somewhat serious	Not very serious
Poor water quality			
Poor air quality			
Contaminated soil			
Pesticide contamination			
Poor sewage facilities			
Poor public Sanitation			
Too much noise			
Soil erosion			
Deforestation			
Flooding			
Overcrowding			

4. Overall, how would you rate the quality of the environment in your local community?

Very good	_____
Fairly good	_____
Fairly bad	_____
Very bad	_____

5. How concerned are you about environmental problems in Guyana?

High concern	_____
Medium concern	_____
Low concern	_____

6. How concerned are you about environmental problems in your local community?

High concern	_____
Medium concern	_____
Low concern	_____

Appendix B

Models of the Observed Frequencies
for the Four-dimensional Multi-way
Frequency Table

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Urban				
Education	High Concern	Med Concern	Low Concern	Total
8-11	16	30	46	92
12-15	112	26	8	146
15+	58	12	6	76
Total	186	68	60	314

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Urban				
Education	High Concern	Med Concern	Low Concern	Total
8-11	18	24	34	76
12-15	74	48	6	128
15+	48	10	4	62
Total	140	82	44	266

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Rural				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	10	40	66	116
12-15	56	44	18	118
15+	26	16	10	53
Total	92	100	94	286

Obs. Freq.: EDUCATION by LOCATION w/in vars: GENDER: Female LOCATION: Rural				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	6	22	54	82
12-15	40	40	8	88
15+	18	6	2	26
Total	64	68	64	196

Obs. Freq.: GENDER by CONCERN w/in EDUCATION: 8-11 LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	16	30	46	92
Female	18	24	34	76
Total	34	54	80	168

Obs. Freq.: GENDER by CONCERN w/in EDUCATION: 12-15 LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	112	26	8	146
Female	74	48	6	128
Total	186	74	14	274

OBS. Freq.: GENDER by CONCERN w/in EDUCATION: 15+ LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	58	12	6	76
Female	48	10	4	62
Total	106	22	10	138

Obs. Freq.: GENDER by CONCERN w/in vars EDUCATION: 8-11 LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	10	40	66	116
Female	6	22	54	82
Total	16	62	120	198

OBS. Freq.: GENDER by CONCERN w/in var EDUCATION: 12-15 LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	56	44	18	118
Female	40	40	8	88
Total	96	84	26	206

Obs. Freq.: GENDER by CONCERN w/in vars. EDUCATION: 15+ LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	26	16	10	52
Female	18	6	2	26
Total	44	22	12	78

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	16	30	46	92
Rural	10	40	66	116
Total	26	70	112	208

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: MALE				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	112	26	8	146
Rural	56	44	18	118
Total	168	70	26	264

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: MALE				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	58	12	6	76
Rural	26	16	10	52
Total	84	28	16	128

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: FEMALE				
Location	High Concern	Med. Concern	Low Concern	Total
Rural	18	24	34	76
Urban	6	22	54	82
Total	24	46	88	158

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: FEMALE				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	74	47	6	128
Rural	40	40	8	88
Total	114	88	14	216

Appendix C

Models of the Fitted Frequencies for the Four-dimensional Multi-way Frequency Table

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: MALE LOCATION: Urban				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	19.7685	31.42114	45.47722	96.6668
12-15	107.9662	42.60494	9.45566	160.0268
15+	57.7847	12.24892	5.40323	75.4396
Total	185.5194	86.27499	60.33611	322.1306

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: FEMALE LOCATION: Urban				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	15.2889	24.30108	35.17204	74.7620
12-15	83.5010	32.95062	7.31300	123.7646
15+	44.6907	9.47330	4.17886	58.3428
Total	143.4805	66.72501	46.66389	256.8694

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: MALE LOCATION: Rural				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	9.55376	35.11774	68.42833	113.0998
12-15	52.17821	47.61728	14.22767	114.0232
15+	27.29636	13.68997	8.13010	49.7464
Total	89.65833	96.42499	90.78610	279.8694

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: MALE LOCATION: Rural				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	7.38887	27.16003	52.92241	87.4713
12-15	40.35458	36.82716	11.00367	88.1854
15+	20.59822	10.58781	6.28781	38.4738
Total	69.34167	74.57500	70.21389	214.1306

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	19.76846	31.42114	45.47722	96.6668
Female	15.28891	24.30108	35.17204	74.7620
Total	35.05737	55.72223	80.64925	171.4289

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	107.9662	42.60494	9.45566	160.0268
Female	83.5010	32.95062	7.31300	123.7646
Total	191.4672	75.55556	16.76856	283.7914

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	57.7847	12.24892	5.403234	75.4369
Female	44.6907	9.47330	4.178856	58.3428
Total	102.4857	21.72222	9.582089	133.7797

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	9.55376	35.11774	68.4283	113.0998
Female	7.38887	27.16003	52.9224	87.4713
Total	16.94262	62.27777	121.3507	200.5711

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	52.17821	47.61728	14.22767	114.0232
Female	40.35468	36.82716	11.00367	88.1854
Total	92.53279	84.44443	25.23134	202.2086

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	27.92636	13.68997	8.13010	49.74643
Female	21.59822	10.58781	6.28781	38.47385
Total	49.52459	24.27778	14.41791	88.22027

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	19.76846	31.42114	45.4772	96.6668
Rural	9.55376	35.11774	68.4283	113.0998
Total	29.32222	66.53888	113.9055	209.7666

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	107.9662	42.60494	9.45566	160.0268
Rural	50.1782	47.61728	14.22767	114.0232
Total	160.1444	90.22221	23.68333	271.0500

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	57.78474	12.24892	5.40323	75.4396
Rural	27.92636	13.68997	8.13010	49.7464
Total	85.71111	25.93889	13.53333	125.1833

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	15.28891	24.30108	35.17204	74.7620
Rural	7.38887	27.16003	52.92241	87.4713
Total	22.67778	51.46111	88.09444	162.2333

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	83.2010	32.95062	7.31300	123.7646
Rural	40.3546	36.82716	11.00367	88.1854
Total	123.8556	69.77778	18.31667	211.9500

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	44.69066	9.47330	4.17886	58.34282
Rural	21.59822	10.58781	6.28781	38.47583
Total	66.28889	20.06111	10.46667	96.81667

Appendix D

Models of the Marginal Tables for the Four-dimensional Multi-way Frequency Table

Marg. Table (Freq+delta): CONCERN by EDUCATION				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	52	118	202	372
12-15	284	160	42	486
15+	152	46	24	222
Total	488	324	268	1080

Marg. Table (Freq+delta): CONCERN by LOCATION				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	329	153	107	589
Rural	159	171	161	491
Total	488	324	268	1080

Marg. Table (Freq+delta): GENDER			
	Gender Male	Gender Female	Total
Frequencies	609	471	1080

Appendix E

Models of the Observed Frequencies
for the Five-dimensional Multi-way
Frequency Table

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Urban Age: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	6	12	18
12-15	24	8	0	32
15+	18	6	0	24
Total	42	20	12	74

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Urban Age: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	8	6	12	26
12-15	12	12	0	24
15+	10	6	0	16
Total	30	24	12	66

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Rural Age: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	8	18	10	36
12-15	22	10	2	34
15+	14	8	0	22
Total	44	36	12	92

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Rural Age: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	4	12	16
12-15	18	12	0	30
15+	10	2	0	12
Total	28	18	12	58

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Urban Age: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	6	10	4	20
12-15	26	6	4	36
15+	24	4	4	32
Total	56	20	12	88

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Urban Age: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	6	8	4	18
12-15	36	16	6	58
15+	30	4	2	36
Total	72	28	12	112

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Rural Age: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	2	12	14	28
12-15	24	14	4	42
15+	6	6	0	12
Total	32	32	18	82

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Rural Age: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	8	8	16
12-15	8	16	2	26
15+	6	4	2	12
Total	14	28	12	54

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Urban Age: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	6	4	14	24
12-15	44	4	2	50
15+	6	2	2	10
Total	56	10	18	84

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Urban Age: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	4	6	8	18
12-15	16	12	0	28
15+	4	0	2	6
Total	24	18	10	52

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Rural Age: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	6	16	22
12-15	6	8	4	18
15+	4	0	4	8
Total	10	14	24	48

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Rural Age: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	4	6	20	30
12-15	12	6	4	22
15+	2	0	0	2
Total	18	12	24	54

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Urban Age: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	4	10	16	30
12-15	18	8	2	28
15+	10	0	0	10
Total	32	18	18	68

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Urban Age: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	4	10	14
12-15	10	8	0	18
15+	4	0	0	4
Total	14	12	10	36

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male Location: Rural Age: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0	4	26	30
12-15	4	12	8	24
15+	2	2	6	10
Total	6	18	40	64

Obs. Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female Location: Rural Age: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	2	4	14	20
12-15	2	6	2	10
15+	0	0	0	0
Total	4	10	16	30

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	0	6	12	18
Female	8	6	12	26
Total	8	12	24	44

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: urban AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	24	8	0	32
Female	12	12	0	24
Total	36	20	0	56

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: urban AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	18	6	0	24
Female	10	6	0	16
Total	28	12	0	40

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	8	18	10	36
Female	0	4	12	16
Total	8	22	22	52

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	22	10	2	34
Female	18	12	0	30
Total	40	22	2	64

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 23-32				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	14	8	0	22
Female	10	2	0	12
Total	24	10	0	34

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	6	10	4	20
Female	6	8	4	18
Total	12	18	8	38

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	26	6	4	36
Female	36	16	6	58
Total	62	16	6	58

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	24	4	4	32
Female	30	4	2	36
Total	54	8	6	68

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	2	12	14	28
Female	0	8	8	16
Total	2	20	22	44

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	24	14	4	42
Female	8	16	2	26
Total	32	30	6	68

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 33-42				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	6	6	0	12
Female	6	4	2	12
Total	12	10	2	24

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	6	4	14	24
Female	4	6	8	18
Total	10	10	22	42

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	44	4	2	50
Female	16	12	0	28
Total	60	16	2	78

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	6	2	2	10
Female	4	0	2	6
Total	10	2	4	16

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	0	6	16	22
Female	4	6	20	30
Total	4	12	36	52

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	6	8	4	18
Female	12	6	4	22
Total	18	14	8	40

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 43-52				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	4	0	4	8
Female	2	0	0	2
Total	6	0	4	10

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	4	10	16	30
Female	0	4	10	14
Total	4	14	26	44

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	18	8	2	28
Female	10	8	0	18
Total	28	16	2	46

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	10	0	0	10
Female	4	0	0	4
Total	14	0	0	14

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	0	4	26	30
Female	2	4	14	20
Total	2	8	40	50

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	4	12	8	24
Female	2	6	2	10
Total	6	18	10	34

Obs. Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 53+				
Gender	High Concern	Med. Concern	Low Concern	Total
Male	2	2	6	10
Female	0	0	0	0
Total	2	2	6	10

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	0	6	12	18
Rural	8	18	10	36
Total	8	24	22	54

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	24	8	0	32
Rural	22	10	2	34
Total	46	18	2	66

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	18	6	0	24
Rural	14	8	0	22
Total	32	14	0	46

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	8	6	12	26
Rural	0	4	12	16
Total	8	10	24	42

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	12	12	0	24
Rural	18	12	0	30
Total	30	24	0	54

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	10	6	0	16
Rural	10	2	0	12
Total	20	8	0	28

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	6	10	4	20
Rural	2	12	14	28
Total	8	22	18	48

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	26	6	4	36
Rural	24	14	4	42
Total	50	20	8	78

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	24	4	4	32
Rural	6	6	0	12
Total	30	10	4	44

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	6	8	4	18
Rural	0	8	8	16
Total	6	16	12	34

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	36	16	6	58
Rural	8	16	2	26
Total	44	32	8	84

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	30	4	2	36
Rural	6	4	2	12
Total	36	8	4	48

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	6	4	14	24
Rural	0	6	16	22
Total	6	10	30	46

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	44	4	2	50
Rural	6	8	4	18
Total	50	12	6	68

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	6	2	2	10
Rural	4	0	4	8
Total	10	2	6	18

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4	6	8	18
Rural	4	6	20	30
Total	8	12	28	48

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	16	12	0	28
Rural	12	6	4	22
Total	28	18	4	50

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4	0	2	6
Rural	2	0	0	2
Total	6	0	2	8

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4	10	16	30
Rural	0	4	26	30
Total	4	14	42	60

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	18	8	2	28
Rural	4	12	8	24
Total	22	20	10	52

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	10	0	0	10
Rural	2	2	6	10
Total	12	2	6	20

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	0	4	10	14
Rural	2	4	14	12
Total	2	8	24	34

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	10	8	0	10
Rural	2	6	2	18
Total	12	14	2	28

Obs. Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4	0	0	4
Rural	0	0	0	0
Total	4	0	0	4

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	0	6	12	18
33-42	6	10	4	20
43-52	6	4	14	24
53+	4	10	16	30
Total	16	30	46	92

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	24	8	0	32
33-42	26	6	4	36
43-52	44	4	2	50
53+	18	8	2	28
Total	112	26	8	146

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	18	6	0	24
33-42	24	4	4	32
43-52	6	2	2	10
53+	10	0	0	10
Total	58	12	6	76

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	8	6	12	26
33-42	6	8	4	18
43-52	4	6	8	18
53+	0	4	10	14
Total	18	24	34	76

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	12	12	0	24
33-42	36	16	6	58
43-52	16	12	0	28
53+	10	8	0	18
Total	74	48	6	128

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	10	6	0	16
33-42	30	4	2	36
43-52	4	0	2	6
53+	4	0	0	4
Total	48	10	4	62

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	8	18	10	36
33-42	2	12	14	28
43-52	0	6	16	22
53+	0	4	26	30
Total	10	40	66	116

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	22	10	2	34
33-42	24	14	4	42
43-52	6	8	4	18
53+	4	12	8	24
Total	56	44	18	118

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	14	8	0	22
33-42	6	6	0	12
43-52	4	0	4	8
53+	2	2	6	10
Total	26	16	10	52

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	14	8	0	22
33-42	6	6	0	12
43-52	4	0	4	8
53+	2	2	6	10
Total	26	16	10	52

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	18	12	0	30
33-42	8	16	2	26
43-52	12	6	4	22
53+	2	6	2	10
Total	40	40	8	88

Obs.Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	10	2	0	12
33-42	6	4	2	12
43-52	2	0	0	2
53+	0	0	0	0
Total	18	6	2	26

Appendix F

Models of the Fitted Frequencies for the Five-dimensional Multi-way Frequency Table

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Urban AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	3.14399	4.88310	11.47295	19.50003
12-15	22.19781	10.05563	1.24655	33.50000
15+	18.15827	6.56126	0.78047	25.50000
Total	45.50007	21.49999	13.49997	78.50002

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Urban AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	4.76010	10.21379	12.52611	27.49999
12-15	15.30315	9.57715	0.61971	25.50001
15+	11.43650	5.70902	0.35447	17.50000
Total	31.49976	25.49996	16.50029	70.50001

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Rural AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	8.06706	16.74942	12.68344	37.49992
12-15	21.78221	13.19079	0.52702	35.50002
15+	15.65041	7.55976	0.28983	23.50000
Total	45.49968	37.49997	13.50029	96.49994

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Rural AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	2.028884	4.15370	11.31751	17.50005
12-15	18.71683	11.17643	1.60672	31.49998
15+	8.75482	4.16995	0.57523	13.50000
Total	29.50049	19.50008	13.49945	62.50002

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Urban AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	5.70531	8.29681	7.49788	21.50000
12-15	25.92804	8.36061	3.21135	37.50000
15+	25.86665	4.84258	2.79077	33.50000
Total	57.50000	21.50000	13.50000	92.50000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Urban AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	5.00479	8.41597	6.07924	19.5000
12-15	40.00418	14.91622	4.57960	59.5000
15+	28.49103	6.16781	2.84116	37.5000
Total	73.50000	29.50000	16.50000	116.5000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Rural AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	4.03099	13.75546	11.71354	29.50000
12-15	21.42308	16.20991	5.86701	43.50000
15+	8.04592	3.53463	1.91945	13.50000
Total	33.50000	33.50000	19.50000	86.49999

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Rural AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	1.25891	9.53176	6.70934	17.50000
12-15	8.64469	14.51326	4.34205	27.50000
15+	5.59640	5.45498	2.44860	16.50000
Total	15.50000	29.50000	13.50000	58.50000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Urban AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	7.30941	4.22116	13.96943	25.50000
12-15	41.56488	6.62470	3.31042	51.50001
15+	8.62568	0.65414	2.22018	11.50000
Total	57.49998	11.50000	19.50003	88.50001

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Urban AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	3.50944	7.68654	8.30403	19.50000
12-15	17.32145	10.47052	1.70803	29.50000
15+	4.66912	1.34294	1.48794	7.50000
Total	25.50001	19.50000	11.50000	56.50000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Rural AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	1.31560	5.50475	16.67965	23.50000
12-15	7.26759	8.39256	3.83985	19.50000
15+	2.91682	1.60270	4.98048	9.50000
Total	11.50001	15.50000	25.49999	52.50000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Rural AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	3.86555	6.58755	21.04690	31.50000
12-15	13.84608	6.51223	3.14169	23.50000
15+	1.78838	0.40022	1.31140	3.50000
Total	19.50001	13.50000	25.49999	58.50000

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Urban AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	5.17415	9.44587	16.87935	31.49937
12-15	18.58806	9.11036	1.80208	29.50050
15+	9.73603	0.94374	0.82108	11.50085
Total	33.49824	19.49997	19.50251	72.50072

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Urban AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	1.55849	4.78133	9.16023	15.49985
12-15	9.75844	8.03722	1.70453	19.50019
15+	4.18325	0.68141	0.63565	5.50029
Total	15.50018	13.49976	11.50039	40.50033

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Male LOCATION: Rural AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0.360493	4.43899	26.70116	31.50064
12-15	3.918722	12.95482	8.62582	25.49936
15+	3.222240	2.10675	6.16987	11.49886
Total	7.501454	19.50057	41.49685	68.49887

Fitted Freq.: EDUCATION by CONCERN w/in vars: GENDER: Female LOCATION: Rural AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	0.906866	5.33400	15.25926	21.50013
12-15	3.734786	5.89759	1.86758	11.49996
15+	0.858472	0.26810	0.37342	1.50000
Total	5.500124	11.49970	17.50026	34.50008

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: URBAN AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	3.143990	4.88310	11.47295	19.50003
Female	4.760102	10.21379	12.52611	27.49999
Total	7.904092	15.09688	23.99905	47.00003

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: URBAN AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	22.19781	10.05563	1.246551	33.50000
Female	15.30315	9.57715	0.619707	25.50001
Total	37.50096	19.63278	1.866258	59.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: URBAN AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	18.15827	6.56126	0.780474	25.50000
Female	11.43650	5.70902	0.354473	17.50000
Total	29.59477	12.27028	1.134947	43.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	8.06706	16.74942	12.68344	37.49992
Female	2.02884	4.15370	11.31751	14.50005
Total	10.09591	20.90312	24.00095	54.99998

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	21.78221	13.19079	0.527023	35.50002
Female	18.77683	11.17643	1.606719	31.49998
Total	40.49904	24.36722	2.133742	67.0000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
Male	15.65041	7.55976	0.289826	23.50000
Female	8.75482	4.16995	0.575226	13.50000
Total	24.40523	11.72972	0.865053	37.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	5.70531	8.29681	7.49788	21.50000
Female	5.00497	8.41597	6.07924	19.50000
Total	10.71010	16.71278	13.57712	41.0000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	25.92804	8036061	3.211350	37.50000
Female	40.00418	14.91622	4.579596	59.50000
Total	65.93222	23.27683	7.790946	97.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	25.86665	4.84258	2.790772	33.50000
Female	28.49103	6.16781	2.841164	37.50000
Total	54.35767	11.01039	5.631936	71.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	4.030994	13.75546	11.71354	28.50000
Female	1.258905	9.53176	6.70934	17.50000
Total	5.289899	23.28722	18.42288	47.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	21.42308	16.20991	5.86701	43.50000
Female	8.64469	14.51326	4.34205	27.50000
Total	30.06777	30.72317	10.20905	70.99999

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
Male	8.04592	3.534627	1.919450	13.50000
Female	5.59640	5.454984	2.448615	13.50000
Total	13.64233	8.989611	4.368064	27.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	7.30940	4.22116	13.96943	25.50000
Female	3.50944	7.68654	8.30403	19.50000
Total	10.81885	11.90770	22.27345	45.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	41.56488	6.62470	3.310421	51.50001
Female	17.32145	10.47052	1.708034	29.50000
Total	58.88634	17.09522	5.018455	81.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	8.62568	0.654141	2.220180	11.50000
Female	4.66912	1.342941	1.487939	7.50000
Total	13.29480	1.997082	3.708118	19.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	1.315600	5.50475	16.67965	23.50000
Female	3.865553	6.58755	21.04690	31.50000
Total	5.181153	12.09230	37.72655	55.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	7.26759	8.39256	3.839851	19.50000
Female	13.84608	6.51223	3.141694	23.50000
Total	21.11367	14.90478	6.981545	43.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
Male	2.916819	1.602697	4.980483	8.50000
Female	1.788380	0.400221	1.311398	3.50000
Total	4.705199	2.002918	6.291882	13.00000

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Urban AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	5.174150	9.44587	16.87935	31.49937
Female	1.558490	4.78113	9.16023	15.49985
Total	6.732640	14.22700	26.03959	46.99923

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Urban AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	18.58806	9.11036	1.802076	29.50050
Female	9.75844	8.03722	1.704530	19.50019
Total	28.34649	17.14758	3.506606	49.00068

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Urban AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	9.73603	0.943738	0.821077	11.50085
Female	4.18325	0.681409	0.635626	5.50029
Total	13.91929	1.625147	1.456703	17.00114

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 8-11 LOCATION: Rural AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	0.360493	4.438994	26.70116	31.50064
Female	0.906886	5.334004	15.25926	21.50013
Total	1.267359	9.772999	41.96041	53.00077

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 12-15 LOCATION: Rural AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	3.918722	12.95482	8.62582	25.49936
Female	3.734786	5.89759	1.86758	11.49996
Total	7.653508	18.85242	10.49339	36.99932

Fitted Freq.: GENDER by CONCERN w/in vars: EDUCATION: 15+ LOCATION: Rural AGE: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
Male	3.222240	2.106749	6.169874	11.49886
Female	0.858472	0.268104	0.373423	1.50000
Total	4.080712	2.374853	6.543297	12.99886

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	3.14399	4.88310	11.47295	19.50003
Rural	8.06706	16.74942	12.68344	37.49992
Total	11.21105	21.63252	24.15639	56.99995

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	22.19781	10.05563	1.246551	33.50000
Rural	21.78221	13.19079	0.527023	35.50002
Total	43.98002	23.24642	1.773574	69.00002

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	18.15827	6.56126	0.780474	25.50000
Rural	15.65041	7.55976	0.289826	23.50000
Total	33.80868	14.12102	1.070300	49.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4.760102	10.21379	12.52661	27.49999
Rural	2.028846	4.15370	11.31751	17.50005
Total	6.788947	14.36748	23.84361	45.00005

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER:Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	15.30315	9.57715	0.619707	25.50001
Rural	18.71683	11.17643	1.606719	31.49998
Total	34.01998	20.75358	2.226426	56.99998

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 23-32				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	11.43650	5.709025	0.354473	17.50000
Rural	8.75482	4.169954	0.575226	13.50000
Total	20.19132	9.878979	0.929700	31.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	5.705308	8.29681	7.49788	21.50000
Rural	4.030994	13.75546	11.71354	29.50000
Total	9.736302	22.05227	19.21142	51.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	25.92804	8.36061	3.211350	37.50000
Rural	21.42308	16.20991	5.867006	43.50000
Total	47.35113	24.57051	9.078356	80.99999

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	25.86665	4.842583	2.790772	33.50000
Rural	8.04592	3.534627	1.919450	13.50000
Total	33.91257	8.377210	4.710222	47.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	5.004791	8.41597	6.07924	19.50000
Rural	1.258905	9.53176	6.70934	17.50000
Total	6.263697	17.94773	12.78858	37.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	40.00418	14.91622	4.579596	59.50000
Rural	8.64469	14.51326	4.342048	27.50000
Total	48.64887	28.42948	8.921643	87.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 33-42				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	28.49103	6.16781	2.841164	37.50000
Rural	5.59640	5.45498	2.448615	13.50000
Total	34.08743	11.62279	5.289779	51.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	7.309412	4.221160	13.96943	25.50000
Rural	1.315600	5.504749	16.67965	23.50000
Total	8.625012	9.725909	30.64908	49.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	41.56488	6.62470	3.310421	51.50001
Rural	7.26756	8.39256	3.839851	19.50000
Total	48.83247	15.01726	7.150272	71.00001

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	8.62568	0.654141	2.220180	11.50000
Rural	2.91682	1.602697	4.980483	9.50000
Total	11.54250	2.256837	7.200663	21.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	3.509436	7.68654	8.30403	19.50000
Rural	3.865553	6.58755	21.04690	31.50000
Total	7.374989	14.27409	29.35092	51.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	17.32145	10.47052	1.708034	29.50000
Rural	13.84608	6.51223	3.141694	23.50000
Total	31.16753	16.98274	4.849728	53.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 43-52				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4.669120	1.342941	1.487939	7.50000
Rural	1.788380	0.400221	1.311398	3.50000
Total	6.457500	1.743162	2.799337	11.00000

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	5.174150	9.44587	16.87935	31.49937
Rural	0.363493	4.43899	26.70116	31.50064
Total	5.534643	13.88486	43.58051	63.00002

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	18.58806	9.11036	1.80208	29.50050
Rural	3.91872	12.95482	8.62582	25.49936
Total	22.50678	22.06519	10.42789	54.99986

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Male AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	9.73603	0.943738	0.821077	11.50085
Rural	3.22224	2.106749	6.169874	11.49886
Total	12.95827	3.050487	6.990951	22.99971

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	1.558490	4.78113	9.16023	15.49985
Rural	0.906866	5.33400	15.25926	21.50013
Total	2.465356	10.11514	24.41949	36.99998

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 12-15 GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	9.75844	8.03722	1.704530	19.50019
Rural	3.73479	5.89759	1.867577	11.49996
Total	13.49322	13.93481	3.572107	31.00014

Fitted Freq.: LOCATION by CONCERN w/in vars: EDUCATION: 15+ GENDER: Female AGE: 53+				
Location	High Concern	Med. Concern	Low Concern	Total
Urban	4.183254	0.681409	0.635626	5.500289
Rural	0.858472	0.268104	0.373423	1.499999
Total	5.041726	0.949513	1.009049	7.000288

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER:Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	3.14399	4.88310	11.47295	19.50003
33-42	5.70531	8.29681	7.49788	21.50000
43-52	7.30941	4.22116	13.96943	25.50000
53+	5.17415	9.44587	16.87935	31.49937
Total	21.33286	26.84694	49.81960	97.99940

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER:Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	22.1978	10.5563	1.246551	33.5000
33-42	25.9280	8.36061	3.211350	37.5000
43-52	41.5649	6.62470	3.310421	51.5000
53+	18.5881	9.11036	1.802076	29.5005
Total	108.2788	34.15130	9.570398	152.0005

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER:Male LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	18.15827	6.56126	0.780474	25.50000
33-42	25.86665	4.84258	2.790772	33.50000
43-52	8.62568	0.65414	2.220180	11.50000
53+	9.73603	0.94374	0.821077	11.50085
Total	62.38663	13.00172	6.612503	82.00085

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	4.76010	10.21379	12.52611	27.49999
33-42	5.00479	8.41597	6.07924	19.50000
43-52	3.50944	7.68654	8.30403	19.50000
53+	1.55849	4.78113	9.16023	15.49985
Total	14.83282	31.09743	36.06960	81.99985

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER:Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	15.30315	9.57715	0.619707	25.5000
33-42	40.00418	14.91622	4.579596	59.5000
43-52	17.32145	10.47052	1.708034	29.5000
53+	9.75844	8.03722	1.704530	19.5002
Total	82.38721	43.00111	8.611867	134.0002

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER:Female LOCATION: Urban				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	11.43650	5.70902	0.354473	18.50000
33-42	28.49103	6.16781	2.841164	37.50000
43-52	4.66912	1.34294	1.487939	7.50000
53+	4.18325	0.68141	0.635626	5.50029
Total	48.77991	13.90118	5.319202	68.00030

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER:Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	8.06706	16.74942	12.68344	37.4999
33-42	4.03099	13.75546	11.71354	29.5000
43-52	1.31560	5.50475	16.67965	23.5000
53+	0.36049	4.43899	26.70116	31.5006
Total	13.77415	40.44862	67.77779	122.0006

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER:Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	21.78221	13.19079	0.52702	35.5000
33-42	21.42308	16.20991	5.86701	43.5000
43-52	7.26759	8.39256	3.83985	19.5000
53+	3.91872	12.95482	8.62582	25.4994
Total	54.39160	50.74808	18.85970	123.9994

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER:Male LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	15.65041	7.55976	0.28983	23.50000
33-42	8.04592	3.53463	1.91945	13.50000
43-52	2.91682	1.60270	4.98048	9.50000
53+	3.22224	2.10675	6.16987	11.49886
Total	29.83540	14.80384	13.35963	57.99887

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 8-11 GENDER: Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	2.028845	4.15370	11.31751	17.50005
33-42	1.258905	9.53176	6.70934	17.50000
43-52	3.865553	6.58755	21.04690	31.50000
53+	0.96866	5.33400	15.25926	21.50013
Total	8.060169	25.60701	54.33300	88.00018

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 12-15 GENDER:Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	18.71683	11.17643	1.60672	31.49998
33-42	8.64469	14.51326	4.34205	27.50000
43-52	13.84608	6.51223	3.14169	23.50000
53+	3.73479	5.89759	1.86758	11.49996
Total	44.94239	38.09951	10.95804	93.99995

Fitted Freq.: AGE by CONCERN w/in vars: EDUCATION: 15+ GENDER:Female LOCATION: Rural				
Age	High Concern	Med. Concern	Low Concern	Total
23-32	8.75482	4.16995	0.575226	13.50000
33-42	5.59640	5.45498	2.448615	13.50000
43-52	1.78838	0.40022	1.311398	3.50000
53+	0.85847	0.26810	0.373423	1.50000
Total	16.99807	10.29326	4.708663	31.99999

Appendix G

Marginal Tables For the Five- Dimensional
Multi-way Frequency Table

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Urban AGE: 23-32				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male	43.5	21.5	13.5	78.5
Female	31.5	25.5	13.5	70.5
Total	75	47	27	149

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Rural AGE: 23-32				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male	45.5	37.5	13.5	96.5
Female	29.5	19.5	13.5	62.5
Total	75	57	27	159

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Urban AGE: 33-42				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male	57.5	21.5	13.5	92.5
Female	73.5	29.5	13.5	116.5
Total	131	51	27	209

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Rural AGE: 33-42				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male	33.5	33.5	19.5	86.5
Female	15.5	29.5	13.5	58.5
Total	49	63	33	145

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Urban AGE: 43-52				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male Female	57.5 25.5	11.5 19.5	19.5 11.5	88.5 56.5
Total	83	31	31	145

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Rural AGE: 43-52				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male Female	11.5 19.5	15.5 13.5	25.5 25.5	52.5 58.5
Total	31	29	51	111

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Urban AGE: 53+				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male Female	33.5 15.5	19.5 13.5	19.5 11.5	72.5 40.5
Total	49	33	31	113

Marginal Table (freq.+delta): CONCERN by GENDER LOCATION: Rural AGE: 53+				
GENDER	High Concern	Med. Concern	Low Concern	Total
Male Female	7.5 5.5	19.5 11.5	41.5 17.5	68.5 34.5
Total	13	31	59	103

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Urban AGE: 23-32				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	19.5 27.5	33.5 25.5	25.5 17.5	78.5 70.5
Total	47	59	43	149

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Rural AGE: 23-32				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	37.5 17.5	35.5 31.5	23.5 13.5	96.5 62.5
Total	55	67	37	159

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Urban AGE: 33-42				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	21.5 19.5	37.5 59.5	33.5 37.5	92.5 116.5
Total	41	97	71	209

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Rural AGE: 33-42				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	29.5 18.5	43.5 27.5	13.5 13.5	86.5 58.5
Total	47	71	27	145

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Urban AGE: 43-52				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	25.5 19.5	51.5 29.5	11.5 7.5	88.5 56.5
Total	45	81	19	145

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Rural AGE: 43-52				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	23.5 31.5	19.5 23.5	9.5 3.5	52.5 58.5
Total	55	43	13	111

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Urban AGE: 53+				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	31.5 15.5	29.5 19.5	11.5 5.5	72.5 40.5
Total	47	49	17	113

Marginal Table (freq.+delta) EDUCATION by GENDER LOCATION: Rural AGE: 53+				
Gender	Education 8-11	Education 12-15	Education 15+	Total
Male Female	31.5 21.5	25.5 11.5	11.5 1.5	68.5 34.5
Total	53	37	13	103

Marginal Table (freq.+delta): CONCERN by EDUCATION Age: 23-32				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	18	36	48	102
12-15	78	44	4	126
15+	54	24	2	80
Total	150	104	54	308

Marginal Table (freq.+delta): CONCERN by EDUCATION Age: 33-42				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	16	40	32	88
12-15	96	54	18	168
15+	68	20	10	98
Total	180	114	60	354

Marginal Table (freq.+delta): CONCERN by EDUCATION Age: 43-52				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	16	24	60	100
12-15	80	32	12	124
15+	18	4	10	32
Total	114	60	82	256

Marginal Table (freq.+delta): CONCERN by EDUCATION Age: 53+				
Education	High Concern	Med. Concern	Low Concern	Total
8-11	8	24	68	100
12-15	36	36	14	86
15+	18	4	8	30
Total	62	64	90	216

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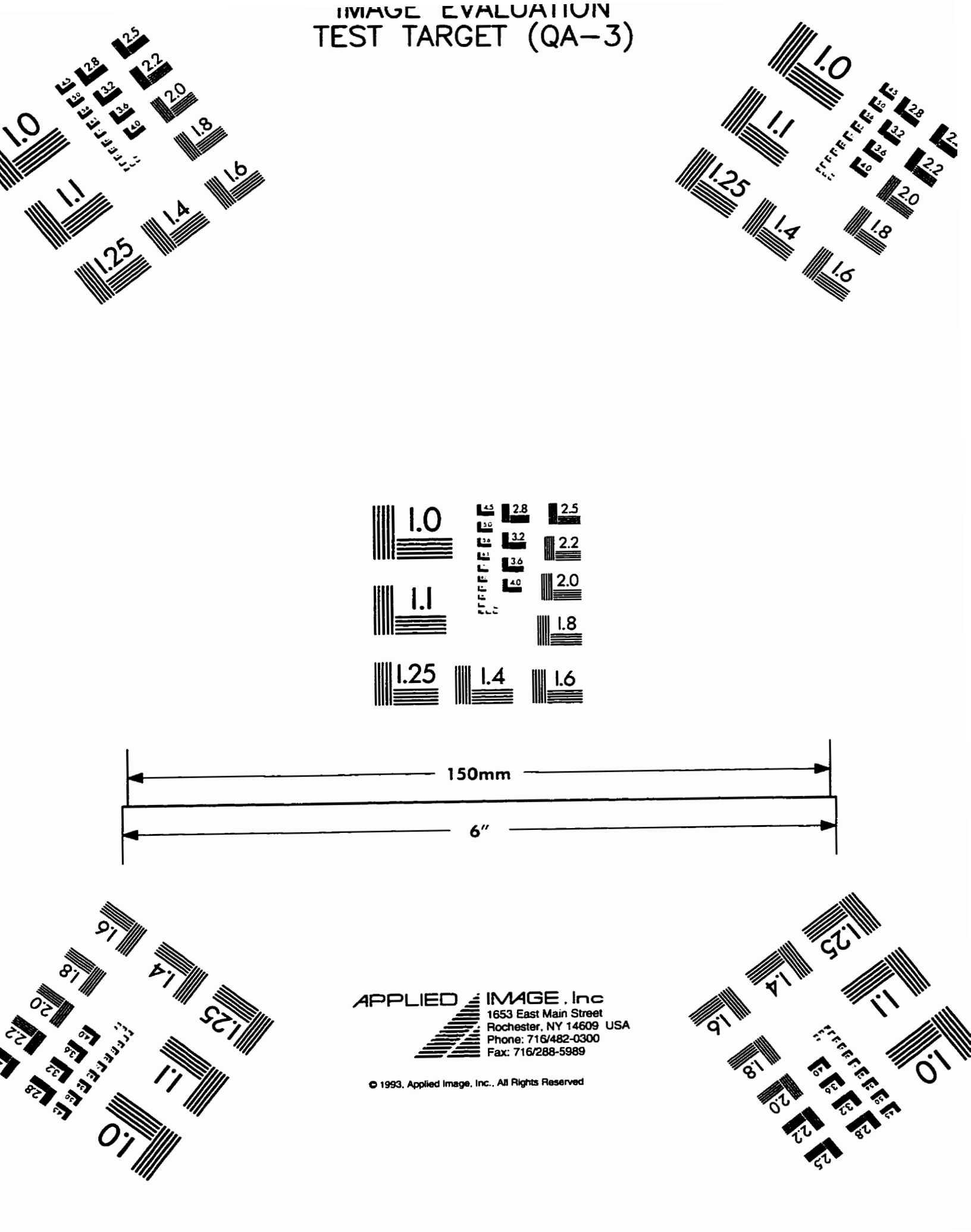
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