San Fernando Valley State College

Measurement and Comparison of Health Knowledge of Foreign and American Students

A thesis submitted in partial satisfaction of the requirements for the degree of Master of Science in Health Science

by

Devi Bahadur Shrestha

June, 1968
The thesis of Devi Bahadur Shrestha is approved:

[Blacked out]

Committee Chairman

San Fernando Valley State College

June, 1968
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>viii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>x</td>
</tr>
</tbody>
</table>

## CHAPTER

### I. INTRODUCTION

Statement of the Problem          1
Limitations of the Study          4
Definitions of Terms Used         5

### II. REVIEW OF LITERATURE

Health Knowledge Measurement Instruments for Schools, Colleges, and Universities in the United States 8
Utilization of Health Knowledge Measurement Instruments 14
Surveys of Health Knowledge of the Public in the United States 26
Comparison of Knowledge in Cross-cultural Situations 37
Measurement and Survey of Health Knowledge in Other Cultures 42
Summary 47

### III. METHODS

Purpose of the Study 48
Measurement 48
<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Studied.</td>
<td>48</td>
</tr>
<tr>
<td>The Foreign Students.</td>
<td>48</td>
</tr>
<tr>
<td>The American Students</td>
<td>49</td>
</tr>
<tr>
<td>The Research Design</td>
<td>49</td>
</tr>
<tr>
<td>Construction and Original Use of the Test</td>
<td>49</td>
</tr>
<tr>
<td>Modification in the Original Test for this Study.</td>
<td>51</td>
</tr>
<tr>
<td>Collection of Data</td>
<td>52</td>
</tr>
<tr>
<td>Statistical Treatment of the Data</td>
<td>54</td>
</tr>
<tr>
<td>IV. ANALYSIS AND DISCUSSION OF DATA</td>
<td>56</td>
</tr>
<tr>
<td>Description of the Study Population</td>
<td>56</td>
</tr>
<tr>
<td>The Foreign Students</td>
<td>56</td>
</tr>
<tr>
<td>The American Students</td>
<td>57</td>
</tr>
<tr>
<td>Comparison of Total Test Results</td>
<td>58</td>
</tr>
<tr>
<td>Comparison with Special Test Groups</td>
<td>60</td>
</tr>
<tr>
<td>Comparison by Scores by Sex</td>
<td>60</td>
</tr>
<tr>
<td>Comparison of Test Results by Health Content Areas</td>
<td>64</td>
</tr>
<tr>
<td>Alcohol and Narcotics</td>
<td>64</td>
</tr>
<tr>
<td>Dental Health</td>
<td>68</td>
</tr>
<tr>
<td>Mental Health</td>
<td>68</td>
</tr>
<tr>
<td>Nutrition</td>
<td>68</td>
</tr>
<tr>
<td>Sex Education</td>
<td>69</td>
</tr>
<tr>
<td>Personal and Community Health</td>
<td>69</td>
</tr>
<tr>
<td>Safety and First-Aid</td>
<td>69</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>70</td>
</tr>
<tr>
<td>Cancer</td>
<td>70</td>
</tr>
<tr>
<td>Exercise</td>
<td>70</td>
</tr>
<tr>
<td>Communicable Diseases</td>
<td>70</td>
</tr>
<tr>
<td>Comparison of Differences in Opinion Questions</td>
<td>71</td>
</tr>
<tr>
<td>Conclusions</td>
<td>73</td>
</tr>
<tr>
<td>V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS</td>
<td>76</td>
</tr>
<tr>
<td>Summary</td>
<td>76</td>
</tr>
<tr>
<td>Conclusions</td>
<td>77</td>
</tr>
<tr>
<td>Recommendations</td>
<td>77</td>
</tr>
<tr>
<td>Further Study</td>
<td>79</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>80</td>
</tr>
<tr>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>A. The Health Knowledge Study Test</td>
<td>84</td>
</tr>
<tr>
<td>B. Item Analysis by Percentage of Correct Responses of the National Sampling, Special Test Groups, and the Foreign and American Student Groups</td>
<td>109</td>
</tr>
<tr>
<td>C. Statistical Formula Utilized in Analysis of Difference in Mean Scores of Content Areas</td>
<td>115</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Respondent Characteristic and Knowledge Scores from ORC Surveys on Questions in CBS National Health Test.</td>
<td>35</td>
</tr>
<tr>
<td>II. Nielsen Audience Composition Data-viewers of CBS National Health Test, Part I and II.</td>
<td>36</td>
</tr>
<tr>
<td>III. Significance of Difference of Mean Scores: Comparison of 100 Foreign Students and 140 American Students.</td>
<td>59</td>
</tr>
<tr>
<td>IV. Comparison of Foreign Students, American Students, Special Test Groups and National Sampling on the Basis of Mean Scores.</td>
<td>61</td>
</tr>
<tr>
<td>V. Significance of Difference of Mean Scores: Comparison of 27 Female and 75 Male Foreign Students.</td>
<td>62</td>
</tr>
<tr>
<td>VI. Significance of Difference of Mean Scores: Comparison of 73 Female and 67 Male American Students.</td>
<td>63</td>
</tr>
<tr>
<td>VII. Percentage of Correct Responses of Foreign and American Students on Eleven Content Areas Compared to National Sampling and Special Test Groups.</td>
<td>65</td>
</tr>
<tr>
<td>FIGURE</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>I. Percentage of Correct Responses for Foreign and American Students by Content Areas</td>
<td>67</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

Sincere thanks and appreciation are extended to all those who assisted in the successful completion of this study.

A special word of acknowledgment is due to Professor Lennin H. Glass, the thesis chairman and academic adviser of the writer, without whose critical guidance and constant encouragement this study would not have been possible; Professor Claude T. Cook, the Chairman of the Department, and Professor Wilfred C. Sutton for their guidance and suggestions as the members of the thesis committee.

Acknowledgment must also be given to Dr. Richard C. Oldenburg, the foreign student adviser and his secretary Mrs. Barbara Roeb, for assistance in providing necessary information about foreign students; Mrs. Esther Kartiganer, Associate Producer of Columbia Broadcasting System for permission to use the National Health Test and providing other information about the test; and Dr. James W. Swinehart, School of Public Health, University of Michigan and Dr. Richard C. Fuisz, National Audiovisual Center, Department of Health, Education, and Welfare, Atlanta, Georgia for their suggestions and cooperation.
Appreciation is given to Mr. and Mrs. Will Tagress for their kindness and generosity in making the writer "feel at home away from home" in this country.

The writer expresses gratitude to his parents and his elder brother "Khadga" who inspired and encouraged him all through his life to pursue his study.

Lastly, the writer wishes to express his sincere thanks to His Majesty's Government of Nepal and the United States Agency for International Development for providing the opportunity to study in the United States. The writer is particularly grateful to Miss Dorothy J. Stacey, Public Health Service for the excellent arrangements made in providing the necessary facilities during training.
ABSTRACT

Measurement and Comparison of Health Knowledge of Foreign and American Students

by

Devi Bahadur Shrestha

Master of Science in Health Science

June, 1968

Mere possession of health knowledge does not always affect health behavior but can serve as a basis for intelligent action directed towards the improvement and/or maintenance of total health.

In this study, the health knowledge of foreign students was measured and compared with that of a sample of American students all of whom were attending San Fernando Valley State College, using the CBS National Health Test.

The test, with the omission of four questions dealing with medicare, was completed by 100 foreign students together with a personal information questionnaire. One hundred and forty American students of three general education health science classes were taken as the sample of the American students. The test, together with a personal information questionnaire was completed in the first regular class meeting.
The variation of the responses by the groups of students was measured by differences in the percentage of correct responses for each question. The percentage of mean scores of the foreign student and the American student groups were compared. Comparison was also made between the male and female students in both groups. The test was divided into eleven content areas and comparison of the scores of the foreign and American students were made in each content area.

The findings of the study revealed that American students were generally better informed about health than were foreign students. Female students usually were better informed in matters of health than male students. American and foreign students had quite similar opinions on controversial topics such as notification about a fatal disease, liberalization of abortion law, where and at what age level sex education should be started, and how drug addiction should be dealt with.

On the basis of the findings, it was recommended that a health course designed according to needs, interests, and background be made available to foreign students. Such a course could increase the level of health knowledge and as a result enable the students to better adjust to the new environment in the United States. In addition, the course might stimulate interest in health problems in the students' home countries. Upon return
the students might better be able to contribute to the promotion of their countries' health standards. A special kind of health counseling and medical care for foreign students, because of their special needs, was also recommended.

As this study was limited in scope, additional study is necessary for further conclusions to be drawn.
CHAPTER I

INTRODUCTION

Health is considered by many to be one of man's most important possessions. Without it the individual is at a disadvantage in reaching desirable objectives. Thus, the attainment and maintenance of health continues to be one of the major needs of all individuals.

For attainment and maintenance of good health, health knowledge is an important asset. Accurate health knowledge can serve as a basis for intelligent action directed towards the improvement and/or maintenance of total health. It is true that mere possession of health knowledge does not always affect health behavior. Other motivating forces may still be necessary to bring about action. It is also true that much health behavior takes place without accurate health knowledge. However, the adoption of health behavior that results in improved health status is facilitated by accurate health knowledge. Van Dalen points out, "If youngsters are to improve their health status and practices, they must acquire knowledge concerning the factors that contribute to mental and physical well-being..." (32:101). Oberteuffer, giving more emphasis on health knowledge, indicates that health knowledge is the framework upon which attitudes and behavior are built. (22:52)
Further emphasizing the importance of providing health knowledge to school children, Kilander states:

Since it is impossible to form in school all the specific health habits needed by an individual, knowledge is essential in aiding the individual to make satisfactory responses to new situations. Knowledge is needed in furnishing rational motives for attitudes and habits. (18:3)

Similarly, Turner feels that possession of health knowledge is more important than learning health habits for adaption in changing environments and situations:

As a child you were trained in health habits. Such training would be fairly adequate if your pattern of life were never to change. A set of health rules would be sufficient health instruction for a life prisoner. But in the free world we are continually adapting, fitting, and adjusting ourselves to new conditions. The struggle for social and material progress tends to crowd out considerations for our physical well-being. We need enough health knowledge to live by principle instead of by rule. (30:6-7)

Turner also gives the following practical example of his thinking by using an incident during World War II:

...there were instances where the use of a knowledge of personal and community health meant escaping disease or death. In the Philippines some men spent 80 centavos for a can of corned beef which gave them 80 grams of protein. Those who knew food values got 400 grams of the much-needed protein by spending 80 centavos for peanuts. Those who knew that 3 drops of tincture of iodine would disinfect a canteen of water escaped dysentery on Death March. In Cabanatuan men were issued mungo beans as part of a diet low in vitamin C. Some officers and men knew that, while dry beans contain no vitamin C, the sprouts do. They escaped scurvy by sprouting the beans and eating beans and sprouts. (30:6)

Oberteuffer suggests similar problems by pointing out that a number of essential elements of nutrition are
often neglected by many American people. He reports that about 40 per cent of the American population omit such important sources of vitamin C as tomatoes, citrus fruits, and cabbage from their diet. At least 34 per cent use no milk or cheese, while 48 per cent fail to eat at least one egg a day. (22:20) What is lacking in this observation, however, is any indication whether the surveyed population derived the essential nutrients from other sources.

The possession of health knowledge can assist an individual in making intelligent decisions. Other factors being equal, the individual possessing accurate and reliable health knowledge should have a distinct advantage over the less informed individual in matters concerning health. Moreover, the person with basic health knowledge usually finds health maintenance more interesting, relatively simple, and quite rewarding.

Differences in environment, tradition, culture and socioeconomic background make people perceive things in different ways. This in turn may make them behave differently. Since knowledge is also one of the important determinants of behavior and health behavior in various countries may be different, it might be possible to explain differences in health behavior on the basis of differences in health knowledge.

A recent survey conducted by the United Nations Educational, Scientific, and Cultural Organization shows
that the number of students studying outside their home countries is increasing rapidly. The world total of such students rose from about 290,000 in 1965 to 341,660 in 1966. Of that number, about one-third i.e. 82,709 are enrolled in the colleges and universities of the United States alone. (31:10) Many of these students are away from home for the first time and have to learn to manage their own affairs and to adjust to new conditions of living and working. Some find the transition to a new way of life upsetting. They often feel uprooted and anxious in their new environment and develop a sense of loneliness and isolation. These foreign students taken together represent a sample of the intellectual population of the countries from which they come. Their behavior, including health behavior, may be different than that of the American students to a considerable extent. An examination of their level of health knowledge would be helpful in understanding their health behavior.

Statement of the Problem

The health knowledge of foreign students attending various American colleges and universities has not as yet been measured and compared with that of American students. If the health knowledge of the foreign students is, in fact, significantly different than that of the American students, this may have a detrimental effect on their health behavior. Therefore, it might be beneficial to
design a special course in health science or health education for all foreign students who come to American colleges and universities. This could help them adjust to the new and different environments of this country, at least in respect to health problems. Moreover, the student health services of colleges and universities of the country could utilize the findings of this study to deal more effectively with the foreign students. The purpose of this study was to measure and compare the health knowledge of foreign students attending San Fernando Valley State College with a sample of American students of the same college, using an adaptation of the Columbia Broadcasting System (CBS) National Health Test.

Limitations of the Study

The scope of the study was limited to the students attending San Fernando Valley State College. The population of the two groups of the students under this study was not based on random sampling method.

The health knowledge of both groups of students was measured by an adaptation of the CBS National Health Test. The questions included in the test were not necessarily related to the health curriculum of the college. Both groups of the students were informed that the test results were for research purpose and had no relation to their academic performance of any kind in the college.
Four questions relating to Medicare Program were omitted from the original test. Because Medicare Program is unique in the United States, foreign students are not exposed to the information relating to such programs in their respective home countries.

The American students had a greater familiarity with the words used in the test. A number of the foreign students had difficulty in understanding some of the words in the test. If the same test had been given in the foreign student's native language, this handicap might have been overcome.

**Definition of Significant Terms Used in the Study**

**Foreign Students** - Students who are not American citizens, who are born and raised in countries other than the United States, and who are registered with San Fernando Valley State College as foreign students.

**CBS National Health Test** - A set of questions relating to health developed by the Columbia Broadcasting System and given to a national sampling of the American population and special test groups. The test consisted of seventy-one questions in two parts and a set of five opinion questions on some controversial health topics.

**Personal Information Questionnaire** - Two sets of questionnaires (regarding personal background) each especially developed for the foreign student group and
the American student group. The Personal Information Questionnaire developed for the foreign student group consisted of seventeen questions. The one developed for the American student group consisted of twelve questions.

Health Knowledge - Information or familiarity or cognizance of facts and truths regarding health.
CHAPTER II

REVIEW OF RELATED LITERATURE

I. HEALTH KNOWLEDGE MEASUREMENT INSTRUMENTS FOR SCHOOLS, COLLEGES, AND UNIVERSITIES IN THE UNITED STATES

The development of methods for measuring knowledge, attitudes, and practice in the field of health by means of a test is fairly recent. Initial efforts involved the measurement of health knowledge. More recently constructed tests have included measurements of attitudes and practices.

Describing the history of health education tests, Larson and Yocom commented:

Measurement in health education, no doubt, is as old as health education; however, it was not until 1925 that an attempt was made to develop some form of standardization. The earlier tests were teacher-made and designed to measure local emphasis in teaching. The work of Franzen with the American Child Health Association, along with the work of Gates and Strang, resulted in the first widely used and recognized health knowledge tests. These tests followed a scientific plan of test construction. Other tests followed this procedure. (20:243)

The Gates-Strang Health Knowledge Test was the earliest standardized health knowledge test designed for grades three through twelve. The test was first published in 1925 and was later revised in 1940. Six forms of the test were constructed, three for the elementary school and three for the junior and senior high schools. Each test
contained 60 multi-choice questions which were carefully selected to gain acceptable curricular validity. The reliability of the test ranged from .74 to .86. (20:247)

The Crow-Ryan Health and Safety Knowledge Test, designed to measure the knowledge of health and safety of students in grades three to six, was divided into three parts. The 90 multiple choice type questions were arranged in three sections as follows: a section on knowledge of good health habits and safety; a section on the knowledge of cause-effect relationship in health and safety, and a section on the application of health and safety rules. The reliability was .91. (20:247)

The Kilander Health Knowledge Test was one of the earliest standardized tests designed for high school and college students. It was first published in 1937 and later revised in 1948. The test consisted of one hundred multiple-choice type questions and was originally administered to 2,900 students. Questions were selected from such aspects of health education as nutrition, safety and first-aid, community hygiene and sanitation, mental and social hygiene, health superstitions, and general information on health. A few questions were aimed at testing attitudes rather than knowledge. The reliabilities reported were .80 for college freshmen and .83 for high school seniors. (18:4-6) On the basis of tests
administered to 844 high school seniors, and 504 college freshmen, and 430 adults, Kilander reported the following findings:

1. More education was needed in the area of nutrition in regard to the values of foods.

2. Forty eight per cent of the high school seniors, 59 per cent of college freshmen and 73 per cent of the adults misunderstood the qualifications of chiropractors as compared to medical doctors.

3. Only one-third of the students realized that the lower death rate of today was due to the prevention of infant deaths rather than the prevention of adult deaths.

4. Almost 50 per cent of the students believed that communicable diseases could be inherited and one-third of these believed that tuberculosis was one of the two or three diseases which may be inherited.

5. Many students held superstitions; beliefs such as the prospective mother could make her child more musical by listening to good music, leaving rubber on the feet indoors too long may cause eye trouble,
and marks of disfiguration on the new born child were due to fright of the mother during pregnancy. (18:30-32)

The Shaw-Troyer Health Knowledge and Application Test was designed to measure both application of health knowledge and health knowledge for grades seven through college. This 100 item test was developed in two stages, form A in 1946 and form B in 1948. The questions were broken down into multiple-choice and true-false type which covered various phases of health education. The test items were reviewed by doctors, nurses, nutritionists, biologists, and health education teachers. Reliability of the tests were found to be .92. (20:249)

The Trustler-Arnett Health Knowledge Test though developed several years ago, has questions of such a nature that they relate to standard health facts which should be known by high school and college students. Test reliability on forms A and B was .86. (33:86)

The Brewer-Schrammel Health Knowledge and Attitude Test is a 100-item test with 77 true and false and 23 multiple-choice type questions. It was constructed to measure knowledge of rules and principles of healthful living and attitudes for the upper elementary (from 4th grade up) through the junior high school grades. The major part of the test was a measure of health knowledge. Test reliability ranged from .66 to .83. (33:90)
The Southworth et al. Test of Health Knowledge, Practices, Attitudes, and Interests test was devised in connection with a health survey which was made by the authors. The test included four parts, namely: Test I, What do you do?, Test II, Health Information, Please!, Test III, Your Opinion, Please!, and Test IV, Your Choice, Please! The test was well-planned by persons knowing health education content. It has served as a useful aid in health teaching. (20:249)

The Begbie Health Knowledge and Attitude Test was primarily a measurement of health knowledge. Only a few of the questions appeared to measure beliefs or feelings. (33:91)

The Getchell Health Knowledge and Attitude Test attempted to measure both knowledge and health attitudes. However, the applicability to measurement of attitudes was limited. It was intended for grades four to eight and was arranged in three types of questions: true-false, multiple-choice, and matching. The questions were clearly written and could be administered quickly. Reliability was undetermined. (33:87)

The Veenker Health Knowledge Test was developed for the purpose of measuring the extent of health knowledge possessed by seventh grade pupils. Appropriate vocabulary, level of difficulty, and curriculum validity were the
primary factors considered in item formulation. The test was easy to administer and to interpret. (33:87)

The Bridges Health Knowledge Test, constructed for college freshmen at Indiana University in 1952, consisted of one hundred multiple-choice items. The test focused on the following health topics: nutrition, emotional health, exercise and rest, narcotics and stimulants, body functions, social health, personal health, family living, sense organs, occupational health, home nursing, current personal health, and community health. The test was validated by a jury of experts and further checked by item discrimination and item analysis. The reliability was found to be .83. (33:86-87)

The Dearborn College Health Knowledge Test was very carefully developed from 1,200 test items applied to 10,000 students by score of instructors in nine colleges, universities, and junior colleges during the period 1936 to 1950. The test consisted of 100 multiple-choice test items which were subdivided into the following eleven health content areas: sociological and biological background, nutrition and diet, excretion and cleanliness, exercise and body mechanics, fatigue and rest, mental hygiene, reproduction and heredity, prevention and control of disease, hygiene of eyes, ear, and teeth, hygiene of environment, and use of medical care. The test items were directed to the measurement of achievement and diagnosis of personal health
knowledge. This test was designed for college level, but is said to be suitable for high school seniors who have been exposed to a full semester course in personal hygiene. Standardization of the test was done from 1948 to 1950 on 2,000 college students primarily in California. The reliability of the test was .89. The 1959 revision of the test was based on the analysis of the results from 15,000 students in twenty selected junior colleges, colleges and universities. Seven items were revised and two items were changed completely. (7)

II. UTILIZATION OF HEALTH KNOWLEDGE
MEASUREMENT INSTRUMENTS

From 1951 to 1957, Dearborn, using his test, conducted a study on 12,000 freshmen and sophomore students in 15 junior colleges, colleges and universities in the United States. In order to distinguish between unrecognized student ignorance and recognized student ignorance, instructions were given to complete as many items as possible but to leave an item blank rather than to make a wild guess. (8:155) The analysis of the 25 per cent randomly sampled responses showed the following results:
### Sectional Analysis of Health Knowledge of 3,000 Students

<table>
<thead>
<tr>
<th>Test Section</th>
<th>Per Cent Responses Correct</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Colleges &amp; Universities.</td>
<td>Junior College</td>
</tr>
<tr>
<td>Social and biological background</td>
<td>57</td>
<td>50</td>
</tr>
<tr>
<td>Nutrition and diet</td>
<td>56</td>
<td>40</td>
</tr>
<tr>
<td>Excretion and cleanliness</td>
<td>54</td>
<td>48</td>
</tr>
<tr>
<td>Exercise and body mechanics</td>
<td>44</td>
<td>34</td>
</tr>
<tr>
<td>Fatigue and rest</td>
<td>62</td>
<td>57</td>
</tr>
<tr>
<td>Mental hygiene</td>
<td>49</td>
<td>45</td>
</tr>
<tr>
<td>Reproduction and control of disease</td>
<td>64</td>
<td>50</td>
</tr>
<tr>
<td>Hygiene and special organs</td>
<td>55</td>
<td>41</td>
</tr>
<tr>
<td>Hygiene and environment</td>
<td>62</td>
<td>58</td>
</tr>
<tr>
<td>The use of medical care and advice</td>
<td>47</td>
<td>39</td>
</tr>
<tr>
<td>Mean Score</td>
<td>54.4</td>
<td>44.5</td>
</tr>
</tbody>
</table>

There was a significant difference (9:9 points) in health knowledge achievement between the junior colleges, universities and four year colleges. The mean achievement scores of 54.4 per cent and 44.5 per cent demonstrated the need and responsibility to make health instruction available on college level and to improve such instruction in high school. Students recognized their ignorance in some
areas of personal health information, were justifiably confident of their understanding in others, but continued to cling to much misinformation in still others. They scored high in the section on social and biological background for health and left few items (3.7 per cent) blank. By contrast, in reproduction and heredity section the scores were similar but nearly 13 per cent of the items were left blank, indicating recognition of ignorance in this area. On the other hand, in the lowest scoring section, exercise and body mechanics, ignorance was not only great but also unrecognized by the students, for the mean number of items left was only 5 per cent. (8:155-159)

Forsythe and Rugen conducted a study to determine the health knowledge of 1,046 freshmen men students at the University of Michigan before they received any health instruction. The findings of the study showed that only 35 per cent of the items on the subject of sex were answered correctly as compared with 72 per cent correct answers on the items of mental hygiene. The overall percentage of only 54 per cent correct answers indicated a poor understanding of the areas covered in this test of health knowledge. (10:199) The findings are given by areas in the following table:
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>PERCENTAGES</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental hygiene</td>
<td>Correct: 72</td>
<td>Incorrect: 25</td>
<td>Unanswered: 3</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous other</td>
<td>Correct: 67</td>
<td>Incorrect: 29</td>
<td>Unanswered: 4</td>
<td></td>
</tr>
<tr>
<td>Medical care, quackery, self-treatment, etc.</td>
<td>Correct: 65</td>
<td>Incorrect: 32</td>
<td>Unanswered: 3</td>
<td></td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Correct: 61</td>
<td>Incorrect: 35</td>
<td>Unanswered: 4</td>
<td></td>
</tr>
<tr>
<td>Nutrition and diet</td>
<td>Correct: 54</td>
<td>Incorrect: 44</td>
<td>Unanswered: 2</td>
<td></td>
</tr>
<tr>
<td>Communicable diseases and infections</td>
<td>Correct: 50</td>
<td>Incorrect: 34</td>
<td>Unanswered: 16</td>
<td></td>
</tr>
<tr>
<td>Public health in general</td>
<td>Correct: 47</td>
<td>Incorrect: 30</td>
<td>Unanswered: 20</td>
<td></td>
</tr>
<tr>
<td>Anatomy and physiology</td>
<td>Correct: 47</td>
<td>Incorrect: 51</td>
<td>Unanswered: 2</td>
<td></td>
</tr>
<tr>
<td>First-aid</td>
<td>Correct: 47</td>
<td>Incorrect: 51</td>
<td>Unanswered: 2</td>
<td></td>
</tr>
<tr>
<td>Health statistics</td>
<td>Correct: 45</td>
<td>Incorrect: 41</td>
<td>Unanswered: 14</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Correct: 35</td>
<td>Incorrect: 39</td>
<td>Unanswered: 26</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Correct: 54</td>
<td>Incorrect: 35</td>
<td>Unanswered: 10</td>
<td></td>
</tr>
</tbody>
</table>

Hinrichs reported a study of a hygiene proficiency test given to 1,100 entering freshmen students at the University of Illinois in September 1951. The test contained 70 multiple-choice type items covering the following broad areas of health: public health and consumer health, general body hygiene, mental health, personal health, reproduction, sex and heredity, and nutrition and diet. The test questions were designed to
cover health information that an entering college student was expected to have acquired. The test included questions on both factual knowledge of currently accepted practices and attitudes in the various phases of hygiene. The test results were not completely analyzed statistically because the author's purpose was to discover the health needs of the students as well as their proficiency, rather than to construct a test. From the data it was found that only one in every three students had enough health background to pass the test with a grade of 75 per cent. Ninety-one students, or one in every 12, missed more than one-half of the total questions. The summary of the results of 500 hand-checked tests showed that in the area of public health and consumer health the average number of misses for each of the twenty questions was 114; for general body hygiene the average number of misses for each of seven questions was 143; for mental health the average number of misses for each of the four questions was 150; for reproduction, sex and heredity the average number of misses for each of twelve questions was 183; for nutrition and diet the average number of misses for each of eleven questions was 191; and for personal health problems the average number of misses for each of sixteen questions was 201. (14:18-21).

As a part of a study to determine the nature and extent of both knowledge and health interests of college
students, Rooks constructed an objective health knowledge test at the University of Iowa. His items were selected on the basis of authoritative statements from ten current hygiene text books and manuals. He compiled a list of five hundred fallacies and superstitions related to personal hygiene. Validation of the test was obtained on the basis of trial tests with resultant revisions, and by the opinion of experts. No statistical reliability was reported. Students studied were a group of 502 freshmen from required men's physical education classes and 262 sophomores from the same classes. (24:52-53) Some of the gaps in health knowledge in the twenty-one areas indicated by the responses were as follows: many of the students lacked a clear concept as to where disease germs originated or how they were transferred; students had poor understanding of the common cold and held many fallacies regarding colds; 80 per cent of the students misunderstood the cause of mental illness and believed that physical damage was the most common cause of mental illness; there was a definite lack of information about the anatomy and physiology of the reproductive system; the students held more fallacies and wrong beliefs in the area of nutrition than in any other area; students appeared to be highly gullible regarding quacks and quackery; and approximately 60 per cent of the students did not recognize that cancer could be cured in its early stage. (24:57-64)
Boydston, Sell and Whelman, in December 1955, conducted a comparative study of the health knowledge of college veterans and non-veterans using the Bridges Health Knowledge Test. Out of a possible sample of 600 freshmen and sophomore veterans of Southern Illinois University, 213 responded to the study. On the other hand, 1077 non-veteran freshmen college students attending six Illinois State Teacher Colleges took part in the study. Contrary to expectations the veteran students, who were on the average of 2 to 3 years older than non-veterans and supposedly had a more diversified background, showed no significant difference in the level of health knowledge. The means of the non-veteran groups and the veteran group were 53.30 and 52.77 respectively. (3:221-222)

Gross and Davis assessed the health knowledge of 5,490 male freshmen college students on their first meeting for health instruction at Pennsylvania State University from 1953-54 to 1956-57 using the Dearborn College Health Knowledge Test. Most of the students had graduated in the upper two-fifths of their high school classes. Approximately 90 per cent of the students were from the high schools of Pennsylvania. The purpose of the study was to determine: the general level of attainment in regard to health information; the specific areas in health knowledge in which the students were weak; and the specific areas in health knowledge in which the
students were already well informed. The students were
given approximately 50 minutes to complete the test. Any
test that was not completed by a student in the allotted
time was eliminated from the study. The mean score of
all these students was 55 out of a possible 100, which
suggested an inadequate level of health knowledge. Most
of the students included in this study needed additional
instruction in all of the areas of health. (12:250-252)

Dann developed a Family Health Knowledge Test with
the concept that "the family is the basic unit of society
through which certain health needs can be fulfilled."
The first draft of the test had 69 multiple-choice items
covering the seven major topics: growth and development,
dating, preparation for marriage, marriage and marital
adjustment, reproduction, preparation for parenthood, and
the family-life-cycle functions. The test was administered
to 150 eleventh grade students in a school selected for
the study. The data from the first trial testing were
analyzed and treated statistically to determine the
usefulness of specific items and the test as a whole. The
test was also critically reviewed by several authorities
in health education, medicine, public health and in the
field of measurement and evaluation. The test items were
reviewed for accuracy of content and for clarity of
meaning and the test was shortened to 63 multiple-choice
items. The revised test was then administered to 527
eleventh and twelfth grade students in three schools and was found to be much improved. The mean score based on the revised test was 33.9. The reliability of the test was 0.73. The level of reliability suggested that the use of the test be limited to a measurement of group differences until further improvements could be made on the test. (5:450-453)

Keeve and Specter conducted a questionnaire survey in the Newburgh, New York public school district to determine the current status of first-aid, safety and health understanding and information of its teachers. An eighty-one item multiple-choice questionnaire was submitted to 357 teachers (kindergarten to twelfth grade) of the district with 231 completing the test anonymously. The mean score of the 231 teachers was 44. Eleven per cent of them achieved superior scores and eight per cent failed the test with scores less than thirty-six. Eighty-one per cent had scores within the "passing" range. This survey revealed that many misconceptions and erroneous beliefs regarding first-aid and safety existed in a population responsible for educating children. (15:384-385)

To determine the incidence of misconception response on the Dearborn College Health Knowledge Test, Heflin and Pangle conducted a study on 243 students enrolled in six sections of a required health education course at Peabody College at the beginning of the course. The sample
comprised 186 freshmen, 38 sophomores, 12 juniors and 7 seniors. Women and men numbered 195 and 48 respectively. The students were informed that the scores of the test would not affect their academic performance in any way. No time limit was imposed. In addition to the usual multiple-choice format, a three-point gradation was included for each item to provide a specific measurement of the misconception. On this three-point gradation, the student was asked to indicate the extent to which he felt his choice had been a correct one after routinely recording each answer choice. In the three-point gradation, a response of "1" represented a guess; a "3" represented a distinct feeling of certainty; and a "2" meant a non-guessing but less certain alternative. Utilizing this gradation process a misconception score was calculated on the basis of the number of items to which a student responded out of certainty but for which the answers were incorrect. The mean score of misconception for all students was 7.12; the score ranging from 0 to 32. (13:154-155) In this study two additional hypotheses were tested. The first hypothesis tested proved that the "recency of health instruction did not seem to be a relevant factor in reducing the prevalence of misconceptions evidenced by college students." (13:155) Another hypothesis tested showed that "there is insufficient evidence to indicate that students following one major
possess fewer (or more) health misconceptions than those of another". (13:155-156) The researcher further suggested that "such a conclusion although disappointing in the case of the health and physical education major, is a modest rebuttal to the frequently encountered request to waive health education requirements for biology or other science students, or both". (13:156) Instructors of the basic required course in health education who participate in curriculum revision, selection of course content, and planning teaching units should be concerned with the prevalence of health misconceptions among college students. This concern into various aspects of health misconceptions among college students could add a new and challenging dimension to the teaching of health education at any instructional level. (13:157)

Sutton, to determine the nature and extent of health knowledge of college students, tested 648 students from three institutions - a large university, a state college, and a junior college in California - using the Dearborn College Health Knowledge Test. The results showed that there were many misconceptions as well as lack of information among these students. In the area of exercise and body mechanics, which ranked poorest among the eleven areas under study, only 49.61 per cent of the responses were correct. Other areas for which students
ranked low were mental hygiene and integration, medical care and advice, hygiene of special sense organs, and excretion and cleanliness. (26:49-52)

Synovitz conducted a similar study with 630 students to measure the harmful misconceptions that were held by the students in basic health information classes in four-year colleges in the state of Indiana. (28:650) According to the findings, the highest percentage of harmful misconceptions 37.59 per cent was in the area of exercise; the lowest 11.75 per cent was in the area of mental hygiene. (28:651)

Reid developed a valid and reliable problem-solving health knowledge test for college students using the following three sources: an analysis of current college health education textbooks, Sutton's Health Needs Study, and Lantagne's Health Interest Study. On the basis of these sources she selected the following ten health problem areas: prevention and control of communicable diseases, consumer health, family life education, heredity, chronic and degenerative diseases, mental health, nutrition and weight problems, first-aid and safety, stimulants and depressants, and community health. A 160 item true-false test was administered to 355 men and women students as a pretest at a junior college, a state college and a state university, all in California. After conducting a study of discriminatory value of each item the test was revised
and reduced down to 127 items and was administered again to a similar population of 320 students. The further refined final test of 100 item true-false questions was administered to 275 men and women students in a state college and a state university in California. (23:95-96) The reliability of the test was found to be .767 with application of the Spearman-Brown prophecy formula and .752 by the Kuder-Richardson method. (23:87-88)

III. SURVEYS OF HEALTH KNOWLEDGE OF THE PUBLIC IN THE UNITED STATES

A number of health knowledge measurement instruments have been designed to survey the health knowledge of the public in the United States. Kilander conducted a series of studies during the years 1936 to 1961. The findings and observations were summarized in a report to show that:

1. There has been a slight but steady improvement in the level of information held by students and adults over the years.

2. Few individuals are found to be adequately informed in all the various areas of health knowledge to be able to act wisely for personal needs.
3. College students are better informed than their former school classmates who did not go to college.

4. The level of information is found not to be very different for different parts of the United States when sufficiently large and varied samplings of the population are taken. However, the range of scores within a given class room or other group varies considerably.

5. A college education per se does not necessarily add to the health information of college students.

6. Intelligence has considerable influence upon the level of health knowledge, as is to be expected.

7. The relationship between health information and health practices is, in general, positive.

8. Teachers tend not to be adequately informed about health, considering their need for greater knowledge because of their position.

(17:28-29)

In the summer of 1955 a nation-wide public knowledge and attitude survey was conducted in the United States by Opinion Research Center on the use of medical resources. Data were collected by personal interview
with 2,379 individuals from the general public sample of 2,900 adults. (9:12-15) The findings of the survey, in general, revealed that the American public were generally well-informed and had positive attitudes about health and medical care. Four out of five respondents were aware that one could have a serious illness without realizing its presence. The same proportion acknowledged the value of periodic health check-ups, and large majorities urged professional medical care rather than self-treatment for a variety of common symptoms. But further investigation showed that public knowledge and ignorance were not random but were clustered within certain sub-groups of the population. Younger and better educated people who read newspapers and magazines were better informed about various disease conditions than other groups composed of older and less educated people. (9:156)

In the summer of 1963 Kirscht, Haefner, Kegeles and Rosenstock conducted a similar national survey to measure the knowledge, beliefs, opinions, and actions of the American public on various health problems. For the study, a nationally stratified multistage probability sample of 1,493 adults, 21 years of age and older was obtained from urban, suburban, and rural households of 70 different geographic areas of the United States. Reports of the different parts of the study are reviewed. The part of the national study dealing with health beliefs
tried to explore a set of variables concerned with the perceived negative consequences of disease, the perceived vulnerability to disease, and beliefs concerning the beneficial effects of taking prevention, remedial, or diagnostic actions to mitigate the threat or consequences of disease. Data were collected by means of personal interviews on the following four health topics: cancer, tuberculosis, tooth decay and gum disease. These topics were selected to provide a range of objective clinical severity and represent problems of continued and increasing concern to public health. (19:248-249) The results showed that cancer was perceived as a very serious disease, and one that was likely to occur. Tuberculosis, though perceived as a serious disease, was not seen as likely to happen. Gum disease was also perceived as fairly serious, but not as likely to happen. Tooth decay, though viewed as likely to occur, was not perceived as a severe condition. (19:249)

Regarding the beliefs concerning prevention, five per cent said there was nothing one could do to prevent dental disease; nineteen per cent believed that nothing could be done to prevent tuberculosis; and forty-four per cent thought nothing could be done to prevent cancer. Three aspects of beliefs were investigated in respect to each disease—perceived susceptibility, perceived severity, and perceived benefits from taking some action. In the
national study it was found that no more than one-fifth of the sample held all three beliefs about cancer. The per cent exhibiting all beliefs for the other conditions was less than ten for the dental diseases and about two for tuberculosis. About ten per cent of the sample held none of the beliefs regarding tuberculosis and dental conditions, while less than three per cent had none of the beliefs for cancer. Interestingly, for tuberculosis and gum disease, the belief in susceptibility was missing most often, while for tooth decay lack of belief in severity was most frequent. Regarding cancer, there was nearly equal absence of beliefs in susceptibility and in benefits. In general, two conclusions were evident from the data: First, vulnerability to disease and helplessness in the fact of disease tend to be associated with lower social status groups, possibly reflecting reduced ability and resources to cope with the environment. Second, cancer was seen as a threat with potentially serious consequences for everyone, it was also clear that those of higher socioeconomic status had more faith in being able to ward off those consequences. (19:249-253) The researchers concluded that on the basis of these findings different kinds of educational programs could be planned for different diseases according to the
nitude of the perception of the public as to the perceived susceptibility, perceived severity, and perceived benefits of taking actions. (19:254)

Another section of the national survey involved a study of the public's beliefs about cancer detection. Of particular interest was information about the Papanicolaou test for cervical cancer. The sample of 884 women was selected through the national probability sample of 1,493 adults, 21 years of age and older. (16:815-816) The results of the study showed that 35 to 44 year old white women reported the greatest use of cervical cytological tests for cancer detection. Few women over 65 years of age reported having obtained the tests. Negro women were far less inclined to obtain the cervical smear test than were white women.

The higher the woman's education, income, and occupational class, the more likely she was to report that she obtained the cervical test. More married than single women reported obtaining the test. The results further indicated that many women held the correct general beliefs about cancer but did not report obtaining cervical tests. (16:822-823) The researchers suggest four separate but interrelated programs to increase the use of cervical cytological tests.

(a) the necessity of including more private physicians to take cervical smears, (b) the continuing use of cervical tests in the offices of physicians supplemented by a clear explanation to patients of
the benefits of the periodic cervical examinations, (c) a mass information program alerting women to the need of professional diagnosis and the benefits of early diagnosis of cervical cancer, and (d) person-to-person solicitation of those women who were not likely to be reached by mass communications. (16:823)

They also suggested the organizing of public health facilities for providing cervical tests to women who do not regularly visit physicians. (16:823)

In the third part of the study the researchers collected data from the national sampling on knowledge, beliefs and actions relative to three issues of increasing public health concern: the health effects of radio-active fallout that gets into "the things we eat and drink"; health effects of insect and plant sprays; and health effects of fatty foods. (25:91)

The findings of the study showed that more than two-thirds of the respondents reported that they had heard something about the effects of pesticides upon health. More than three-quarters reported having heard about the health effects of radio-active fallout and/or about the health effects of eating fatty foods. Many respondents not only had some correct information on all three issues, but they also were correctly informed on two and even three issues. Thirty-one per cent of the total sample had at least some correct information on all three issues. A total of 53 per cent of the respondents evidenced some correct information on at least two of these public issues. A positive relationship of
education and income was observed with individuals with correct information. A larger proportion of the white group was found to be correctly informed than the non-white group. Men were found to be slightly superior to women in the number of correct responses about pesticides and about radio-active fallout. On the other hand, women showed a slight superiority over men regarding information on fatty foods. Relationship between age and possession of correct information was observed to be complex. However, in general, the age group 35-44 was observed to be the best informed about each issue with the groups 45-54, 55-64 tending to follow closely.

Regarding the taking of health action, forty-one per cent reported taking some actions on the problem of "fatty foods". Such actions included cutting down on or eliminating fats, milk, or butter from diets, or the use of unsaturated substitutes such as vegetable oil or powdered milk. In the matter of pesticides, over thirty-seven per cent reported taking specific actions. Only three per cent of the sample reported taking any action with respect to fall out. This finding was not surprising because individual action is not too feasible regarding radio-active fallout. (25:92-97)

In January 1966, the Columbia Broadcasting System conducted a national survey of the health knowledge of the American people by means of a telecast. The instrument
used for the survey was the CBS National Health Test which included seventy-one factual questions and five opinion questions. Opinion Research Corporation (ORC) later gathered information about respondent's personal characteristics by means of interviews with 1,009 respondents selected by an area sample designed to represent various segments of the United States population ages 14 and over.

The description of respondent characteristics was quite limited, yet some general conclusions were drawn from the results (Table I). For instance, women scored slightly higher than men. Persons 50 years old or over were found to be somewhat less informed than younger persons. A strong positive relationship between level of education and score on the test was found. (27:4-5)

The A.C. Nielsen Company obtained data on the characteristics of those persons viewing the CBS National Health Test of television. The collection of data were based on combined use of its Audimeter method and diary techniques. The Audimeter method recorded minute-by-minute information on each television set in one area probability sample of 1,100 homes and the diary entries recorded the age and sex of each person actually viewing television at 2,200 homes derived from a parallel national probability sample (Table II). (27:5)

Najar, using the CBS National Health Test, compared the health knowledge of 375 eighth grade junior high
### TABLE II

Nielsen Audience Composition Data—Viewers of CBS National Health Test, Parts I and II*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Part I</th>
<th>Part II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Region</td>
<td>14.0%</td>
<td>17.1%</td>
</tr>
<tr>
<td>Northeast</td>
<td>19.1</td>
<td>18.9</td>
</tr>
<tr>
<td>East Central</td>
<td>9.0</td>
<td>14.3</td>
</tr>
<tr>
<td>West Central</td>
<td>18.2</td>
<td>24.7</td>
</tr>
<tr>
<td>South</td>
<td>9.0</td>
<td>14.9</td>
</tr>
<tr>
<td>Pacific</td>
<td>12.0</td>
<td>9.7</td>
</tr>
<tr>
<td>County Size (population)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A—largest</td>
<td>14.1</td>
<td>17.6</td>
</tr>
<tr>
<td>B</td>
<td>13.1</td>
<td>15.0</td>
</tr>
<tr>
<td>C</td>
<td>15.3</td>
<td>17.2</td>
</tr>
<tr>
<td>D—smallest</td>
<td>13.9</td>
<td>19.4</td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower (under $5,000)</td>
<td>14.0</td>
<td>16.9</td>
</tr>
<tr>
<td>Middle ($5,000—9,999)</td>
<td>14.5</td>
<td>17.1</td>
</tr>
<tr>
<td>Upper ($10,000 and over)</td>
<td>12.8</td>
<td>17.5</td>
</tr>
<tr>
<td>Education of Household Head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade school</td>
<td>12.4</td>
<td>14.4</td>
</tr>
<tr>
<td>1-3 years high school</td>
<td>14.1</td>
<td>20.0</td>
</tr>
<tr>
<td>4 years high school</td>
<td>13.3</td>
<td>19.7</td>
</tr>
<tr>
<td>1 or more years college</td>
<td>16.5</td>
<td>14.5</td>
</tr>
<tr>
<td>Occupation of Household Head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional and white collar</td>
<td>13.6</td>
<td>16.1</td>
</tr>
<tr>
<td>Blue collar—skilled</td>
<td>15.9</td>
<td>21.5</td>
</tr>
<tr>
<td>Blue collar—unskilled</td>
<td>11.1</td>
<td>13.3</td>
</tr>
<tr>
<td>Retired and unemployed</td>
<td>18.4</td>
<td>21.3</td>
</tr>
<tr>
<td>Age of Household Head</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 35</td>
<td>13.4</td>
<td>14.0</td>
</tr>
<tr>
<td>35-49</td>
<td>13.1</td>
<td>15.9</td>
</tr>
<tr>
<td>50-64</td>
<td>13.7</td>
<td>17.6</td>
</tr>
<tr>
<td>65 and older</td>
<td>18.2</td>
<td>24.6</td>
</tr>
<tr>
<td>Household Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2 persons</td>
<td>15.1</td>
<td>18.5</td>
</tr>
<tr>
<td>3-4 persons</td>
<td>13.8</td>
<td>16.8</td>
</tr>
<tr>
<td>5 or more persons</td>
<td>12.3</td>
<td>15.1</td>
</tr>
</tbody>
</table>

*Percentages are of all television households in each market section viewing the program during the average minute. The programs were telecast from 10:00 to 11:00 pm on two successive Tuesdays, January 18th and 25th, 1966.
school students in Southern California who were completing a 5-week health course with that of the national sampling. The findings of the study showed a significant difference of 4.55 points on the inventory by the national sampling over the junior high school group. A comparison of the results of girls and boys of the junior high school group indicated that the girls outranked boys by 1 per cent. The student group demonstrated their lowest competency in the area of alcohol and narcotics information and highest score in the area of dental health. The junior high school students outscored the national sampling in the area of personal and community health, and in the area of safety and first-aid knowledge they scored 1 per cent less than the national sampling. (21:27-29)

IV. COMPARISON OF KNOWLEDGE IN CROSS-CULTURAL SITUATION

A review of the literature revealed the lack of published studies designed to measure the health knowledge of persons in cross-cultural situations. Cross-cultural studies of areas other than the measurement of health knowledge are reviewed below.

Children living in different environments learn and perceive things differently. Dart and Pradhan, in October and November 1965, conducted a pilot study in Nepal regarding information about attitudes towards familiar
phenomena of nature, and about the sources of knowledge about nature. Through personal interviews, data were gathered from school children (9-14 years of age) in villages in Nepal and compared with data from a group of American school children (9-12 years of age) in Honolulu. The children were interviewed informally in small groups of 3 or 4 individuals at a time. The questions were designed to reveal: how the respondents accounted for various commonly experienced phenomena, such as rain, lightning, thunder, fire, and earthquake; what attitudes the respondents held about the control or manipulation of such phenomena; and what were considered to be the origins of knowledge about nature, and what accepted criteria of validity of such knowledge were. (6:649-650) With very few exceptions the Nepalese group gave both a "folk-oriented" or "myth-oriented" and "school oriented" explanation of a given phenomenon within a single interview. For instance, the cause of earthquakes as given by the various groups of the Nepalese school children were as follows:

"The earth is supported on the back of a fish. When the fish grows tired it shifts the weight, and this shakes the earth."

"The earth is supported by four elephants. When one of them shifts the weight to another shoulder an earthquake results."

"There are fire and molten metal inside the earth which try to escape. They may crack or move the rock of the earth, causing an earthquake."
Similar answers were given as the cause of rain and lightning. 

"The deities break the vessels of water in the sky, causing rain."

"The sun evaporates water from the sea, producing vapor which is cooled by the mountains to make clouds and rain."

"Lightning comes from the bangles of Indra (King of Gods)'s dancers."

"Lightning comes from the collision of clouds."

The American school children group explained the cause of earthquakes, rain and lightning on the basis of "scientific" concepts. Regarding the control or manipulation of such phenomena as earthquakes, rain and lightning the Nepalese group referred to religious rituals in which the actual control was at the will of a deity who might not always respond. The use of charms also was mentioned as a control or manipulating medium. None of the American school children believed in magical or religious practices for manipulating natural phenomena. They considered such control achievable through technological procedures or impossible. (6:651-652)

The Nepalese students, in general, expressed the idea that "knowledge" is a closed body, rarely capable of extension. It is passed from teacher to student and from generation to generation. The American students, on the other hand, stated that knowledge originated in
observation and experiment. They believed that new knowledge not only could be obtained but was continuously being obtained. (6:652)

The American students in the United States, in the process of learning, receive systematic training and practice skills of abstraction and inference. At the same time they strive to maintain contact with the real world by subjecting conclusions to observational verifications. Moreover, informal learning plays an important part in this process. The typical surroundings in the United States include mechanical games and toys, magazines and television. The children can watch and imitate the activities and conversations of the adults. The environment contributes to the knowledge, attitude, and skills the student develops. Whatever the child does in the school is influenced by his environment. The Nepalese village child, on the other hand, does not have a favorable environment in which to learn science. He lives in a non-western influenced village, close to nature and the ritual of planting and harvesting. There is little or no abstraction and little need to generalize. He does not get a chance to play with mechanical toys. He rarely sees a book in his home. His society, any other society does contain many abstractions ranging from spoken or written language to a very complex religious cosmology. These kinds of abstractions, however, are not too useful in
preparing the way for science. For instance, the Nepalese child will be familiar with an abstract representing certain Hindu or Buddhist deities and heroes of religious myths and legends. These are not, however, observable phenomena and they may not be conducive to the scientific approach. (6:652)

A study conducted by Thaver et al. at the University of Hawaii compared conceptions of mental health held by Asian and American students and by a group of American psychologists. The data were acquired by means of a 60-item questionnaire developed by Nunnally. No statistically significant differences were found between the two American groups of students and psychologists, nor any of the four Asian groups of composed Chinese, Japanese, Filipino and Thai students. However, each American group differed significantly with each Asian group. (29:21-26)

Arnhooff, Leon and Lorge conducted a study analyzing the beliefs about aging in a cross-cultural situation. The sample included students from the United States, England, Greece, Japan, Puerto Rico, and Sweden. Each country represented differed in recency and degree of industrialization, economic level, social-welfare programs for the aged, family structure, and living conditions, all of which are related to relevant factors of the life patterns of aged persons. Each group of students responded to a 100-item list of statements about
aged people which are chosen from an original list of 137 items collected by Tuckman and Lorge. The questionnaire was translated into the respective language of the country involved in the study and mailed to colleges of that country. The findings indicated a ubiquitousness of beliefs about aging and the aged that transcended geography, education and cultural differences. Aging was accompanied by many stereotyped beliefs, and these in turn were predominantly negative in outlook, regardless of the country involved. In many instances American attitudes towards aging were found to be more favorable than those entertained in other countries. (2:42-57)

V. MEASUREMENT AND SURVEY OF HEALTH KNOWLEDGE IN OTHER CULTURES

Surveys of the health knowledge of the public, including students, have been completed in a number of countries. The following two studies conducted in selected areas of India provide a vivid picture of the health knowledge level. Gill and Prasad conducted a study in Lucknow, India to obtain baseline information on personal hygiene and health knowledge of primary school children. The survey included 812 primary school students in six randomly selected villages of Sarojini Nagar Community Development Block situated near the city of Lucknow. Data concerning personal hygiene and health habits were
collected by means of a score-card filling method. The health knowledge part of the survey was assessed of only the 106 students who could take a written test. The mean age of these students was 12.4 years. The five test questions written in Hindi were as follows:

1. What diseases are caused by mosquitoes?
2. What diseases are caused by flies?
3. How can you prevent smallpox?
4. Name water-borne diseases.
5. Why is a latrine needed in the house?

For comparison the same written test was given to students in the city of Lucknow. The students were of the same class level, had a similar educational background and syllabus, but apparently had a better socioeconomic background. These children were 85 in number and their average age was 11.98 years. All the 812 students from the six villages were within the age group of 6 to 15 years. They came from typically large rural families of low socioeconomic status with an average income of Rs. 58 per month. Seventy-four per cent had illiterate fathers and ninety-six per cent had illiterate mothers. Both school and home environment were poor and depressing with a minimum of sanitary facilities. The school lacked trained teachers, particularly in health subjects. The students had a very poor standard of personal hygiene and health habits. General observation suggested that most of the
students took weekly baths, had dirty bodies and wore dirty clothes. Soap was rarely used in washing hands. The standard of oral hygiene was very poor. Teeth were cleaned with charcoal or "Datun" (the twig of a tree). Many students did not wear shoes. Every seventh child was pock-marked by smallpox. The mid-day meal was unknown and about 78 per cent showed signs of malnutrition. Ninety-six per cent had one or more clinical, dental or nutritional defects.

The findings of the health knowledge test showed that there was a marked difference in the level of health knowledge of the urban and rural school children. Eighty per cent rural and 35.5 per cent urban children knew that mosquitoes caused malaria, 18 per cent rural and 64.7 per cent urban students gave wrong or no answers.

To the questions of fly-borne diseases, 82 per cent rural and 49 per cent urban children mentioned diarrhea and 9.5 per cent rural and 42.4 per cent urban children gave wrong or no replies.

About prevention of smallpox, 84 per cent rural and 51.8 per cent urban children mentioned vaccination. Thirty-six per cent rural and 16.5 per cent urban children felt that smallpox cases should be isolated, and 3.8 per cent rural children also suggested other measures like boiling patients clothing, "washing the patients room with phenule" etc. Twelve per cent rural and 48.2 per cent urban
children gave wrong or no replies. About the water-borne diseases the knowledge was poor. Fifty-six per cent rural children gave wrong or no replies, 10.4 per cent mentioned cholera and 33.6 per cent mentioned diarrhea.

About the need of a latrine in the house, 42.3 per cent rural and 9.4 per cent urban children thought that it saved the trouble of going out; 30.5 per cent rural and 78.9 per cent urban children gave wrong or no answers, and only 27.2 per cent rural and 11.7 per cent urban children believed that it prevented the spread of diseases. Some of the rural children expressed the idea that the latrines were necessary at home for "women who feel shy to go out" or "for small children", or "for a case of diarrhea for whom it may be impossible to run and reach the field in time". They also thought that "latrines were cooler to use in summer than going to the fields". Some of the urban children thought that latrines were essential to decorate the house and to prevent smell. (11:179-183)

In November 1965 Ahluwalia conducted a survey in India at Kurukshetra Fair, regarding what the general public knew about certain communicable diseases such as malaria, trachoma, smallpox, and tuberculosis. A total of 222 visitors to the fair were interviewed by trained interviewers. The 222 visitors were composed of 179 males and 43 females; 41 per cent were in the 21-30 year age group and 21 per cent in the 31-40 year age group; 53 per
cent were illiterate, 32 per cent had high school education and 10.8 per cent had college education; 46 per cent were agriculturists, 12.2 per cent housewives, 10 per cent military personnel, 7 per cent students, 6.8 per cent teachers and 4.5 per cent shopkeepers; 71.6 per cent lived in rural areas and 28.4 per cent in urban areas. The data collected about malaria revealed that 65 per cent of the sample did not know whether malaria was eradicated from India or not. Twenty-three per cent of the respondents thought malaria was caused by flies, food, water or air. Regarding trachoma, 90 per cent thought that trachoma could be caused by excessive heat, food gone sour, smoke and dust. Only 9 per cent (mostly educated and urban people) knew that germs caused the diseases. As to the question regarding the cause of smallpox, 71 per cent of the respondents attributed this to the annoyance of the Goddess Devi, to bad air, bad diet or to God's scourge. Forty per cent thought that the disease could not be prevented, or could be prevented by worshipping the Goddess or by eating good foods. Sixty per cent mentioned vaccination as the preventive measure.

Sixty-seven per cent of the respondents did not know bacteria was the cause of tuberculosis. According to them, faulty nutrition, general debility, exposure to cold, and vitamin deficiency were the causes. Knowledge about treatment was also lacking. Sixty-nine per cent
of the respondents were misinformed. They thought that the tuberculosis patient could not be treated at home. The findings also indicated that with one exception, young educated persons, students, teachers and city-dwellers were found to be better informed about the communicable diseases. The exception involved malaria, about which housewives and elderly men were better informed. (1:9-13)

VI. SUMMARY

Numerous efforts have been made to design new and efficient instruments to measure the health knowledge of American students and the American public. Data collected by means of these instruments have revealed a number of strong and weak aspects of health knowledge of the American people and the health education programs. Studies involving health knowledge measurement have been reported in other countries as well. Extensive investigation of related literature reveals that some cross-cultural studies involving health beliefs have been published. A similar investigation reveals no published evidence of any study involving a cross-cultural comparison of health knowledge.
CHAPTER III

METHODS

I. PURPOSE OF THE STUDY

The purpose of this study was to compare the health knowledge of foreign students attending San Fernando Valley State College with that of a sample of American students attending the same college, using the Columbia Broadcasting System (CBS) National Health Test.

II. MEASUREMENT

For purpose of this study, variations in responses by the two groups of students were measured by the differences in the percentage of correct replies for each question.

III. POPULATION STUDIED

The population selected for study were foreign students attending San Fernando Valley State College and those American students enrolled in three selected general education health classes at the same institution.

The Foreign Students

At the time of the study there were 130 foreign students attending San Fernando Valley State College from 37 different countries of the world. All of these students
were asked to participate in the study. One hundred foreign students responded and thus participated in the study.

The American Students

The students of three Health and Society (Health Science 120) classes, which are general education health classes, were taken as the sample of the American students for this study. The few foreign students enrolled in these classes were excluded as they belonged to the foreign student group. All together 140 American students participated in the study.

IV. THE RESEARCH DESIGN

The following research design was utilized for this study.

Construction and Original Use of the Test

The National Health Test was designed and administered by the Columbia Broadcasting System (CBS) to a national television sampling of the American population in January 1966. Along with the national sampling, three special test groups took part in the survey: student nurses served as audience participants in the test in New York; the National Awards Congress of the United States Junior Chamber of Commerce was involved in the study in St. Paul, Minnesota; and in San Francisco, at the California
Academy of Sciences, 292 American Red Cross volunteer workers completed the sampling. (4:3)

The sampling used in this original research was developed by the Opinion Research Corporation in cooperation with the Columbia Broadcasting System. (4:2)

The test was televised in two parts from 10:00 to 11:00 pm on two successive Tuesdays, January 18th and 25th, 1966.

The questions and answers on the National Health Test were developed with the aid of selected health experts and a professional testing agency. Reasoner described these individuals as follows:

...a special committee of the American Medical Association headed by Dr. Hugh Hussey and Dr. Charles Edwards of Chicago, by Dr. Howard Reid Craig and Dr. Samuel Standard of the New York Academy of Medicine, by Dr. Leona Bumgartner, former New York City Health Commissioner, by Dr. Paul Dudley White, the heart specialist of Boston, and by the Educational Testing Services of Princeton, New Jersey. (4:2)

The original test had three parts. The first two parts were composed of seventy-one questions: fifty true-false type; thirteen yes-no questions; five multiple-choice questions; and three listing-type questions. Content areas of the test included alcohol and narcotics, dental health, mental health, nutrition, sex education, personal and community health, safety and first-aid, heart disease, cancer, exercise, and communicable diseases. The third part of the test contained five opinion questions regarding controversial health topics.
Modification in the Original Test for this Study

A letter was sent to the CBS News requesting permission to use the National Test for this study. An affirmative reply was obtained for the use of the test.

In order to make the test suitable for this study the name of the test was changed to "Health Knowledge Study Test" with minor modification in the original test.

Since programs such as medicare at present do not exist in many parts of the world other than the United States, the foreign students were not expected to be acquainted with information pertaining to the program. As a result, the researcher omitted four questions from the original test which were related to Medicare Program. The four questions omitted were of the true-false type.

Two sets of Personal Information Questionnaires, each especially designed for the foreign student group and the American student group, were developed by the researcher. The Personal Information Questionnaire designed for the foreign student group contained 17 questions while the set designed for the American students contained 12 questions. These questionnaires were intended to record the students' biographical data, opinion on the quality of the San Fernando Valley State College Student Health Service, self-evaluation of personal physical fitness and health, interest in health literature, and personal evaluation of health knowledge.
Before distribution, the test and questionnaire were pretested on three foreign students to check whether the foreign students understood the questions. The test and questionnaire are included in the Appendix.

V. COLLECTION OF DATA

The test, including the Personal Information Questionnaire, was administered to the American students in three selected general education health science classes at San Fernando Valley State College on the first day of instruction of Spring Semester 1968. All three classes met on the same day but at different hours. Before the administration of the test, the students were informed about the research purpose of the test and were requested to answer the questions with honesty and frankness. The tests were collected as each subject completed the questions. The time needed for the completion of the test ranged from 8 minutes to 25 minutes.

It was not feasible to bring all the foreign students together in one classroom to administer the test. So, a letter of invitation was attached to each test packet. The letter stated the purpose of the study and invited the foreign students to participate by answering the questions frankly and honestly without consulting any kind of resources. The participants were requested to return the completed questionnaire in the enclosed
self-addressed stamped envelope as soon as possible. A promise was made by the researcher to keep all information confidential. The test, with the letter of invitation, and a self-addressed stamped envelope were made available to the foreign students with their registration packets. Registration packets are packets of class cards obtained in advance by the Office of Foreign Student Advisor for the convenience of registering foreign students. These packets were handed to the individual foreign student during the period of registration to help avoid rush and confusion. Tests were mailed to those students who did not go through the normal registration procedure. Ninety students received the test with the registration packet and tests were mailed to 40 students.

Some completed tests started arriving by mail the day following distribution. After two weeks, telephone calls were made to remind those students who had not returned the test. Two weeks later a reminder letter was sent by the researcher's academic advisor to those students who had not yet returned the tests. A few personal contacts were also made by the researcher to remind other students about returning the test. The International Student's Club in its monthly newsletter of March 1967 requested the foreign students to cooperate with the researcher by returning the completed tests. Again as
a last effort in the collection of the completed tests, the foreign student advisor sent a letter to each of the foreign students who had not returned his test.

VI. STATISTICAL TREATMENT OF THE DATA

The data were analyzed on the basis of percentage of correct responses scored by the two groups— the American student and the foreign student group. In addition, comparisons were made with the percentage of correct responses scored by the national sampling and the three professional groups.

The responses of the foreign student and the American student groups were categorized by Sex and Content Areas. Mean scores were determined for each of the groups involved in the study. Differences in percentage of correct responses by the foreign student group compared to the American student group were analyzed for the inventory. This comparison was also made to the national sampling and the three professional groups.

After computation of the mean score for both student groups, the standard deviations of these means were calculated. The standard error of each mean was determined to measure the extent to which the mean was affected by errors of measurement.

The next computation involved the standard error of the difference between means. The Critical Ratio was
derived by dividing the actual difference between means by the standard error of the difference between means. Finally, the Critical Ratio was compared with the Normal Probability Curve to determine the Statistical Significance among means. The 0.05 per cent level of confidence was used for the test.

Similar computation was performed to determine the statistical significance of the mean scores of male and female students in both groups of students. A content analysis was made by dividing the test into eleven content areas. The difference in the scores of both groups of the students in each content area was compared. The statistical significance of the difference in the score in each content area was established using the z test at 0.05 level of significance.

A complete item analysis was formulated for the purpose of isolating some content topics and therefore indicating the strength and weaknesses in content areas of the different groups. This has been included in the Appendix.
CHAPTER IV

ANALYSIS AND DISCUSSION OF DATA

DESCRIPTION OF THE STUDY POPULATION

The Foreign Students

The group of 100 foreign students who participated in this study was composed of 73 males and 27 females. Their ages ranged from 18 to 39, with the average age being 23.3 years. Eighty-three of the students were single. More than 50 per cent of the foreign students came from five countries: China (16 students); Iran (13 students); Israel (8 students); Japan (8 students); and Canada (7 students). Eighty-six per cent of the students had been in the United States for more than one year.

The distribution of students according to class status was as follows: 19 freshmen, 18 sophomores, 28 juniors, 9 seniors, and 26 graduate students. Most of the students had majors in engineering (29%) and business (23%). More than 50 per cent completed some education beyond high school before entering San Fernando Valley State College.

Thirty-two per cent of the students said that they had some type of health course in their home country.
Thirteen per cent completed courses while studying in the United States.

Sixty-eight per cent of the students utilized the student health service on the campus for health counseling or medical treatment. They rated the available services as follows: excellent 16.2%; good 61.8%; fair 19.1%; and poor 2.9%.

The students rated their personal physical fitness and health as follows:

<table>
<thead>
<tr>
<th>Physical Fitness</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>29.0%</td>
</tr>
<tr>
<td>Good</td>
<td>63.0%</td>
</tr>
<tr>
<td>Fair</td>
<td>7.0%</td>
</tr>
<tr>
<td>Poor</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Forty per cent of the foreign students reported that they read health-related literature. Seventy per cent of the students thought they were fairly well informed about health.

The American Students

The group of 140 American students who participated in this study was composed of 67 males and 73 females. Their ages ranged from 17 to 45, with the average age being 20.4 years. There were 87 freshmen, 24 sophomores, 19 juniors, and 10 seniors. One hundred and thirty-two of the students were single.
Many fields of study were represented among the students, with no single major predominating. One hundred and four of the students said that they previously had some type of a health course. Eighty of the students who had been to the student health service on the campus rated the available services in the following manner: excellent 25.0%; good 53.7%; fair 20.0%; and poor 1.3%.

The participants rated their personal physical fitness and health as follows:

<table>
<thead>
<tr>
<th>Physical Fitness</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>10.0%</td>
</tr>
<tr>
<td>Good</td>
<td>71.4%</td>
</tr>
<tr>
<td>Fair</td>
<td>18.6%</td>
</tr>
</tbody>
</table>

Thirty-two per cent of the students reported that they read health related besides their required text-books. Eighty-five per cent thought they were fairly well informed in matters of health.

II. COMPARISON OF TOTAL TEST RESULTS

Mean scores, based on the number of correct responses, were determined for the foreign student group and the American student group. A comparison of these scores (Table III) revealed a significant difference in favor of the American Student Group. The actual difference in total mean scores was 9.16.
TABLE III

SIGNIFICANCE OF DIFFERENCE OF MEAN SCORES: COMPARISON OF
100 FOREIGN STUDENTS AND 140 AMERICAN STUDENTS

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Difference of Means</th>
<th>Standard Deviation</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference</th>
<th>Critical Ratio</th>
<th>Significant at 0.05 Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Students</td>
<td>65.22</td>
<td>9.16</td>
<td>11.21</td>
<td>2.20</td>
<td></td>
<td>1.39</td>
<td>Yes</td>
</tr>
<tr>
<td>American Students</td>
<td>74.38</td>
<td></td>
<td>9.57</td>
<td>1.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comparison with Special Test Groups

When the CBS National Health Test was originally given, a national sampling was completed and compared to scores of special test groups. Of these groups, student nurses had the highest mean score (87.09%) on the test. An American Red Cross volunteer group was second with a mean score of 82.15 per cent. The Junior Chamber of Commerce of St. Paul, Minnesota had a mean score of 77.00 per cent. The participants in the national sampling had the lowest score, 64.43 per cent.

Both the foreign student group and the American student group in this had a higher mean score than the national sample, but fell below the scores of the special test groups. The mean scores of the foreign student group and the American student group were 65.22 per cent and 74.38 per cent respectively. (Table IV)

Comparison of Scores by Sex

Within the foreign student group of 100 students, the female students scored slightly higher than did the male students (Table V). The female students had a mean score of 66.58 per cent while the male students had a mean score of 63.86 per cent. The difference was not statistically significant.

American female students scored slightly higher than American male students (Table VI). The female students had a mean score of 74.81 per cent while the
<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Scores (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Sampling (N = 1,009)</td>
<td>64.43</td>
</tr>
<tr>
<td>Student Nurses (N = 100)</td>
<td>83.20</td>
</tr>
<tr>
<td>Junior Chamber of Commerce (N = 149)</td>
<td>76.50</td>
</tr>
<tr>
<td>Red Cross Volunteers (N = 292)</td>
<td>83.50</td>
</tr>
<tr>
<td>Foreign Students (N = 100)</td>
<td>65.22</td>
</tr>
<tr>
<td>Male (N = 73)</td>
<td>63.86</td>
</tr>
<tr>
<td>Female (N = 27)</td>
<td>66.58</td>
</tr>
<tr>
<td>American Students (N = 140)</td>
<td>74.38</td>
</tr>
<tr>
<td>Male (N = 67)</td>
<td>73.94</td>
</tr>
<tr>
<td>Female (N = 73)</td>
<td>74.81</td>
</tr>
</tbody>
</table>
### TABLE V

**SIGNIFICANCE OF DIFFERENCE OF MEAN SCORES: COMPARISON OF 27 FEMALE AND 73 MALE FOREIGN STUDENTS**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>Difference of Means</th>
<th>Standard Deviation</th>
<th>Standard Error of Mean</th>
<th>Error of Difference</th>
<th>Critical Ratio</th>
<th>Significant at 0.05 Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Students</td>
<td>66.58</td>
<td>2.72</td>
<td>12.80</td>
<td>4.82</td>
<td>.978</td>
<td>2.32</td>
<td>No</td>
</tr>
<tr>
<td>Male Students</td>
<td>63.86</td>
<td></td>
<td>11.03</td>
<td>2.53</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE VI

**SIGNIFICANCE OF DIFFERENCE OF MEAN SCORES: COMPARISON OF 73 FEMALE AND 67 MALE AMERICAN STUDENTS**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Difference of Means</th>
<th>Standard Deviation</th>
<th>Standard Error of Mean</th>
<th>Standard Error of Difference</th>
<th>Critical Ratio</th>
<th>Significant at 0.05 Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Students</td>
<td>74.81</td>
<td>8.56</td>
<td>2.00</td>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Male Students</td>
<td>73.94</td>
<td>8.35</td>
<td>1.96</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
male students had a mean score of 73.94 per cent. The difference was not statistically significant.

III. COMPARISON OF TEST RESULTS BY HEALTH CONTENT AREA

For purposes of comparison, the Health Knowledge Study Test was divided into eleven content areas: Alcohol and Narcotics, Dental Health, Mental Health, Nutrition, Sex Education, Personal and Community Health, Safety and First-Aid, Heart Disease, Cancer, Exercise and Communicable Diseases.

The percentage of correct responses for each content area, according to student and special test groups, is shown in Table VII. The difference between scores of the foreign student group and the American student group, according to each of the content areas, is shown in Figure I.

The z statistical test (at the 0.05 level of significance) was used in this study to observe the differences between the mean scores of the two student groups.

I. Alcohol and Narcotics

Six questions of the Health Knowledge Study Test (Part II-27, 28, 29, 30, 31, and 32) were included in this content area. The foreign students had a correct response of 45.50 per cent while the American students scored 62.74 per cent. The difference in the score was statistically significant.
TABLE VII

PERCENTAGE OF CORRECT RESPONSES OF FOREIGN AND AMERICAN STUDENTS ON ELEVEN
CONTENT AREAS COMPARED TO NATIONAL SAMPLING AND SPECIAL TEST GROUPS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol &amp; Narcotics</td>
<td>56.00</td>
<td>77.00</td>
<td>63.16</td>
<td>70.66</td>
<td>45.66</td>
<td>45.06</td>
<td>45.50</td>
<td>65.67</td>
<td>60.04</td>
<td>62.74</td>
</tr>
<tr>
<td>Dental Health</td>
<td>78.00</td>
<td>85.33</td>
<td>77.66</td>
<td>83.00</td>
<td>65.29</td>
<td>61.73</td>
<td>64.33</td>
<td>72.63</td>
<td>72.14</td>
<td>72.38</td>
</tr>
<tr>
<td>Mental Health</td>
<td>70.66</td>
<td>90.00</td>
<td>78.25</td>
<td>76.50</td>
<td>64.38</td>
<td>58.33</td>
<td>62.75</td>
<td>66.42</td>
<td>67.12</td>
<td>66.79</td>
</tr>
<tr>
<td>Nutrition</td>
<td>69.57</td>
<td>88.29</td>
<td>73.75</td>
<td>80.50</td>
<td>70.44</td>
<td>78.31</td>
<td>75.57</td>
<td>78.95</td>
<td>81.01</td>
<td>80.00</td>
</tr>
<tr>
<td>Sex Ed.</td>
<td>58.50</td>
<td>84.75</td>
<td>79.50</td>
<td>75.25</td>
<td>62.36</td>
<td>81.48</td>
<td>67.50</td>
<td>71.27</td>
<td>75.68</td>
<td>73.57</td>
</tr>
<tr>
<td>Personal &amp; Comm. Hlth.</td>
<td>60.00</td>
<td>88.50</td>
<td>80.75</td>
<td>84.17</td>
<td>71.34</td>
<td>69.13</td>
<td>70.75</td>
<td>79.60</td>
<td>77.62</td>
<td>76.07</td>
</tr>
<tr>
<td>Safety &amp; First-Aid</td>
<td>77.33</td>
<td>72.50</td>
<td>76.00</td>
<td>74.00</td>
<td>75.11</td>
<td>74.07</td>
<td>74.83</td>
<td>82.34</td>
<td>85.39</td>
<td>83.93</td>
</tr>
<tr>
<td>Heart Dis.</td>
<td>68.28</td>
<td>87.28</td>
<td>72.57</td>
<td>80.00</td>
<td>60.86</td>
<td>61.37</td>
<td>61.00</td>
<td>72.28</td>
<td>51.78</td>
<td>69.69</td>
</tr>
<tr>
<td>Cancer</td>
<td>48.00</td>
<td>99.00</td>
<td>90.50</td>
<td>94.50</td>
<td>49.91</td>
<td>43.70</td>
<td>42.40</td>
<td>54.33</td>
<td>67.39</td>
<td>61.50</td>
</tr>
<tr>
<td>Exercise</td>
<td>63.40</td>
<td>78.67</td>
<td>74.75</td>
<td>85.40</td>
<td>67.35</td>
<td>69.14</td>
<td>67.83</td>
<td>75.12</td>
<td>74.88</td>
<td>75.00</td>
</tr>
<tr>
<td>Comm. Dis.</td>
<td>70.43</td>
<td>88.86</td>
<td>80.29</td>
<td>86.28</td>
<td>65.95</td>
<td>65.08</td>
<td>65.72</td>
<td>77.61</td>
<td>81.03</td>
<td>79.39</td>
</tr>
</tbody>
</table>
FIGURE I

PERCENTAGE OF CORRECT RESPONSES FOR FOREIGN AND AMERICAN STUDENTS BY CONTENT AREAS

I. Alcohol and Narcotics
II. Dental Health
III. Mental Health
IV. Nutrition
V. Sex Education
VI. Personal and Community Health
VII. Safety and First-Aid
VIII. Heart Disease
IX. Cancer
X. Exercise
XI. Communicable Diseases
FIGURE I
PERCENTAGE OF CORRECT RESPONSES FOR FOREIGN
AND AMERICAN STUDENTS BY CONTENT AREAS

KEY
--- American Students
--- Foreign Students
II. Dental Health

Three questions from the Health Knowledge Study Test (Part II-33, 34, and 35) were included in this content area. The foreign students had a score of 64.33 per cent while the American students scored 72.38 per cent. Although the difference in scores seemed great, it did not quite reach statistical significance.

III. Mental Health

Four questions (Part I-25; Part II-24, 25, and 26) from the Health Knowledge Study Test constituted the content area of mental health. The foreign students scored 62.75 per cent and the American students scored 66.79 per cent. Statistical computation showed no significant difference between these scores.

IV. Nutrition

Six questions from the Health Knowledge Study Test (Part II-17, 18, 19, 20, 21, 22, and 23) were included in the area of nutrition. The foreign students had a score of 72.57 per cent and the American students scored 80.00 per cent. Statistical computation showed no significant difference between the scores of these two student groups.
V. Sex Education

Four questions from the Health Knowledge Study Test (Part I-22, 24, 26, and 27) were included in this content area. The score of the foreign students was 67.50 per cent. The American students scored 73.57 per cent and outranked the foreign students by 6.07 per cent. The statistical computation showed that the difference in the scores was not significant.

VI. Personal and Community Health

Twelve questions (Part I-1, 2, 7, 8, 9, 14, and 23; Part II-4, 6, 7, 8, and 9) were included in this content area. The foreign student group had a score of 70.75 per cent. The American student group scored 76.07 per cent and outranked the foreign student group by 5.32 per cent. The difference in the score was found to be not significant statistically.

VII. Safety and First-Aid

Six questions (Part I-3, 4, 5, and 6; Part II-36, and 37) from the Health Knowledge Study Test were included in this content area. The foreign students scored 74.83 per cent. The American student group scored 83.93 per cent. This was the highest score obtained by the student groups in the eleven content areas. The difference of 9.10 per cent between the foreign and the American students was not statistically significant.
VIII. **Heart Disease.**

Seven questions (Part I-16, 18, 18, 19, 20, and 21; Part II-10) constituted this content area on heart disease. The foreign student and the American student groups scored 60.86 per cent and 69.69 per cent respectively with a difference of 8.83 per cent. The difference was not statistically significant.

IX. **Cancer**

Five questions (Part I-10, 11, 12, 13, and 15) were included as part of the cancer content area. The foreign students and the American students scored 42.40 per cent and 61.50 per cent respectively. The difference was statistically significant.

X. **Exercise**

Six questions (Part II-11, 12, 13, 14, 15, and 16) were included in the content area of exercise. The foreign students and the American students scored 67.83 per cent and 75.00 per cent respectively. The difference between the scores of the two groups of students was not found to be statistically significant.

XI. **Communicable Disease**

Seven questions of the Health Knowledge Study Test (Part I-32, 33, and 34; Part II-1, 2, 3, and 5) were included in this content area. The foreign student group had a score of 65.72 per cent whereas the American student
group scored 79.39 per cent. The difference in scores between the two groups was found to be statistically significant.

IV. COMPARISON OF DIFFERENCES IN OPINION QUESTIONS

In the third part of the test opinions of students were asked on five controversial health topics. In answer to the first question, 46 per cent of the foreign students and 32.14 per cent of the American students gave their opinion that if they had a fatal disease they would want the doctor to tell only them. Another 41.00 per cent of the foreign students and 61.43 per cent of the American students thought it would be acceptable to tell them and their families. Nine per cent of the foreign students and five per cent of the American students did not want anyone, including themselves, to be told about their possible fatal disease. The rest of the students, decided that only their families should know about it.

The second opinion question dealt with changing the abortion law to make it easier for a married woman to have an abortion. The majority of the students (foreign students - 61%, and American students - 65.71%) favored liberalization of the laws. A smaller percentage of students (foreign students - 23.00%, and American students - 20.00%) were against liberalization. The rest of the
students (16% of the foreign students and 14.28% of the American students) gave no opinion.

The third opinion question asked where sex education of a child should be started. A vast majority of both groups of students (foreign students 93.00% and American students 97.86%) answered that a child should be given sex education in the home as well as in the school. Slightly more than two per cent of the American students expressed the opinion that sex education should be given in the home only while 7 per cent of the foreign students gave no opinion.

The fourth question was concerned with the age level at which sex education should begin. More foreign students (foreign students 57.00% and American students 31.43%) indicated that this type of education should begin at an older age i.e. 13-17 years. An earlier age level, 6-12 years, was indicated by 54.29 per cent of the American students whereas only 30.00 per cent of the foreign students recommended this age level. Thirteen per cent of the foreign students and 14.28 per cent of the American students responded that the right time to give sex education was before the age of six years.

The fifth opinion question was about drug addiction. The majority of the students (78% of the foreign students and 86.43% of the American students) gave their opinion that drug addiction should be dealt with as an illness.
Only 8 per cent of the foreign students and 5.72 per cent of the American students wanted to deal with the problem as a crime. The rest of the students from both groups did not give any opinion.

V. CONCLUSIONS

The findings of this study may be summarized as follows:

1. A difference of 9.16 points on the 67 item Health Knowledge Study Test was observed in favor of the American students. The difference was statistically significant.

2. Both the foreign student group and the American student group outranked the score of the individuals involved in the national sampling completed for the CBS National Health Test.

3. Within both groups of the students, the female students obtained higher scores than did the males. The difference in the mean scores was not statistically significant.

4. Both the foreign student group and the American student group had their highest score in the area of safety and first-aid. The foreign student group had a score of 74.83 per cent and the American student group scored 83.93 per cent. In this
content area, the score of the American student group surpassed the score of all the special test groups whereas the foreign student group surpassed only the student nurses.

5. Both groups of students had the lowest score in the area of cancer. A considerable number of students were unable to complete the answers to the questions on cancer.

6. Although the American students outscored the foreign students in all the health content areas, a statistically significant difference at 0.05 level of significance was seen only in the areas of cancer, alcohol and narcotics, and communicable diseases.

7. The group of the female foreign students outscored all the student groups and the special test groups with the exception of the student nurses in the content of sex education. The female foreign students had a score of 81.48 per cent and the student nurses had a score of 84.75 per cent.

8. Both groups of students in almost equal number, held similar opinions on the controversial health topics. Some difference in opinion was observed in questions dealing with fatal disease and sex education. Comparatively more foreign
students wanted only themselves to be informed, while more American students felt that families should also know about the fatal disease. A difference was also observed in the matter of sex education. Comparatively more foreign students gave the opinion that sex education should be started at an older age (13-17 years) whereas more American students prescribed a younger age (6-12 years) for beginning sex education.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

I. SUMMARY

It was the purpose of this study to measure and compare the health knowledge of foreign students with that of a sample of American students all of whom were attending San Fernando Valley State College, using the CBS National Health Test.

A review of the literature revealed that numerous studies have been made in an attempt to measure the health knowledge of American students and American public. Studies involving health knowledge measurement have been reported from other countries as well. No published evidence of any study involving a cross-cultural comparison of health knowledge was reported.

The CBS National Health Test, with the omission of four questions dealing with Medicare, was completed by 100 foreign students together with a personal information questionnaire. One hundred and forty American students of three general education health science classes were taken as the sample of the American students and the test, together with a personal information questionnaire was completed in the first regular class meeting.
The variation of the responses by the groups of students was measured by differences in the percentage of correct responses for each question. The percentage of mean scores of the foreign student and the American student groups were compared. Comparison was also made between the male and female students among the foreign students and the American students. The test was divided into eleven content areas and comparison of the scores of the foreign students and American students was made in each content area.

II. CONCLUSIONS

1. American students are generally better informed about health than are foreign students.

2. Female students usually are better informed in matters of health than male students.

3. In regard to selected controversial opinion questions, American and foreign students are quite similar in their points of view.

III. RECOMMENDATIONS

On the basis of the findings of this study the following recommendations were made:
1. Foreign students seemed to have less health knowledge than the American students. Therefore, a specially designed health course may be beneficial to raise the level of health knowledge of the foreign students. This might further enable them to better adjust to the new environment in the United States.

2. The content of the health course specially designed for the foreign students should be tailored according to the needs, interests, and background knowledge of the foreign students.

3. Cancer, alcohol and narcotics, and communicable diseases should be emphasized in the health course for all foreign students.

4. A special health education course for the foreign students might also be used to stimulate their interest in health problems in their home countries. Thus, when the student returns to his homeland and begins his career he might be better able to contribute to the promotion of health.

5. The student health service should consider providing a special kind of health counseling and medical care to the foreign students, who,
because of lack of knowledge in health matters and being in a new and different environment, might need special assistance.

IV. FURTHER STUDY

Extensive investigation of published literature has indicated that this study is probably the first attempt to compare the health knowledge of foreign students and American students studying in American institutions. The scope of the study was limited to one campus and the population studied was not randomly selected. Additional study involving a comparison of health knowledge between the foreign students and American students is necessary before further conclusions can be drawn.
BIBLIOGRAPHY


APPENDIX A

THE HEALTH KNOWLEDGE STUDY TEST
HEALTH KNOWLEDGE STUDY

Personal Information
(Foreign Students)

1. Name _____________________________________________

2. Age ________________ (in years)

3. Sex
   ___Male
   ___Female

4. What is your marital status?
   ___Single          ___Divorced or Separated
   ___Married        ___Widow or Widower

5. What is your home country? ________________________

6. What is your major? ______________________________

7. What is your college status?
   ___Freshman        ___Senior
   ___Sophomore       ___Graduate
   ___Junior         ___Non-degree student
8. What educational background did you have before coming to the United States?

___ Less than completion of high school
___ High school graduate
___ High school graduate plus 1 more year
___ High school graduate plus 2 more years
___ Other (Specify) ________________________________

9. (a) Did you receive any of this education (checked in Question 8) in a country other than your home country?

___ Yes
___ No

(b) If yes, please describe where and what level of education.

<table>
<thead>
<tr>
<th>Where</th>
<th>What Grade Level</th>
<th>No. of Years</th>
</tr>
</thead>
</table>

10. How long have you been in the United States in total?

___ Less than a year ___ More than 3 years
___ More than 1 year ___ More than 4 years
___ More than 2 years ___ More than 5 years

11. (a) Did you have or are you having any course in health at San Fernando Valley State College?

___ Yes
___ No
(b) If yes, what course and how many units?

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. (a) Have you ever had any course(s) in health at any school other than San Fernando Valley State College?

____ Yes
____ No

(b) If yes, where and how many courses?

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Location</th>
<th>Number of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) What kind(s) of health course(s) did you have?

(Mark one or more)

____ Family Life Education  ____ Chronic Disease Control
____ First Aid              ____ Nutrition
____ Personal Health or Hygiene
____ Communicable Disease Control
____ Community Health
____ Health Education
____ Other (Specify)
13. (a) How many times have you been to the Student Health Service at San Fernando Valley State College for health counseling or medical treatment?
   ___Never
   ___Once
   ___Twice
   ___Three times
   ___Many times

   (b) If you have been to the Student Health Service, how would you rate the available services?
   ___Excellent
   ___Good
   ___Fair
   ___Poor

14. How would you rate your physical fitness?
   ___Excellent
   ___Good
   ___Fair
   ___Poor

15. How would you rate your health?
   ___Excellent
   ___Good
   ___Fair
   ___Poor
16. Do you read books, magazines or journals regarding health other than those necessary for your courses?
   ___Yes
   ___No

17. How adequately informed are you in matters of health?
   ___Very adequately
   ___Fairly well
   ___Poorly
HEALTH KNOWLEDGE STUDY

Personal Information
(American Students)

1. Name ________________________________________________

2. Age ___________ (in years)

3. Sex
   ___ Male
   ___ Female

4. What is your marital status?
   ___ Single          ___ Divorced or Separated
   ___ Married        ___ Widow or Widower

5. What is your major? ____________________________________

6. What is your college status?
   ___ Freshman       ___ Senior
   ___ Sophomore      ___ Graduate
   ___ Junior         ___ Non-degree student

7. (a) Have you ever had any course(s) in health in any school other than San Fernando Valley State College?
   ___ Yes
   ___ No
(b) If yes, where and how many courses?

<table>
<thead>
<tr>
<th>Name of the School</th>
<th>Location</th>
<th>Number of Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) What kind(s) of health course(s) did you have?

(Mark one or more)

- Family Life Education
- Chronic Disease Control
- First Aid
- Nutrition
- Personal Health or Hygiene
- Community Health
- Health Education
- Communicable Disease Control
- Other (Specify)

8. (a) How many times have you been to the Student Health Service at San Fernando Valley State College for health counseling or medical treatment?

- Never
- Once
- Twice
- Three times
- Many times
(b) If you have been to the Student Health Service, how would you rate the available services?

___ Excellent
___ Good
___ Fair
___ Poor

9. How would you rate your physical fitness?

___ Excellent
___ Good
___ Fair
___ Poor

10. How would you rate your health?

___ Excellent
___ Good
___ Fair
___ Poor

11. Do you read books, magazines or journals regarding health other than those necessary for your courses?

___ Yes
___ No

12. How adequately informed are you in matters of health?

___ Very adequately
___ Fairly well
___ Poorly
HEALTH KNOWLEDGE STUDY

Test - Part I

1. Do you know your Blood type?
   ____ Yes
   ____ No

2. The normal body temperature is 96.2° Farenheit.
   ____ True
   ____ False

3. If youngster develops a moderate fever, what should parents do while waiting for the doctor to arrive?
   a. Give him aspirin to bring temperature down
   b. Give him an alcohol rub to bring the temperature down
   c. Keep him warm and comfortable in bed

4. If a youngster complains of a bad stomach ache, what should the parents do while waiting for the doctor to arrive?
   a. Give him a mild laxative
   b. give him an enema
   c. keep him warm and comfortable
5. Leftover prescription medicine ought to be saved in case the disease for which it was prescribed occurs again.
   ___ True
   ___ False

6. In order to make it more convenient for a patient, it is a good idea to leave his medicine by his bedside if he has to take a dose of it during the night.
   ___ True
   ___ False

7. You can cure a cold by taking the right medicine.
   ___ True
   ___ False

8. Blowing your nose too hard can be harmful to your ears.
   ___ True
   ___ False

9. When you have a cold it will help you to get well if you increase the amount of food you eat.
   ___ True
   ___ False

10. Name three of seven common danger signals of cancer.
    _______________________________________
    _______________________________________
    _______________________________________
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Cervical cancer can be detected readily by a quick and reliable test.</td>
<td></td>
</tr>
<tr>
<td>___ True</td>
<td></td>
</tr>
<tr>
<td>___ False</td>
<td></td>
</tr>
</tbody>
</table>

| 14. If a man has been smoking heavily for more than 20 years, it is too late for him to benefit from stopping. |   |
| ___ True |   |
| ___ False |   |

| 15. Skin cancer can be caused by repeated over-exposure to the sun. |   |
| ___ True |   |
| ___ False |   |

| 16. If a child has a heart murmur he is bound to suffer heart disease when he grows up. |   |
|   |   |

| 17. Rheumatic fever is always preceded by a streptococcal infection. |   |
| ___ True |   |
| ___ False |   |

| 18. An overweight person increases the workload on his heart. |   |
| ___ True |   |
| ___ False |   |
19. A woman in her 40's is just as likely to have a heart attack as a man in this age group.
   ___True
   ___False

20. The cigarette smoker is more likely to have a heart attack than a non-smoker.
   ___True
   ___False

21. A stroke is a type of heart attack.
   ___True
   ___False

22. Doctors advise expectant mothers to control their weight so that their babies will not be too large.
   ___True
   ___False

23. The United States has the lowest rate of infant mortality in the world.
   ___True
   ___False

24. During pregnancy the first three months are the most critical for normal formation of baby's body structures.
   ___True
   ___False
25. Some cases of mental retardation can be avoided by changing the diet of a new born infant.
   ____ True
   ____ False

26. A woman is most fertile three days after her menstrual period.
   ____ True
   ____ False

27. Birth control pills are available only by a doctor's prescription.
   ____ True
   ____ False

28. Deleted

29. Deleted

30. Deleted

31. Deleted

32. Venereal diseases are often spread through unclean toilets.
   ____ True
   ____ False
33. A woman can be a carrier of syphilis and not know it.
   ___ True
   ___ False

34. If the rash from syphilis goes away by itself, there is no further damage from the disease.
   ___ True
   ___ False
HEALTH KNOWLEDGE STUDY

Test - Part II

1. Because this boy was vaccinated against smallpox as a baby can it be assumed that he has life long immunity to smallpox?
   ____Yes
   ____No

2. Because this boy was vaccinated against polio can it be assumed that he has life long immunity against polio.
   ____Yes
   ____No

3. Can a child be immunized against chickenpox?
   ____Yes
   ____No

4. Do tonsils serve a useful function?
   ____Yes
   ____No

5. Is TB still a serious health problem in the U.S. today?
   ____Yes
   ____No
6. Because he has 20/20 vision, can it be assumed that this man is free from eye trouble?
   ____Yes
   ____No

7. Physicians are subject to periodic re-examination of their medical knowledge in order to maintain their license.
   ____True
   ____False

8. Your medical history often reveals more about your physical condition than does a doctor's examination.
   ____True
   ____False

9. When a doctor looks into your eyes with his ophthalmoscope (his special light), his main purpose is to check on whether or not you need eye glasses.
   ____True
   ____False

10. When a doctor takes your blood pressure he is measuring the rate at which your heart beats.
    ____True
    ____False
Statistical formula utilized in analysis of difference in mean scores of content areas

Statistical formula used

\[
\begin{align*}
    z &= \frac{\hat{p}_1 - \hat{p}_2 - (p_1 - p_2)}{\sqrt{\frac{p^* (1-p^*)}{n_1} + \frac{p^* (1-p^*)}{n_2}}} \\
    \text{where,} \\
    \hat{p}_1 &= \text{sample proportion of the American student group} \\
    \hat{p}_2 &= \text{sample proportion of the foreign student group} \\
    p^* &= \text{combined proportion} \\
    n_1 &= \text{number of American students} \\
    n_2 &= \text{number of foreign students} \\
    H_0: p_1 &= p_2 \\
    \alpha &= 0.05 \\
    H_1: p_1 \neq p_2 \\
    Z &= \pm 1.96
\end{align*}
\]

<table>
<thead>
<tr>
<th>Content Areas</th>
<th>Statistical Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alcohol and Narcotics</td>
<td>2.63</td>
</tr>
<tr>
<td>2. Dental Health</td>
<td>1.33</td>
</tr>
<tr>
<td>3. Mental Health</td>
<td>0.66</td>
</tr>
<tr>
<td>4. Nutrition</td>
<td>1.35</td>
</tr>
<tr>
<td>5. Sex Education</td>
<td>1.02</td>
</tr>
<tr>
<td>6. Personal and Community Health</td>
<td>0.88</td>
</tr>
<tr>
<td>7. Safety and First-Aid</td>
<td>1.75</td>
</tr>
<tr>
<td>8. Heart Disease</td>
<td>1.35</td>
</tr>
<tr>
<td>9. Cancer</td>
<td>3.01</td>
</tr>
<tr>
<td>10. Exercise</td>
<td>1.22</td>
</tr>
<tr>
<td>11. Communicable Diseases</td>
<td>2.33</td>
</tr>
</tbody>
</table>
11. Short periods of exercise everyday are better for you than a long workout once a week.
   ___ True
   ___ False

12. Which of these activities is best for conditioning all parts of the body:
   a. dancing
   b. volleyball
   c. swimming
   d. weight lifting

13. You can lose a pound of fat by running for a half an hour.
   ___ True
   ___ False

14. It is bad for athletes to drink water during strenuous exercise.
   ___ True
   ___ False

15. You use up as many calories doing hard mental work as you use doing strenuous exercise.
   ___ True
   ___ False