Health Knowledge Assessment of College Freshmen Educated in South Dakota K-12

Nadeen E. Lunde

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HEALTH KNOWLEDGE ASSESSMENT OF
COLLEGE FRESHMEN EDUCATED IN SOUTH DAKOTA K-12

By
NADEEN E. LUNDE

A thesis presented
in partial fulfillment of the requirements for the
degree Master of Science
Major in Health, Physical Education, and Recreation
South Dakota State University
1983

The Kilander-Leach Health Knowledge Test (1972) was administered to selected college freshmen students enrolled in eight, four year institutions of higher learning in South Dakota during the fall semester of 1977. Subjects \( N = 919 \) were educated in only one South Dakota school district grades K-12. Demographic data of age, sex, size of graduating class, number of completed health classes, and high school grade-point average were collected and analyzed. Test results revealed a \( \bar{x} \) score of 53.83, and a \( P_{50} \) score of 55, which was significantly below the national norm \( P_{50} \) score of 70. The sample \( P_{50} \) score of 55 and the national norm \( P_{10} \) score of 54 were comparable. Highest percentages of correct responses were recorded in the areas of first aid (64.4%) and safety (64.3%). Lowest percentages of correct responses were attained in the areas of community health (44.0%) and mental health (48.1%). All eleven content areas had mean scores which represented less than 65.0 percent correct responses. The test score was the dependent variable for a two-way ANOVA (sex X size of graduating class). Interaction and the size of graduating class were not significant effects. However, females had significantly higher health knowledge scores than males.
(p < 0.05). Test results indicated a general rise in health knowledge with an increase in age, greater number of completed health classes, and higher grade-point average.
HEALTH KNOWLEDGE ASSESSMENT OF
COLLEGE FRESHMEN EDUCATED IN SOUTH DAKOTA K-12.

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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NEL
DEDICATION

This thesis is dedicated to my parents,
ALBERT AND FERN BENNETT
and my husband,
MICHAEL LUNDE
whose guidance and support will
always be appreciated.
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Chapter 1

INTRODUCTION

Significance of the Study

Nothing in life is so taken for granted when possessed, or so missed when lost, as is health (Rash, 1966:10). Therefore, it is essential to possess basic facts if each individual is to take advantage of medical science advances, protect himself against quackery, and obtain an optimum level of health (Sliepcevich, 1964). Health education is recognized by leading educators as of vital importance in educating our youth, but health education has not established itself in a way comparable to other subjects. Kilander noted this fact as early as 1937, and yet, 46 years later, South Dakota's health education programs have not been established. Many South Dakota elementary and secondary schools offer little health education (Pugh, 1973). In 1976, South Dakota was one of only three states which did not require health education, and presently, in 1983, still has no legislative requirement (Castile, 1976; Noak, 1982).

Previous studies have shown that misconceptions and superstitions in a wide variety of health areas were prevalent among investigated populations regardless of their educational level (Rash, 1966:10). With health knowledge
growing at an unprecedented rate, health educators need to improve the extent and methods of disseminating that knowledge to overcome these misconceptions and superstitions, while introducing newly discovered information. Individuals must have this factual base for their health attitudes and health behaviors (Sliepcevich, 1964:1; Kilander, 1968:9).

Health education is multifaceted and simply imparting knowledge does not guarantee a behavior change (Sliepcevich, 1964:2). Health education has the difficult task of persuading people to forego harmful yet sometimes enjoyable habits, and to take precautionary actions which may be regarded as troublesome. Health education is not forcing people to act in a positive manner, rather it is persuading them along certain lines to do what they actually want to do for themselves, by fusing knowledge from social, health, and educational sciences, and subsequently incorporating it into action (Richards, 1975:142,153). Again, knowing the facts does not guarantee correct conduct, for it does not motivate the desired action. Actions do not occur without motivation, and motivation does not occur unless it is based on experience (Kilander, 1968:33; Richards, 1975:142). However, for healthful actions to be followed, students need this essential base of scientific knowledge, for they cannot practice what they do not know.
"Knowledge without action is sterile, and action without knowledge is blind" (Kilander, 1968:37).

**Statement of the Problem**

The purpose of the study was to determine the level of health knowledge of selected college freshmen educated in South Dakota. The subjects attended grades K-12 in only one school district.

**Pertinent Questions**

1. What is the level of health knowledge of college freshmen educated in only the state of South Dakota grades K-12?

2. What is the level of health knowledge of college freshmen educated in only one school district in South Dakota grades K-12?

3. What is the level of health knowledge of college freshmen educated in only one school district grades K-12 concerning each of the eleven health content areas (personal health, community health, nutrition, family health, first aid, safety, consumer health, chronic disease, communicable disease, mental health, and stimulants and depressants) included in the Kilander-Leach Health Knowledge Test?
4. How does the level of health knowledge of college freshmen educated in only one school district in South Dakota grades K-12 compare to the established norm of the Kilander-Leach Health Knowledge Test?

5. Is there a difference in the level of health knowledge between male and female college freshmen educated in only one South Dakota school district grades K-12?

6. Is there a difference in the level of health knowledge of college freshmen educated in only one South Dakota school district grades K-12 based on the size of their graduating class?

Scope of the Study

This health knowledge study was a descriptive survey of college freshmen enrolled in South Dakota four year colleges and universities during the fall semester of 1977 (N=1,773). The majority of the students surveyed were enrolled in required physical education activity classes, while the remaining students were physical education majors enrolled in freshman courses dealing with the history and principles of physical education, or students in elective physical education activity classes. One college did not choose to participate in the survey; two colleges and two universities did not return the answer sheets for analysis (Appendix A). The 1972 edition of the Kilander-Leach
Health Knowledge Test was selected as the test instrument and consists of 100 multiple-choice (four alternative) items which measures knowledge of eleven health content areas (Appendix B). A copy of the 1972 edition of the Kilander-Leach Health Knowledge Test is presented in Appendix C. The demographic data categories were as follows:

1. age
2. sex
3. state of formal education
4. education received in only one school district
5. size of graduating class
6. number of completed health courses
7. high school grade-point average

Limitations

The following limitations were present in the study:

1. There was no assurance that all subjects tested were highly motivated in taking the written test.

2. Two institutions of higher learning did not require physical education activity classes. Therefore, only subjects enrolled in elective activity classes could be contacted.
Definition of Terms

Chronic Disease

Chronic (degenerative) diseases are the natural result of the wearing out of the human body and the gradual slowing down of its functions, including diseases of the heart, cancer, stroke, arteriosclerosis, diabetes, and cirrhosis of the liver (Kilander, 1968:111).

Communicable Disease

Communicable disease topics include disease-producing organisms, transmission of germs, and immunization (Kilander, 1968:122).

Community Health

Community health is concerned with the problems of groups of people and the various opportunities for the group approach to health protection (Kilander, 1968:111).

Consumer Health

Consumer health refers to giving students (consumer) a background that will enable them to make sound decisions in the selection (purchase) and use of professional health services and products (Kilander, 1968:128).

Family Living

Family living topics include those which may help young people prepare to meet the problems of life that
for the protection, preservation, extension, improvement, and development of the monogamic family (Kilander, 1968:213).

First Aid

First aid is the immediate and temporary care given to the victim of an accident or sudden illness until the services of a physician can be obtained (Kilander, 1968:213).

Health Education

Health education is the sum of all experiences that favorably influence knowledge, attitudes, and practices relating to individual and community health. It can be grouped into three areas: (1) education of the general public, (2) school health education, and (3) training of workers in the field of public health (Kilander, 1968:9).

Kilander-Leach Health Knowledge Test

The Kilander-Leach Health Knowledge Test is a 100 item multiple-choice test measuring the extent of a college student's health knowledge and understanding (Kilander, 1972).

Mental Health

Mental health is the measure of people's abilities to shape their environment, to adjust to life as they have to face it, and to do so with a reasonable amount of
satisfaction, success, efficiency, and happiness (Kilander, 1968:149).

**Nutrition**

Nutrition may be defined as the science of providing the body with the nourishment for growth, maintenance, and repair (Kilander, 1968:90).

**Personal Health**

Personal health includes topics such as exercise, sleep, rest and relaxation, personal appearance, health appraisal, care of the special senses and care of the teeth (Kilander, 1968:67-8).

**Safety**

Safety education topics are under the major headings of home safety, school safety, safety in play and recreation, occupational safety, safety in the community, and civil defense and disaster preparedness (Kilander, 1968:213).

**Stimulants and Depressants**

Stimulant and depressant topics include alcoholic beverages, narcotics, tobacco, and other addicting and habit-forming drugs (Kilander, 1968:172).

**Trend**

A trend is a general prevailing movement reflecting recognizable change of tendency of emphasis; change in a specific indicated direction (Beyrer, 1959:7).
Chapter 2

REVIEW OF RELATED LITERATURE

The presentation of the review of related literature is divided into the following sections: (1) health education history, (2) health education trends, (3) health knowledge testing including the history of health knowledge testing and selected health knowledge assessment tools, and (4) selected health knowledge studies.

Health Education History

The status of today's health education is due, at least in part, to historic influences. Past successes and failures might well provide guidance to present and future work. "By greater understanding of the historical facets of the profession, further light may be cast upon some of the persisting problems and perplexities" (Means, 1963:26).

Health education actually antedates Hippocratic medicine and was practiced by ancient Jews, Egyptians, and Hindus (Piper, 1948:651). The Jews and Egyptians dealt with a wide variety of personal health areas and community responsibilities. The ancient Greeks emphasized disease control, diet, exercise, and cleanliness along with physical education (Means, 1962:13-4; Piper, 1948:651; Van Dalen, Mitchell and Bennett, 1953:75).
Formal health education began in the Roman era, but Galen of Pergamon, Hippocrates' successor, initiated health instruction. After the decline of the Roman Empire, health education virtually disappeared; however, some health measures were accepted out of necessity because of epidemics (Means, 1962:15; Piper, 1948:651, Van Dalen, Mitchell and Bennett, 1953:83). The Arabs are given credit for preserving health education during the Roman demise.

During the 15th century, the renaissance of health education began with the invention of the printing press in 1438, while writings of healthful living were produced in Italy. In the 16th century Hieronymus Mercurialis (1503-1606), an Italian physician, wrote the first complete book on health; Roger Ascham (1515-68) and Michel De Montaigne (1533-92) recognized the need for exercise, health, and education; while Richard Mulcaster (1531-1611) was one of the first to recognize the individual needs of students. John Comenius (1592-1671) recommended proper exercise, sleep practices, nutrition, and recreational pursuits, and his realistic philosophy laid the foundation for many present day practices in health education. The discovery of the microscope in the 17th century, made possible the observation of bacteria by Antony van Leeuwenhoek (1632-1723); a major breakthrough for medicine, but one of great health importance as well. The 18th
century witnessed health education's change toward modern ideas with notable personalities including Morgagni (1682-1771), the first great pathologist; Basedow (1723-90), the originator of physical education in Germany; Jenner (1749-1839), the discoverer of the small pox vaccine; and Guts-Muth (1759-1839), the father of modern physical education. The early 19th century health interest turned to physiology and hygiene (Means, 1962:16-9; Van Dalen, Mitchell and Bennett, 1953:380).

Health education did not receive direct attention in the schools of colonial America. However, one significant health development came from Benjamin Franklin's (1706-90) Philadelphia Academy in 1751 because health education was included in the curriculum (Means, 1962:23-4). Higher education in America played an important role in health education when Harvard College required hygiene lectures in 1818 and the College of the City of New York had classes in anatomy, physiology, and hygiene in 1851. Amherst College became the first college to employ a physician for the expressed purpose of directing health activities as the professor of Hygiene and Physical Education in 1860 and they began anatomy lectures in 1923 (Means, 1962:36,64).

From 1900 until World War I there was slow but steady progress in health education. After World War I
health strides were made because medical people had access to nationwide physical examination reports of men the ages of eighteen through thirty-one. The doctors found that one-third of the men examined were in such poor condition that they were unfit for active duty (Van Dalen, Mitchell and Bennett 1953:447). Hygiene, not "health education" became the accepted terminology of the day. Health education saw the beginning of concentrated research from 1920-1940, while it also gained widespread acceptance and inclusion in curriculums, under the term of "health service" (Van Dalen, Mitchell and Bennett, 1953:445; Means, 1962:78,107,231).

Health education during the modern era (1940-1962) mobilized, expanded, and consolidated, building on foundations established by previous development (Van Dalen, Mitchell and Bennett 1953:504-5). During this period, health education gained world-wide interest shown by the activity of the World Health Organizations; the United Nations Educational, Scientific, and Cultural Organization; the International Union for Health Education; and the International Council for Health, Physical Education, and Recreation (Means, 1962:382).

**Health Education Trends**

Trends in health education occur in a variety of categories such as curriculum, careers, evaluation,
professional preparation, and content areas. Trends can come from innovative answers to questions like what should the curriculum be, how should it be taught, and what are the needs and interests of students and society? Some health education trends can be identified by examining current research topics, as well as those topics listed in health education textbooks.

Trends in content areas can be the foundations of trends in other areas because the number of content areas have steadily increased and now include topics that encompass all aspects of human life. Content areas listed in Health Education Completed Research: Vol. II (1979) are community health; community and public health; consumer health, including patient education; death and dying; driver and traffic safety; drug education; drug use and abuse; environmental health; exercise, relaxation, and fitness; gerontology; mental health and mental illness; nutrition; safety, sex education and family life education; sexuality; marriage; family life or family planning; and venereal disease. A sampling of trends in other topical areas are discussed below.

Curriculum Guides

There is a surge to create or update health education curriculum guides by state health education departments. The guides keep instructors current on past
health issues, as well as emerging health needs (Blazey, 1981). Methodology is also included in some education guides.

Value Clarification

Jack D. Osman suggests using selected value clarification strategies to assist in attitude self-evaluation (Osman, 1972). Carl Willgoose supports Osman's view of the importance of health education values in the following statement.

Building health values will not be easy, for an action gap exists between many so-called educated people -- a wide breach between personal health knowledge and rational action ... Unless health education becomes entangled with personal values and is brought to bear on all values an individual is apt to hold dear, it will continue to be a 'take it or leave it' kind of education (Read, 1971a:16).

Osman (1972) has selected several levels of valuing including:

1. choosing freely.
2. choosing from alternatives.
3. choosing after thoughtful consideration of the consequences.
4. prizing; being happy with the choice.
5. publicly affirming the choice.
6. acting on the choice.
7. acting repeatedly as a pattern of life.


Role Delineation

"The purpose of role delineation is to allow all professional health educators to be identified as such, ... (U.S., 1981a:5). As a rapidly expanding field, health education must examine the increasing expectation of its instructors. Questions arise as to (1) what the entry-level health educator should be able to do, (2) what the prospective employer should look for in hiring a health educator, and (3) what standards, in both preparation and demonstrated competence, can help to assure these expectations are met (U.S., 1982a:1). Some individuals have proclaimed themselves "health educators" when their training lies in a related field, such as nursing or physical education, even though they have little or no formal health instruction preparation (U.S., 1982a:1). Efforts are being made by the collaboration between the Bureau of Health Education and the Office of Health Information, Health Promotion, and Physical Fitness and Sports Medicine to specify roles, functions, and responsibilities of entry-level health educator's requisite skills and knowledge (U.S., 1981a:4).

Wellness Awareness

Curriculum development for health education can be focused on a learning theory which emphasizes a balanced cognitive, affective, and action approach. One facility
using a comprehensive wellness program is Sioux Valley Hospital in Sioux Falls, South Dakota. The goal of the program is "to help people learn the basics of STAYING healthy" (Papers on Wellness, 1981b). The program includes: (1) a publication covering topics under the area of stress management, exercise, nutrition, and environmental issues; (2) a health information library entitled TEL-MED with over 1,000 three to five minute pre-recorded taped accessible by telephone; (3) classes in physical fitness, nutrition, and relaxation; and (4) clinics to help people stop smoking, as well as screening for hypertension and hearing deficiencies (Paper on Wellness, 1981b).

South Dakota State University's wellness philosophy is stated as an "awareness of the resources and alternatives available which can lead to a more self-directed life-style, resulting in a more satisfying existence" (Papers on Wellness, 1981a). Wellness involves all areas of a person's being including the intellectual, emotional, physical, social, occupational, and spiritual. Wellness awareness is:

1. becoming aware of the effect of one's current habits (life-styles).

2. becoming aware of the holistic concept of health as it relates to one's total existence in the integration of the above.
3. becoming aware of the alternatives to any habits of one's life-style which are or may become hazardous.

4. becoming aware of the resources available to aid in the learning of new skills leading to more appropriate and productive habits.

5. becoming aware of one's right to make choices leading to a more satisfying existence (Papers on Wellness, 1981a).

**National Center for Health Education**

The National Center for Health Education is based in San Francisco and was established in 1975 with the goal of improving the health of all Americans by educating them to make their own informed choices on health matters. The founding committee focused on a non-profit center in the private sector. The five functional areas emphasized by the committee are: (1) health education advocacy, (2) strategy design, (3) technical assistance, (4) research and evaluation, (5) informational exchange (National Center for Health Education, 1975).

**Area Health Education Center**

Since September, 1978, an Area Health Education Center (AHEC) has been headquartered at the School of Medicine, University of South Dakota at Vermillion.
Its aim is to improve the distribution, supply, utilization, and efficiency of health-care personnel in South Dakota... AHEC is a program of coordination and cooperation to make the best possible use of existing resources, to provide missing elements, and, at the same time, to avoid duplication and overlapping efforts (Area Health Education, 1979).

The Area Health Education Centers are organized around the five largest communities in South Dakota. South Dakota's AHEC responsibilities include:

1. arranging for and supporting education opportunities for undergraduate medical, pharmacy, nursing, and allied health students at South Dakota facilities, and coordinate the efficient use of clinical resources.

2. providing continuing education opportunities for physicians, dentists, pharmacists, nurses, and allied health personnel consistent with needs determined by health providers.

3. assessing South Dakota's health personnel needs in unison with other date-gathering agencies.

4. assisting in the recruitment and training of students in health-care careers, with special emphasis on disadvantaged and minority students.

5. supporting the efforts of health-care providers in conducting public and patient education in nutrition and health maintenance.
6. participating in the recruitment and utilization of all health personnel with the service areas, in consultation with health professions and community representatives.

7. supporting primary care residency training programs, predominantly in family practice.

Health Knowledge Testing

Testing History

"Knowledge is essential in aiding the individual to make satisfactory responses to a new or altered situation outside of the classroom and later in life" (Klander, 1968:33). The type of knowledge desired in health education is that which stimulates individuals to analyze their behavior and serves as a motivating factor (Klander, 1968:33).

Prior to 1920, the testing of factual knowledge was emphasized by health educators (Cook, 1973:35). There have been isolated and limited studies, and few have been nationwide (Means, 1962:167). Some content areas in health education lend themselves easier to knowledge testing, such as nutrition, sanitation, personal health, and anatomy and physiology, due to the substantial body of facts inherent in the area. In contrast, areas concerning mental health
and family living are more difficult to test (Kilander, 1968:366).

An increased number of studies directed toward test construction reflects the general lack of well-developed evaluation instruments (Veenker, 1966:33-4). Every health knowledge test needs to be valid, testing what is purports to measure, and reliable, showing dependability and consistency of results (Kilander, 1968:366).

Health knowledge test instruments take several forms, including true and false, multiple-choice, matching, completion, check-list, and situational. Any of these types of tests may be standardized though the multiple-choice test is the most common (Kilander, 1968:367-71).

After 1920, testing was no longer limited to health facts, but was used in conjunction with the evaluation of health attitudes and behaviors. Even though these attitudes and behaviors are relatively difficult to measure, they are in general, the result of obtaining health information (Kilander, 1968:365).

Review of Assessment Tools

In the process of selecting a proper health knowledge assessment tool, the following tests were examined. Included in the review are the author(s), the appropriate test group, reliability, validity, and content areas of the test.
The College Health Knowledge Test. The College Health Knowledge Test by Terry H. Dearborn (1959), originally written in 1951, provides a comprehensive measure of achievement and diagnosis in the field of personal health knowledge, and was constructed specifically for the college level; however, it is suitable for informed adults, and may also be used in senior high schools offering a full semester course in personal hygiene. The test consists of 100 multiple-choice (five alternatives) items sampling the areas of social and biological background; nutrition and diet; excretion and cleanliness; exercise and body mechanics; prevention and control of disease; fatigue and rest; mental hygiene; reproduction and heredity; hygiene of eyes, ears, and teeth; hygiene of environment; and the use of medical care. The test usually requires 28 to 50 minutes to complete, but has no maximum completion time. The validity coefficient was calculated to be 0.75. The reliability coefficient was calculated to be 0.89.

The Kilander-Leach Health Knowledge Test. H. F. Kilander, Ph.D. (1937), originally constructed a 100 item test selecting questions from 150 items administered to several thousand high school and college students and adults. Revisions have occurred in 1950, 1958, 1961, 1966,
1969, and 1972. The 1972 edition was co-authored by Dr. Glenn C. Leach, coordinator of Health Education at Wagner College. The test measures the extent of a college student's health knowledge and understanding using a multiple-choice (four alternative) format. Sampling the content areas of personal health, community health, nutrition, family living, first aid, safety, consumer health, chronic disease, communicable disease, mental health, and stimulants and depressants. The test allows a maximum of 50 minutes for completion.

The content validity was determined from state courses of study and textbooks on health as well as with extensive subjective and objective experience including eight research studies in the field of health knowledge. The reliability coefficient, applying the Spearman-Brown Formulas was calculated to be 0.80 for college freshmen and 0.83 for high school seniors.

The Fast-Tyson Health Knowledge Test. The Fast-Tyson Health Knowledge Test (1975) was co-authored by Charles G. Fast, Ed.D. and Harry L. Tyson, Jr., M.S. The test was constructed in 1970 with revisions in 1971 and 1975. This test measures the level of a student's knowledge and understanding of factors pertaining to health. The test is appropriate as a pre-test or re-test instrument.
for basic health courses at the high school, college or
university level.

The 100 multiple-choice (four alternative) items
were selected from 850 questions given to 12,000 high
school seniors and college freshmen. Fifty minutes is
allowed for administration of the test. Content validity
was established by surveying student health interest
studies, textbooks, courses of study in health, test
questions, experts in fourteen disciplines, and field
tests. The reliability coefficient was calculated to be
0.73 for college freshmen and 0.70 for high school seniors
using the Kuder-Richardson formula. Content areas included
in the test are personal health; exercise, relaxation, and
sleep; nutrition and diet; consumer health; contemporary
health problems; tobacco, alcohol, drugs, and narcotics;
safety and first aid; communicable and non-communicable
diseases; mental health; and sex and family life.

Health Knowledge Studies

Studies Prior to 1960

Kilander (1937) developed one of the first health
knowledge studies sampling high school students, college
students, and adults. Purposes of the survey were to (1)
determine the relative scores (norms) of high school and
college students, (2) determine in which fields of health
education students are best and least informed, (3) determine what factors contribute to greater health knowledge or lack of health knowledge, and (4) offer certain suggestions based upon the findings of the investigation. A preliminary test of 100 multiple-choice questions was administered to 2900 individuals. The results of this test indicated there was no significant difference between the high school students, college students, or adults. The revised test was less difficult than the preliminary test and was constructed of selected questions from the pre-test. Health areas selected for the test were nutrition, safety and first aid, community hygiene and sanitation, mental health and social hygiene, common errors and superstitions, and general field of health. The revised test was administered to 2800 individuals in northern New Jersey. The sampling for analysis included 844 high school seniors, 504 college freshmen, and 430 adults. Test reliability was obtained by the split-halves method and was calculated to be 0.80 for college freshmen and 0.83 for high school seniors. High school seniors had a mean score of 56.15, while the college freshmen had a mean score of 62.70. Conclusions reached by Kilander included:

1. Even intelligent and educated people hold many health misconceptions and superstitions.
2. A college education \textit{per se} does not necessarily add to the health knowledge of students.

3. College students of the same intelligence as high school seniors ordinarily do not score higher unless they have had specific health instruction.

4. Health instruction may not necessarily improve the score of the individual who already has a high score, but instruction does definitely eliminate the low scorer by raising his grade to at least the average.

Marie Hinricks, M.D., (1953) conducted an analytical study of the results of a Hygiene Proficiency Test given to an entering class of freshmen at the University of Illinois. The test was designed to cover information that an entering freshmen is expected to have acquired in the field of healthful living, including questions on both factual knowledge and on the knowledge of currently accepted practices and attitudes in the various phases of health. Health content areas sampled were public health and consumer health; general bodily hygiene; mental health; personal health problems; reproduction, sex, and heredity; and nutrition and diet. The 70 multiple-choice questions were administered to 1,157 students. Public and consumer health was found to be the area of the least difficulty. Other areas in order of increasing difficulty include general bodily hygiene; mental health; reproduction, sex,
and heredity; nutrition and diet; and personal health problems. Results indicated that (1) students entering the liberal arts field seemed better prepared in the various phases of health knowledge than those preparing to enter other fields, (2) one student in every three had the health knowledge to pass with a score of 75 percent, and (3) one in every twelve students missed more than one-half of the total questions. Hinricks concluded that the results showed a need to discover where the lack of preparation occurs and where greater emphasis should be placed in college training.

Gist (1955) conducted a study to determine the prevalence of certain health misconceptions among freshmen in selected Black colleges and to make comparisons on the basis of sex, religion, geographic location, and socio-economic status. The test Gist constructed included nine health education categories of which 74 items were true and 26 items were false. Response choices included true, partly true, false, partly false, and do not know. The test items were validated by a jury of experts which included two health educators and three medical doctors. Statements were omitted if they did not receive a unanimous vote from the jury. A pilot study was conducted and the reliability was calculated to be 0.81 using the Spearman-Brown Formula. The final instrument was administered to
289 males and 486 females attending the four year co-educational and liberal arts colleges for Blacks in the Middle Atlantic Association of Colleges and Universities. Beginning with the category having the most misconceptions, the order was (1) venereal diseases, (2) physical activity, (3) preventive measures, (4) mental health, (5) sex education, and (6) maternity-child care. The author concluded that:

1. Freshmen in selected Black colleges subscribe to health misconceptions to a marked degree.

2. Males subscribe to misconceptions to a greater degree than females.

3. Freshmen whose parents were professional workers subscribe to more misconceptions than those students whose parents were not professional workers.

4. There was no significant difference between students of different religious affiliations, indicating that religion had a small influence on misconceptions.

5. There was no significant difference in the number of misconceptions held by students from different geographical locations.

Washnik (1957) conducted a study to determine the (1) health knowledge of senior students in the secondary schools of New Jersey, (2) degree to which students gained an ability to use that health knowledge, and (3) strengths and weaknesses in content areas of health education. The
Shaw-Troyer Health Knowledge and Application Test was administered to 1,171 seniors, 545 males and 626 females, representing 20 high schools from twelve counties. The test was validated from health texts, class curriculums, and reviewed by physicians, nurses, nutritionists, biologists, and health education teachers. The reliability coefficient was calculated to be 0.92. Washnik reported that (1) females scored slightly higher than males in level of health knowledge; (2) there was only a moderate correlation (0.42) between health knowledge and the application of the knowledge; and (3) the students scored highest in the mental health area; second in health in the home, school, and community; third in nutrition; and fourth in safety and first aid.

Dearborn (1958) studied the level of personal health knowledge of predominantly freshmen students in fifteen selected universities, colleges, and junior colleges across the United States. A 25 percent sample was analyzed to determine the health knowledge of students before instruction in a college hygiene class. The standardized Dearborn Health Knowledge Test has a reliability coefficient of 0.89 as calculated by the Spearman-Brown Formula. The validity was assured by a jury of health educators, physicians, and related experts. The mean score for college and university students was 54.4 percent and it
was 44.5 percent for junior college students. The author concluded:

1. The low mean score demonstrated the need and responsibility to make health instruction available on the college level, and to improve such instruction in the high school.

2. The students scored highest in the area of social and biological background and lowest in the area of exercise and body mechanics.

3. Thirteen percent of the incorrect responses concerning reproduction and heredity were blank, rather than errors, indicating the students' recognition of ignorance in this area.

4. Many of the students retained much misinformation in health content areas, some recognized and some unrecognized.

Adams (1959) surveyed a random sample of the personal health classes at the University of Oregon to determine the extent of health misconceptions and superstitions subscribed to by freshmen students. He also attempted to make comparisons on the basis of sex and to determine if there was a relationship between grade-point average and subscription to health misconceptions. The testing instrument of 75 items was validated by five health education professors at the University of Oregon. Item
responses were: agree, disagree, or undecided. A pilot study was administered to 46 males and 46 females in a personal health class at the College of Idaho at Caldwell. The final instrument was administered to 63 females and 63 males. The results of the study showed that (1) males subscribed to six major misconceptions (48 percent or more subscribing to the misconception) while females subscribe to seven major health misconceptions, (2) males may have had a better knowledge of the areas presented, (3) females subscribed to the largest percentage of misconceptions in the area of food, diet, and nutrition. The correlation coefficient between the subject's grade-point average and items missed was calculated to be 0.744 for the female group and 0.485 for the male group.

Students from 1960-1969

A nationally acclaimed study, directed by Elena M. Sliepcevich (1964), was conducted from 1961-63. The School Health Education Study was designed to meet the need for current information on the nationwide status of health instruction practices in the public schools. The study included an investigation of the health knowledge, attitudes, and practices of boys and girls in the sixth, ninth, and twelfth grades. Because of the enormity of the student enrollment in schools, a multistage, stratified cluster procedure was devised to select the sample. Acceptable
test development procedures were followed in the construction of the LeMaistre-Pollack Health Behavior Inventory used as the criterion instrument for the senior students. The 75 items were written as problem situations to test health behavior as a whole. The test included twelve health content areas. Significant findings from the study included:

1. Of the 75 test items, an average of two out of three were answered correctly by senior students.

2. High school seniors excelled on questions related to stimulants and depressants, personal health, and mental health, while their greatest deficiencies were in nutrition, community health, chronic diseases, and consumer health.

3. The percentage of correct responses in each of the twelve health areas were higher for girls than for boys.

Lyons (1961) conducted a study to survey the level of health knowledge in the Associated Colleges of the Midwest, Oberlin College, and the State University of Iowa. Purposes of the investigation were to (1) determine whether there were various levels of general health knowledge existing among freshmen and sophomore students before health instruction; (2) make comparison of these levels, if they exist, between freshmen and sophomores; (3) survey the
health knowledge differences among college students in these institutions at the beginning of health classes; and (4) determine the extent of improvement in general health knowledge among these same students at the close of health education classes. A general health knowledge test for liberal arts students was constructed and administered as a pilot study to 498 freshmen. A revised test was administered as a pre-test to 1,586 college students in twelve liberal arts colleges to mostly freshmen and sophomores, and to 103 health education students as both a pre-test and a re-test. The conclusions were:

1. Students improved significantly in health knowledge and understanding after a course in health education.

2. Comparison of the general health knowledge scores of freshmen and sophomore students who were not taking a health course showed sophomore women's health background to be significantly higher than those of sophomore men; also higher than that of freshmen women; and the background of health knowledge of freshmen women was significantly higher than freshmen men.

3. Among freshmen and sophomore men there was no significant difference in general health knowledge.

4. The General Health Knowledge Test appeared to be a valid instrument.
A comparison of health knowledge of college freshmen and the parent of the same sex was conducted by Campbell and Early (1969). The study involved the administration of the 1966 edition of the Kilander Health Knowledge Test to 45 students and their parents. The test instrument contained 100 multiple-choice questions sampling ten health content areas. A total of 25 sets of data were collected for male subjects and 20 sets of data for female subjects. A reliability coefficient of 0.80 was calculated by applying the Spearman-Brown Prophecy Formula. The conclusions were:

1. There was little relationship in the level of health knowledge of a child to his same-sexed parent.

2. Parents had more knowledge and understanding of matters pertaining to health than did the students.

3. Freshmen had health misconceptions and superstitions.

4. Females had a significantly higher level of health knowledge than the males.

Studies after 1970

Stephens (1971) conducted a study to determine the prevalence of health misconceptions of twelfth grade students in each of three sizes of public high schools in the State of Colorado, and whether the prevalence of misconceptions was related to the factors of sex,
grade-point average, level of father's education, level of mother's education, father's occupation, and amount of public high school formal health education. A list of 155 health misconceptions compiled from health textbooks, magazine articles, professional journals, government publications, and research studies was validated by a jury of four health educators, four physicians, and two school nurses. The misconceptions sampled nine health content areas. A health opinionnaire was constructed of 100 validated statements and administered as a pilot study to high school seniors. The test was revised and the final draft was administered to 349 high school seniors in 33 randomly-chosen schools of three sizes. The percentage of Colorado high school seniors who subscribe to health misconceptions ranged from 2.5 to 90.8 percent. The greatest percentage of misconceptions was found in the area of consumer health, followed in descending order by nutrition, care and prevention of disease, family living, first aid and safety, mental health, personal health, habit-forming substances, and rest and exercise. The conclusions were:

1. Colorado public high school seniors subscribe to many health misconceptions, suggesting that secondary education needs to do much in the area of health education to overcome deficiencies.
2. Health misconception scores tended to decrease as the size of the school increased, suggesting that larger schools in Colorado provided better opportunities for acquisition of correct health knowledge.

3. The student's grade-point average proved to be the best indicator of health misconception scores, suggesting that the students with high academic ability tends to be a healthy, well adjusted individual.

4. The mother is a prime influence in development of health knowledge and attitudes.

5. The slight degree of positive correlation between formal health instruction and misconception scores suggested the need for health education in Colorado secondary schools to be redesigned.

Campbell and Foster (1972) conducted a study to determine if students who attend a high school from an attendance district designated as a high socioeconomic area respond the same to a standardized health knowledge test as students who attend a high school from an attendance district designated as a low socioeconomic area. Socioeconomic level was determined by estimated average income, occupation of parents, and value of residence. The 1969 edition of the Kilander Health Knowledge Test was used as the criterion measurement instrument and was administered to all ninth and twelfth grade students attending two high
schools in Portland, Oregon. The test consists of 100 multiple-choice questions which samples nine health content areas. The reliability coefficient was calculated to be 0.80. The conclusions were:

1. The students from a high socioeconomic level had more knowledge and understanding of health than did the students from the low socioeconomic level.

2. Females attained a higher mean score than did males independent of either grade level or socioeconomic level.

3. The three health areas that primarily contributed to separating the groups were family living, safety education, and mental health.

Roettger (1972) conducted a study concerning the prevalence of health misconceptions among freshmen at Indiana State University. The 129 item, author constructed Health Misconception Inventory contained health areas including (1) foods, diet, and nutrition; (2) organic functioning and disorder; (3) prevention and control of disease; (4) mental health and mental illness; (5) personal hygiene; (6) first aid and emergency medical care; and (7) family life and sex education. The answering format included an agree, disagree, or indecision comment about each statement. The reliability was calculated to be 0.94 applying the Spearman-Brown Formula. Results included:
1. The mean performance of the Health Misconception Inventory was found to be 76.71 (59.46 percent).

2. No significant difference was found between mean performances of male and female students.

3. Of the twenty-five most prevalent health misconceptions, ten were in the area of organic functioning and disorders.

4. The next most prevalent area among the top twenty-five was prevention and control of disease.

5. Of the seven areas contained in the Health Misconception Inventory, students subscribed to the highest percentage of misconceptions in the area of prevention and control of disease.

6. The area with the least percentage of misconceptions was food, diet, and nutrition.

7. Of the twenty-five most prevalent misconceptions, male students subscribed to more misconceptions in the area of organic functioning and disorders.

8. Of the twenty-five most prevalent misconceptions, female students subscribe to more misconceptions in the area of prevention and control of disease.

9. Males held the highest overall percentage of misconceptions in the areas of prevention and control of disease, mental health and mental illness, personal
hygiene, first aid and emergency medical care, and family life and sex education.

10. Females held the highest overall percentage of misconceptions in the areas of food, diet, and nutrition; and organic functioning and disorders.

Palmer (1973) conducted a state-wide study investigating the prevalence of health misconceptions among freshmen and sophomore college students in the state of Georgia. The purposes of the study were to (1) construct and validate an instrument for determining the prevalence of certain health misconceptions among freshmen and sophomore college students; (2) determine the prevalence of health misconceptions among students attending Georgia junior colleges; (3) determine the relationship of the following factors to health misconceptions held by Georgia junior college students: marital status, race, religion, sex, size of school attended, size of home community, college class, college attended, previous college health course; and (4) make recommendations for improving the health curriculum in Georgia junior colleges. A list of 287 statements thought to be health misconceptions or false health concepts was collected and submitted to sixteen experts for their evaluation of the validity of the statements. Ten health areas were sampled in the revised 201 item instrument administered to 99 students in a pilot
study. The reliability was calculated to be 0.82. The final Health Information Inventory contained 150 items and was administered to 400 men and women students enrolled in physical education classes in eleven junior colleges of the University of Georgia system. The conclusions were:

1. Students believed a large number of health misconceptions.

2. White students believed significantly fewer health misconceptions than black students.

3. Sophomore students believe significantly fewer health misconceptions than freshmen students.

4. Students who had not completed a health course in high school believed significantly fewer health misconceptions than students who had not completed a course.

5. Graduates of Georgia high schools did not have a strong background in health education based on their acceptance of many health misconceptions.

6. In planning college curriculums concerning health, consideration should be given to the student's race, class in college, and previous health related courses.

Pigg (1976) supervised a two-year study to determine the level of health knowledge of student enrolled in 29 Georgia colleges. The 1975 edition of the Fast-Tyson Health Knowledge Test was used to survey 4,387 college
freshmen. The test consists of 100 multiple-choice questions divided into ten content areas. The authors evaluate mean performance by health area in the following manner: (1) 0-50 percent -- weakness in the area, (2) 51-74 percent -- moderate strength in the area, and (3) 75-100 percent -- strength in the area. Study results included:

1. The mean test score was 45.6.

2. Subjects 18 years of age recorded the highest mean test score of the five categories.

3. Female subjects recorded a significantly higher mean score than did male subjects.

4. Mean test scores of subjects increased as the population of the hometown increased.

5. Mean test scores of residents and non-residents of Georgia were essentially equivalent.

6. Mean test scores of subjects who had completed a high school health course were generally below the Fast-Tyson projected norms for high school students.

7. Subject knowledge was not strong in any health content area.

8. Subject knowledge was moderately strong in the areas of safety and first aid, and consumer health.

9. Subject knowledge was weak in the areas of personal health; exercise, relaxation, and sleep; nutrition
and diet; contemporary health problems; tobacco, alcohol, drugs, and narcotics; diseases; mental health; and human sexuality.

10. Subjects who had completed a health course at the high school and/or college levels recorded a slightly lower mean test score than did subjects who had not completed a health course at either level.

Watts (1977) supervised an investigation designed to evaluate the health knowledge of freshmen college students within the state of Kansas and to identify areas of cognitive strength and weakness. Form A of the 1975 edition of the Fast-Tyson Health Knowledge Test was selected as the test instrument. The test was administered to 1,742 freshmen students enrolled in 22 colleges and universities in the state of Kansas. Reliability was calculated to be 0.82. The study results included:

1. The mean test score was 48.00.

2. Subjects 20 years of age and older recorded the highest mean test score of the five age categories.

3. Female subjects recorded a significantly higher test score than did male subjects.

4. Subjects whose hometowns had populations between 1,000 and 9,999 recorded the highest mean test score of the five hometown population categories.
5. Residents of Kansas recorded a higher mean test score than did non-residents.

6. Mean test scores of subjects who had completed a high school health course were generally below the Fast-Tyson projected norms for high school students.

7. Mean test scores of subjects increased as high school grade-point averages increased.

8. Mean test scores of students who had completed a college health course were generally below the Fast-Tyson projected norms for college students.

9. Subject knowledge was not strong in any health content area.

10. Subject knowledge was moderately strong in the areas of safety and first aid, consumer health, and mental health.

11. Subject knowledge was weak in the areas of personal health; exercise, relaxation, and sleep; nutrition and diet, contemporary health problems; tobacco, alcohol, drugs, and narcotics; diseases; and human sexuality.

12. Subjects who had completed a health education course at the high school level only, recorded a slightly higher mean test score than did subjects who had completed both a high school and a college health education course or subjects who had never completed a formal health education course.
13. Subjects who had completed a health course at the college level only, recorded the lowest mean test score.

**South Dakota Studies**

The following studies are not limited to general health knowledge testing, but include studies concerning other health topics investigated in the State of South Dakota.

Dr. Charles Blazey (1965), Head of the Health Science Department at South Dakota State University, conducted a study to determine the scope and areas of previous health knowledge of freshmen students enrolled in South Dakota State University. All 1,435 freshmen students took the test the week of September 12, 1965, but only 1,327 answer sheets were valid.

The College Health Knowledge Test (1959) was used as the test instrument. The mean score was calculated to be 52.40. Beginning with the most difficult, the students found the content areas in order as follows: (1) exercise and body mechanics, (2) medical care and advice, (3) social and biological background, (4) mental hygiene, (5) hygiene of special organs, (6) excretion and cleanliness, (7) nutrition and diet, (8) hygiene of environment, (9) reproduction and heredity, (10) prevention and disease control, and (11) fatigue and rest. The results were:
1. The mean achievement score of 52.40 demonstrates the need to make health available on the college level.

2. Instruction on the high school level requires improvement.

3. The range of total scores indicates considerable variation in knowledge.

4. All areas of the test were weak, but especially the areas of (1) exercise and body mechanics (42 percent), (2) medical care and advice (44 percent), (3) social and biological background (49 percent), and (4) mental hygiene (52 percent).

Parrish (1973) conducted a study to determine the prevalence of drug use among eighth and eleventh grade students in small rural communities in eastern South Dakota. Drug categories included in the study were marijuana, hallucinogens, amphetamines, barbiturates, opiates, and inhalants. Factors including sex, age, race, participation in extracurricular activities, smoking and drinking patterns, cognitive knowledge about dangerous drugs, and student's values and attitudes about drugs were compared to the student's drug use. The research instrument consisted of a 109 item questionnaire, of which five items were sample questions. The research instrument had been pre-tested in several California schools. The South Dakota
A stratified random sample was comprised of 434 eighth graders and 470 eleventh graders from rural independent school districts. The major results were:

1. The drug use prevalence rate per 100 students was significantly higher for males than females.
2. The drug use prevalence rate was significantly higher for eleventh grade students than for eighth grade students.
3. Minority racial groups had significantly higher drug use rates than whites.
4. There was an inconsistent association between extracurricular activities and student drug use.
5. It was not possible to determine precise drug use prevalence rates according to the specific drug category used by the students.
6. There were significant differences in drug users versus non-users in their value orientations related to the ability to discuss problems with parents as to why people smoke, drink, and take drugs, and to what attributes make a person popular.
7. Drug users had significantly less cognitive knowledge about drugs than non-users.
8. A significantly lower percentage of students who engage in church activities one or more times per month were drug users.
9. There were no significant differences in post-high school plans of drug users versus non-users.

10. A significantly higher percentage of drug users versus non-users reported "F" grade averages.

11. There were significantly lower drug use prevalence rates for students who participated in musical activities. There were no significant differences in drug use for eighth grade students who participated in sports activities. However, there was a significantly lower drug use rate for eleventh grade students who participated in sports activities.

12. The drug use prevalence rates were significantly higher for students who smoked cigarettes and drank alcohol.

Pugh (1973) conducted a study to determine the status of health instruction in the public secondary schools of South Dakota. The author constructed questionnaire was sent to 84 randomly selected public high schools of which 16 were Class "A", 34 were Class "B", and 34 were Class "C" as classified by the South Dakota High School Activities Association by classification for track and field competition. The questionnaire was reviewed by the author's advisor, revised by the author, and used in a pilot study utilizing faculty members from South Dakota State University, Dakota State College, Brookings High
School, and six graduate students. A final draft was written and mailed; 70.24 percent of the questionnaires were returned. The conclusions were:

1. Health instruction seemed more neglected at the eleventh grade level than at the other grade levels.

2. Only the larger high schools seemed interested in having a school health council.

3. The school nurse is utilized well for the health programs.

4. There seems to be a need to teach health as a separate subject at the junior and senior high levels.

5. The facilities for health instruction lack proper environment and laboratories.

6. There is a lack of qualified, certified instructors teaching health.

7. Health is poorly organized as a subject area.

8. Health textbooks and periodicals are not being used to their fullest extent.

Odegaard (1978) conducted a study to determine the level of understanding in the area of human sexuality among undergraduates at South Dakota State University. The 1968 edition of Form X of McHugh's Sex Knowledge Inventory consisting of 80 multiple-choice (five alternative) items sampling thirteen content areas was administered to 1,437 selected undergraduates at South Dakota State University.
The Inventory, constructed in 1950 and revised in 1968, was validated by an advisory committee consisting of authorities in the field of human sexuality. The Cronbach-Alfa reliability coefficient was 0.86. Results revealed that:

1. The mean test score was 45.3 (56.6 percent).
2. Females scored significantly higher than did males.
3. Students scored highest in the area of superstitions, misconceptions, and misinformation; second in the area of masterbation; and third in the area of menstruation.
4. Students scored the lowest in the area of menopause of sex life, second lowest in the area of possible causes for poor sexual adjustment, and third in birth control.
5. Subjects who had received a majority of their present knowledge of human sexuality from either college courses or books and magazines achieved significantly higher test results than subjects who cited friends as their major source of sex information.

Summary

The review of literature indicates that health education actually antedates Hippocratic medicine and has been influenced by social forces, be they progressive or
backward. Health education trends have been varied, and the many topical and content areas indicate the vastness of health education.

The review of selected studies revealed similar findings and conclusions. A general consensus concerning the following conclusions was found:

1. Female students scored higher than male students.
2. White students scored higher than black students.
3. Students believed a large number of health misconceptions and superstitions.
4. Mean scores increased as the size of hometown increased.
5. High school and college curriculums should be evaluated and altered to overcome deficiencies.

The literature revealed no previous general health knowledge testing in South Dakota which further justified the need for this study.
Chapter 3

METHODS AND PROCEDURES

The purpose of the study was to determine the level of health knowledge of selected college freshmen educated in South Dakota. The subjects attended grades K-12 in only one school district. The study was designed so recommendations could be made relative to curriculum adjustments in health education knowledge areas. The following sections are presented in this chapter: (1) organization of the study, (2) source of the data, (3) collection of the data, and (4) statistical analysis.

Organization of the Study

The 1972 edition of the Kilander-Leach Health Knowledge Test was administered to 1,773 freshmen college students enrolled in eight, four year institutions of higher learning in South Dakota during the fall semester of 1977. Subjects were contacted through a previously selected staff member at each cooperating institution who was responsible for supervising the administration of the test and its return for analysis.

Source of the Data

The majority of the students surveyed were enrolled in required physical education activity classes, while the
remaining students were physical education majors enrolled in freshmen courses dealing with history and principles of physical education, or students in elective physical education activity classes. Physical education programs were required by all but two institutions of higher learning, therefore large numbers of students could be contacted. It was theorized there would be a greater degree of cooperation and appreciation of the study on the part of the physical education professionals versus other discipline areas. Selected representatives at all thirteen, four year institutions of higher learning in South Dakota received a letter (Appendix D) asking for their cooperation. Included with the letter of participation was a return postcard asking if the institution planned to participate, confirming their representative, and estimating the number of freshmen expected to enroll in physical education classes. A list of the institutional representatives is presented in Appendix A. The test was administered to students during a regularly scheduled class period on a date mutually agreed upon between each administrator and the individual class instructor.

Of the total 1,773 test administered, 1,719 were suitable for analysis and 919 were pertinent to this study. Mark sense computer answer sheets (Appendix E) having five
or more total questions left unanswered or not properly completed were not included in the analysis. The sample group represented 15.5 percent of freshmen statewide and 18.8 percent of freshmen from institutions participating in the investigation. The number of students tested at each institution is presented in Table 1 (Registrar Office, 1977).

Collection of the Data

The search for an appropriate test instrument began by sending a letter of inquiry (Appendix F) to health education directors at selected universities nationwide (Appendix G). Following a review of instruments designed to measure health knowledge, the 1972 edition of the Kilander-Leach Health Knowledge Test was selected (Kilander, 1972). The test was constructed in 1936 by H. F. Kilander and has been revised six times including the most recent revision with co-author Dr. Glenn Leach. The test consists of 100 multiple-choice items categorized into eleven health content areas (Appendix B). Validation of the instrument has been established from state courses of study and textbooks on health as well as extensive subjective and objective experience of the authors. The reliability coefficient, applying the Spearman-Brown
### Table 1

**Number and Percent of Selected College Freshman in each Participating South Dakota Institution**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Total Freshmen Enrolled</th>
<th>Subjects ( n (%) )</th>
<th>Pertinent Subjects ( n (%) )</th>
<th>Relative % Pertinent Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augustana College</td>
<td>518</td>
<td>60 (12)</td>
<td>20 (3.9)</td>
<td>2.2</td>
</tr>
<tr>
<td>Black Hills State College</td>
<td>514</td>
<td>57 (11)</td>
<td>29 (5.6)</td>
<td>3.2</td>
</tr>
<tr>
<td>Mount Marty College</td>
<td>116</td>
<td>28 (25)</td>
<td>7 (6.0)</td>
<td>0.8</td>
</tr>
<tr>
<td>Northern State College</td>
<td>603</td>
<td>293 (49)</td>
<td>196 (32.5)</td>
<td>21.3</td>
</tr>
<tr>
<td>Sioux Falls College</td>
<td>175</td>
<td>22 (13)</td>
<td>5 (2.9)</td>
<td>0.5</td>
</tr>
<tr>
<td>South Dakota School of Mines and Technology</td>
<td>498</td>
<td>233 (13)</td>
<td>107 (21.5)</td>
<td>11.6</td>
</tr>
<tr>
<td>South Dakota State University</td>
<td>1,475</td>
<td>842 (57)</td>
<td>485 (32.8)</td>
<td>52.8</td>
</tr>
<tr>
<td>University of South Dakota</td>
<td>1,082</td>
<td>184 (17)</td>
<td>70 (6.5)</td>
<td>7.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,891</td>
<td>1,719 (35.1)</td>
<td>919 (18.8)</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Formula was calculated to be 0.80 for college freshmen and 0.83 for high school seniors.

The 1972 edition of the Kilander-Leach Health Knowledge Test was chosen because the norms are now based on over 100,000 individual scores and because of the multiple-choice format. Also, it was the only test instrument reviewed that was available in its entirety for evaluation.

Revised instructions were added to the test booklet to facilitate the acquisition of the demographic data. Letters corresponding to the demographic data questions were mimeographed onto the computer answer sheets illustrating the proper area for these responses. Test instructions and demographic questions are presented in Appendix H. The students were allowed to take the test only once.

Tests and answer sheets were mailed to the representatives by September 1, 1977 or when acknowledgement was received confirming participation. Administrators were instructed to read the instructions aloud to the students. A list of the administrative guidelines is presented in Appendix I.

Upon completion of the testing and the return of the mark sense answer sheets, the data were transferred to 1230 computer cards at the Office of Tests and Measurements at South Dakota State University. Added to the computer
cards was a code number identifying each institution. The data were transferred to magnetic tape using an expanded TES-TAT program at the computer center.

**Statistical Analysis**

Data collected were subsequently analyzed at the computer center at South Dakota State University utilizing the Statistical Package for the Social Sciences (Nie and others, 1975). Statistics computed for the demographic data, correct scores for the test subcategories, and correct scores for the entire test included the mean, standard deviation, standard error, and minimum and maximum values. Raw scores were converted to percentile points. A two-way analysis of variance with the health test score being the criterion measure was performed. Sex and size of high school graduating class were the independent variables. The 0.05 level of significance was established for all statistical tests. Percentile points calculated for the sample group were compared to the national percentile points.
Chapter 4

ANALYSIS AND DISCUSSION OF RESULTS

The purpose of the study was to determine the level of health knowledge of selected college freshmen educated in South Dakota. The data analysis focused on the subjects who attended grades K-12 in only one school district. The results of the study are divided into the following sections: (1) organization of the data for analysis, (2) analysis of the data, and (3) discussion of the results.

Organization of the Data for Analysis

Freshmen enrolled in required physical education activity classes; physical education majors, enrolled in courses dealing with history and principles of physical education; and students in elective physical education activity programs (N=1,773) at eight South Dakota four year colleges and universities were the subjects. The testing was conducted the fall semester of 1977. Answer sheets having five or more total questions left unanswered or not properly completed were not included in the data analysis. Some subjects did not respond to all seven of the demographic data questions, therefore, the total number of responses per question varied.
Analysis of the Data

Of the 1,773 tests administered, 1,719 were suitable for analysis. Of the tests analyzed 1,244 students were educated grades K-12 in only South Dakota. The mean score for this group was 53.84 with a standard deviation of 12.78 and minimum and maximum values of 7-86 (Table 2). Of the 1,244 students, 919 were educated in only one school district in South Dakota grades K-12. This sample group had a mean test score of 53.83 with a standard deviation of 12.65 and minimum and maximum values of 7-86 (Table 3). A Cronbach-Alpa reliability coefficient of 0.88 was calculated for the 1972 edition of the Kilander-Leach Health Knowledge Test for the sample group.

Table 2

Mean Correct Responses of South Dakota College Freshmen (N=1,244)

<table>
<thead>
<tr>
<th>Number</th>
<th>X</th>
<th>SD</th>
<th>SE</th>
<th>Minimum-Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,244</td>
<td>53.84</td>
<td>12.78</td>
<td>0.36</td>
<td>7-86</td>
</tr>
</tbody>
</table>
Table 3

Mean Correct Responses of South Dakota College Freshmen Educated in One School District (N=919)

<table>
<thead>
<tr>
<th>Number</th>
<th>( \bar{X} )</th>
<th>SD</th>
<th>SE</th>
<th>Minimum-Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>919</td>
<td>53.83</td>
<td>12.65</td>
<td>0.42</td>
<td>7-86</td>
</tr>
</tbody>
</table>

Results of the mean correct responses for each of the eleven health content areas of the health knowledge test were ranked in descending order and are presented in Table 4. The minimum and maximum values for the content areas included subjects who failed to respond correctly to any questions, and subjects who responded correctly to all items. Areas in which the subjects exhibited the least amount of knowledge included: (1) community health (44.0 percent of the community health questions answered correctly), (2) mental health (48.1 percent), and (3) personal health (49.4 percent). The subjects demonstrated the greatest amount of knowledge in the areas of (1) first aid (64.4 percent of the first aid questions answered correctly), (2) safety (64.3 percent), and (3) chronic disease (60.7 percent).
Table 4
Content Areas Ranked by Percentage of Mean Correct Responses (N=919)

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Number of Questions</th>
<th>Correct (%)</th>
<th>$\bar{X}$</th>
<th>SD</th>
<th>SE</th>
<th>Minimum-Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Aid</td>
<td>7</td>
<td>64.4</td>
<td>4.51</td>
<td>1.4</td>
<td>0.05</td>
<td>0-7</td>
</tr>
<tr>
<td>Safety</td>
<td>3</td>
<td>64.3</td>
<td>1.93</td>
<td>0.7</td>
<td>0.02</td>
<td>0-3</td>
</tr>
<tr>
<td>Chronic Disease</td>
<td>7</td>
<td>60.7</td>
<td>4.25</td>
<td>1.5</td>
<td>0.05</td>
<td>0-7</td>
</tr>
<tr>
<td>Nutrition</td>
<td>9</td>
<td>59.4</td>
<td>5.35</td>
<td>1.9</td>
<td>0.06</td>
<td>0-9</td>
</tr>
<tr>
<td>Family Living</td>
<td>7</td>
<td>56.6</td>
<td>3.96</td>
<td>1.6</td>
<td>0.05</td>
<td>0-7</td>
</tr>
<tr>
<td>Consumer Health</td>
<td>11</td>
<td>54.1</td>
<td>5.95</td>
<td>2.1</td>
<td>0.07</td>
<td>0-11</td>
</tr>
<tr>
<td>Communicable Disease</td>
<td>14</td>
<td>52.6</td>
<td>7.36</td>
<td>2.4</td>
<td>0.08</td>
<td>1-14</td>
</tr>
<tr>
<td>Stimulants and Depressants</td>
<td>9</td>
<td>51.0</td>
<td>4.59</td>
<td>1.6</td>
<td>0.05</td>
<td>0-9</td>
</tr>
<tr>
<td>Personal Health</td>
<td>21</td>
<td>49.4</td>
<td>10.37</td>
<td>3.2</td>
<td>0.10</td>
<td>0-19</td>
</tr>
<tr>
<td>Mental Health</td>
<td>7</td>
<td>48.1</td>
<td>3.37</td>
<td>1.3</td>
<td>0.04</td>
<td>0-7</td>
</tr>
<tr>
<td>Community Health</td>
<td>5</td>
<td>44.0</td>
<td>2.19</td>
<td>1.0</td>
<td>0.03</td>
<td>0-5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The test results of the sample group (N=919) were categorized by age and are presented in Table 5. The number of subjects tested in the 18 (N=690) and 19 (N=102) year old age groups collectively represented 86.2 percent of the sample. Mean scores relative to age ranged from 49.0 for the over 35 age group to 86.0 for the 30-35 age group.

Table 5
Mean Correct Responses by Age Group (N=919)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>N</th>
<th>Relative %</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 18</td>
<td>48</td>
<td>5.2</td>
<td>51.2</td>
<td>13.4</td>
</tr>
<tr>
<td>18</td>
<td>690</td>
<td>75.1</td>
<td>54.1</td>
<td>12.4</td>
</tr>
<tr>
<td>19</td>
<td>102</td>
<td>11.1</td>
<td>51.0</td>
<td>13.2</td>
</tr>
<tr>
<td>20-24</td>
<td>66</td>
<td>7.2</td>
<td>55.3</td>
<td>13.0</td>
</tr>
<tr>
<td>25-29</td>
<td>11</td>
<td>1.2</td>
<td>63.5</td>
<td>8.6</td>
</tr>
<tr>
<td>30-35</td>
<td>1</td>
<td>0.1</td>
<td>86.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Over 35</td>
<td>1</td>
<td>0.1</td>
<td>49.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>919</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The test results of the sample group (N=916) were analyzed by sex and are presented in Table 6. A total of 479 males achieved a mean score of 51.8, while the mean test score the the 437 females was 56.0

Table 6
Mean Correct Responses by Sex (N=916)

<table>
<thead>
<tr>
<th>Sex</th>
<th>N</th>
<th>Relative %</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>479</td>
<td>52.3</td>
<td>51.8</td>
<td>12.9</td>
</tr>
<tr>
<td>Female</td>
<td>437</td>
<td>47.7</td>
<td>56.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Total</td>
<td>916</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The test results of the sample group (N=917) were analyzed by size of high school graduating class and are presented in Table 7. The number of subjects tested in the Under 50 (N=273), 50-100 (N=234), and Over 250 (N=235) size of graduating class collectively represented 80.9 percent of the sample. Mean scores relative to size of graduating class ranged from 52.3 for the Under 50 class size to 55.4 for the Over 250 class size.
Table 7
Mean Correct Responses by Size of Graduating Class (N=917)

<table>
<thead>
<tr>
<th>Size of Class</th>
<th>N</th>
<th>Relative %</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 50</td>
<td>273</td>
<td>29.8</td>
<td>52.3</td>
<td>12.4</td>
</tr>
<tr>
<td>50-100</td>
<td>234</td>
<td>25.5</td>
<td>54.2</td>
<td>12.1</td>
</tr>
<tr>
<td>101-150</td>
<td>63</td>
<td>6.9</td>
<td>53.5</td>
<td>11.9</td>
</tr>
<tr>
<td>151-200</td>
<td>38</td>
<td>4.1</td>
<td>53.3</td>
<td>13.3</td>
</tr>
<tr>
<td>201-250</td>
<td>74</td>
<td>8.1</td>
<td>54.0</td>
<td>14.6</td>
</tr>
<tr>
<td>Over 250</td>
<td>235</td>
<td>25.6</td>
<td>55.4</td>
<td>12.9</td>
</tr>
<tr>
<td>Total</td>
<td>917</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A two-way analysis of variance with the health test score being the criterion measure was performed. Sex and size of graduating class were the independent variables (Table 8). Option nine of the SPSS ANOVA program was used for analysis in order to give equal weight to the unequal distribution of the responses in the sex by size of graduating class categories. The F-ratio of 0.74 (p > 0.05) for the interaction of sex and graduating class was not significant. The F-ratio of 10.79 (p < 0.05) indicated a significant difference between males and females mean test
scores. The F-ratio of 1.5 (p > 0.05) was not significant for size of graduating class.

Table 8
Analysis of Variance for Mean Correct Responses of Sex by Class Size (N=914)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>1,677.25</td>
<td>1,677.25</td>
<td>10.79*</td>
</tr>
<tr>
<td>Class Size</td>
<td>5</td>
<td>1,166.50</td>
<td>233.30</td>
<td>1.50</td>
</tr>
<tr>
<td>Sex by Class Size</td>
<td>5</td>
<td>575.34</td>
<td>115.34</td>
<td>0.74</td>
</tr>
<tr>
<td>Residual</td>
<td>902</td>
<td>104,205.56</td>
<td>159.80</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>913</td>
<td>145,900.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

The test results of the sample group (N=911) were analyzed by number of completed health classes and are presented in Table 9. The number of subjects having completed no health classes (N=347), one health class (N=294), and two health classes (N=161) collectively represented 88.0 percent of the sample group. Mean scores relative to number of completed health classes ranged from 52.7 for the group having no health classes to 59.6 for the group having completed four health classes. Those having
completed over four health classes had a mean score of 55.0.

Table 9
Mean Correct Responses by Number of Completed Health Classes (N=911)

<table>
<thead>
<tr>
<th>Number of Classes</th>
<th>N</th>
<th>Relative %</th>
<th>X</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>347</td>
<td>38.1</td>
<td>52.7</td>
<td>12.8</td>
</tr>
<tr>
<td>1</td>
<td>294</td>
<td>32.3</td>
<td>53.1</td>
<td>12.2</td>
</tr>
<tr>
<td>2</td>
<td>161</td>
<td>17.6</td>
<td>55.8</td>
<td>12.1</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>6.6</td>
<td>55.9</td>
<td>13.9</td>
</tr>
<tr>
<td>4</td>
<td>29</td>
<td>3.2</td>
<td>59.6</td>
<td>11.5</td>
</tr>
<tr>
<td>Over 4</td>
<td>20</td>
<td>2.2</td>
<td>55.0</td>
<td>14.8</td>
</tr>
<tr>
<td>Total</td>
<td>911</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The test results of the sample group (N=898) were analyzed by high school grade-point average and are presented in Table 10. The number of subjects tested in the 2.6-3.0 group (N=196), 3.1-3.5 group (N=306), and 3.6-4.0 group (N=197) collectively represented 77.8 percent of the sample group. Mean test scores relative to
grade-point average ranged from 48.0 for the 1.0-1.5 group to 59.8 for the 3.6-4.0 grade-point average group.

Table 10

Mean Correct Responses by High School Grade-Point Average (N=898)

<table>
<thead>
<tr>
<th>Grade-Point Average</th>
<th>N</th>
<th>Relative %</th>
<th>( \bar{X} )</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0-1.5</td>
<td>2</td>
<td>0.2</td>
<td>48.0</td>
<td>2.8</td>
</tr>
<tr>
<td>1.6-2.0</td>
<td>11</td>
<td>1.2</td>
<td>54.6</td>
<td>11.3</td>
</tr>
<tr>
<td>2.1-2.5</td>
<td>84</td>
<td>9.4</td>
<td>47.0</td>
<td>12.6</td>
</tr>
<tr>
<td>2.6-3.0</td>
<td>196</td>
<td>21.8</td>
<td>51.2</td>
<td>12.6</td>
</tr>
<tr>
<td>3.1-3.5</td>
<td>306</td>
<td>34.1</td>
<td>55.1</td>
<td>12.2</td>
</tr>
<tr>
<td>3.6-4.0</td>
<td>197</td>
<td>21.9</td>
<td>59.8</td>
<td>11.3</td>
</tr>
<tr>
<td>Do not know</td>
<td>102</td>
<td>11.4</td>
<td>49.1</td>
<td>11.5</td>
</tr>
<tr>
<td>Total</td>
<td>898</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentile points were calculated for the sample group and compared to the national percentile points. These are presented in Table 11 and Figure 1. Fifty percent of the South Dakota students scored above 55 while 50 percent of the national norm group scored above 70.
Table 11
Comparison of South Dakota College Freshmen Educated in One School District to the Kilander-Leach National Norms by Percentile Points

<table>
<thead>
<tr>
<th>Percentile</th>
<th>South Dakota Freshmen</th>
<th>Kilander-Leach National Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>86</td>
<td>91</td>
</tr>
<tr>
<td>90</td>
<td>69</td>
<td>83</td>
</tr>
<tr>
<td>84</td>
<td>66</td>
<td>78</td>
</tr>
<tr>
<td>75</td>
<td>62</td>
<td>75</td>
</tr>
<tr>
<td>50</td>
<td>55</td>
<td>70</td>
</tr>
<tr>
<td>25</td>
<td>45</td>
<td>61</td>
</tr>
<tr>
<td>16</td>
<td>40</td>
<td>57</td>
</tr>
<tr>
<td>10</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>0</td>
<td>7</td>
<td>35</td>
</tr>
</tbody>
</table>

The "Do Not Know" answer option was added to the test to allow the students to admit not knowing the answer. Analysis of the "Do Not Know" answer option is presented in Table 12. Areas in which the subjects chose the "Do Not Know" option the fewest times included: (1) stimulants and depressants (88 students per question -- 9.6 percent of the sample), (2) nutrition (104 students per question -- 11.3 percent of the sample), and (3) family living (118 students
Figure 1

Comparison of South Dakota College Freshmen Educated in One School District to the Kilander-Leach National Norms by Percentile Points
Table 12
Content Areas by Mean Responses to the "Do Not Know" Answer Option (N=919)

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Question N</th>
<th>( \bar{X} ) Response per question</th>
<th>( \bar{X} ) Percentage per question</th>
<th>Minimum-Maximum per area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulants and Depressants</td>
<td>9</td>
<td>88</td>
<td>9.6</td>
<td>55-165</td>
</tr>
<tr>
<td>Nutrition</td>
<td>9</td>
<td>104</td>
<td>11.3</td>
<td>46-221</td>
</tr>
<tr>
<td>Family Living</td>
<td>7</td>
<td>118</td>
<td>12.8</td>
<td>9-221</td>
</tr>
<tr>
<td>First Aid</td>
<td>7</td>
<td>128</td>
<td>13.9</td>
<td>55-267</td>
</tr>
<tr>
<td>Personal Health</td>
<td>21</td>
<td>131</td>
<td>14.3</td>
<td>28-368</td>
</tr>
<tr>
<td>Safety</td>
<td>3</td>
<td>144</td>
<td>15.7</td>
<td>28-340</td>
</tr>
<tr>
<td>Chronic Disease</td>
<td>7</td>
<td>150</td>
<td>16.3</td>
<td>18-221</td>
</tr>
<tr>
<td>Consumer Health</td>
<td>11</td>
<td>179</td>
<td>19.5</td>
<td>28-340</td>
</tr>
<tr>
<td>Mental Health</td>
<td>7</td>
<td>185</td>
<td>20.1</td>
<td>46-496</td>
</tr>
<tr>
<td>Communicable Disease</td>
<td>14</td>
<td>191</td>
<td>10.8</td>
<td>46-450</td>
</tr>
<tr>
<td>Community Health</td>
<td>5</td>
<td>191</td>
<td>20.8</td>
<td>18-414</td>
</tr>
</tbody>
</table>
per question -- 12.8 percent of the sample). Areas in which the subjects chose the "Do Not Know" option the most included: (1) community health (191 students per question -- 20.8 percent of the sample), (2) communicable disease (191 students per question -- 20.8 percent of the sample), and (3) mental health (185 students per question -- 20.1 percent of the sample). The minimum and maximum values in Table 12 show the fewest students and the most students choosing the "Do Not Know" answer option on questions in each area. Question number 14, in the family living content area had the fewest "Do Not Know" responses (9); while question 91, in the mental health area, had the most "Do Not Know" responses (496). The questions for the test are located in Appendix C.

**Discussion of the Results**

The discussion of the results will compare and contrast the South Dakota results to the findings of previous studies. Areas of the discussion will include mean score, health content areas, national norm, age, number of completed health classes, grade-point average, interaction of sex by size of graduating class, and "Do Not Know" responses. Inferences drawn from the comparisons will be presented at the conclusion of each discussion area.
Analysis of the test results revealed a mean test score of 53.84 for students educated in only South Dakota, while the South Dakota students educated in only one school district in South Dakota had a mean test score of 53.83. The fiftieth percentile score for the South Dakota students educated in only one school district was 55, while the national norm fiftieth percentile point was 70. Studies utilizing previous editions of the Kilander-Leach Health Knowledge Test showed a mean test scores of 62.70 and 65.78 for college freshmen, and 50.01 for high school seniors (Kilander, 1937; Campbell and Early, 1969; Campbell and Foster, 1972).

Results of other college freshmen health knowledge and health misconceptions testing, using various testing instruments, showed mean test scores of 54.40 (Dearborn, 1958), 52.40 (Blazey, 1965), 45.60 (Pigg, 1976), and 48.0 (Watts, 1977) when 100 item tests were used. A mean test score of 76.71 was found when Roetteger (1972) used a 129 item test. The percentage correct found in the previous studies ranged from 48.00 to 59.47 percent, and each researcher evaluated the mean test score of their study as indicating a low level of health knowledge. The mean test score (53.83) of the South Dakota sample (N=919) is
comparable to mean scores of previous studies which indicates a low level of health knowledge.

**Content Areas**

Analysis of the test results relative to the eleven content areas included in the Kilander-Leach Health Knowledge Test indicated the lowest mean scores in the areas of (1) community health, (2) mental health, (3) personal health, and (4) stimulants and depressants (Table 4). In comparison, Blazey (1965) also found mental hygiene to be a low scoring area, while Sliepecevich (1964) also found community health to be a low knowledge area. The stimulants and depressants category was found to be a low knowledge area by Pigg (1976) and Watts (1977), agreeing with the South Dakota results.

However, Sliepecevich (1964) found stimulants and depressants, personal health, and mental health to be areas of greater knowledge, while these areas were included in the four lowest scoring areas in the South Dakota results. Stephens (1971) found that high school seniors scored well in habit-forming substances (stimulants and depressants) and personal health, while these areas were again included in the four lowest scoring areas in the South Dakota results.

Analysis of the test results relative to the eleven content areas indicated the highest mean scores in the
areas of (1) first aid, (2) safety, (3) chronic disease, and (4) nutrition (Table 4). First aid was found to be an area of greater knowledge also by Pigg (1976) and Watts (1977). Roetteger (1972) also found agreement with the South Dakota results in the area of food, diet, and nutrition.

In contrast to the South Dakota results, Sliepevich (1964), Stephens (1971), Roetteger (1972), and Washnik (1957) found nutrition to be an area of low knowledge. Sliepevich (1964), Pigg (1976), and Watts (1977) found chronic disease to be an area of low knowledge, in contrast to the South Dakota results.

The results indicate that South Dakota students scored low in areas that other students have scored high, and that South Dakota students scored highest in areas that other students have scored low, indicating that teachers need to be aware of the areas in which their students may need more instruction. Even the highest scoring areas of the South Dakota sample was below 65 percent correct, which suggests that study is needed in all eleven content areas.

National Norm

The South Dakota sample scored fifteen points lower than the national norm at the fiftieth percentile point (Table 11 and Figure 1). Only ten percent of the South Dakota sample scored above the fiftieth percentile point
score of 70 of the national norm. The national norm had a tenth percentile score of 54, while the South Dakota sample had a fiftieth percentile score of 55. These comparisons indicated that South Dakota college freshmen educated in only one school district scored significantly lower than the Kilander-Leach national norm.

Age

The results analyzed by age indicated a general rise of mean scores with an increase in age group, with the exception of 19 year olds, who scored lower than the under 18 year group (Table 5). Pigg (1976) found that the 18 year olds had the highest score, while Watts (1977) found that the 20 year olds and older group had the highest mean score. A small sample of the higher age groups limited additional analysis.

Completed Health Classes

Analysis of results of the number of completed health classes showed a gradual increase of mean scores as the number of completed classes increased (Table 9). However, students having completed over four health classes scored lower than those having two health classes. Pigg (1976) and Watts (1977) found that having health classes may not significantly increase one's health knowledge. Watts (1977) found that students who had completed a course at the high school level only, scored slightly higher than
subjects who had completed both a high school and college health course, or subjects who had never completed a formal health course. Lyons (1961) and Palmer (1973) found a significant increase of health knowledge after completion of a health class. Kilander (1937) found that health instruction may not improve the score of an individual who already has a high score, but instruction definitely helps the low scorer raise his grade to the average. Research results tend to indicate that health education classes can benefit students' general health knowledge.

Grade-Point Average

Analysis of results of mean scores relative to grade-point average revealed a general rise in the mean scores as the grade-point average increased, except for those in the 2.1-2.5 category. These students had a mean score of 47.0, which was lower than those in the 1.0-1.5 grade-point average group (Table 10). Watts (1977) studying college freshmen and Stephens (1971) studying high school seniors both found a significant rise of health knowledge with a rise in high school grade-point average. This could suggest that a student with higher academic ability tends to have a greater knowledge of health.

Sex and Size of Graduating Class

The interaction of sex by size of high school graduating class was not statistically significant (Table
8). No studies were found that had tested for a similar interaction.

The size of graduating class was not a statistically significant factor. Previous studies used size of hometown as a variable rather than size of graduating class. If the assumption of having a larger hometown means having a larger graduating class is made then the South Dakota test results vary from previous studies. Stephens (1971), Pigg (1976), and Watts (1977) found that scores generally increased as the size of hometown increased.

Sex was a significant factor. The females of the pertinent sample group scored significantly higher than the males. Females scored slightly higher than males in studies by Washnik (1957), Campbell and Foster (1972), and Sliepcevich (1964) where seniors in high school were the subjects. Female college freshmen scored significantly higher than male college freshmen in studies by Gist (1955), Lyons (1961), Campbell and Early (1969), Pigg (1976), and Watts (1977). This suggests that more attention should be given to the study of health education by males than has been in the past. Health education should not be lessened for females, but emphasized for males.

"Do Not Know" Responses

Students had the lowest mean score in the community health area, but they admitted not knowing the answers by
using the "Do Not Know" answer option 191 times (20.8 percent) per community health question. The mental health area had the second lowest mean score, but students again admitted lack of knowledge in this area by choosing the "Do Not Know" answer option 185 times (20.1 percent) per mental health question. The mean test score was relatively low (51 percent) in the area of stimulants and depressants. The students chose the "Do Not Know" answer option only 88 times (9.6 percent) per question, indicating the students felt they knew this area, but really did not, as reflected by the mean score. Table 13 shows a comparison of mean score to "Do Not Know" responses for each content area.

The students scored highest in the area of first aid (64.4 percent) and second in safety (64.3 percent), but both of these areas had relatively high "Do Not Know" response frequencies of 128 (13.9 percent) and 144 (15.7 percent) per question per area, respectively. These results might indicate they did not know the answer by using the "Do Not Know" answer option, instead of guessing.

South Dakota college freshmen educated in only one school district seem to have a general lack of health knowledge, some recognized by the students, and some unrecognized. Dearborn (1958) found that students retained much misinformation, some recognized and some unrecognized.
Table 13
Content Areas by Percentage of Mean Correct Responses and Mean Percent of "Do Not Know" Answers

<table>
<thead>
<tr>
<th>Content Area</th>
<th>$\bar{X}$ (%) Correct Responses</th>
<th>$\bar{X}$ (%) &quot;Do Not Know&quot; Per Question</th>
<th>$\bar{X}$ (%) &quot;Do Not Know&quot; Per Question</th>
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<tbody>
<tr>
<td>First Aid</td>
<td>64.4</td>
<td>13.9</td>
<td>128</td>
</tr>
<tr>
<td>Safety</td>
<td>64.3</td>
<td>15.7</td>
<td>144</td>
</tr>
<tr>
<td>Chronic Disease</td>
<td>60.7</td>
<td>16.3</td>
<td>150</td>
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<tr>
<td>Nutrition</td>
<td>59.4</td>
<td>11.3</td>
<td>104</td>
</tr>
<tr>
<td>Family Living</td>
<td>56.6</td>
<td>12.8</td>
<td>118</td>
</tr>
<tr>
<td>Consumer Health</td>
<td>54.1</td>
<td>19.5</td>
<td>179</td>
</tr>
<tr>
<td>Communicable Disease</td>
<td>52.6</td>
<td>10.8</td>
<td>191</td>
</tr>
<tr>
<td>Stimulants and</td>
<td>51.0</td>
<td>9.6</td>
<td>88</td>
</tr>
<tr>
<td>Depressants</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Personal Health</td>
<td>49.4</td>
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<tr>
<td>Mental Health</td>
<td>48.1</td>
<td>20.1</td>
<td>185</td>
</tr>
<tr>
<td>Community Health</td>
<td>44.0</td>
<td>20.8</td>
<td>191</td>
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</table>
Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

The purpose of this study was to determine the level of health knowledge of selected college freshmen educated in South Dakota. The subjects attended grades K-12 in only one school district. The following sections are presented in this chapter: (1) pertinent questions, (2) methodology, (3) findings, (4) conclusions, (5) implications, and (6) recommendations.

**Pertinent Questions**

1. What is the level of health knowledge of college freshmen educated in only the state of South Dakota grades K-12?

2. What is the level of health knowledge of college freshmen educated in only one school district in South Dakota grades K-12?

3. What is the level of health knowledge of college freshmen educated in only one school district grades K-12 concerning each of the eleven health content areas (personal health, community health, nutrition, family living, first aid, safety, consumer health, chronic disease, communicable disease, mental health, and stimulants and depressants) included in the Kilander-Leach Health Knowledge Test?
4. How does the level of health knowledge of college freshmen educated in only one South Dakota school district grades K-12 compare to the established norm of the Kilander-Leach Health Knowledge Test?

5. Is there a difference in the level of health knowledge between male and female college freshmen educated in only one South Dakota school district grades K-12?

6. Is there a difference in the level of health knowledge of college freshmen educated in only one South Dakota school district grades K-12 based on the size of their graduating class?

Methodology

The 1972 edition of the Kilander-Leach Health Knowledge Test was administered to 1,773 freshmen college students enrolled in eight, four year institutions of higher learning in South Dakota during the fall semester of 1977. Subjects were contacted through a previously selected staff member at each cooperating institution who was responsible for supervising the administration of the test and its return for analysis. The majority of the students surveyed were enrolled in required physical education activity classes, while the remaining students were physical education majors enrolled in freshmen courses of
history and principles of physical education, or students in elective physical education activity classes.

A total of 1,719 were suitable for analysis, but only 919 attended grades K-12 in only one school district. Statistics computed for the demographic data analysis, correct scores for test subcategories, and correct scores for the entire test included mean, standard deviation, standard error, and minimum and maximum values. Raw scores were converted to percentile points. A two-way analysis of variance with the health test score being the criterion measure was performed. Sex and size of graduating class were the independent variables. The 0.05 level of significance was established for all statistical tests.

Findings

Analysis of the test results revealed a mean test score of 53.83 for the 919 students in the sample group. Subjects exhibited the greatest amount of knowledge in the area of (1) first aid (64.4 percent), (2) safety (64.3 percent), and (3) chronic disease (60.7 percent). Subjects exhibited the least amount of knowledge in the areas of (1) community health (44.0 percent), (2) mental health (48.1 percent), and personal health (49.4 percent). The South Dakota sample scored significantly lower than the national norm. The fiftieth percentile scores were 55 and 70, for
the South Dakota sample and norm, respectively. The South Dakota fiftieth percentile score of 55.0 and the national norm tenth percentile score of 54.0 were comparable. Significantly higher test scores were achieved by females when compared to males. The size of graduating class was not statistically significant. Test results indicated a general rise of mean score with the increase in age, higher grade-point average, and an increased number of completed health classes.

Conclusions

Based on the test results of subjects involved in the study the following conclusions were drawn.

1. South Dakota freshmen seem to have a general lack of health knowledge.

2. Subject knowledge is weak to moderate in all of the eleven health content areas.

3. Subject knowledge is significantly lower than the Kilander-Leach national norm.

4. Females have significantly higher general health knowledge than males.

5. The size of a school is not related to the level of general health knowledge attained by students.
6. General health knowledge increases as a function of increased age, higher academic ability, and increased health instruction.

Implications

The level of general health knowledge revealed by subjects' scores on the Kilander-Leach Health Knowledge Test and the comparison of these scores to the Kilander-Leach national norm illustrates the need for a required program of health education on the high school level in South Dakota. If health education is to be an important phase of total education of the student, then qualified instructors are also needed. South Dakota institutions of higher education may need to evaluate their responsibility to provide health instructors, and therefore, offer health majors.

Recommendations for Further Research

1. Since this study dealt with knowledge of health, further study of the relationship between health knowledge and health behavior of South Dakota college freshmen is recommended.

2. A study of high school students' health knowledge is recommended.
3. A study to determine the students' sources of health knowledge should be undertaken.

4. A study of general health knowledge of South Dakota College freshmen should be undertaken in the future to determine if improvement has occurred since this investigation.
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APPENDICES
## APPENDIX A

### Institutional Representatives

<table>
<thead>
<tr>
<th>Institution</th>
<th>Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augustana College</td>
<td>Mrs. Bonnie Almond</td>
</tr>
<tr>
<td>Black Hills State College</td>
<td>Dr. William Jordon</td>
</tr>
<tr>
<td>*Dakota State College</td>
<td>Al Weisbecker</td>
</tr>
<tr>
<td>*Dakota Wesleyan University</td>
<td>Gordon Fosness</td>
</tr>
<tr>
<td>**Huron College</td>
<td>Vern Tate</td>
</tr>
<tr>
<td>Mount Marty College</td>
<td>Ken Yama</td>
</tr>
<tr>
<td>Northern State College</td>
<td>Don Woods</td>
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<tr>
<td>Sioux Falls College</td>
<td>Dr. Floyd Boschee</td>
</tr>
<tr>
<td>South Dakota School of Mines and Technology</td>
<td>Mike Reily</td>
</tr>
<tr>
<td>South Dakota State University</td>
<td>Nadeen Lunde</td>
</tr>
<tr>
<td>University of South Dakota</td>
<td>Dr. Charles Spencer</td>
</tr>
<tr>
<td>*University of South Dakota at Springfield</td>
<td>John J. Martin</td>
</tr>
<tr>
<td>*Yankton State College</td>
<td>Don Allan</td>
</tr>
</tbody>
</table>

*Denotes schools not participating as of February 15, 1978.

**Denotes schools who did not participate in the study.
## APPENDIX B

Number of Items Per Content Area Included in the 1972 Kilander-Leach Health Knowledge Test

<table>
<thead>
<tr>
<th>Content Areas</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personal Health</td>
<td>21</td>
</tr>
<tr>
<td>2. Community Health</td>
<td>5</td>
</tr>
<tr>
<td>3. Nutrition</td>
<td>9</td>
</tr>
<tr>
<td>4. Family Living</td>
<td>7</td>
</tr>
<tr>
<td>5. First Aid</td>
<td>7</td>
</tr>
<tr>
<td>6. Safety</td>
<td>3</td>
</tr>
<tr>
<td>7. Consumer Health</td>
<td>11</td>
</tr>
<tr>
<td>8. Chronic Disease</td>
<td>7</td>
</tr>
<tr>
<td>9. Communicable Disease</td>
<td>14</td>
</tr>
<tr>
<td>10. Mental Health</td>
<td>7</td>
</tr>
<tr>
<td>11. Stimulants and Depressants</td>
<td>9</td>
</tr>
</tbody>
</table>
HEALTH KNOWLEDGE TEST

1. Many people lack emotional stability in adult life. This characteristic most probably is traceable to: 1. Early home life 2. Early school life 3. Bad companions 4. Heredity
   1

2. All except which one food can be used instead of meat as a source of protein? 1. Fish 2. Dried beans and peas 3. Macaroni 4. Poultry
   2

3. Which one is a voluntary health agency, as the term is commonly used? 1. Metropolitan Life Insurance Company 2. U. S. Public Health Service 3. National Tuberculosis Association 4. American Medical Association
   3

4. The blood test required in many states before a marriage license is issued is for the purpose of determining whether or not either party has: 1. Syphilis 2. Gonorrhea 3. Tuberculosis 4. Hemophilia
   4

5. What is missing in an otherwise well-balanced breakfast made up of a glass of strained orange juice, a cooked egg, 2 slices of enriched white bread, and a glass of whole milk? 1. Vitamins 2. Roughage 3. Protein 4. Minerals
   5

6. The best rule to follow to prevent constipation is to: 1. Take a laxative regularly once a week. 2. Avoid cheese since it is considered to be binding. 3. Eat plenty of food high in water content such as soups and beverages. 4. Eat regularly foods containing roughage such as vegetables, fruits and whole grain bread.
   6

7. The World Health Organization, known as WHO, is: 1. An agency of the old League of Nations. 2. An independent international agency working closely with the UN. 3. An agency of the United Nations. 4. A loose international federation which includes most countries but not Russia and its satellites.
   7

8. Which temperature of the bath water is most conducive to relaxation when one is nervous? 1. Hot 2. Warm 3. Cold 4. Hot followed by cold
   8

   9

10. Fatigue due to sedentary or mental work is best relieved at the end of one's working hours by: 1. Coffee 2. Sleep 3. A shower 4. Recreational activity of a physical type
    10

11. Which statement about the inheritance of allergies is the most accurate? 1. Allergies are inherited. 2. Allergies are not inherited. 3. The tendency to develop allergies is inherited. 4. It is not known definitely whether there is an inherited factor.
    11

12. Comment on the statement: A fever can be "killed" by drinking whiskey. 1. This is true. 2. There is neither harm nor value in this method. 3. It frequently helps. 4. It is more dangerous than helpful.
    12

13. Which of the following statements is correct? 1. Excessive masturbation leads to insanity. 2. Excessive masturbation leads to sterility. 3. Masturbation is not physically harmful, and is usually outgrown. 4. Masturbation is participated in by the male species only.
    13
14. The process whereby a sperm and egg unite is known as fertilization. By which other name is it also called?
1. Reproduction
2. Conception
3. Implantation
4. Sterilization

15. Which is the best way to arrange a chair and writing desk in a room with windows only on one side and for a right-handed person?
1. Facing windows
2. With right side toward windows
3. With back to windows
4. With left side toward windows

16. The ultra-violet rays either from sunlight or artificial sun lamps are of value in preventing:
1. Rickets
2. Goiter
3. Cancer
4. Kidney trouble

17. Of the various forms of insurance, the one that offers hospitalization benefits is known as:
1. American Hospital Plan
2. Blue Shield
3. Blue Cross
4. Major Medical

18. A college degree is required in order to take up specialized study in three of these fields. For which one is a high school diploma sufficient?
1. Medical social worker
2. Dentist
3. Hospital administrator
4. Dental hygienist

19. Can a prospective mother make her child more musical if she listens to good music?
1. Yes, several prominent musicians can ascribe their musical ability to such a procedure.
2. It is doubtful that it would have such an effect.
3. Probably, if the mother does so during the entire prenatal period.
4. It is contrary to the facts of heredity to expect this.

20. A person has cut an artery in the forearm. A tourniquet should be applied:
1. On the side of the cut toward the wrist
2. Either at wrist or elbow
3. On the side of the cut toward the elbow
4. Both at wrist and elbow

21. The most serious type of fatigue is induced by:
1. Physical work
2. Mental work
3. Emotional strain
4. Not known

22. Having which one of these diseases is most likely to be fatal?
1. Tetanus (lockjaw)
2. Mumps
3. Scurvy
4. Hookworm

23. Which one statement concerning the heart and exercise is incorrect?
1. If heart trouble is already present, excessive muscular activity may lead to trouble.
2. Some heart patients benefit from medically prescribed exercise.
3. Exercise causes "athlete's heart."
4. The death rate from heart disease is lower for people who do heavy physical work as compared with those who do sedentary work.

24. That field of medicine which deals with the aged is known as:
1. Pediatrics
2. Geriatrics
3. Obstetrics
4. Orthopedics

25. For people at sedentary work, 68 degrees is the ideal room temperature because:
1. It keeps the humidity sufficiently low.
2. We are accustomed to that temperature.
3. It is the temperature at which our body makes heat at the same rate that it loses it without shivering or perspiring.
4. It is the nearest temperature to that of summer.

26. The best method today of lowering the death rate from cancer is by:
1. Early diagnosis.
2. Repeated use of radium and X-ray.
3. Improvement in one's general health.
4. Early operation.

27. In fighting biological warfare, you as a citizen should:
1. Identify germs, toxins or poisons before reporting them.
2. Avoid washing or dry cleaning any contaminated clothing.
3. Wear airtight face mask and suit covering entire body.
4. Report all unusual symptoms and illnesses to your local or civil defense authorities.
28. The cooking of foods decreases particularly the value of:

29. Is the "taste" for alcohol inherited?
   1. Yes  2. Yes, in some cases  3. Yes, in most cases  4. No

30. When a strong acid has accidentally come in contact with the skin, one should immediately:
   1. Wash it off with plenty of water, preferably alkaline.
   2. Cover it with oil.
   3. Apply an ointment dressing.
   4. Wash it off with rubbing alcohol.

31. Astigmatism is defined as:
   1. An infection of the eye  2. Weak eyes  3. A type of nearsightedness  4. Imperfect curvature of the eye

32. Gonorrhea may cause:

33. The number of cases of organic diseases such as heart trouble and cancer compared with communicable diseases such as typhoid, tuberculosis, and diphtheria is:
   1. Increasing  2. The same  3. Decreasing  4. Not known

34. In which way is sugar used in the body?
   1. To yield energy  2. To build tissue  3. To regulate the body processes  4. To yield energy and build tissue

35. The souring of milk is hastened most quickly by:
   1. Thunderstorms  2. Pasteurization  3. Leaving the bottle uncovered in the refrigerator  4. Poor refrigeration

36. What is the relative professional competency of medical doctors in comparison with chiropractors in treating disease?

37. Which of the following statements about syphilis is the only correct one?
   1. It is a hereditary disease.  2. Once a person has contracted it, he develops an immunity toward it.  3. The latent stage may cause heart defects or insanity.  4. It is often acquired from dirty toilet seats or towels.

38. In attempting to reduce the rate of tuberculosis, this disease should be considered primarily:

39. What is meant by "tolerance" as used in speaking of drug addiction?
   1. A sense of well-being and relaxation caused by the drug.
   2. The need for larger doses of the drug with continued use.
   3. Physical dependence on the drug.
   4. Emotional dependence on the drug.

40. Three of these countries have relatively low death rates; for which one is the death rate the highest?

41. Which disease is transmitted most readily and quickly by personal contact?

42. Milk, which is high in protein and vitamins, completely lacks which one of the following food essentials?

43. Which one of these factors contributes most to mental health?
44. What is it in tobacco smoking which causes lung cancer? 1. Nicotine 2. Tobacco tars 3. Carbon monoxide in tobacco smoke 4. The heat of the smoke

45. Which factor most frequently makes the air less healthful in heated homes or offices during the winter? 1. Room temperature kept too high 2. Dampness 3. Lack of sufficient oxygen 4. Too much carbon dioxide


47. For which communicable disease must you present a certificate of successful vaccination when you return to the U. S. from abroad? 1. Yellow fever 2. Chickenpox 3. Smallpox 4. Cholera

48. Which one of these symptoms is NOT a symptom of shock? 1. Cold perspiration on forehead 2. Strong pulse 3. Shallow, irregular breathing 4. Dilated pupils of eyes


50. The type of illness that occurs when emotional tension creates functional bodily disorders, such as headaches and high blood pressure, is known as: 1. Psychosomatic condition 2. Neurosis 3. Psychosis 4. Insanity


52. The oxygen taken in by the lungs is carried to the body tissues by which one of the following substances? 1. White blood cells 2. Blood platelets 3. Red blood cells 4. Autocoids


54. The Federal Food, Drug and Cosmetic Act prohibits: 1. False advertising in newspapers 2. The sale of products in the same state in which they are made 3. False advertising on the package 4. Both sale and advertising of product

55. A glass of drinking water contains approximately how many calories? 1. None 2. 10 3. 100 4. 200

56. Which one of the following is favorable to the maintenance of a healthy mind? 1. Introspection 2. Monotonous living 3. Cultivation of hobbies 4. Emotionalizing over one's handicaps

57. Three of the following four personality traits indicate emotional maturity in a person which one does not? 1. Self-discipline 2. Self-satisfaction 3. Determination 4. Independence

58. Which one of these chemical salts, when found in drinking water or applied to the teeth, helps to reduce tooth decay? 1. Chlorides 2. Fluorides 3. Sulphates 4. Carbonates

59. When it is time for the baby to be born: 1. The navel gradually opens to let the baby out. 2. The muscles of the uterus contract to force out the baby. 3. The Fallopian tube expands to permit the baby to pass through. 4. None of these three statements applies.

60. The main function in perspiring (sweating) is: 1. To eliminate body poisons 2. To regulate the temperature of the body 3. To get rid of excess water 4. To cleanse the surface of the body
61. Various marks of disfigurement on a newborn child are due to the fright of the mother during pregnancy.  
1. This has frequently happened.  
2. It may happen when the fright occurs early in pregnancy.  
3. It may happen when the fright occurs during last 3 or 4 months of pregnancy.  
4. There is no biological basis for this statement.

62. The "Pap" test is used in determining the presence of cancer in what part of the body?  
1. Skin  
2. Stomach  
3. Breast  
4. Uterus

63. Human whole blood or some of its derivatives can be used in the treatment of all except which one?  
1. Shock  
2. Goiter  
3. Anemia  
4. Burns

64. Which is the correct view in regard to "cousin marriage"?  
1. Such a marriage almost always results in some inferior children.  
2. It frequently results in mentally deficient children.  
3. It is not likely to result in deficient children any more than any other marriage.  
4. It is biologically undesirable if undesirable inheritable traits are known to be present in the family.

65. Cigarette smoking produces all of the following effects except which one?  
1. It causes shortness of breath.  
2. It causes an increase in mental alertness.  
3. It causes a measurable rise in blood pressure.  
4. It makes the extremities (feet and hands) cold.

66. The dangerous gas contained in manufactured illuminating and cooking gas is:  
1. Methane  
2. Hydrogen  
3. Carbon monoxide  
4. Carbon dioxide

67. Three of the following services are considered to be functions of the city and county health departments. Which function is NOT the health department's responsibility?  
1. Compiling vital statistics  
2. Providing for sanitation in the community  
3. Providing for communicable disease control  
4. Caring for the needy

68. In order to recover from tuberculosis, which procedure is most important?  
1. To rest a great deal  
2. To move to a dry climate  
3. To exercise by taking long walks  
4. To take injections of tuberculin

69. During which age period will the lack of proper food result in most harm?  
1. From birth to 6 years  
2. Childhood—6-12 years  
3. Adolescence—12-18 years  
4. Early maturity—18-24 years

70. Is fish a brain food?  
1. It is, because fish is rich in protein similar to that found in the brain.  
2. It is of value because it contains quantities of the salts found in the brain.  
3. It is doubtful whether enough fish can be eaten to make much difference.  
4. No one type of food is used specifically for one organ or region such as the brain.

71. Can communicable diseases be inherited? (Consider only biological inheritance.)  
1. Many but not all communicable diseases can be inherited.  
2. It is only occasionally that such diseases are inherited.  
3. Tuberculosis is one of the two or three communicable diseases that may be inherited.  
4. Communicable diseases cannot be inherited.

72. Which one is the best reason why patent medicines should NOT be used?  
1. They are too expensive for what a person gets from them.  
2. They stimulate one too much by means of harmful drugs.  
3. They may cause a person to become a drug addict.  
4. They may contain substances that give temporary relief while the condition causing the trouble grows worse.
73. Can rheumatism be cured by the application of rattlesnake (or other snake) oil?
   1. This is an old, reliable remedy used in the west.
   2. It is known to have helped in many instances.
   3. There is no value in this remedy.
   4. Snake oil will cure only when rubbed in thoroughly.

74. Venereal diseases (syphilis and gonorrhea) are most frequently contracted in which age group?
   1. 13-18 years  2. 19-24 years  3. 25-30 years  4. 31-36 years

75. Most people who are overweight are so primarily because:
   1. They exercise too little.  2. They have inherited the tendency.  3. They have an underactive thyroid gland.  4. They eat too much fattening food.

76. "Handling toads or frogs is a cause of warts forming on the hands."
   1. This statement is true.  2. It is true only for toads, not for frogs.  3. It is doubtful whether frogs or toads can cause warts.
   4. Both animals can be handled without fear of getting warts from them.

77. Anemia is a disease in which the individual may not have sufficient:

78. Active acquired immunity develops when a person has a disease and then recovers from it. For which pair of diseases is this common?

79. According to present scientific knowledge, which one is entirely attributed to heredity?

80. The human embryo gets its food through:

81. The main value in the use of a dentifrice (toothpaste or powder) is to:
   1. Help scour and clean the teeth  2. Kill bacteria in the mouth  3. Neutralize bad mouth odors  4. It has no value

82. It is through the Eustachian tube that infections in the nose frequently spread to:

83. Which statement is most often true about alcoholics?
   1. They eventually become insane.  2. They show personality changes.  3. They suffer from infectious diseases.  4. They suffer from malnutrition

84. Which is the incorrect statement?
   1. Marijuana is a synthetic drug.
   2. Marijuana may produce hallucinations.
   3. Marijuana does not produce a physical dependency.
   4. Marijuana may lead to the use of heroin.

85. Can a swelling or a "black eye" due to a bruise be reduced by applying raw meat?
   1. It works in many instances because raw meat is able to absorb the liquid which otherwise would cause the swelling to develop.
   2. Statement (1) holds true only for certain kinds of meat such as beefsteak.
   3. It works at times because of a special enzyme in meat.
   4. There is no special value in the use of raw meat in the treatment of bruises.

86. Tuberculosis in childhood is acquired most frequently by getting the germs:
   1. Through inheritance  2. From street dust  3. From contact with adults who have the disease.  4. By drinking milk from infected cows
87. Which statement is correct concerning lighting and television watching?
1. TV gives off certain harmful rays that may injure the eyes.
2. It is best to sit slightly to the side of the TV screen when viewing it.
3. Moderate indirect lighting for the room as a whole is recommended for minimum eye strain.
4. There should be sufficient contrast between the lighting in the room and that from the TV screen.

88. Which vitamin should be included in children's diets in order to prevent rickets?

89. In the event of a heart attack, which procedure is wrong?
1. Keep patient quiet.
2. If patient so desires, have him slowly walk around to stimulate his circulation.
3. Assist patient to a comfortable position.
4. Provide moderate warmth.

90. Antibiotics refer to:
1. Drugs used in combating certain diseases
2. A special food for infants
3. A disinfectant for sterilizing utensils
4. A hormone for preventing certain diseases

91. Four of the following represent types of neurosis; which one is a type of psychosis?
1. Hypochondriasis
2. Hysteria
3. Neurasthenia
4. Paresis

92. Botulism refers to:
1. A type of food poisoning
2. One of the newer drugs
3. An enzyme
4. A tropical disease

93. The periodic health examination is valuable in the detection and prevention of all except which one of these diseases?
1. Typhoid fever
2. Heart disease
3. Diabetes
4. Cancer

94. Which department of the Federal Government is responsible for the control of narcotics and drug abuse?
1. Department of Justice
2. Department of the Treasury
3. Department of Health, Education and Welfare
4. Department of Commerce

95. The physiological effect of alcohol upon the nervous system is:
1. As a stimulant
2. As a depressant
3. As both a stimulant and a depressant
4. Either, depending upon the person

96. The average life span (expectation of life at birth) during the past century has been increased from about 30 years to about 70 years. This change has been accomplished mainly by:
1. Preventing infant deaths
2. Reducing diseases of old age
3. Equally by both (1) and (2)
4. It is not definitely known

97. The best thing to do when fatigued from a strenuous day of muscular work is to:
1. Take a cold shower to "pep one up."
2. Massage the tired muscles.
3. Take further exercise to "work off" the fatigue toxins.
4. Sleep it off.

98. What is the best thing for a person to do who feels that he is about to faint?
1. Move to fresh air.
2. Drink some cold water.
3. Lower the head between the knees.
4. Have someone rub his forehead with a rotary motion.

99. Which one of these factors contributes most to automobile accidents?
1. Car design
2. Weather
3. Human element
4. Defects of car

100. Which one of the following statements on teeth and their care is true?
1. Since wisdom teeth (third molars) are useless and decay early, the sooner they are extracted, the better.
2. "Pink toothbrush" can be cured by the right kind of toothpaste.
3. Eating soft, sugary foods and candies contributes to tooth decay.
4. One's physical condition has little effect on the health of the teeth.
APPENDIX D

Advance Letter for Participation

July 6, 1977

I am a graduate student at South Dakota State University and am developing plans for a study among students in South Dakota colleges and universities this Fall.

The purpose of this study is to evaluate the health knowledge of selected students in our state. In order to gain an accurate picture of health knowledge among incoming college and university students it is important that we obtain cooperation from all institutions. We would appreciate the participation of your institution in this study.

To administer the standardized health knowledge test it will be necessary to reserve a fifty minute time period from your basic physical education course, within the first three weeks of the Fall term.

Whether or not you plan to participate, please complete the enclosed self-addressed stamped envelope.

A summary of the performances of your students will be sent to you upon completion of the study.

Thanking you in advance for your immediate attention to this matter.

Sincerely,

Nadeen Lunde

This thesis has been approved by the Health, Physical Education, and Recreation Department of South Dakota State University and I would appreciate any assistance you could give Mrs. Lunde.

Dr. James Booher, Coordinator
Health Education-Dept. of HPER
### APPENDIX E

#### COMPUTER ANSWER SHEET

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*IBM 1350 DOCUMENT NO 469 WHICH CAN BE USED IN IBM 805 FORM NO. 1000 A 309*
APPENDIX F

Letter of Inquiry Concerning Health Knowledge Assessment Tools

June 14, 1977

Health Education Director

Dear Director:

I am a graduate student at South Dakota State University and am planning a thesis investigation similar to R. Morgan Pigg's Georgia Health Knowledge Study. Mr. Pigg's study involved the administration of the Fast-Tyson Health Knowledge Test to freshmen in thirty Georgia colleges.

I am presently reviewing tools to collect the data, and would be interested in your assessment of the Fast-Tyson Test, the Kilander-Leach Test, and any other tools familiar to you.

My advisors feel that with my thesis and another graduate student's survey of elementary and secondary school health educators, we can assess the health knowledge of South Dakota students. This should enable us to make recommendations relative to adjustments in present health teaching and certification requirements. Due to the size of the state and number of colleges, we will be able to survey the entire state.

We would appreciate any assistance you could give us in acquiring a copy of tests you might feel appropriate or other pertinent information.

Thank you for your time and effort.

Sincerely,

Nadeen Lunde
APPENDIX G

College and University School and Public Health Educators

CALIFORNIA

School of Public Health
UCLA
Los Angeles, California 90024

ILLINOIS

Southern Illinois University-Carbondale
Department of Health Education
Carbondale, Illinois 62901

Department of Health and Safety Education
University of Illinois, Urbana-Champaign
Champaign, Illinois 61820

INDIANA

Department of Health and Safety Education
School of Health, Physical Education, and Recreation
Indiana University
Bloomington, Indiana 47401

Department of Health Education
Lambert Building Room 110
Purdue University
West Lafayette, Indiana 47907

LOUISIANA

Department of Health, Physical and Recreation Education
Louisiana State University
Baton Rouge, Louisiana 70803

MARYLAND

Department of Health Education
University of Maryland
College Park, Maryland 20742
MASSACHUSETTS

School of Education
Boston University
704 Commonwealth Avenue
Boston, Massachusetts 02215

MINNESOTA

Division of School Health Education
101 NGW
University of Minnesota
Minneapolis, Minnesota 55455

NEW YORK

School of Health Education
Cooke Hall
State University of New York at Buffalo
Buffalo, New York 13045

Department of Health Education
State University of New York at Cortland
Cortland, New York 13045

Department of Health Education
New York University
New York, New York 10003

Department of Health, Physical Education and Recreation
Syracuse University
Syracuse, New York 13210

OHIO

Department of Health Education
Ohio State University
215 Promerene -- 1760 Neil
Columbus, Ohio 43210

Department of Health Education
University of Toledo
Toledo, Ohio 43606
OREGON

Department of Health Education
Oregon State University
Corvallis, Oregon 97331

Department of Health Education
University of Oregon
Eugene, Oregon 97403

PENNSYLVANIA

Department of Health Education
Temple University
Philadelphia, Pennsylvania 19122

TEXAS

Department of Health, Physical Education, and Recreation
University of Texas at Austin
Austin, Texas 78712

Department of Health and Physical Education
Texas A & M University
College Station, Texas 77843

Department of Health Education
North Texas State University
Denton, Texas 76203

Department of Health and Physical Education
University of Houston
Houston, Texas 77004

UTAH

College of Health
University of Utah
Salt Lake City, Utah 84112

WEST VIRGINIA

Department of Health Education
607 Allen Hall
West Virginia University
Morgantown, West Virginia 26506
APPENDIX H

Demographic Data

DIRECTIONS: This test requires a maximum of 50 minutes. Each question gives a choice of four (4) answers. Using a no. 2 pencil, mark the corresponding number on the computer answer sheet representing the answer you think is correct. Do not spend too much time on each question. If you do not understand the question, or if you do not know the answer, mark answer number 5 for that question. DO NOT GUESS. Your cooperation is appreciated.

IF YOU HAVE ANY QUESTIONS, ASK THEM NOW
DO NOT OPEN THIS TEST UNTIL THE EXAMINER TELLS YOU TO DO SO

USE THE IDENTIFICATION NUMBER SECTION OF THE ANSWER SHEET FOR THE QUESTIONS BELOW

A. What is your age?
   0) under 18   2) 19   4) 25-29   6) over 36
   1) 18         3) 20-24   5) 30-35

B. What is your sex?
   0) male   1) female

C. Where did you receive your formal education (K-12)?
   0) All in South Dakota   4) All in North Dakota
   1) All in Minnesota     5) All in Wyoming
   2) All in Iowa          6) All in another state
   3) All in Nebraska      7) Educated in several states

D. Did you receive your formal education in only one school district?
   0) Yes, all in one school district
   1) No, different school districts

E. What was the size of your high school graduating class?
   0) under 50   2) 101-150   4) 201-250
   1) 50-100     3) 151-200   5) over 250

F. How many health courses (NOT Biology, Science, Etc.) have you completed?
   0) none   2) two   4) four
   1) one     3) three   5) more than four

G. What was your high school grade point average?
   0) under 1.0   3) 2.1-2.5   6) 3.6-4.0
   1) 1.0-1.5     4) 2.6-3.0   7) do not know
   2) 1.6-2.0     5) 3.1-3.5
APPENDIX I

Guidelines to Administrators

Administrators:

Please follow the instructions from the guidelines to administrators every time you administer the test. After reading and completing instruction number 1, THEN read instructions numbered 2-10 aloud. Do not answer questions concerning the test once the students have begun.

1. Read the instructions on the front page aloud.

2. Use only a number 2 pencil. NO INK OR FELT TIP PENS.

3. Make marks only between the lines provided.

4. DO NOT GUESS -- Mark answer number 5 for that question if you do not know the answer or if you do not understand the question.

5. QUESTIONS A-G on the cover sheet of the test should be answered in the identification number section in the upper right hand area of the answer sheet.

6. Answer sheet reads across (NOT DOWN)
1. 2. 3. 4.
5. 6. 7. 8.

7. No names are needed.

8. Only take the test once.

9. The maximum amount of time to take the test is 50 minutes. Less time may be taken.

10. Ask the students to make no marks on the test booklet.