ABSTRACT

LANGE, Daniel H. A comparison of Wisconsin area health clubs in regards to participant safety. M.S. in Adult Fitness/Cardiac Rehabilitation, 1986. 89 pp. (P. J. Buckenmeyer).

This study was designed to determine if there was a difference in levels of safety when comparing multi-purpose facilities (MPS) to YMCA's/YWCA's (YS). A 29-item questionnaire was sent out to 79 membership-dependent health clubs (HCS), 55 responded; 39 YS and 19 MPS. Levels of safety analyzed included CPR requirements, risk factor screening, fitness instructor certifications, and response time of an emergency vehicle. Statistical analysis involved proportions and the Chi square ($X^2$) test. A significant difference ($P<.05$) was found between YS and MPS in regards to CPR classes offered to members and employees. Significant proportions ($P<.05$) of both HCS required CPR for aerobic instructors, lifeguards, health class instructors, and child care workers. All other job positions in a HC had a proportion of $\leq 50\%$. A significant difference was found between YS and MPS in regards to risk factor screening methods, and certifications required for fitness instructors. In regards to emergency vehicle response time, no significant difference existed in comparison, but each HC had a significant response time of less than 10 min. Overall, YS appear to have an edge in comparison to MPS, but both HCS have much room for improvement.

# A COMPARISON OF WISCONSIN AREA HEALTH CLUBS IN REGARDS TO PARTICIPANT SAFETY

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A Thesis Presented

to

The Graduate Faculty

University of Wisconsin-La Crosse

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In Partial Fulfillment

of the Requirements for the

Master of Science Degree

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by

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August, 1986

UNIVERSITY OF WISCONSIN-LA CROSSE
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M.S. in Adult Fitness/Cardiac Rehabilitation

This candidate has completed his oral report.

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This thesis is approved for the College of Health, Physical Education and Recreation.

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| John C. Mitchem<br>Dean, College of Health, Physical Education and Recreation | Sept. 19, 1986<br>Date |
| Dean of Graduate Studies | Sept 24, 1986<br>Date |

This thesis is dedicated to my parents, Patrick and Deena Lange; for without their love and support throughout the years, who knows where I would be today.

ACKNOWLEDGEMENTS

My deepest thanks,

To Phil Buckenmeyer, my chairperson, for his helpful suggestions and "speedy" return on my revisions.

To Michael Olan, my committee member, for his great help with statistics as well as other valuable comments, regardless of when or where we had to meet.

To Bill Floyd, my committee member, for his great thesis assistance as well as friendship throughout my college years.

To Lakewood Publications for allowing me to use their mailing list.

To my family and friends for "keeping me going" when times were tought as well as celebrating with me when times were not so tough.

To Mrs. James Patterson for your patience and super times living in the "Miracle House".

To Art Pratt, "The Miracle Man", for showing others that life diesn't have to end with a heart attack. In your case id doesn't even come close. Keep on going, you're doing super!

To the AFCR Crew, I think we will all make a difference some day.

To God for helping me to continue to grow.

## THE AFCR CREW

We came to school for a fifteen month shot.
Some will finish on time, others will not.

I sometimes wonder where the time has gone.
It's almost time again to cut Mrs. P's lawn.

We're quite a diverse group; no two are the same.
I often wonder, who will gain the most fame.

Who will shake Cooper's hand?
Who will own a fitness center?
Who will aerobic dance with Richard Simmons?
Or do research for the Pritikin Longevity Center?

You're a great group of folks!
I think we'll all graduate some day.
Whether it be June, July, August, or next May.

If I had one sincere thought:
A thought to give to youse.
I would say in a smiley way;
THANKS FOR THE GREAT MEMORIES "AFCR CREW".

Lange-1986

TABLE OF CONTENTS

CHAPTER

PAGE

LIST OF TABLES

# CHAPTER I

## INTRODUCTION

Early history of cardiopulmonary resuscitation (CPR) was summed up by Roser (1967) as follows:

> Cardiac arrest and sudden cardiopulmonary collapse are problems that have always plagued physicians. Until very recently, nothing was done when this occurred because of the heretofore mistaken conclusion that there was nothing beneficial to be done for the patient. However, in the 1950's, it was discovered that cardiac resuscitation following cardiac arrest was indeed possible (p. 658).

The first type of cardiac massage was called thoractomy and it required opening the chest surgically in order to give direct cardiac massage. As a result of exhaustive animal experimentation, Kouwenhoven, Ing, Jude, and Knickerbocker (1960), developed an external cardiac massage technique. The technique involved compressing the heart between the sternum portion of the chest and the vertebral spine, while also using artificial respiration.

According to Goldberg (1974), the goal of CPR is to prevent irreversible brain damage after the onset of cardiopulmonary arrest. If nothing is done, these changes will begin to occur after four to six minutes and probably much sooner. If basic CPR measures are instituted before the end of this four to six minute period, the onset of brain death may be postponed. This would provide time for the intervention of advanced cardiac care assistance that is usually required for the restoration of effective ventilation and circulation.

At first CPR was restricted mainly to medical personnel as indicated in this quotation by Blalock (1961):

> The value of external cardiac massage lies in its simplicity and safety. When combined with mouth-to-mouth ventilation, no special equipment is required unless it is necessary to use an external defibrillator. Even so, it would seem to be advisable at present to restrict the performance of external massage to the medical profession, to nurses who have had special training in its use, to those who render first aid in connection with ambulance services, and to those who render first aid in the electrical industry (p. 609).

In 1973, the American Heart Association set up standards for CPR so that it could be performed by lay people as well as the medical profession. It is known, according to Lund and Skulberg (1976), that about 60% of deaths from coronary heart disease take place outside of hospitals. This is because many patients who have an acute heart attack, die suddenly and often unexpectedly. Prevention of unnecessary deaths, i. e., reaching patients who could be saved by resuscitation, is a problem which also must be tackled outside of hospitals. Lund and Skulberg (1976) stated that, "immediate attempts at resuscitation of patients with cardiac arrest from acute coronary heart disease by lay people increased the chances of survival in such patients" (p. 702).

Because the provision of cardiopulmonary resuscitation training for the general public requires added effort and expense, it is essential to ascertain the role of bystander-initiated resuscitation as an adjunct to a rapid response emergency care system. Research has shown the value of CPR utilization as standards are continaully being evaluated for optimal success in the community setting (American Heart Association, 1986). As an example in Seattle, since 1970, more than

six hunderd patients with out-of-hospital ventricular fibrillation have been successfully resuscitated at the scene of occurrence, transported to local hospitals, and ultimately discharged home (Thompson, Hallstrom, and Cobb, 1979).

In recent years there has been a growing popularity in the health and fitness field. Health clubs continue to grow in memberships and facility size (Anderson, 1985). Since health clubs are a place of increased physical activity, their members have a greater chance of a sudden unexpected respiratory or cardiac arrest (Thompson, Funk, Carleton, and Sturner, 1982; Northcote and Ballantyne, 1984). That is why it is important for health club employees to be ready at all times for a possible unexpected participant respiratory and/or cardiac arrest.

## Statement of the Problem

The purpose of this study was to determine the current levels of safety in Wisconsin area membership-dependent health clubs. Special emphasis was placed on safety through the utilization of Cardiopulmonary Resuscitation, but other areas which were covered included: risk factor screening, fitness instructor certifications, and emergency vehicle response time.

## Need for the Study

Several studies have re-emphasized the increased survival rates due to the efficient utilization of bystander CPR in many communities. Now that CPR is being utilized more by lay people, a question is raised

as to the role CPR should play in exercise settings, along with other safety measures. Are health clubs prepared to handle a sudden respiratory or cardiac arrest? It would be very difficult to measure specifically the degree to which health clubs are prepared for a respiratory or cardiac emergency. Since there is a lack of research in this area, this study intends to examine the level of safety which each selected health club possesses in regards to certification, safety education, etc. Knowing the level of safety that a health club has, in comparison to others, will help to determine if a health club needs to re-evaluate its current safety practices.

## Hypotheses

Though YMCA's/YWCA's and multi-purpose facilities are both primarily dependent on their memberships, YMCA's/YWCA's are more directly regulated by the government (therefore tax exempt). Most multi-purpose health clubs are privately owned, therefore revenues and expenses are utilized in a different manner than YMCA's/YWCA's. Therefore, a legitimate comparison could be made between these two types of health clubs since YMCA's/YWCA's are non-profit organizations and multi-purpose facilities are primarily for-profit. The following null hypotheses were developed:

1. There was no difference when comparing multi-purpose facilities to YMCA's/YWCA's in regards to the frequency of CPR certification classes offered to the health club's (a) employees, or (b) members.

2. There was no difference in employee CPR certification requirements when comparing multi-purpose facilities to YMCA's/YWCA's.

3. There was no difference when comparing multi-purpose facilities to YMCA's/YWCA's in regards to risk factor screening.

4. There was no difference when comparing multi-purpose facilities to YMCA's/YWCA's in regards to fitness instructor certifications.

5. There was no difference when comparing multi-purpose facilities to YMCA's/YWCA's in regards to the response time for the arrival of an emergency vehicle at each type of health.

## Assumptions

It was necessary to make the following assumptions within the limits of this study:

1. The respondents of the questionnaire understood the questions that were presented.

2. The director or manager of each health club surveyed in the most qualified employee to accurately answer the questionnaire.

## Delimitations

The following controls in the design of this study were necessary. The delimitations were:

1. Due to the cost and time constraints of this study, only health clubs in the state of Wisconsin were surveyed.

2. The health clubs chose for this survey were only those which were defined by Anderson (1985) as membership-dependent facilities (see Definition of Terms for further explanation). These health clubs, which were obtained from a Lakewood Publications mailing list, were broken down into two categories: (1) YMCA's/YWCA's, and (2) Multi-purpose health clubs.

## Limitations

This study was limited in the following ways:

1. The respondents who completed the survey might have withheld truthful answers in order to protect their facility's good reputation.

2. This study only applied to those health clubs which returned questionnaires.

3. This study did not control for employees at a health club who are required by the facility to be CPR certified each year, but were not current in their certification.

4. This study was administered during the summer months, a time when some health club directors or managers may be on vacations, at workshops, etc., possibly causing a reduced return rate.

## Definition of Terms

Advanced Cardiac Life Support (ACLS): A more advanced type of specialized care. It works in conjunction with Basic Cardiac Life Support (BCLS) in an attempt to restore effective spontaneous circulation to a victim of respiratory and cardiac arrest. ACLS care may include the use of emergency drugs, medical equipment, and medical personnel (American Health Association, 1981, p. 7).

Basic Cardiac Life Support (BCLS): An emergency process which involves prompt recognition, intervention, and early entry into the emergency medical system. BCLS is accomplished by treating a respiratory and cardiac arrest victim with Cardiopulmonary Resuscitation (American Health Association, 1981, p. 7).

Bystander-initiated CPR: CPR which is started by a person at a scene of sudden respiratory and/or cardiac arrest (Thompson et al., 1979, p. 737).

Cardiac Arrest: The abrupt, unexpected cessation of breathing and circulation (American Heart Association, 1981, p. 8).

Cardiopulmonary Arrest: The absence of functional ventilation and circulation in a person: including people who experience coronary occlusion, asphyxia, anaphylactic reactions, and electrocution (Goldberg, 1974, p. 381).

Cardiopulmonary Resuscitation (CPR): The action of performing artificial respiration and cardiac compressions in a non-breathing, pulseless victim in an effort to sustain life (American Heart Association, 1985, p. 39).

Definitive Care: The administration of advanced emergency medical care to a victim of cardiac arrest; usually provided by a paramedic team or a hospital staff. The type of equipment used in definitive care includes: a defibrillator, an intubator, and various medication (Eisenburg, Nagel, Hearne, Hallstrom, & Bergner, 1982, p. 19).

Emergency Medical Services (EMS) System: A community-wide coordinated means of responding to sudden death or injury. The six

parts of the system are: entry, rescue and transportation, hospital emergency facilities, communications, public education, and management and evaluation (American Heart Association, 1981, pp. 8 and 9).

Lay Person: A non-medical person who is given the opportunity to be certified in CPR (Winslow, 1979, p. 929).

Membership-Dependent Health Club: Any exercise facility which relys on its membership for a substantial amount of its operation revenue. Two categories of this kind of health club are: YMCA's/YWCA's and Multi-purpose facilities (Anderson, 1985, p. 39).

Multi-Purpose Health Club: A membership-dependent health club which is private (for-profit) and provides more than one service for their members (i.e., fitness classes, basketball, racquetball, weight lifting, etc.) (Anderson, 1985, p. 15).

Sudden Death: An unexpected, nontraumatic death which receives out-of-hospital emergency care (Eisenburg, et al., 1982, p. 14).

Thoractomy: Direct heart massage by surgically opening the chest (Kouwenhoven, et al., 1960, p. 94).

Ventilation: The ability to inspire air into one's lungs in order to provide the body with a sufficient supply of oxygen (American Heart Association, 1985, p. 45).

YMCA (Young Men's Christian Association): A chain of non-profit Christian type of membership-dependent health clubs, which generally receive no government support. This organization originated as being for males only, but now most of them are coed (Anderson, 1985, p. 15).

YWCA (Young Women's Christian Association): A chain of non-profit Christian type of membership-dependent health clubs, which generally

receive no government support. This organization originated as being for females only, but now most of them are coed (Anderson, 1985, p. 15).

# CHAPTER II

# REVIEW OF RELATED LITERATURE

## Introduction

Closed chest cardiopulmonary resuscitation is only about twenty-five years old. It has quite a history, starting as something only to be used by medical personnel and now being available to almost anyone willing to be trained. This review of related literature will cover: (1) open versus closed cardiac compressions, (2) hospital studies on CPR, (3) out-of-hospital (bystander) CPR, (4) CPR standards, (5) steps in CPR training, and (6) sudden death during exercise.

## Open Versus Closed Cardiac Compressions

In the 1950's and early 1960's, the only means used to resuscitate a cardiac arrest victim was by the method of thoractomy (open chest massage). A major breakthrough in cardiac massage occurred when Kouwenhoven, et al. (1960)experimented with closed chest cardiac compressions. They concluded that in their experiment with more than 100 dogs, closed chest cardiac massage was an effective method of resuscitating a cardiac arrest victim.

Kouwenhoven, et al. (1960)reported that nine months prior to this writing of this study, John Hopkins Hospital attempted to resuscitate 20 patients with closed chest cardiac massage. Fourteen of these patients were successfully resuscitated.

Del Guercio, Feins, Cohn, Coomaraswamy, Wollman, and State (1965) compared the physiological differences between the closed and open chest techniques for cardiac resuscitation. Eleven patients from Bronx Municipal Hospital Center were studied and the results showed that the open chest technique produced significantly more physiological blood flow than did closed chest cardiac compressions. The comparisons in the 11 patients were measured 10 times during closed chest massage and 15 times during open chest massage. First, the closed chest technique was used and when proven ineffective, the open chest technique was used.

Lillihei, Lavadia, DeWall, and Sellers (1965) reviewed the history of a hospital where from 1950 until 1959, the open chest cardiac compression technique had been used for victims of cardiac asystole and ventricular fibrillation. There was only one successful case outside of the operating room in the ten year period. During 1959 until 1963, 33 patients had been successfully resuscitated by the method of closed chest cardiac resuscitation.

Because of the controversy in open and closed cardiac resuscitation techniques, Pappelbaum, Lang, Bazika, Bernstein, Herrold, and Corday (1965) tried to compare under more controlled conditions, the hemodynamic benefits of these two cardiac resuscitation techniques. In this study, the main emphasis was placed in the areas of comparing cerebral blood flow using each technique. Electroencephalogram tracings were used during this study to measure the voltages generated by each compression technique. Each technique generated adequate blood flow to the cerebral tissue showing that

closed chest cardiac massage was as effective a technique as was open chest cardiac massage.

## Hospital Studies on CPR

Hospitals began to implement the usage of closed chest cardiac resuscitation as current research began to show its effectivness. Shipman, McCrady, and Bradford (1962) studied one year of hospital results, which tested the survival rate from closed chest cardiac resuscitation. The technique involved the heel of the hand or a clinched fist placed directly over the lower portion of the sternum. The sternum was depressed downward about one and a half to two inches toward the vertebral column and then released. Assisted ventilations were necessary with this technique. In this particular hospital, 49 resuscitations were performed on 30 patients. Some of the patients were resuscitated more than once. Ten of these patients survived to be discharged from the hospital. Shipmen, et al. felt that this closed chest cardiac resuscitation method was preferable over the open chest method on the basis of its immediate applicability, low rate of complications, and the results of comparison studies of each technique. Several other important studies which show survival rates due to CPR are listed in Table 1.

As CPR became more effective, hospitals began to venture out into the communities for CPR assistance. It was discovered that a mobile intensive care unit was very effective in assisting people in need of resuscitation away from the hospital. According to Pantridge and Geddes (1967), one of the earlier mobile units, tested over a 15

month period, responded to 312 cases of suspected coronary thrombosis. Ten of these patients, who were admitted to the hospital were resuscitated by CPR techniques in the community. The main emphasis of having a fast mobile unit was due to the fact that the risk of death from myocardial infarction is the highest in the 12 hour period after the onset of symptoms.

Table 1

Hospital Studies on CPR

| Study | Year | Length of Study | Survival Rate/ Total Patients | Survival Rate Percent |
|---|---|---|---|---|
| Lemire and Johnson | 1972 | 10 years | 230/1,204 | 19% |
| Johnson, Tanser, Ulan and Wood | 1967 | 5.5 years | 82/552 | 15% |
| Roser | 1967 | 2.5 years | 15/98 | 15% |
| Hofkin | 1967 | 9 months | 9/78 | 12% |
| Day | 1965 | 5 days post infarction | 13/24 | 54% |
| Ayers and Doyle | 1964 | 1 year | 8/48 | 17% |

A four year follow-up was conducted by Cobb, Baum, Alvarez, and Schaffer (1975) in regards to an emergency paramedic service. Rapid response to the scene and rapid skilled treatment was a major objective of this paramedic unit. The time from dispatch to arrival on the scene averaged three minutes for any of the primary mobile units, which

were staffed by fire fighters. The result of this 51 month study was the successful resuscitation, hospitalization, and discharge of 234 patients out of 1,006 attempts.

Tweed, Bristow, Donen, and Kirk (1980) studied a hospital-based CPR program for four years. This program was unique in that it also catered to cardiac arrest victims outside of the hospital, although basic life support was the only technique that could be used in this type of situation. Out of hospital CPR efforts had an overall success rate of only six percent, whereas those whose arrest occurred in an emergency room of the hospital had a survival rate of 32%. It is believed by researchers that the potential survival rate of cardiac arrest victims outside of the hospital could be as high as 30%. The overall survival rate of both in and out of hospital CPR efforts was 261 patients out of 2,091 resuscitation victims or a 12% survival rate.

## Out-of-Hospital (Bystander) CPR

Due to positive results of early bystander CPR, the idea of out-of-hospital resuscitation was being looked at more seriously. Eisenburg, Bergner, and Hallstrom (1979) studied paramedic programs and out-of-hospital cardiac arrests to determine which factors were related to successful resuscitation efforts. Four factors which contributed to successful resuscitation survival rates were: (1) paramedic service, (2) rapid time to initiation of CPR, (3) rapid time to definitive care, and (4) bystander-initiated CPR. Age was found to be a weak predictor of discharge. This study concluded

that CPR must be initiated within four minutes and definitive care provided within ten minutes.

As can be seen in the following studies, early out-of-hospital CPR programs were off to a slow start. A cardiac resuscitation training program was started in Brookline, Massachusetts to pilot the results of training rescue personnel according to Weingarten and Taubenhaus (1964). Training in a CPR course had been completed by 99 firemen and 37 policemen. During a one year period after training, 25 resuscitations were attempted with only one survival. There were many problems encountered in rescue team attempts to use CPR. These problems included failure of the rescuers to move the patient to the hospital fast enough as well as failure to include mouth-to-mouth breathing. There were also organizational problems in the whole system.

These same problems were also encountered in a Middlesex County Study according to Braun, Reitman, and Florin (1965). The trained rescue squad attempted 30 resuscitations, which resulted in a survival rate of two patients. Many things were learned from this study, including the need for a standardized teaching method of CPR.

Eleven years later, survival rates improved dramatically as Lund and Skulberg (1976) helped to show the value of training lay people in CPR. This study showed a survival rate in 27 of 75 patients (36%) with cardiac arrest in which resuscitation was started outside of the hospital by lay people. The survival rate dropped to eight percent when attempts at resuscitation were delayed until the arrival of a well-equipped ambulance team.

Copley, Mantle, Rogers, Russell, and Rackley (1977) analyzed the effectiveness of bystander CPR initiated within five minutes of the cardiac arrest. Six of seven early resuscitated patients survived. The other 12 patients received assistance beyond five minutes from rescue personnel; six of those survived. Besides the increased survival rate, fewer complications occurred with early initiated CPR.

Thompson, et al. (1979) studied the results of the resuscitation of 316 consecutive out-of-hospital ventricular fibrillation patients. The survival rate of those who received bystander CPR was 43% compared to 21% for those who were delayed until arrival of the fire department personnel. Another study by Guzy, Pearce, and Greenfield (1983) helped to reinforce the need for bystander CPR. Of the 93 cases who received bystander CPR, 22% survived compared with a survival rate of only five percent of 150 patients who did not receive bystander CPR.

## CPR Standards

Prior to 1973, the training of CPR was limited to the medical, allied health, and professional paramedical personnel. At the National Conference of Standards for CPR and Emergency Cardiac Care (ECC) held in May, 1973, standards for CPR and ECC were developed and recommended (1974). They related to:

> (1) recommended principles and techniques for basic and advanced life support, (2) CPR training and certification according to American Heart Association Standards, (3) training of medical and allied health personnel, (4) the role of the American National Red Cross and other agencies in training the lay public, (5) the role of life support units in stratified systems of emergency cardiac care, and (6) medicolegal aspects of CPR and ECC (p. 837).

In 1979, the same standards and guidelines from the 1973 Conference were discussed and evaluated. Additions from this 1979 conference included a renewed, strong emphasis on community acceptance of responsibility for coronary heart disease morbidity and mortality, and acceptance of organized implementation of primary and secondary prevention programs in parallel with ECC efforts. It also included a definition of the role of ECC units in stratified systems of emergency care (The 1979 National Conference on CPR and ECC, 1980).

After six years, a need developed for revising current standards and guidelines in the area of CPR and ECC (American Heart Association, 1986). A Fourth National Conference was held in July, 1985. All standards and guidlines were examined for scientific validity and practical applicability. These changes that were made had a common goal--reducing lives to sudden, unexpected death in the community.

Changes in the CPR guidelines according to the American Heart Association (1986) included teaching the head tilt-chin lift to the lay public as the only means of "opening the airway" in a breathless victim (disgarding the head tilt-neck lift). Instead of giving 4 quick breaths to a breathless victim, a rescuer is to give two initial slower breaths within 2 to 3 seconds. The rate of chest compressions has also been increased from 60-80 compressions per minute to 80-100 compressions per minute. For simplicity in learning, only one rescuer CPR will be taught to the lay public, leaving two rescuer CPR to the more advanced health care provider. Other changes were also made in child and infant CPR, but they will not be mentioned in this review of literature.

## Steps in CPR Training

According to the American Heart Association (1981), certification in CPR is obtained by successfully completing an eight hour course. The course includes lecture, a CPR film, manikin practice, and completion of both a cognitive and a performance examination.

Flax, Larke, Walser, Kaye, and Uhley (1976) have stated numerous benefits of a CPR training program in addition to developing a population proficient in CPR. They have noted that:

> The participants in the course of discussion become aware of the early warning signs of a heart attack and familiar with the management of related emergency problems. They also develop insight into the total emergency medical system of the community. They recognize that emergency services cannot operate in a vacuum, but become more effective when the specialized knowledge of basic CPR is disseminated to the general public. The trainees, in turn can exert their influence to upgrade existing systems, or speed the development of an emergency care system in their community. Those who are motivated may ultimately seek further training to become instructors and teach others (p. 124).

Flax, et al. (1976) adds that there are three key ideas which are helpful in implementing a successful CPR training program. First, an active planning group must guide the program to the public. Secondly, the instruction format must be implemented by skilled and highly motivated instructors. Finally, various groups in the community must be reached in order to assist in generating interest.

A basic CPR training program involves the A, B, C's of life support: airway, breathing, and circulation (Goldberg, 1974). The first step, opening the airway was of considerable debate at the 1979 CPR conference according to White (1982). While the victim is laying

on his/her back, it was shown in physiological research that the head tilt-chin lift was a superior technique over the head tilt-neck lift. Both methods involve pushing the head backwards, and ultimately lifting the chin upward. This moves the tongue away from the throat thereby opening the airway. The head tilt-chin lift is currently the only technique which should be used by the lay public (American Heart Association, 1986).

By looking for a chest rise, listening for breathing, and feeling the victim's breaths hitting the rescuer's ear, a rescuer can assess any possible breathing of a victim. The next step, rescuer breathing, has recently been changed according to the Standards and Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC) held in 1985 (American Heart Association, 1986). It involves giving two initial ventilations within 2 to 3 seconds to allow time for full lung deflation between breaths. This is accomplished by mouth-to-mouth breathing or mouth-to-nose breathing. McIntyre, Parisi, Benfari, Goldberg, and Dalen (1978) add that for adequate ventilation in mouth-to-mouth breathing, the nose should be pinched shut and a rescuer should be careful not to over ventilate. According to the American Heart Association (1986), the slower rate for ventilations should reduce excessive esophageal opening pressure, therefore efficiently maintaining an artificial respiratory system.

The rescuer would next check for a neck pulse (carotid artery) on the victim. This location for a pulse check is chosen since it is most accessible, reliable, and easily learned and remembered. If a neck pulse cannot be detected, the rescuer activates the Emergency

Medical Services (EMS) System and begins external chest compressions. In one-person (adult) CPR, a rescuer completes 15 compressions for every two breaths. The rate of compressions is about 80 to 100 per minute (American Heart Association, 1986).

Yarbrough (1984) describes the "thoracic pump" mechanism which occurs due to cardiac compressions. It is suggested that blood flows during closed chest compressions due to intrathoracic pressure, rather than compression of the heart. According to the American Heart Association (1980), the carotid artery blood flow resulting from external chest compressions on a cardiac arrest victim usually is about only one fourth to one third of normal.

To summarize, according to the American Heart Association (1981), the proper steps in CPR are as follows:

A. Establish unresponsiveness
B. Call out for help
C. Position the victim
D. Open the airway
E. Establish breathlessness
F. Rescue breathing
G. Establish presence or absence of pulse
H. Activate EMS system
I. Cardiac compressions (pp. 38-39).

## Sudden Death During Exercise

Having many lay people certified in CPR is of great value, since it is unknown when or where someone will have a respiratory arrest or heart failure. Studies on sudden death helped to show that cardiovascular sysmptoms of long duration prior to sudden death were common in the patients studied, although sudden death was the initial symptom in some (Tresch, Grove, Siegal, Keelan, and Brooks, 1981).

It appears that educating the public about heart attack symptoms may assist in reducing the rate of sudden death.

Many people wonder why an exercise enthusiast may have a sudden heart attack. According to Virmani, Robinowitz, and McAllister (1982), 73% of the 30 joggers they examined at autopsy have severe coronary artery atherosclerosis. The ages of these male joggers ranged from 18 to 57 years (mean 36 years). Nineteen of these patients had died while jogging; six died suddenly after jogging; three noted chest pain soon after jogging; and two were found dead in bed.

Thompson, et al. (1982) studied the incidence of death during jogging in Rhode Island from 1975 to 1980. Out of the 12 deaths discovered over the six years, 11 were directly related to coronary heart disease. The incidence rate was one death per 7,620 joggers per year (age 30 to 64 years). This rate was seven times greater than the estimated death from coronary heart disease during more sedentary activities in Rhode Island. This study shows the importance of a medical screening prior to entering a fitness program and suggests that exercise contributes to sudden death in susceptible people. Northcote and Ballantyne (1984) and Koplan (1979) agree with the conclusions of this study. Koplan adds that a group of joggers who have had risk factors such as being overweight and/or smoking have a greater chance of a sudden death event than a healthier jogging group.

The Framingham Study, according to Schatzkin, Cupples, Heeren, Morelock, Mucatel, and Kannel (1984), which has continued since 1948, discovered incidence rates of sudden unexpected death for men and women to be 151 and 53 deaths per 100,000 person-years, respectively.

In this study, 69 men died suddenly out of 2,336 (3%) and 34 women died suddenly out of 2,873 (1%) during a 26 year time period. Predictors of sudden unexpected death in men were left ventricular hypertrophy on the electrocardiogram, age, serum, cholesterol, number of cigarettes smoked daily, relative weight, and systolic blood pressure. The risk profile for women differed and included age, vital capacity (lungs), hematocrit, serum cholesterol (marginal), and serum glucose (marginal).

According to Thompson (1981), coronary heart disease is the major cause of death in middle-aged athletes. Also, when Rabkin, Mathewson, and Tate (1982) tested 3,983 men on electrocardiograms, a significant relationship was found between cardiac abnormalities and risk of sudden death. The mean age of these subjects in this 30 year study was 30.8 years. The prevalence of electrocardiographic abnormalities before sudden death was 71.4%.

An additional way that unnecessary deaths can be prevented in exercise facilities is by screening for risk factors of heart disease. Since vigorous exercise programs play a part in many health clubs, some type of screening for cardiac abnormalities could help prevent a sudden unexpected heart attack.

According to the American Heart Association (1985), a consistent association has been found between specific behaviors and the development of blood vessel disease. The risk factor concept developed from these associations. Research now shows that heart attacks occur much more frequently in people who smoke cigarettes, have elevated blood cholesterol levels, and those with high blood

pressure. Other contributing risk factors include diabetes, obesity, stress, and lack of exercise (American Heart Association, 1985). As important as it is to provide emergency care to a heart attack victim, primary prevention through risk factor screening and modification is by far a much more desirable approach.

## Summary

Cardiopulmonary Resuscitation was only developed about 25 years ago. Continuous studies and actual experiences repeatedly show that knowledge and training in CPR is assisting in saving lives. Not only is it valuable for medical personnel to learn CPR, but the general public too can make a difference by being current with CPR techniques.

It appears that by having many people certified in CPR, more lives can be saved during a sudden respiratory or cardiac arrest. With this current resource of knowledge, community facilities must be re-evaluated to see where CPR certified people can have the greatest impact on saving lives. Then the question must be raised as to whether CPR certification should be a mandatory requirement for employees of this type of facility.

# CHAPTER III

# METHODOLOGY

## Introduction

A comparison in levels of safety was made between YMCA's/YWCA's (non-profit) and multi-purpose (for-profit) health clubs in the Wisconsin area to determine if there was a difference in each type of health club. A closed-ended questionnaire was developed and utilized as the research tool for this descriptive study. The questionnaire evaluated CPR practices as well as risk factor screening, fitness instructor certifications, and emergency vehicle response time at Wisconsin area health clubs. The method of data collection involved the following procedures: (1) sample selection, (2) development of the instrument, (3) administration of the instrument, and (4) statistical treatment of the data.

## Sample Selection

This study consisted of a list of 79 Wisconsin area membership-dependent health clubs. The mailing list was obtained from Lakewood Publications and consisted of a list of YMCA's, YWCA's, and multi-purpose health clubs. Since YMCA's and YWCA's are very similar organizations, they were combined and compared to multi-purpose health clubs. A total of 36 multi-purpose health clubs and 43 YMCA/YWCA health clubs were taken from the mailing list.

Originally there was a list of ninety Wisconsin area membership-dependent health clubs, but due to errors such as duplicate mailing labels, names of places which were not health clubs, etc, 11 names were removed from the list.

## Development of the Instrument

The instrument developed for this descriptive study was a closed-ended questionnaire (Appendix A). The questionnaire was divided into four sections with a total of twenty-nine questions. The four sections were (1) Background Information, (2) CPR Classes, (3) Employee CPR, and (4) Additional Safety Information.

Section I included background information relating to risk factors of health club members (i.e., age, sex). It also included questions on the total number of memberships and the number of full and part time health club employees.

Section II was a brief group of questions asking about certification classes for employees as well as health club members.

Section III was a list of all possible job positions at the health club. The objective of this section was to check those job positions which required CPR certification on the job (with a "YES") and those that did not require it (with a "NO").

Section IV added additional important safety questions such as screening of health club members for heart disease, fitness instructor certifications, and the estimated length of response time for the arrival of an emergency vehicle at each type of health club.

The questionnaire was developed by Daniel Lange. His ideas for the questionnaire items resulted from two years of employment in health clubs as well as a vast amount of current CPR literature. The questionnaires were coded in order to determine which health clubs did not return a completed survey.

To assure content validity and clarity, the questionnaire was evaluated by the thesis committee consisting of Dr. Philip Buckenmeyer, Associate Director of the Cardiopulmonary Rehabilitation Unit at the University of Wisconsin-La Crosse, Dr. William Floyd, Professor of Physical Education at U.W.-La Crosse, and Dr. Michael Olan, Computer Science Professor at U.W.-La Crosse.

To further assure validity and reliability, the questionnaire was piloted to ten membership-dependent health clubs in Michigan on May 28, 1986. Five health clubs were chosen which were YMCA's/YWCA's and five which were multi-purpose facilities.

## Administration of the Instrument

The Health Club Safety Survey (Appendix A) was distributed to 79 health clubs: 36 multi-purpose and 43 YMCA's/YWCA's on June 13, 1986. A cover letter (Appendix B) accompanied the questionnaire which explained the purpose and the importance of the study, along with a return date deadline, and an enclosure for receiving the results from the questionnaire. The cover letter also reinforced confidentiality of the questionnaire. Since the Lakewood Publication's mailing list addressed some health club "head" positions as Director, and others as Manager; all cover letters were individually addressed

as such. For example, all directors received cover letters saying, "Dear Director", and the same held for the managers.

Approximately two weeks were allowed for returning the questionnaire. After two weeks a follow-up letter (Appendix C), with another copy of the original questionnaire, was sent to all health clubs who had failed to answer the initial questionnaire. Two and one half weeks after the initial questionnaire, all health clubs failing to return their completed questionnaire were sent a post card with a reminder on it.

## Statistical Treatment of the Data

The major means of analyzing the data (Hinkle, Wiersma, and Jurs, 1979) was by frequencies and percentages. Of the five hypotheses (see Chapter 1), four were statistically analyzed by first using Binomial Population Proportions and comparing all health clubs as one group. The next step was to use Chi-square tests of Contingency Tables to compare each type of health club separately; in other words multi-purpose versus YMCA's/YWCA's. The fifth hypothesis was analyzed using a Comparison of Grouped Means and then use of the Chi-square test of Contingency Tables. All statistical treatment of the data was performed at a 0.05 level of significance.

# CHAPTER IV

# RESULTS AND DISCUSSION

## Introduction

A 29-item questionnaire was used to compare current levels of safety between multi-purpose facilities and YMCA's/YWCA's. It was completed and returned by 55 health clubs: 19 multi-purpose health clubs and 36 YMCA's/YWCA's, yielding a return rate of approximately 70%. This chapter intends to present the results from this questionnaire, as well as providing a discussion and an analysis (Appendix E) of the data.

## Background Information

Male/Female Ratio. According to the American Heart Association (1985), a greater percentage of males have heart disease (and therefore more heart attacks) when compared to females. A comparison of the male/female ratio in multi-purpose facilities and YMCA's/YWCA's can be observed in Table 2 and Appendix F. Most health clubs had an approximately equal number of both males and females (multi-purpose-58%; YMCA's/YWCA's-47%). The second highest male/female ratio for both types of health clubs was "more than females", and a small number of each had "more females than males"; 22% for YMCA's/YWCA's and 11% for multi-purpose facilities.

Table 2

Male/Female Health Club Ratio

| | YMCA/YWAC | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| More males than females | 11 | 31% | 6 | 32% |
| More females than males | 8 | 22% | 2 | 11% |
| About an equal amount of both | 17 | 47% | 11 | 58% |
| TOTALS | 36 | 100% | 19 | 101% |

Age Grouping. The death rate from coronary heart disease increases with age (American Heart Association, 1985). By far, the majority of members of either type of health club fell under the 31 to 40 year old age group (Table 3 and Appendix G). This represented 63% of the multi-purpose facilities and 41% of the YMCA's/YWCA's. The smallest age group for YMCA's/YWCA's appeared to be in the "51 to 60 year old" category (0%) and "less than 20 years old" for the multi-purpose facilities (0%). The multi-purpose facilities also had a low percentage in the 51 to 60 years old age group (5%).

Table 3

Age Group of Member Majority

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Less than 20 years | 9 | 26% | 0 | 0% |
| 21-30 years | 6 | 18% | 3 | 16% |
| 31-40 years | 14 | 41% | 12 | 63% |
| 41-50 years | 3 | 9% | 1 | 5% |
| 51-60 years | 0 | 0% | 1 | 5% |
| Greater than 60 years | 2 | 6% | 2 | 11% |
| TOTALS | *34 | 100% | 19 | 100% |

* Two YMCA's/YWCA's responses were disgarded due to invalid answers

Permanent Full Time Employees. Full time employees were defined in this questionnaire as working more than 35 hours per week. A comparison is reflected in Table 4. Both types of health clubs show a graph with a positively skewd distribution (Appendix H). The largest number of responses for multi-purpose facilities (63%) and YMCA's/YWCA's (44%) were located in the "less than 10" employee grouping.

Table 4

Permanent Full Time Employees

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Less than 10 | 16 | 44% | 12 | 63% |
| 10-20 | 13 | 36% | 5 | 26% |
| 21-30 | 5 | 14% | 2 | 11% |
| 31-40 | 1 | 3% | 0 | 0% |
| 41-50 | 0 | 0% | 0 | 0% |
| More than 50 | 1 | 3% | 0 | 0% |
| TOTALS | 36 | 100% | 19 | 100% |

Permanent Part Time Employees. Part time employees were defined in this questionnaire as less than 35 hours of work per week (Table 5). The comparison of both types of health clubs can be seen in Appendix I. Multi-purpose facilities have very few part time employees; 42% in the "less than 10" employee's category." Whereas, YMCA's/YWCA's have several part time employees; 42% in the "more than 50" employee's category. The multi purpose facilities form a positively skewd distribution and the YMCA's/YWCA's form a negatively skewd distribution, making this an interesting comparison.

Table 5

Permanent Part Time Employees

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Less than 10 | 7 | 19% | 8 | 42% |
| 10-20 | 1 | 3% | 6 | 32% |
| 21-30 | 1 | 3% | 2 | 11% |
| 31-40 | 7 | 19% | 2 | 11% |
| 41-50 | 5 | 14% | 0 | 0% |
| More than 50 | 15 | 42% | 1 | 5% |
| TOTALS | 36 | 99% | 19 | 101% |

Total Memberships. The total number of memberships in YMCA's/YWCA's and multi-purpose facilities are also directly opposed (Table 6 and Appendix J). Most of the multi-purpose health clubs (47%) had "less than 1,000" total memberships. Most YMCA's/YWCA's (36%) had "more than 3,000" total memberships.

Table 6

Total Health Club Memberships

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Less than 1,000 | 7 | 19% | 9 | 47% |
| 1,000-1,499 | 3 | 8% | 4 | 21% |
| 1,500-1,999 | 7 | 19% | 2 | 11% |
| 2,000-2,499 | 5 | 14% | 4 | 21% |
| 2,500-3,000 | 1 | 3% | 0 | 0% |
| More than 3,000 | 13 | 36% | 0 | 0% |
| TOTALS | 36 | 99% | | 100% |

## CPR Certification Classes

Classes For Members. A comparison of CPR certification classes offered to members was difficult to analyze, since they were not offered in 84% of the multi-purpose facilities and 36% of the YMCA's/YWCA's (Table 7 and Appendix K). Of the YMCA's/YWCA's that offered CPR classes to their members, most classes were available every 6 months. The few multi-purpose facilities, which offered CPR classes for their members, were evenly distributed between quarterly, biannually, and yearly time periods.

Table 7

CPR Certification Classes For Members

| | YMCA/YWCA | | | Multi-purpose | | |
|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Freq. | % | Valid % |
| Weekly | 0 | 0% | 0% | 0 | 0% | 0% |
| Monthly | 3 | 8% | 13% | 0 | 0% | 0% |
| Quarterly | 8 | 22% | 35% | 1 | 5% | 33% |
| Every 6 months | 9 | 25% | 39% | 1 | 5% | 33% |
| Yearly | 3 | 8% | 13% | 1 | 5% | 33% |
| Does not apply | 13 | 36% | - | 16 | 84% | - |
| TOTALS | 36 | 99% | 100% | 19 | 99% | 99% |

Classes For Employees. Most Wisconsin area multi-purpose facilities (74%) and almost all of the YMCA's/YWCA's (97%) provided CPR classes for their employees (Table 8). As seen in Appendix L, most employee CPR classes were offered in multi-purpose facilities on a yearly basis (50%). Most YMCA's/YWCA's (46%) offered CPR classes every 6 months. Very few health clubs provided CPR classes to their employees at a frequency of weekly or monthly, representing only 9% of the YMCA's/YWCA's and 0% of the multi-purpose facilities.

Table 8

CPR Certification Classes For Employees

| | YMCA/YWCA | | | Multi-purpose | | |
|---|---|---|---|---|---|---|
| | Freq. | % | Valid % | Freq. | % | Valid % |
| Weekly | 0 | 0% | 0% | 0 | 0% | 0% |
| Monthly | 3 | 8% | 9% | 0 | 0% | 0% |
| Quarterly | 10 | 28% | 29% | 4 | 21% | 29% |
| Every 6 months | 16 | 44% | 46% | 3 | 16% | 21% |
| Yearly | 6 | 17% | 17% | 7 | 37% | 50% |
| Not applicable | 1 | 3% | - | 5 | 26% | - |
| TOTALS | 36 | 100% | 101% | 19 | 100% | 100% |

## Employee CPR Requirements

Tables 9, 10, and 11 show a comparison of CPR requirements for fourteen different job positions. Respondents were requested to answer "YES" if that position required CPR certification or "NO" if not required. There was also a "Not Applicable" choice which was interpreted as not offering that kind of a job position at that particular health club.

Table 9

Health Club Employee CPR

| | | YMCA/YWCA | | | Multi-purpose | | |
|---|---|---|---|---|---|---|---|
| | | Freq. | % | Valid % | Freq. | % | Valid % |
| Aerobic Instructors | YES | 33 | 92% | 92% | 12 | 63% | 71% |
| | NO | 3 | 8% | 8% | 5 | 26% | 29% |
| | *NA | 0 | 0% | - | 2 | 4% | - |
| Lifeguards | YES | 32 | 91% | 91% | 8 | 42% | 80% |
| | NO | 3 | 9% | 9% | 2 | 11% | 20% |
| | NA | 1 | 2% | - | 9 | 47% | - |
| Attendants | YES | 22 | 61% | 65% | 10 | 53% | 63% |
| | NO | 12 | 33% | 35% | 6 | 32% | 38% |
| | NA | 2 | 6% | - | 3 | 16% | - |
| Child Care Workers | YES | 25 | 69% | 76% | 6 | 32% | 35% |
| | NO | 8 | 22% | 24% | 11 | 58% | 65% |
| | NA | 3 | 8% | - | 2 | 11% | - |

*Not Applicable

Table 10

Health Club Employee CPR

| | | YMCA/YWCA | | | Multi-purpose | | |
|---|---|---|---|---|---|---|---|
| | | Freq. | % | Valid % | Freq. | % | Valid % |
| Health Class Instructor | YES | 22 | 61% | 63% | 8 | 42% | 67% |
| | NO | 13 | 36% | 37% | 4 | 21% | 33% |
| | *NA | 1 | 2% | - | 7 | 37% | - |
| Massage Technicians | YES | 6 | 17% | 24% | 4 | 21% | 44% |
| | NO | 19 | 53% | 76% | 5 | 26% | 56% |
| | NA | 11 | 31% | - | 10 | 53% | - |
| Skilled Professionals | YES | 2 | 6% | 17% | 2 | 11% | 25% |
| | NO | 10 | 28% | 83% | 6 | 32% | 75% |
| | NA | 24 | 67% | - | 11 | 58% | - |
| Food Service Workers | YES | 2 | 6% | 13% | 4 | 21% | 36% |
| | NO | 31 | 36% | 87% | 7 | 37% | 64% |
| | NA | 21 | 58% | - | 8 | 42% | - |
| Volunteers | YES | 9 | 25% | 38% | 3 | 16% | 25% |
| | NO | 15 | 42% | 63% | 9 | 47% | 75% |
| | NA | 12 | 33% | - | 7 | 37% | - |

*Not Applicable

Table 11

Health Club Employee CPR

| | | YMCA/YWCA | | | Multi-purpose | | |
|---|---|---|---|---|---|---|---|
| | | Freq. | % | Valid % | Freq. | % | Valid % |
| Administrative Employees | YES | 19 | 53% | 56% | 9 | 47% | |
| | NO | 15 | 42% | 44% | 9 | 47% | |
| | *NA | 2 | 6% | - | 1 | 5% | |
| Membership and Marketing Offices | YES | 7 | 19% | 23% | 8 | 42% | |
| | NO | 24 | 67% | 77% | 7 | 37% | |
| | NA | 5 | 14% | - | 4 | 21% | |
| Custodial | YES | 6 | 17% | 20% | 1 | 5% | |
| | NO | 24 | 67% | 80% | 12 | 63% | |
| | NA | 6 | 17% | - | 6 | 32% | |
| Maintenance | YES | 5 | 14% | 16% | 2 | 11% | |
| | NO | 26 | 72% | 84% | 12 | 63% | |
| | NA | 5 | 14% | - | 5 | 26% | |
| Security Workers | YES | 3 | 8% | 20% | 2 | 11% | |
| | NO | 12 | 33% | 80% | 7 | 27% | |
| | NA | 21 | 58% | - | 10 | 52% | |

*Not Applicable

Aerobic Instructors. Ninety-two percent of all aerobic instructors were required to be CPR certified in the YMCA's/YWCA's compared to 63% in the multi-purpose facilities. All of the YMCA's/YWCA's responding to aerobic instructors compared to 96% of the multi-purpose facilities.

Lifeguards. Forty-seven percent of the multi-purpose facilities did not have lifeguards compared with only 2% of the YMCA's/YWCA's. Of those health clubs with lifeguards, 91% of YMCA's/YWCA's and 80% of multi-purpose facilities required that they were CPR certified.

Health Class Instructors. Health Class Instructors were defined in this study as employees who taught non-exercise types of health classes such as stress maanagement or smoking termination. Only 2% of the YMCA's/YWCA's did not have health class instructors compared to 37% of the multi-purpose facilities. Of the health clubs with health class instructors, 63% of the YMCA's/YWCA's and 67% of the mulci-purpose facilities required their instructors to be CPR certified on the job.

Massage Technicians. Thirty-one percent of the YMCA's/YWCA's and 53% of the multi-purpose facilities did not have massage technicians at their health clubs. Of the health clubs that did have massage technicians, only 24% of the YMCA's/YWCA's and 44% of the muli-purpose facilities required CPR certification for their massage technicians.

Administrative Employees. Only 6% and 5% of YMCA's/YMCA's and multi-purpose facilities, respectively, did not have "administrative employees". Of the health clubs with administrative employees, 56% of the YMCA's/YWCA's and 50% of the multi-purpose facilities required CPR certification for this job position.

Membership and Marketing Offices. Fourteen percent of the YMCA's/YWCA's and 21% of the multi-purpose facilities felt that this job position did not apply to their health club. Of the health clubs with membership and marketing offices, 23% of the YMCA's/YWCA's and

53% of the multi-purpose facilities required CPR certification for this job.

Attendants. This questionnaire defined "attendants" as employees who supervised locker rooms, weight lifting rooms, etc. Only 6% of the YMCA's/YWCA's and 16% of the multi-purpose facilities did not have attendants in any specified job position. Sixty-five percent and 63% of the YMCA's/YWCA's and multi-purpose facilities respectively, had job positions labeled "attendants" which required a CPR certification.

Skilled Professionals. A health club skilled professional was someone involved in the health club such as a shoe shiner, barber, etc. According to this questionnaire, 56% of the YMCA's/YWCA's and 58% of the multi-purpose facilities did not have this job position. Of the small percent ramaining, 17% and 11% of YMCA's/YWCA's and multi-purpose facilities respectively, required CPR certification for this job position.

Food Service Workers. Fifty-eight percent of the YMCA's/YWCA's and 42% of the multi-purpose facilities did not have food service workers at their health club. Of the remaining health clubs, 13% of the YMCA's/YWCA's and 21% of the multi-purpose facilities required CPR certification for their food service workers.

Volunteers. Thirty-three percent of YMCA's/YWCA's and 37% of the multi-purpose facilities did not utilize volunteers in their health club. Of the health clubs that used volunteers, 38% of YMCA's/YWCA's and 16% of the multi-purpose facilities required CPR certification for this job position.

Custodial. Seventeen percent of the YMCA's/YWCA's and 32% of the multi-purpose facilities answered this question as "Not Applicable". Of the health clubs that utilized custodians, 17% of YMCA's/YWCA's and 32% of the multi-purpose facilities respectively, required this job position to be CPR certified.

Maintenance. This job position was not applicable for 14% of the YMCA's/YWCA's and 26% of the multi-purpose facilities. CPR certification was required by 16% of the YMCA's/YWCA's and 11% of the multi-purpose facility's maintenance employees.

Security Workers. Fifty-eight percent of the YMCA's/YWCA's and 53% of the multi-purpose facilities respectively were surveyed, that did not possess a security worker job position. Of the health clubs with security workers, 20% of the YMCA's/YWCA's and 11% of the multi-purpose facilities required CPR certification for this job position.

Child Care Workers. Only 8% of the YMCA's/YWCA's and 11% of the multi-purpose facilities did not have child care workers. CPR certification was required for child care workers from 69% of the YMCA's/YWCA's and 32% of the multi-purpose health clubs.

Other. Any additional comments from the respondents on job positions that may require a CPR certification can be seen in Appendix D.

## Risk Factor Screening

According to the questionnaire, 31% of the YMCA's/YWCA's and 37% of the multi-purpose facilities did not screen for risk factors at their particular health club (Table 12). As can be seen in

Appendix M, both YMCA's/YWCA's (76%) and multi-purpose facilities (75%) utilized the "written risk factor form". Also popular in multi-purpose facilities was the "risk factor interview" (75%) and "medical clearance from a doctor" (58%). YMCA's/YWCA's had their largest response under the category of a "medical clearance from a doctor" (80%). The smallest response was under the category of "pretested with a maximal test", which yielded no response in multi-purpose facilities and only 4% in the YMCA's/YWCA's.

Some additional methods of risk factor screening which were available in some YMCA's/YWCA's included fitness evaluations, stress testing, maximum oxygen uptake testing, and body composition measurements, if so desired. Also, a comment was added suggesting that risk factor screening in only necessary at their particular YMCA for special fitness classes.

Table 12

Risk Factor Screening

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Written risk factor form | 19/25 | 76% | 9/12 | 75% |
| Risk factor interview | 4/25 | 16% | 9/12 | 75% |
| Pretested with submaximal exercise test | 10/25 | 40% | 6/12 | 50% |
| Pretested with maximal exercise test | 1/25 | 4% | 0 | 0% |
| Medical clearance from a doctor | 20/25 | 80% | 7/12 | 58% |
| Other methods | 2/25 | 8% | 0 | 0% |
| Not applicable | 11/36 | 31% | 7/19 | 37% |

## Fitness Instructor Certifications

Certifications in fitness instruction are important, since health club participants rely on their instructors for an effective, but safe exercise session. Questionnaire respondents had to "check off" the minimal certification requirements for their health club fitness instructors (Table 13). As seen in Appendix N, the highest response for both types of health clubs (YMCA's/YWCA's-86%, multi-purpose-72%) was under CPR certification. Several YMCA's/YWCA's (75%) also required a certification specifically designed for their "fitness instructors from within the health club organization". Only 8% of the YMCA's/YWCA's required "some type of college degree" for their fitness instructors. Multi-purpose facilities also responded fairly high under the certification categories of "first aid" (44%) and "fitness instructor certification from within the health club organization" (39%). A "college degree requirement (28%) and "fitness instructor certification from outside the health club organization (28%) received fairly low responses from multi-purpose health club facilities. Two additional comments (see Appendix D) which were important to a health club's fitness instruction included past experience and periodic training sessions.

Table 13

Fitness Instructor Certifications

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| CPR | 31/36 | 86% | 13/18 | 72% |
| First Aid | 7/36 | 19% | 8/18 | 44% |
| Bachelor degree | 3/36 | 75% | 5/18 | 28% |
| Fitness instructor (within organization) | 27/36 | 75% | 7/18 | 39% |
| Fitness instructor (outside organization) | 10/36 | 28% | 5/18 | 28% |
| Other | 4/36 | 11% | 4/18 | 22% |
| Not applicable | 0 | 0% | 1/18 | 6% |

## Emergency Vehicle Response Time

When comparing the response time for an emergency vehicle to reach a health club, both types of health clubs appeared very similar according to their responses (Table 14 and Appendix O). YMCA's/YWCA's had a response time of "less than 3 minutes" for 39% of their health clubs, and another 58% responded to a "3 to 6 minute" time frame. Multi-purpose health clubs had a "less than 3 minute" response time for 42% of their health clubs, and 37% responded to a "3 to 6 minute" time range.

Table 14

Emergency Vehicle Response Time

| | YMCA/YWCA | | Multi-purpose | |
|---|---|---|---|---|
| | Freq. | Valid % | Freq. | Valid % |
| Less than 3 minutes | 14 | 39% | 8 | 42% |
| 3-6 minutes | 21 | 58% | 7 | 37% |
| 7-10 minutes | 1 | 3% | 3 | 16% |
| 11-14 minutes | 0 | 0% | 1 | 5% |
| 15 or greater | 0 | 0% | 0 | 0% |
| Unknown | 0 | 0% | 0 | 0% |
| TOTALS | 36 | 100% | 19 | 100% |

## Discussion

### Background Information

Male/Female Ratio. The male/female ratio for each type of health club was similar in comparison. It appears that many health clubs have introduced both sexes into their health club and so a large percentage of both received the highest response in this questionnaire. Marketing to both sexes is probably also important financially. It is interesting to note that YMCA's/YWCA's (22%) had twice as high a percentage as the multi-purpose facilities (11%), who responded to the "more females than males" category. This may be due to the

influence of some YWCA's. Even though most YWCA's are coed, there are still some which allow only women members.

Age Grouping. When ranking the age group with the most health club members, the 31-40 year old age group received the highest percentages by far. It is interesting to note that when grouping the categories below 41 years of age, this is 85% of the YMCA's/YWCA's member majority and 79% of the multi-purpose facilities member majority. This shows that the health clubs are focused on a younger aged population.

Permanent Full Time Employees. Both health clubs showed their largest response in the "less than 10" full time employee's category. When grouping all health clubs with "less than 21" full time employees, 80% of the YMCA's/YWCA's and 89% of the multi-purpose facilities are included. This shows that health clubs on the average, may have smaller facilities and/or lower budgets.

Permanent Part Time Employees. It can be seen that, YMCA's/YWCA's utilize many part time employees, with a high percentage (42%) of their health clubs in the "more than 50" part time employee's category. Multi-purpose facilities had a large percentage (42%) of their health club part time employees in the "less than 10" part time employee's category.

Total Memberships. The total number of memberships for multi-purpose facilities is low according to Anderson (1985), who found in his National Survey on recreation facilities that each type of health club (multi-purpose and YMCA's/YWCA's) had nearly an identical average total membership which was greater than 4,000 members. In the Health Club

Safety Survey, most of the multi-purpose facilities had less than 1,000 total memberships and YMCA's/YWCA's had more than 3,000 memberships.

When combining the results of this study in regards to part time employees, full time employees, and total memberships; it appears that multi-purpose facilities on the average have a lower total membership and therefore less employees at their health clubs. YMCA's/YWCA's, on the other hand, have a higher total membership, about the same number of full time employees as a multi-purpose facility, but many more part time employees.

## CPR Certification Classes

Classes For Members. As noted earlier, 84% of the multi-purpose facilities and 36% of YMCA's/YWCA's did not offer CPR certification classes to their members. Using Binomial Population Proportions ($P \leq .50$), no significance was found when comparing all health clubs which offered CPR classes to members compared to those that don't. Therefore, the null hypothesis could not be rejected, indicating that based on the evidence provided; 50% or less of all health clubs in Wisconsin offered CPR classes to their members. After then performing a Chi-square test of Contingency Tables, a significant difference ($X^2 = 3.841$, $p < .05$) was found between YMCA's/YWCA's and multi-purpose facilities. This meant that of the health clubs which provided CPR certification classes to members; YMCA's/YWCA's offered a significantly larger number of classes than multi-purpose facilities. Several studies (Vanderschmidt, Burnak, & Thwaites, 1975; Mandel, DeMers, Olsen, &

Cobb, 1977; Weaver, Ramirez, Dorfman, & Raizner, 1979) show that the retention of CPR skills is poor. CPR certification classes for members of health clubs, as well as frequent refresher courses, are of great value in order to keep the lay public up-to-date and ready for a respiratory or cardiac emergency. According to the American Heart Association (1974), "Basic life support training of the public should be under the auspices of the American National Red Cross, the YMCA, and comparable volunteer and public service agencies concerned with saving lives (p. 850)."

Classes For Employees. The outlook on CPR classes for employees looked much better than CPR classes offered to health club members as seen in the Binomial Population Proportion test. Based upon the evidence provided by this sample, the null hypothesis was rejected in favor of the alternative that a significant percentage ($P>.50$) of all health clubs require CPR certification classes for their employees ($z = 9.286$, $p<.05$). The Chi-square test of Contingency Tables was then used and a significant difference was found ($X^2 = 4.360$, $p<.05$) between YMCA's/YWCA's and multi-purpose facilities when looking at CPR certification classes provided for health club employees. Again YMCA's/YWCA's were shown to offer a significantly higher percentage of CPR classes than multi-purpose facilities, but this time over 50% of both kinds of health clubs offered CPR classes to their employees.

The importance of CPR classes for employees is reinforced by Berry (1983), who states:

> For a population such as the faculty and staff and student volunteers of the La Crosse Exercise Program, the continual review of CPR procedures and other emergency procedures is an utmost necessity when supervising exercise programs for highly-prone cardiac participants (p. 66).

Even though most health clubs do not have "labeled" groups of highly-prone cardiac participants, there may be some high risk individuals vigorously exercising without any visible heart disease symptoms. In Berry's study (1983), a significant decline occurred in retention levels of CPR skills from initial to follow-up testing in all of the groups she tested in her study. These groups were a mixture of students, volunteers, and faculty of the La Crosse Exercise Program, who were required to practice their CPR skills every month, 3 months, or 6 months (depending on the group) for a total of one 6 month period. A comparison between pre and post tests showed a decline in retention levels at the end of 6 months. Since research shows a significant decrease in retention levels, employees should review CPR skills more frequently. By offering CPR classes for employees, health club presonnel proficient in CPR skills can be achieved.

## Employee CPR Requirements

Aerobic Instructors. When analyzing aerobic instructors with the Binomial Population Proportions, the null hypothesis was set at ($P \leq .75$ due to the active physical role of aerobic instructors. Based upon the evidence provided by this sample, the null hypothesis was rejected ($z = 2.041$, $p > .05$) in favor of the alternative that a

significant percentage of all Wisconsin health clubs require CPR certification. When running a Chi-square test of Contingency Tables, no significant difference was found ($p>.05$) between YMCA's/YWCA's and multi-purpose facilities when looking at the requirements for CPR certifying aerobic instructors.

Lifeguards. When analyzing lifeguards with the Binomial Population Proportions, the null hypothesis was also set at $P\leq.75$ due to the active physical role of lifeguards. Based upon the evidence provided by this sample, the null hypothesis was rejected ($z = 2.370$, $p<.05$) in favor of the alternative that a significant percentage of all Wisconsin area health clubs require CPR certification. A Chi-square test of Contingency Tables was then conducted in order to compare both types of Wisconsin area health clubs. No significant difference ($p>.05$) was found and so the null hypothesis could not be rejected.

Health Class Instructors. When comparing all health clubs using Binomial Population Proportions ($P\leq.50$) in the area of health class instructors, a significant ($z = 2.000$, $p =<.05$) percentage was found. Based upon the evidence provided by this sample, the null hypothesis was rejected in favor of the alternative that a significant percentage of all health clubs required CPR certification for their health class instructors. When using the Chi-square test of Contingency Tables, there was no significant difference found ($p>.05$) when comparing multi-purpose facilities to YMCA's/YWCA's in regards to CPR certification requirements.

Child Care Workers. An analysis of child care workers was performed using $P\leq.50$ as the null hypothesis in the Binomial Population

Proportion test. Based upon the evidence provided by this sample, the null hypothesis was rejected in favor of the alternative that a significant percentage of all Wisconsin area health clubs require CPR certification for their child care workers ($z = 1.739$, $p<.05$). A Chi-square test of Contingency Tables was then conducted and a significant difference was found ($X^2 = 8.940$, $p>.05$) between YMCA's/YWCA's and multi-purpose facilities when looking at the requirements for CPR certifying child care workers. A significantly greater percent of YMCA's/YWCA's required CPR certification for their child care workers.

Skilled Professionals. An accurate analysis of skilled professionals could not be conducted due to insufficient date ( n = 20). Only 36% of the health clubs responded "YES" or "NO" to this question, with 64% responding "Not Applicable" to the category of skilled professionals.

Other Job Positions. All other job positions listed in this questionnaire were analyzed using Binomial Population Proportions. These job positions included: massage technicians, administrative employees, membership and marketing offices, food service workers, volunteers, custodial employees, maintenance, security workers, and attendants. The null hypothesis in all, but the attendant category were set at $P<.50$ at a 0.05 level of significance. Since "attendants" are usually around physical activity at health clubs, the null hypothesis was set at $P\leq.75$ at a 0.05 level of significance. The results of these Proportion tests showed no significance, which meant that no more than 50% of all of these health club employee positions required CPR certification. A Chi-square test of Contingency Tables was then conducted. In every job position listed about except for

"membership and marketing office employees', no significant difference ($p>.05$) was found when comparing YMCA's/YWCA's to multi-purpose facilities. Membership and Marketing Office employees did however show a significant difference ($X^2 = 4.03$, $p<.05$) in favor of multi-purpose facilities when comparing both types of health clubs. This meant that each type of health club had CPR requirement proportions that were less than or equal to 50%, but multi-purpose facilities had a significantly greater amount of membership and marketing employees which required CPR certification on the job.

Discussion. Research in the area of CPR states that in any setting, the more people that know CPR, the better. Since time is of the essence, more certified people in one area means there is a better chance of reaching a victim in need of resuscitation, usually at a faster rate. Lund and Skulberg (1976) showed that when CPR was begun by bystanders within 5 minutes of collapse, the victims probability of survival rose from 8% to 36%. In a health club, nobody knows where a heart attack may occur, so the more employees certified may show a faster response to a victim in need of CPR. If members are also certified, this may increase the response time even more.

## Risk Factor Screening

When analyzing data on methods of screening for risk factors of a health club participant, Binomial Population Proportions were initially used with a null hypothesis set at $P\leq.50$. Based upon the evidence provided by this sample, the null hypothesis was rejected in favor of the alternative that a significant percentage of all

Wisconsin area health clubs screen in some way for risk factors ($z = 2.540$, $p<.05$). A Chi-square Test of Contingency Tables was then conducted between YMCA's/YWCA's and multi-purpose facilities; no significance was discovered.

Individual comparisons were then investigated using the Chi-square test of Contingency Tables. Based upon the evidence provided by this sample, a significant difference was found ($X^2 = 13.72$; $p<.05$) between YMCA's/YWCA's and multi-purpose facilities when looking at the method of screening risk factors through the use of an interview. No significant difference was found between individual comparisons when testing the "written risk factor form", "pretesting with a submaximal exercise test", or a "medical clearance from a doctor". Due to insufficient data, "pretesting with a maximal test" could not be analyzed statistically.

Research does not state what kind of risk factor screening is the most effective, but it does state that a simple medical history and a clinical examination with special attention on risk factors of heart disease would be useful (Northcote and Ballantyne, 1984). According to Schatzkin, et al. (1984), the Framingham Study concluded that certain risk factors are predictors of sudden unexpected death. Koplan (1979) also agrees with the importance of some form of risk factor screening.

## Fitness Instructor Certifications

In order to analyze the minimal certification requirements for health club fitness instructors, the Chi-square test of Contingency

Tables was used for individual certification requirements. A significant difference was found ($X^2$ = 5.670, $p<.05$) for "fitness instructor certifications from within the health club organization". Seventy-five percent of the YMCA's/YWCA's required an "in-house" certification, whereas only 39% of multi-purpose health clubs required it. When all other individual categories were compared using a Chi-square test of Contingency Tables, no significance was found between the two types of health clubs. These categories were: CPR certification, first aid, and a Bachelor Degree in physical fitness or a related field.

Research on fitness instructor certifications was limited, but according to West (cited in Nash, 1985), certifications are becoming a popular issue. It is estimated that only about 10% of the 100,000 fitness instructors in the United States have had formal training or certification. Health club professionals are beginning to see that inexperienced fitness instructors may cause serious harm to their participants. Nash (1985) adds a positive note that many YMCA's are presently certifying their own fitness instructors and this is reaffirmed in The Health Club Safety Survey results.

## Emergency Vehicle Response Time

A test of Combined Group Means was conducted to separately test YMCA's/YWCA's and multi-purpose facilities in regards to the response time for the arrival of an emergency vehicle to a health club site. When YMCA's/YWCA's ($z$ = 25.42, $p<.05$) and multi-purpose facilities ($z$ = 9.42, $p<.05$) were tested, significance was found for each health

club individually and the null hypothesis was rejected in favor of the alternative. Both types of health clubs had a response time of less than 10 minutes. A Chi-square test of Contingency Tables was then tested to see if a significant difference existed between the multi-purpose facilities and YMCA's/YWCA's. No significant difference ($p<.05$) was found and the null hypothesis was retained, based on the evidence provided.

These results are positive as can be seen by Eisenburg, et al. (1979) in his summary on how the usage of CPR can optimally be successful. In his study, four factors which contributed to successful resuscitation survival rates were: (1) paramedic service, (2) rapid time to initiation of CPR, (3) rapid time to definitive care, and (4) bystander-initiated CPR. This study concluded that CPR must be initiated within four minutes and definitive care provided within ten minutes. Tweed, Bristow, and Donen (1980) also agreed with this previous statement.

## Summary

When comparing YMCA's/YWCA's to multi-purpose facilities in regards to levels of safety, it appears that YMCA's/YWCA's are a small step ahead. More YMCA's/YWCA's have CPR certification requirements for their employees as well as the classes offered to obtain the certification. Certifications of fitness instructors also seem stricter in the YMCA/YWCA health clubs. YMCA's/YWCA's seem to be a more unified organization; since their early "roots" are from a common

origin, whereas multi-purpose facilities usually work independently of each other.

Though YMCA's/YWCA's have an apparent edge, there is still much work to be done in the area of health club safety. Risk factor screening and emergency vehicle response time appear to be at fairly safe levels based on the results of this study, but more certification classes could be offered and stricter CPR requirements need to be placed on health club employee job positions. Since CPR is new and growing, maybe we will see its growth spread further into the health club setting.

# CHAPTER V

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## Summary

This study was designed to compare specific levels of safety in two different kinds of membership-dependent health clubs. A 29-item questionnaire was sent out to 79 health clubs. Fifty-five health clubs (70%) responded to the questionnaire. 36 YMCA's/YWCA's and 19 multi-purpose facilities.

The questionnaire was analyzed by frequencies, percentages, group mean comparisons, Binomial Population Proportions, and Chi-square testing of Contingency Tables. All statistical analysis was performed at a 0.05 level of significance. Five hypotheses were developed and their results will now be summarized.

1. A significant difference was found between multi-purpose facilities and YMCA's/YWCA's in regards to CPR classes offered to both health club members and employees. Therefore, based upon the evidence provided, the null hypothesis was rejected. A significantly greater percentage of YMCA's/YWCA's offered CPR classes to their members and employees.

2. When comparing multi-purpose facilities to YMCA's/YWCA's in regards to employee requirements for CPR certification, a significant difference was found. This was found in the jobs of the child care worker and the membership and marketing office

workers. Therefore, based upon the evidence provided, the null hypothesis was rejected. A significantly greater percentage of YMCA's/YWCA's required CPR certification for their child care workers, and a significantly greater percentage of multi-purpose facilities required CPR certification for their membership and marketing office workers.

3. In regards to risk factor screening, a significant difference was seen when comparing multi-purpose facilities to YMCA's/YWCA's. The difference was seen in the risk factor interview and so based upon the evidence provided, the null hypothesis was rejected. A significantly greater percentage of multi-purpose facilities utilized the risk factor interview in risk factor screening.

4. A significant difference was found when comparing multi-purpose facilities to YMCA's/YWCA's in regards to fitness instructor certifications. This difference was observed in "fitness instructor certification from within the organization". Therefore, based upon the data provided, the null hypothesis was rejected in favor of the alternative. A significantly greater percentage of YMCA's/YWCA's required a fitness instructor certification from within the health club organization.

5. There was no significant difference found when comparing multi-purpose facilities to YMCA's/YWCA's in regards to the response time for an emergency vehicle to arrive at a health club after initially being called. The null hypothesis was retained, based upon the evidence provided in favor of the alternative.

## Conclusions

Based upon the results of this study, the following conclusions were drawn:

1. It was observed that the majority of both types of health clubs had approximately the same ratio of males as females and most of their members fell into the 31-40 year old age category.

2. Observations also showed that most of either type of health club has less than 10 full time employees working at a time.

3. The majority of YMCA's/YWCA's were observed to have more than 50 part time employees at their health club, whereas the majority of the multi-purpose facilities had less than 10 part time employees.

4. It was observed that the majority of the YMCA's/YWCA's had a total number of memberships, which was greater than 3,000 members compared to multi-purpose facilities, which mostly had less than 1,000 members.

5. Fifty percent or less of either type of health club offered CPR classes to their members at least once a year.

6. More than 50% of each type of health club provided CPR certification classes for their employees.

7. A significantly greater percentage of YMCA's/YWCA's offered CPR certification classes to their health club members and employees.

8. More than 50% of each type of health club required their health class instructors to be CPR certified.

9. More than 75% of each type of health club also required their aerobic instructors and lifeguards to be CPR certified.

10. More than 50% of each type of health club required their child care workers to be CPR certified, but a significantly larger number of YMCA's/YWCA's required CPR certification for their child care workers.

11. Job positions that could be improved in regards to CPR certification requirements in health clubs include: massage technicians, administrative employees, membership and marketing office workers, food service workers, volunteers, custodians, maintenance workers, security workers, and attendants. All of these job positions, except for attendants, were required to be CPR certified in 50% or less of the health clubs surveyed. Only a significantly greater number of multi-purpose facilities required their membership and marketing office workers to be CPR certified.

12. More than 50% of either type of health club screen for risk factors in some manner.

13. A significantly greater number of YMCA's/YWCA's were requiring their fitness instructors to obtain a certification from within the YMCA/YWCA organization.

14. A significant amount of both; multi-purpose facilities and YMCA's/YWCA's had an emergency vehicle response time of less than 10 minutes, with no significant difference found between the two health clubs.

## Recommendations For Further Study

The following recommendations are given as a guide for further study:

1. The same questionnaire could be used, but with a different mailing list; possibly using a larger sample. When using the present mailing list in this study, the problem of not covering all of the known Wisocnsin health clubs occurred. If there is any way of obtaining a larger number of health clubs in the same state, it would be of benefit to the study.
2. A survey of other states besides Wisconsin could be investigated and a comparison between states could be made.
3. A comparison could be made using other types of health clubs such as government owned, publicly owned, corporate fitness facilities, etc. Some YMCA's/YWCA's did not care to be called a "health club", so another name such as "fitness facility" could be used in its place.
4. A similar study could be conducted with a smaller sample, where the researcher actually interviews health club employees about their facility's safety.
5. Emergency vehicles or employee response times could actually be tested in area health clubs, after obtaining permission of course.
6. Comparisons could be made using only one component of the present questionnaire and expanding on it (i.e., certifications).
7. Instead of addressing letters to directors or managers, a mailing could be aimed at executives to see what their response would be.

8. Since certifications are becoming a big issue, the cost of certifications to a health club could be investigated.
9. Since this study shows that the majority of health club members fall within the age range of 31-40 years old, it would be wise to use this age group in any future studies on exercise equipment.
10. Since this is the first known study which deals with health club safety, it can be used as a baseline for many more studies which are similar in nature.

# REFERENCES CITED

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American Heart Association. (1985) Instructors manual for basic life support. Dallas, Texas: The American Heart Association.

American Heart Association. (1981, April). Manual for instructors of basic life support(3 ed.). Dallas, Texas: The American Heart Association.

American Heart Association. (1986). Standards and guidelines for cardiopulmonary resuscitation and emergency cardiac care. The Journal of the American Medical Association, 255(21), pp. 2841-3044.

American Heart Association Committee on Cardiopulmonary Resuscitation and Emergency Cardiac Care. (1974). Standards for cardiopulmonary resuscitation and emergency cardiac care. The Journal of the American Medical Association, 227(8), pp. 877-881.

Anderson, Bill (Ed.). (1985, August). Managed recreation research report (Special issue). Recreation, Sports, & Leisure.

Ayers, W. R., & Doyle, J. T. (1964). Cardiopulmonary resuscitation: review of one year's experience in a general hospital. New York State Journal of Medicine, 64, pp. 1929-1932.

Berry, D. (1983). The retention of cardiopulmonary resuscitation skills. Unpublished master's thesis, University of Wisconsin-La Crosse.

Blalock, A. (1961). External cardiac massage. The Journal of The American Medical Association, 176(7). p. 609.

Braun, P., Reitman, N., & Florin, A. A. (1965). Closed-chest cardiac resuscitation. The New England Journal of Medicine, 272(1), pp. 1-6.

Cobb, L. A., Baum, R. S., Alvarez III, H., & Schaffer, W. A. (1975). Resuscitation from out-of-hospital ventricular fibrillation: 4 years follow-up. Circulation, 51 & 52 (Suppl. III), pp. 223-228.

Copley, D. P., Mantle, J. A., Rogers, W. J., Russell, R. O., & Rackley, C. E. (1977). Improved outcome for prehospital cardiopulmonary collapse with resuscitation by bystanders. Circulation, 56(6), pp. 901-905.

Day, H. W. (1965). Effectiveness of an intensive coronary care area. American Journal of Cardiology, 15, pp. 51-54.

Del Guercio, L. R. M., Feins, N. R., Cohn, J. D., Coomaraswamy, R. P., Wollman, S. B., & State, D. (1965). Comparison of blood flow during external and internal cardiac massage in man. Circulation, 31 (Suppl. I), pp. 171-180.

Eisenberg, M., Bergner, L., & Hallstrom, A. (1979). Paramedic programs and out-of-hospital cardiac arrest: I. factors associated with successful resuscitation. American Journal of Public Health, 69(1), pp. 30-38.

Eisenberg, M. S., Nagel, E. L., Hearne, T., Hallstrom, A. P., & Bergner, L. (1982). Sudden cardiac arrest in the community. Clinics in Emergency Medicine, 2, p. 13.

Flax, P., Larke, T., Walser, G., Kaye, W., & Uhley, H. (1976). The mechanics of widespread training of cardiopulmonary resuscitation: A community project implemented by volunteers. American Heart Journal, 91(1), pp. 123-125.

Goldberg, A. H. (1974). Current concepts: cardiopulmonary arrest. The New England Journal of Medicine, 290(7), pp. 381-387.

Guzy, P. M., Pearce, M. L., Greenfield, S. (1983). The survival benefit of bystander cardiopulmonary resuscitation in a paramedic served metropolitan area. American Journal of Public Health, 73, pp. 766-759.

Hinkle, D. E., Wiersma, W., & Jurs, S. G. (1979). Applied statistics for the behavioral sciences. Boston: Houghton Mifflin Company.

Hofkin, G. A. (1967). Survival after cardiopulmonary resuscitation. The Journal of the American Medical Association, 202(7), pp. 652-654.

Johnson, A. L., Tanser, P. H., Ulan, R. A., & Wood, T. E. (1967). Results of cardiac resuscitation in 552 patients. The American Journal of Cardiology, 20, pp. 831-835.

Koplan, J. P. (1979). Cardiovascular deaths while running. The Journal of the American Medical Association, 242(23), pp. 2578-2579.

Kouwenhoven, W. B., Ing., D., Jude, J. R., & Knickerbocker, G. G. (1960). Closed-chest cardiac massage. The Journal of the American Medical Association, 202(7), pp. 652-654.

Lemire, J. G., & Johnson, A. L. (1972). Is cardiac resuscitation worthwhile? The New England Journal of Medicine, 286, pp. 970-972.

Lillehei, C. W., Lavadia, P. G., DeWall, R. A. & Sellers, R. D. (1965). Four years experience with external cardiac resuscitation. The Journal of the American Medical Association, 193(8), pp. 651-658.

Lund, I., & Skulberg, A. (1976). Cardiopulmonary resuscitation by lay people. The Lancet, 2, pp. 702-704.

Mandel, L. P., DeMers, J. L., Olsen, M. F., and Cobb, L. A. (1977). Evaluation of instructional aspects of a citizen CPR training program. Circulation, 55, 114 (Abstract No. 137).

McIntryre, K. M., Parisi, A. F., Benfari, R., Goldberg, A. H., & Salen, J. E. (1978). Pathophysiologic syndromes of cardiopulmonary resuscitation. Archives of Internal Medicine, 138, pp. 1130-1133.

Nash, H. L. (1985). Instructor certification: making fitness programs safer. The Physician and Sportsmedicine, 13(10), pp. 142-155.

Northcote, R. J., & Ballantyne, D. (1984). Sudden death and sport. The Lancet, 1(8368), 113 (letter).

Pantridge, J. F., & Geddes, J. S. (1967). A mobile intensive care unit in the management of myocardial infarction. The Lancet, 2(7510), pp. 271-273.

Pappelbaum, S., Lange, T. W., Bazika, V., Bernstein, H., Herrold, G., & Corday, E. (1965) Comparative hemodynamics during open vs. closed cardiac resuscitation. The Journal of the American Medical Association, 193(8), pp. 651-658.

Rabkin, S. W., Mathewson, G. A. L., & Tate, R. B. (1982). The electrocardiogram in apparently healthy men and the risk of sudden death. British Heart Journal, 47, pp. 546-552.

Ramirez, A. G., Weaver, F., Raizner, A. E., Dorfman, S. B., Herrick, K. L., & Gotto, A. M. (1977). The efficacy of lay CPR instruction: an evaluation. American Journal of Public Health, 67(11), pp. 1093-1095.

Roser L. A. (1967). Cardiopulmonary resuscitation experience in a general hospital. Archives of Surgery, 95, pp. 658-663.

Schatzkin, A., Cupples, L. A., Heeren, T., Morelock. S., Mucatel, M., & Kennel, W. B. (1984). The epidemiology of sudden unexpected death: risk factors for men and women in the Framingham Heart Study. American Heart Journal, 107(6), pp. 1300-1306.

Shipman, K. H., McCrady, W., & Bradford, H. A. (1962). Closed chest cardiac resuscitation. The American Journal of Cardiology, 10, pp. 551-554.

The 1979 National Conference on Cardiopulmonary Resuscitation and Emergency Cardiac Care. (1980). Standards and guidelines for cardiopulmonary resuscitation and emergency cardiac care. The Journal of the American Medical Association, 244(5), pp. 453-509.

Thompson, P. D. (1981). Coronary heart disease and sudden death while running. THe American Journal of Cardiology, 47(6), pp. 1381-1382.

Thompson, P. D., Funk, E. J., Carleton, R. A., & Sturner, W. Q. (1982). Incidence of death during jogging in Rhode Island from 1975 through 1980. The Journal of the American Medical Association, 247(18), pp. 2535-2538.

Thompson, R. G., Hallstrom, A. P., & Cobb, L.A. (1979). Bystander-initiated cardiopulmonary resuscitation in the management of ventricular fibrillation. Annals of Internal Medicine, 90(5), pp. 737-740.

Tresch, D. D., Grove, J. R., Siegal, R., Keelan, M. H., & Brooks, H. L. (1981). Survivors of prehospitalization sudden death. Archives of Internal Medicine, 141, pp. 1154-1157.

Tweed, W. A., Bristow, G., & Donen, N. (1980. Resuscitation from cardiac arrest: assessment of a system providing only basic life support outside of hospital. Canadian Medical Association Journal, 122, pp. 297-300.

Tweed, W. A., Bristow, G., Donen, N., & Kirk, B. W. (1980). Evaluation of hospital-based cardiac resuscitation, 1973-1977. Canadian Medical Association Journal,122, pp. 301-304.

Vanderschmidt, H., Burnak, T. K. & Thwaites, J. K. (1975). Evaluation of cardiopulmonary resuscitation course for secondary schools. Medical Care, 13, pp. 763-774.

Virmani, R., Robinowitz, M., & McAllister, H. A. (1982). Nontraumatic death in joggers. The American Journal of Medicine, 72, pp. 874-882.

Weaver, F. J., Ramirez, A. G., Dorfman, S. B., & Raizner, A. E. (1979). Trainees' retention of cardiopulmonary resuscitation. Journal of The American Medical Association, 241(9), pp. 901-903.

Weingarten, C. H., & Taubenhaus, L. J. (1964). Training of rescue personnel in closed-chest cardiac resuscitation. The New England Journal of Medicine, 270(26), pp. 1396-1399.

White, J. D. (1982). The new CPR. Clinics in Emergency Medicine, 2, pp. 27-38.

Winslow, B. J. (1979). Saving lives? The Journal of the American Medical Association, 241(editorial), p. 929.

Yarbrough, B. E. (1984). Current concepts of cardiopulmonary resuscitation. Virginia Medical, 3, pp. 283-287.

# APPENDICES

# APPENDIX A

# THE HEALTH CLUB SAFETY SURVEY

# HEALTH CLUB SAFETY SURVEY

Read each question carefully and answer as directed. Place a check ( X ) on the line which best identifies your health club. Your response will be kept confidential.

Section I: Background Information

1. Does your health club consist of:

___ (a) more males than females

___ (b) more females than males

___ (c) about an equal amount of both

2. Rank the following age groups according to the number of members in your health club (1 equals most members; 6 equals least members).

___ (a) less than 20 years

___ (b) 21-30 years

___ (c) 31-40 years

___ (d) 41-50 years

___ (e) 51-60 years

___ (f) greater than 60 years

3. How many permanent full time (more than 35 hours per week) workers does your health club currently employ?

___ (a) less than 10 ___ (b) 10-20 ___ (c) 21-30

___ (d) 31-40 ___ (e) 41-50 ___ (f) more than 50

4. How many permanent part time (less than 35 hours per week) workers does your health club currently employ?

___ (a) less than 10 ___ (b) 10-20 ___ (c) 21-30

___ (d) 31-40 ___ (e) 41-50 ___ (f) more than 50

5. How many total memberships (i.e., individual, couple, family, etc.) do you have in your health club?

___ (a) less than 1,000

___ (b) 1,000 - 1,499

___ (c) 1,500 - 1,999

___ (d) 2,000 - 2,499

___ (e) 2,500 - 3,000

___ (f) more than 3,000

Section II: CPR Education

6. Does your health club provide CPR certification classes for its members?

___ (a) YES

___ (b) NO.....if NO skip to #8

7. When are CPR certification classes offered to your health club members?

___ (a) weekly

___ (b) monthly

___ (c) quarterly

___ (d) every 6 months

___ (e) yearly

8. Does your health club provide CPR certification classes for its employees?

___ (a) YES

___ (b) NO.....if NO skip to #10

9. When are CPR certification classes offered to your health club employees?

___ (a) weekly

___ (b) monthly

___ (c) quarterly

___ (d) every 6 months

___ (e) yearly

Section III: Employee CPR

Listed below are several job positions which may pertain to your health club. On the right side, indicate with YES or NO if that sub group is required to be certified in CPR. Omit any sub groups that does not apply.

| Position | YES - CPR is required<br>NO - CPR is not required | |
|---|---|---|
| 10. Aerobic Exercise Instructors | ___ (a) YES | ___ (b) NO |
| 11. Lifeguards | ___ (a) YES | ___ (b) NO |
| 12. Health Class Instructors (non-exercise, i.e., quit smoking, stress management, etc.) | ___ (a) YES | ___ (b) NO |
| 13. Massage Technicians | ___ (a) YES | ___ (b) NO |
| 14. Administrative Employees | ___ (a) YES | ___ (b) NO |
| 15. Membership and Marketing Offices | ___ (a) YES | ___ (b) NO |
| 16. Attendants (locker room, weight lifting room, etc.) | ___ (a) YES | ___ (b) NO |
| 17. Skilled Professionals (barbers, shoe shiners, etc.) | ___ (a) YES | ___ (b) NO |
| 18. Food Service Workers | ___ (a) YES | ___ (b) NO |
| 19. Volunteers | ___ (a) YES | ___ (b) NO |
| 20. Custodial | ___ (a) YES | ___ (b) NO |
| 21. Maintenance | ___ (a) YES | ___ (b) NO |
| 22. Security Workers | ___ (a) YES | ___ (b) NO |
| 23. Child Care Workers | ___ (a) YES | ___ (b) NO |
| 24. Other _____ | ___ (a) YES | ___ (b) NO |
| 25. _____ | ___ (a) YES | ___ (b) NO |

Section IV: Additional Safety Information

26. Do you screen for risk factors of heart disease in any way prior to enrolling a participant in your exercise program(s)?

___ (a) YES

___ (b) NO.....if NO skip to #28

27. How do you screen for risk factors at your health club? (check those that apply).

___ (a) written risk factor form

___ (b) risk factor interview

___ (c) pretested with submaximal exercise test

___ (d) pretested with maximal exercise test

___ (e) medical clearance from a doctor

___ (f) other (please specify) _____

28. What are the minimal requirements in regards to certification of your fitness instructor? (check those that apply).

___ (a) CPR certified

___ (b) First Aid certified

___ (c) Bachelor Degree in Physical Fitness or related field

___ (d) Fitness Instructor Certification (from within health club organization)

___ (e) Fitness Instructor Certification (from outside health club organization)

___ (f) other (please specify) _____

29. What is the estimated response time for an emergency vehicle to arrive at your health club after initially being called?

___ (a) less than 3 minutes

___ (b) 3 - 6 minutes

___ (c) 7 - 10 minutes

___ (d) 11 - 14 minutes

___ (e) 15 minutes or greater

___ (f) unknown

If you would like to see the results obtained from this study, send in the enclosed self-addressed stamped post card with your name and address included.

# APPENDIX B

# THE COVER LETTER

Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

# La Crosse Exercise Program



June 13, 1986

Dear Director:

Several studies have shown that Cardiopulmonary Resuscitation (CPR) is effective in saving lives in the community setting. Now that CPR is being utilized by the people of many communities, a question is raised as to the role that CPR should play in exercise settings. The purpose of my thesis is to investigate the current levels of safety in Wisconsin area membership-dependent health clubs with special emphasis in the area of CPR.

By completing this thesis, I will be fulfilling a requirement for my Master's Degree in Adult Fitness/Cardiac Rehabilitation at the University of Wisconsin-LaCrosse. I am writing my thesis under the direction of Dr. Philip Buckenmeyer.

If you would be willing to participate, please fill out the enclosed questionnaire and return it in the enclosed self-addressed, stamped envelope by June 27, 1986. All information will be kept confidential.

If you would like the results from this questionnaire, put your name and address on the enclosed self-addressed stamped post card and mail it back to me. Thank you for your time and cooperation.

Sincerely,

Daniel H. Lange

Enclosure

Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

# La Crosse Exercise Program



June 13, 1986

Dear Manager:

Several studies have shown that Cardiopulmonary Resuscitation (CPR) is effective in saving lives in the community setting. Now that CPR is being utilized by the people of many communities, a question is raised as to the role that CPR should play in exercise settings. The purpose of my thesis is to investigate the current levels of safety in Wisconsin area membership-dependent health clubs with special emphasis in the area of CPR.

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Sincerely,

Daniel H. Lange

Enclosure

Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

# La Crosse Exercise Program



June 27, 1986

Dear Director:

Two weeks ago you were mailed a questionnaire investigating the current levels of safety in Wisconsin area membership-dependent health clubs. If you have not already done so, please complete this questionnaire and mail it to me in the self-addressed stamped envelope provided. In case you have lost or misplaced the last questionnaire, I have enclosed a second copy. Your results will be strictly confidential. Again, thank you for your time and cooperation.

If you have any questions, feel free to call me at: (608) 784-0576.

Sincerely,

Daniel H. Lange

Enclosure

# La Crosse Exercise Program

Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601



June 27, 1986

Dear Manager:

Two weeks ago you were mailed a questionnaire investigating the current levels of safety in Wisconsin area membership-dependent health clubs. If you have not already done so, please complete this questionnaire and mail it to me in the self-addressed stamped envelope provided. In case you have lost or misplaced the last questionnaire, I have enclosed a second copy. Your results will be strictly confidential. Again, thank you for your time and cooperation.

If you have any questions, feel free to call me at: (608) 784-0576.

Sincerely,

Daniel H. Lange

Enclosure

# APPENDIX D

# ADDITIONAL COMMENTS

Question #24

"Other"

Listed below are "other" job positions which pertain to some health clubs.

| YMCA's/YWCA's | Mulit-purpose Facilities |
|---|---|
| Part time Employees | An "Activities" Person |
| Clerical Staff | |
| Service Desk Attendants | |
| Professional Staff | |
| Evening Staff | |
| Youth Staff | |
| Exempt Staff | |

---

Additional Comments

*Some other requirements of fitness instructors are:

- past experience in teaching/participating
- experience
- training sessions
- fitness knowledge, personality
- previous teaching experience

Comments

- The YMCA is not considered a health club.

- The YMCA does not have a specific health club.

- In general you might need a separate questionnaire for facilities such as ours. Our instructors get CPR certified through the Red Cross. We send instructors to get certified for YMCA programs that have a set format and standards (exercise physiology, etc.) to YMCA certified clinics. Occasionally if there is enough of a need, we put on a certification clinic at our YMCA and pay a fee to our Regional or National organization to supply us with certified teaching instructors, much like professionals from Red Cross who certifies our staff.

# APPENDIX E

# STATISTICAL SUMMARY

## Statistical Analysis

| 1. CPR Certification Classes | $z = 1.645$ | $X^2 = 3.841$ |
|---|---|---|
| a. Member CPR | -0.448 | *11.610 |
| b. Employee CPR | *9.286 | 4.360 |

| 2. Employee CPR Requirements | $z = 1.645$ | $X^2 = 3.841$ |
|---|---|---|
| Aerobic Instructors (.75) | *1.695 | 2.550 |
| Lifeguards (.75) | *3.256 | 1.390 |
| Health Class Instructors | *1.940 | 0.000 |
| Massage Technicians | -2.692 | 0.700 |
| Administrative Employees | 1.026 | 0.340 |
| Membership and Marketing | -3.542 | *4.030 |
| Attendants (.75) | -1.618 | 0.000 |
| Skilled Professionals | Insufficient Data | |
| Food Service Workers | -2.755 | 0.000 |
| Volunteers | -2.179 | 0.570 |
| Custodial | -6.071 | 0.000 |
| Maintenance | -6.180 | 0.000 |
| Security Workers | -3.494 | 0.000 |
| Child Care Workers | *1.739 | *8.940 |

| 3. Risk Factor Screening | $z = 1.645$ | $X^2 = 3.841$ |
|---|---|---|
| Total Comparison | *2.698 | 0.370 |
| Individual Comparisons | | |
| Written Risk Factor Form | | 0.000 |
| Risk Factor Inteview | | *13.720 |
| Sub-maximal Pretest | | 0.000 |
| Maximal Pretest | | Insufficent Data |
| Medical Clearance from Doctor | | 2.560 |

| 4. Fitness Instructor Certifications (Individual Comparisons) | $X^2 = 3.841$ |
|---|---|
| CPR Certification | 2.310 |
| First Aid | 3.740 |
| Bachelor Degree | 2.530 |
| Fitness Instructor Certification (Inhouse) | *5.670 |
| Fitness Instructor Certification (Out-of-house) | 0.000 |

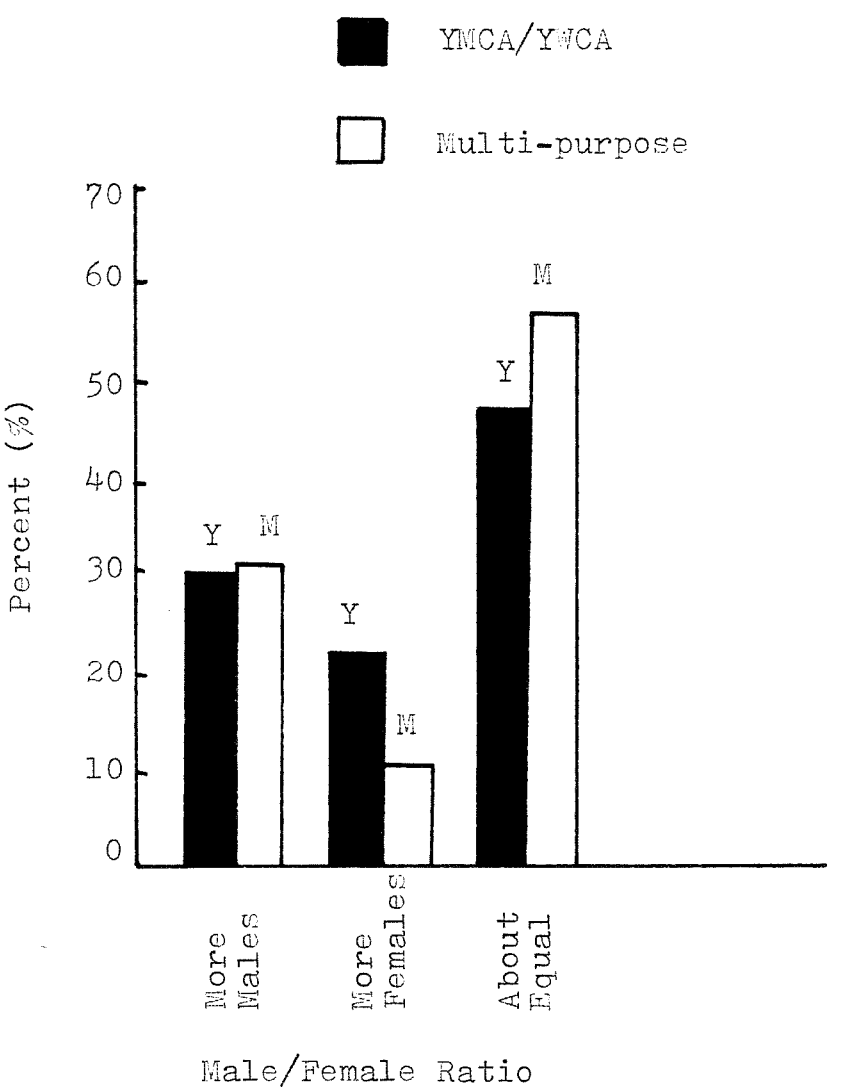
5. Emergency Vehicle Response Time-Grouped Means

| YMCA's/YWCA's | Multi-purpose |
|---|---|
| p 1.645 | 1.645 |
| *25.420 | *9.280 |

| Individual Comparisons | $X^2 = 3.841$ |
|---|---|
| Less than 3 minutes | 0.000 |
| 3 - 6 minutes | 2.900 |

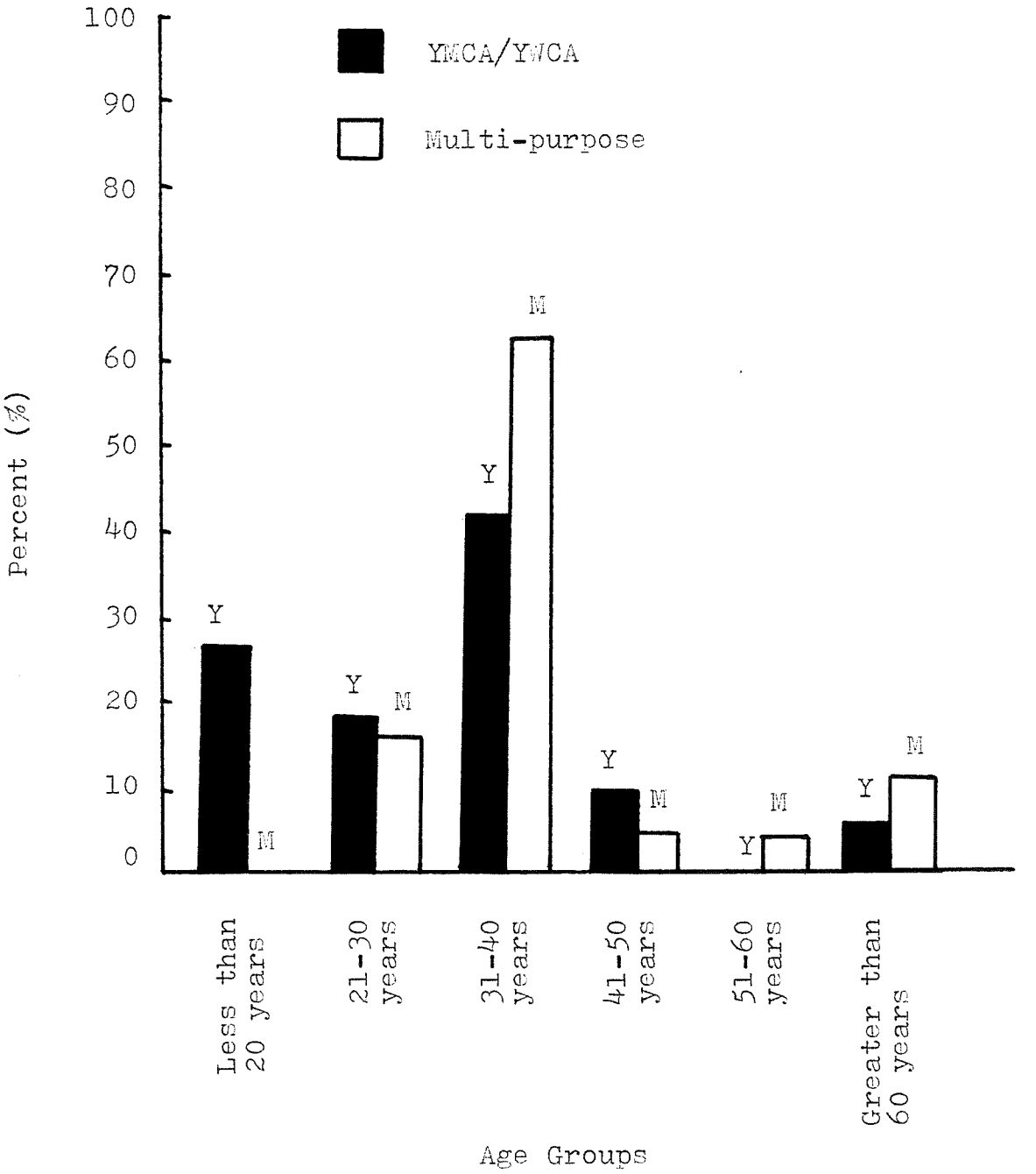
# APPENDIX F

## HEALTH CLUB MALE/FEMALE RATIO


YMCA/YWCA
Multi-purpose
Percent (%)
70
60
50
40
30
20
10
0
Y
M
Y
M
Y
M
More Males
More Females
About Equal
Male/Female Ratio

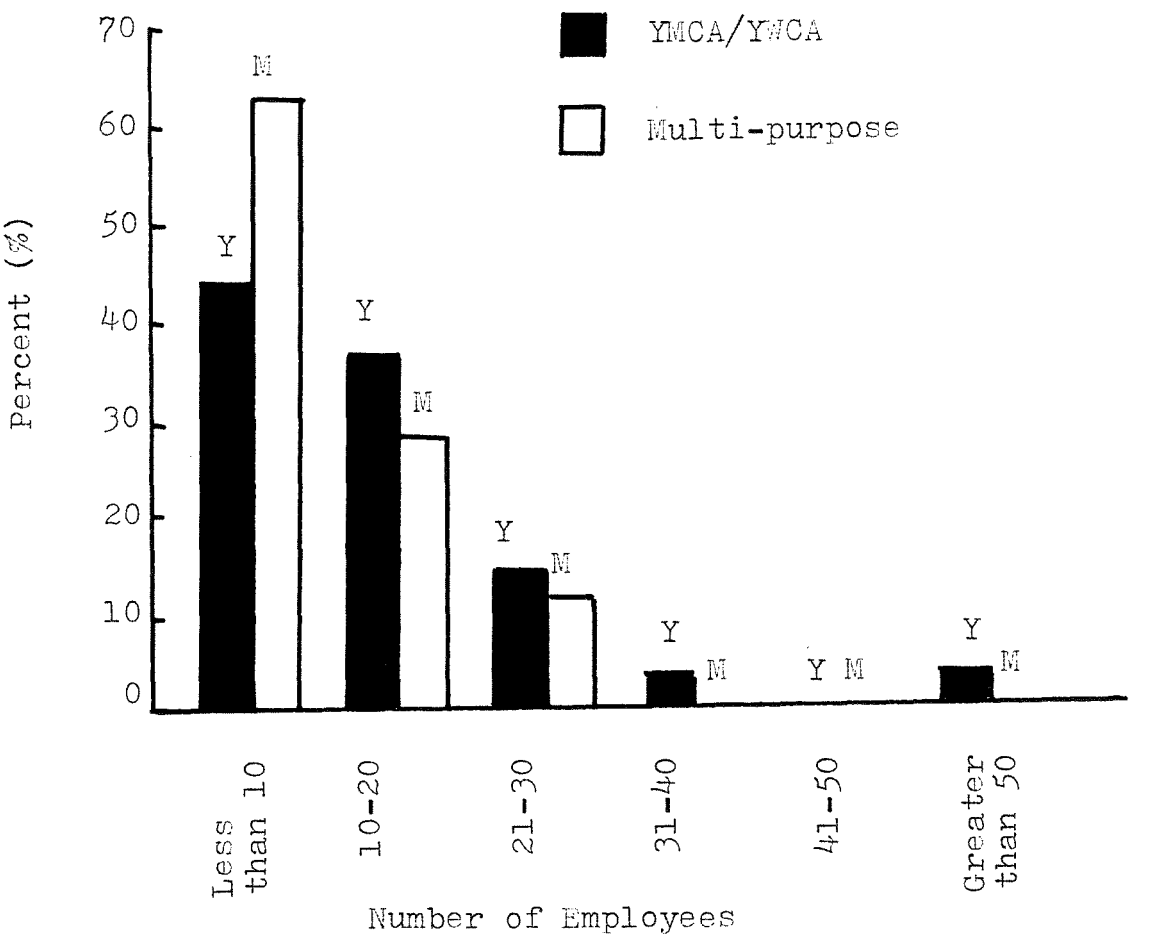
# APPENDIX G

## MAJORITY OF MEMBERS IN EACH AGE GROUP


100
90
80
70
60
50
40
30
20
10
0
Percent (%)
YMCA/YWCA
Multi-purpose
Y
M
Less than 20 years
21-30 years
31-40 years
41-50 years
51-60 years
Greater than 60 years
Age Groups

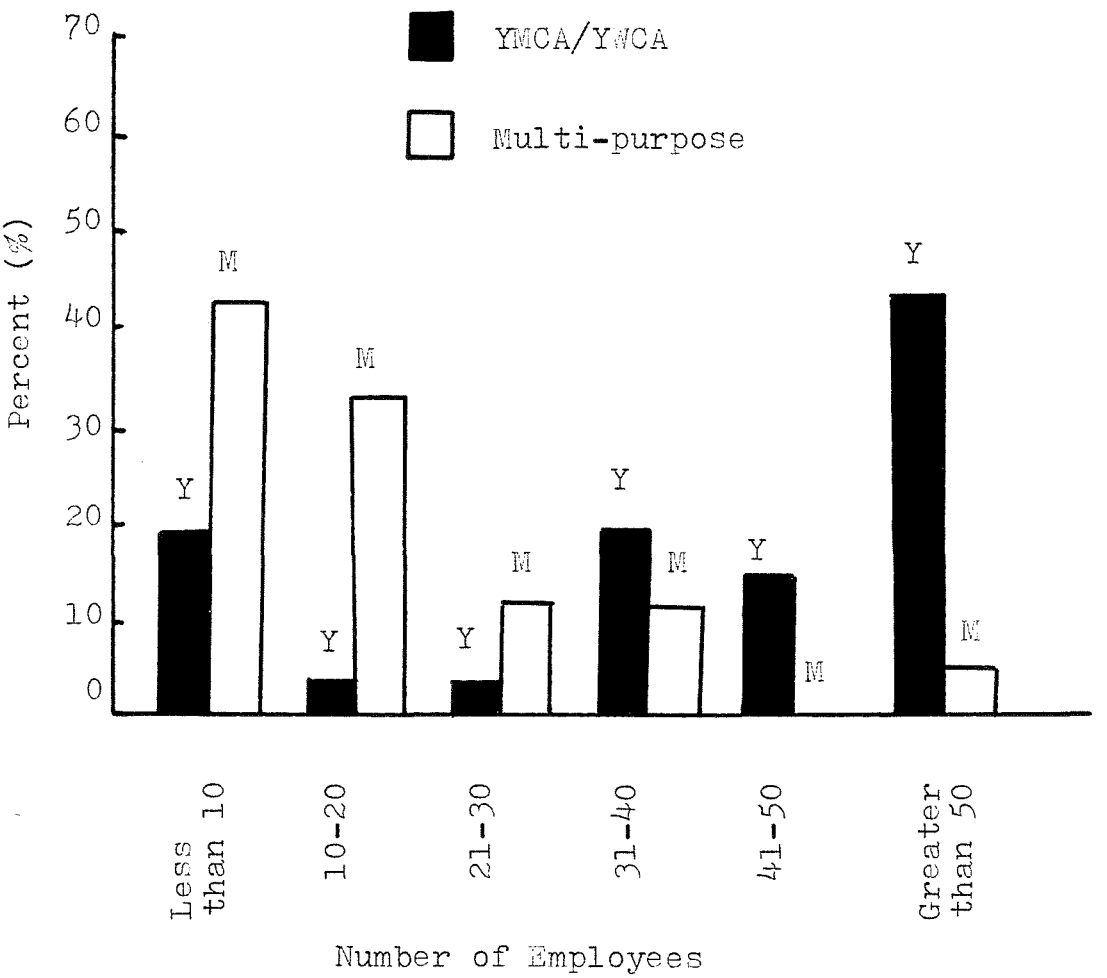
# APPENDIX H

## PERMANENT FULL TIME EMPLOYEES


YMCA/YWCA
Multi-purpose
Percent (%)
70
60
50
40
30
20
10
0
Y
M
Less than 10
10-20
21-30
31-40
41-50
Greater than 50
Number of Employees

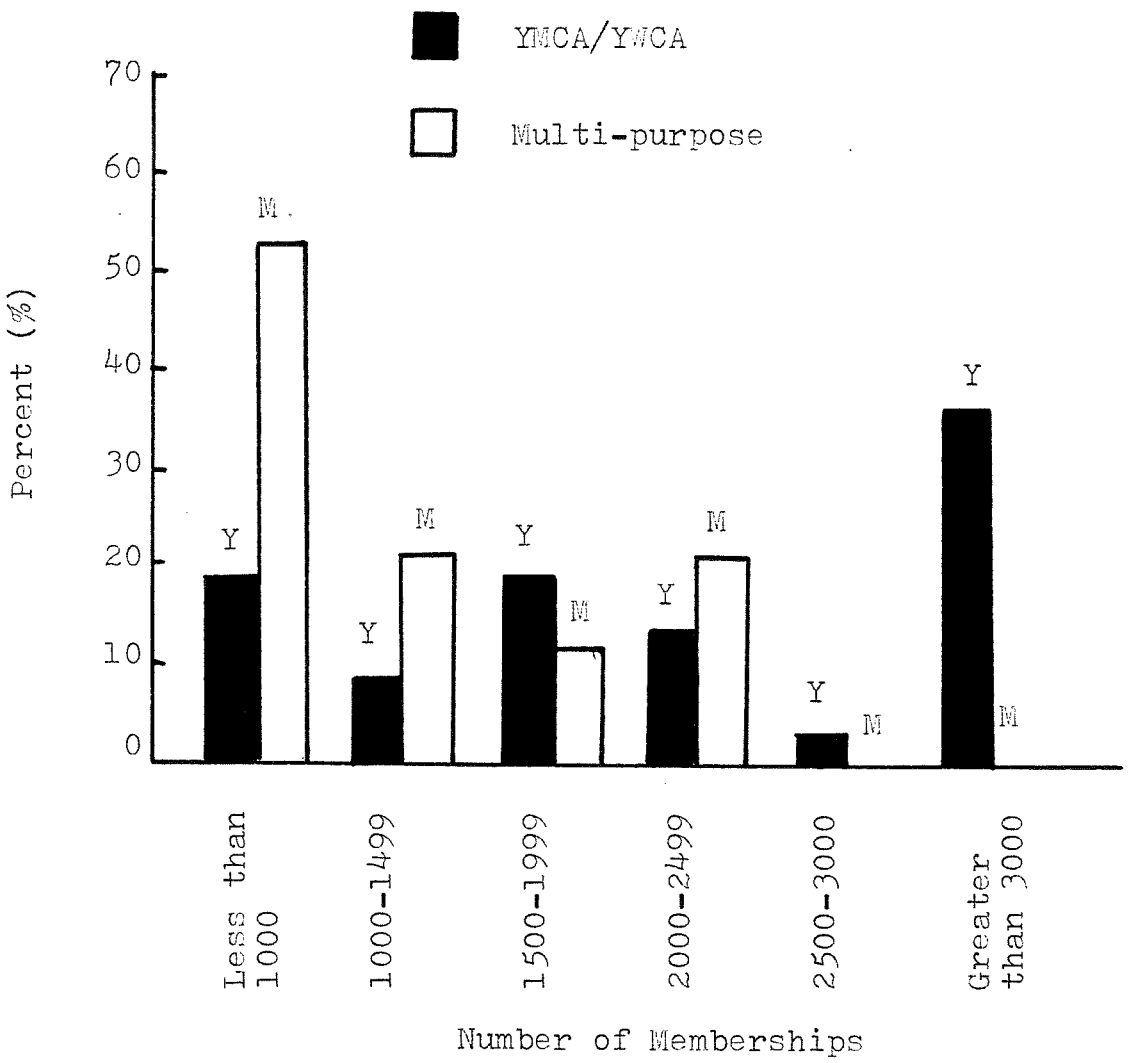
# APPENDIX I

# PERMANENT PART TIME EMPLOYEES


YMCA/YWCA
Multi-purpose
Percent (%)
70
60
50
40
30
20
10
0
Y
M
Less than 10
10-20
21-30
31-40
41-50
Greater than 50
Number of Employees

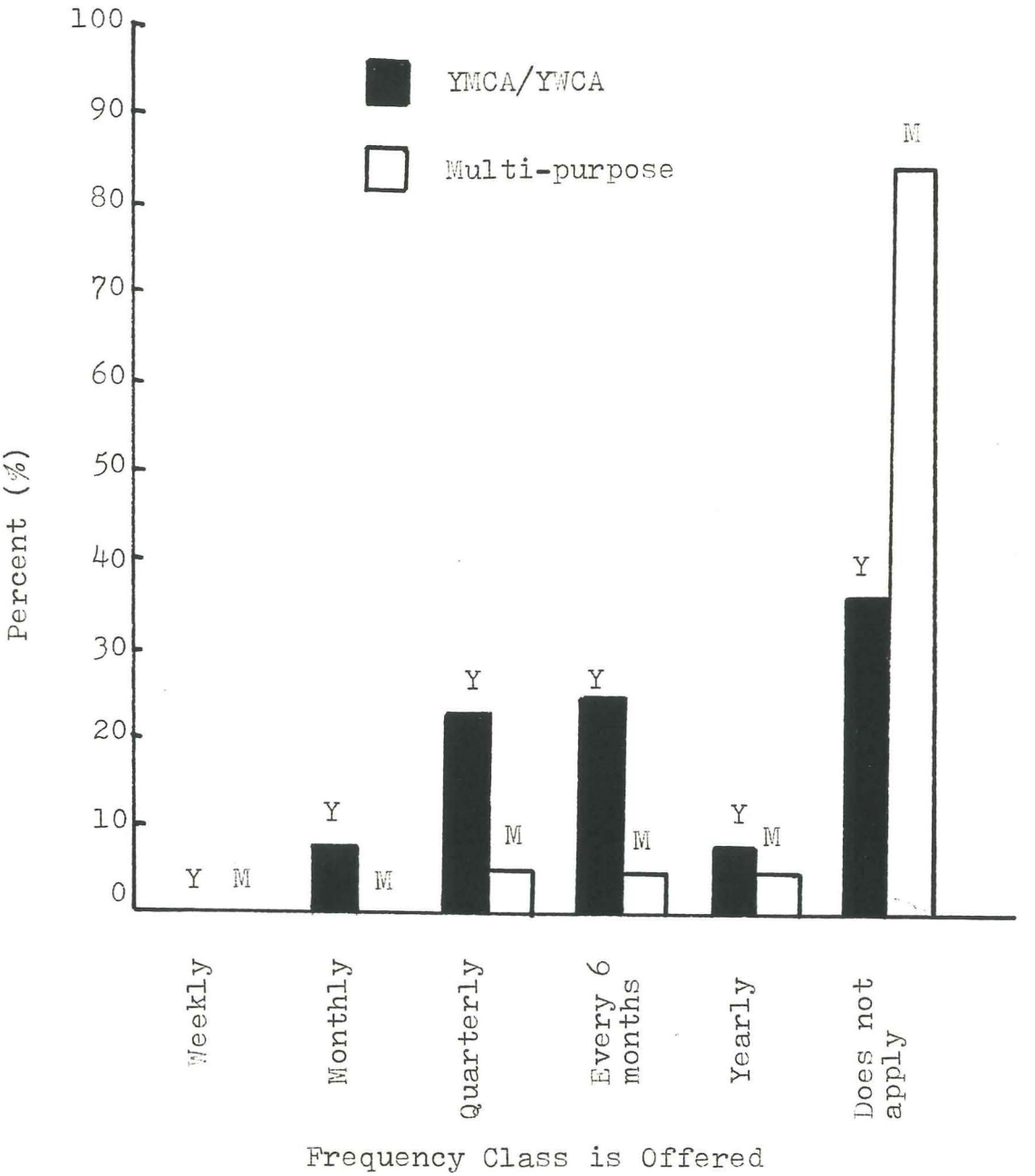
# APPENDIX J

# TOTAL MEMBERSHIPS


YMCA/YWCA
Multi-purpose
Percent (%)
70
60
50
40
30
20
10
0
Y
M
Less than 1000
1000-1499
1500-1999
2000-2499
2500-3000
Greater than 3000
Number of Memberships

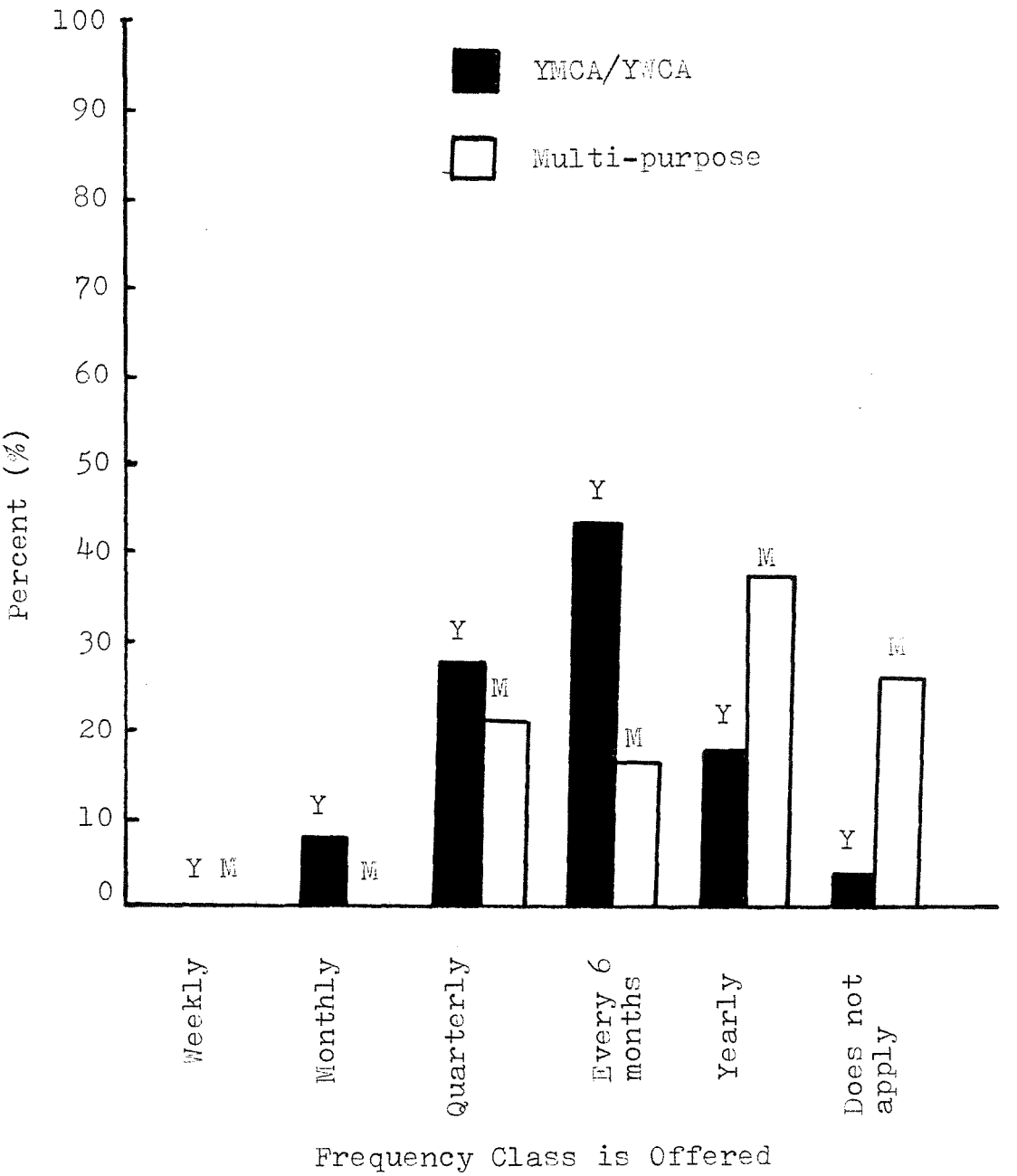
# APPENDIX K

# MEMBER CPR CERTIFICATION CLASSES


100
90
80
70
60
50
40
30
20
10
0
Percent (%)
YMCA/YWCA
Multi-purpose
Y
M
Weekly
Monthly
Quarterly
Every 6 months
Yearly
Does not apply
Frequency Class is Offered

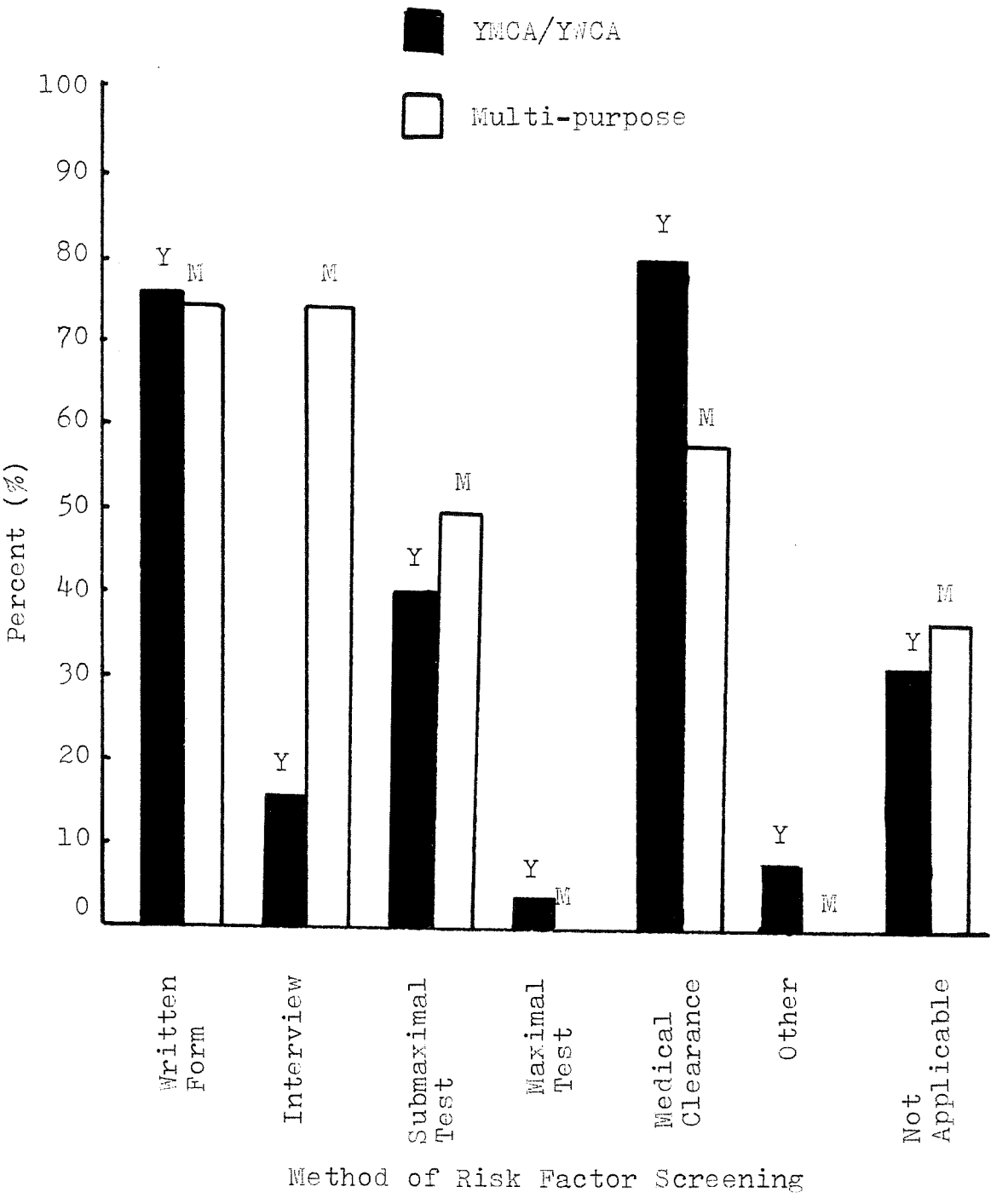
# APPENDIX L

# EMPLOYEE CPR CERTIFICATION CLASSES


100
90
80
70
60
50
40
30
20
10
0
Percent (%)
YMCA/YWCA
Multi-purpose
Y M
Y
M
Y
M
Y
M
Y
M
Y
M
Weekly
Monthly
Quarterly
Every 6 months
Yearly
Does not apply
Frequency Class is Offered

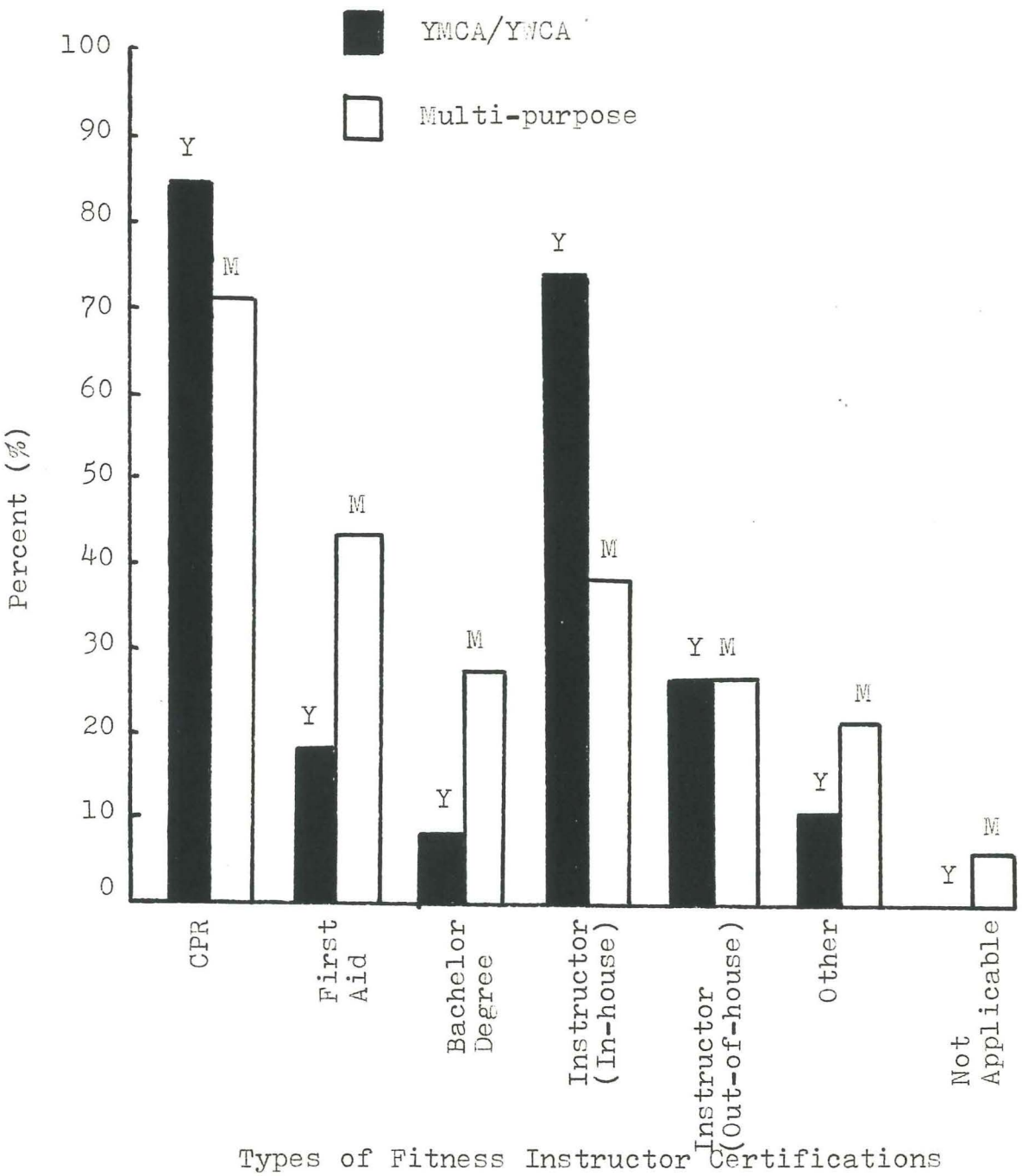
# APPENDIX M

# RISK FACTOR SCREENING


YMCA/YWCA
Multi-purpose
Percent (%)
100
90
80
70
60
50
40
30
20
10
0
Y
M
Written Form
Interview
Submaximal Test
Maximal Test
Medical Clearance
Other
Not Applicable
Method of Risk Factor Screening

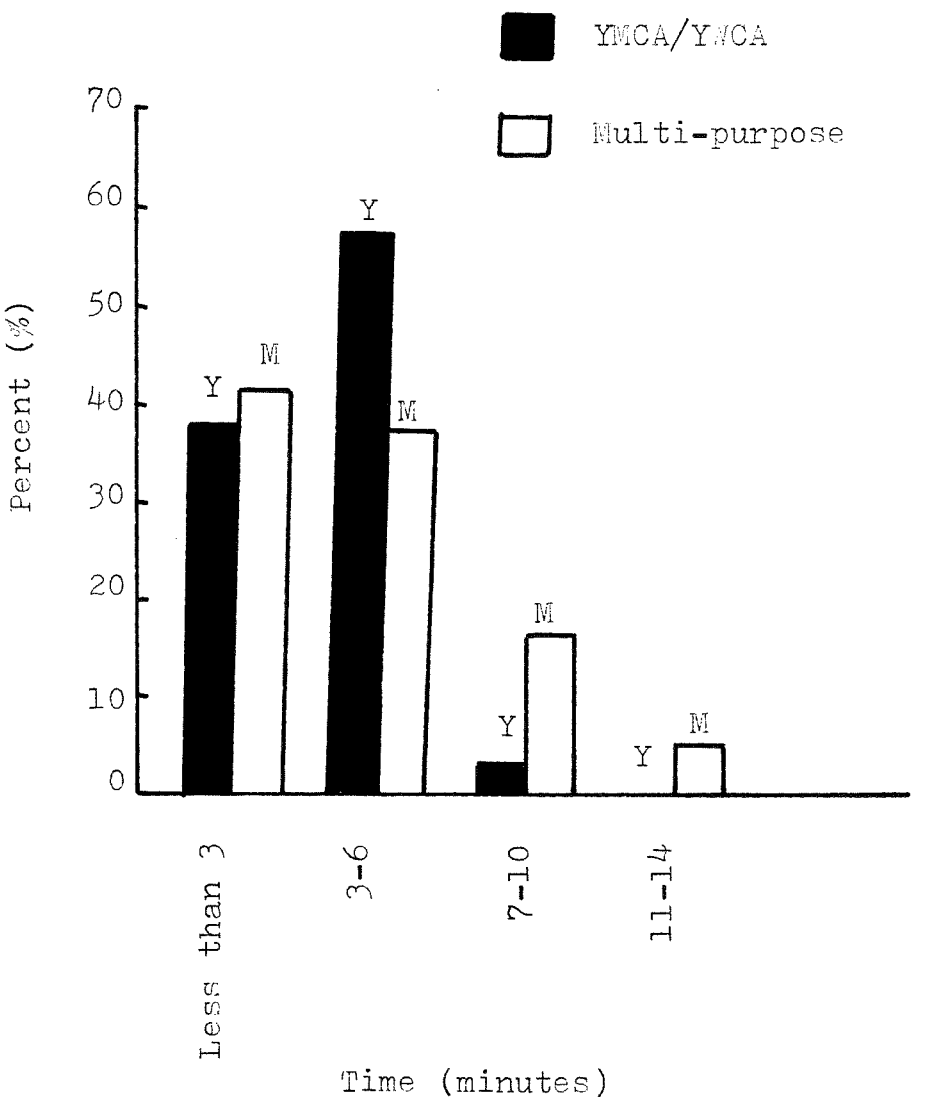
# APPENDIX N

# FITNESS INSTRUCTOR CERTIFICATIONS


YMCA/YWCA
Multi-purpose
Percent (%)
100
90
80
70
60
50
40
30
20
10
0
Y
M
CPR
First Aid
Bachelor Degree
Instructor (In-house)
Instructor (Out-of-house)
Other
Not Applicable
Types of Fitness Instructor Certifications

# APPENDIX O

# EMERGENCY VEHICLE RESPONSE TIME


YMCA/YWCA
Multi-purpose
70
60
50
40
30
20
10
0
Percent (%)
Y
M
Y
M
Y
M
Y
M
Less than 3
3-6
7-10
11-14
Time (minutes)