

**"MORTALITY DURING U.S. ARMED FORCES BASIC TRAINING: A 25-YEAR
REVIEW (1977-2001)"**

by

Stephanie L. Scoville

A dissertation submitted to the Faculty of the
Department of Preventive Medicine and Biometrics,
Uniformed Services University of the Health Sciences
in partial fulfillment of the requirements for the degree

of

DOCTOR OF PUBLIC HEALTH, 2002

Dissertation and Abstract Approved:

David F. Cruess, Ph.D.
Committee Chairperson

COL John W. Gardner, M.D., Dr.P.H.
Dissertation Advisor

Col Gary D. Gackstetter,
D.V.M., M.P.H., Ph.D.
Committee Member

COL(ret) John A. Kark, M.D.
Committee Member

Col(ret) Michael R. Peterson,
D.V.M., M.P.H., Dr.P.H.
Committee Member

Patricia A. Deuster, Ph.D., M.P.H.
Committee Member

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE

AUG 2002

2. REPORT TYPE

N/A

3. DATES COVERED

-

4. TITLE AND SUBTITLE

MORTALITY DURING U.S. ARMED FORCES BASIC TRAINING: A 25-YEAR REVIEW (1977-2001)

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

STEPHANIE L. SCOVILLE

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Uniformed Services University of the Health Sciences

8. PERFORMING ORGANIZATION
REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT
NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Background: Efforts to understand and prevent the rare, but tragic, occurrence of death among healthy, young military recruits trying to serve their country depend upon medical surveillance data and accurate determination of mortality rates by specific cause. The purpose of this study was to create a Recruit Mortality Registry that includes deaths that have occurred during Air Force, Navy, Marine Corps, and Army basic military training from 1977 through 2001, and to describe the epidemiology of recruit mortality due to traumatic and nontraumatic deaths. **Methods:** Recruit deaths were identified and confirmed through redundant sources. Attempts were made to obtain a complete file on each death including all available medical and personnel records. Demographic, circumstantial, and medical information was recorded on an abstraction form developed for this study. Mortality rates per 100,000 recruit-years were calculated using recruit accession data from the Defense Manpower Data Center. **Results:** There were 276 recruit deaths from 1977 through 2001 identified through the Recruit Mortality Registry. Age-specific recruit mortality rates were less than half of same-age U.S. civilian mortality rates. Between Services, the age-adjusted mortality rates were highest in the Army and lowest in the Air Force and Navy, with the Marine Corps in between. The majority (71%) of recruit deaths were classified as nontraumatic and 69% (136/196) of these were exercise-related. Of the exercise-related deaths, 42% (57/136) were cardiac deaths and at least one-third (45/136) were related to heat stress. Infectious agents accounted for 24% (48/196) of the nontraumatic deaths. Only 29% (80/276) of recruit deaths were classified as traumatic. Of these, the majority (58%) were due to suicide, followed by unintentional injuries (37%), and homicide (5%). **Conclusions:** Comparison of military recruit mortality rates with the same-age U. S. civilian population establishes the safety of the basic military training environment. This can be attributed to selection factors in inducting healthy recruits, a well-supervised training environment, the tremendous focus on safety during recruit training, and lack of access to alcohol and motor vehicles. Preventive measures focused on reducing heat stress during exercise may be effective in reducing high rates of exercise-related death.

15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 154	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

The author hereby certifies that the use of any copyrighted material in the dissertation manuscript entitled:

**"MORTALITY DURING U.S. ARMED FORCES BASIC TRAINING: A 25-YEAR
REVIEW (1977-2001)"**

is appropriately acknowledged and, beyond brief excerpts, is with the permission of the copyright owner.

Stephanie L. Scoville
Department of Preventive Medicine and Biometrics
Uniformed Services University of the Health Sciences

ABSTRACT

"MORTALITY DURING U.S. ARMED FORCES BASIC TRAINING: A 25-YEAR
REVIEW (1977-2001)"

by

Stephanie L. Scoville, Doctor of Public Health

Uniformed Services University of the Health Sciences, 2002

Dissertation Advisor: John Gardner, M.D., Dr.P.H.
Department: Preventive Medicine and Biometrics
Division: Epidemiology and Biostatistics

Background: Efforts to understand and prevent the rare, but tragic, occurrence of death among healthy, young military recruits trying to serve their country depend upon medical surveillance data and accurate determination of mortality rates by specific cause. The purpose of this study was to create a Recruit Mortality Registry that includes deaths that have occurred during Air Force, Navy, Marine Corps, and Army basic military training from 1977 through 2001, and to describe the epidemiology of recruit mortality due to traumatic and nontraumatic deaths.

Methods: Recruit deaths were identified and confirmed through redundant sources. Attempts were made to obtain a complete file on each death including all available medical and personnel records. Demographic, circumstantial, and medical information

was recorded on an abstraction form developed for this study. Mortality rates per 100,000 recruit-years were calculated using recruit accession data from the Defense Manpower Data Center.

Results: There were 276 recruit deaths from 1977 through 2001 identified through the Recruit Mortality Registry. Age-specific recruit mortality rates were less than half of same-age U.S. civilian mortality rates. Between Services, the age-adjusted mortality rates were highest in the Army and lowest in the Air Force and Navy, with the Marine Corps in between. The majority (71%) of recruit deaths were classified as nontraumatic and 69% (136/196) of these were exercise-related. Of the exercise-related deaths, 42% (57/136) were cardiac deaths and at least one-third (45/136) were related to heat stress. Infectious agents accounted for 24% (48/196) of the nontraumatic deaths. Only 29% (80/276) of recruit deaths were classified as traumatic. Of these, the majority (58%) were due to suicide, followed by unintentional injuries (37%), and homicide (5%).

Conclusions: Comparison of military recruit mortality rates with the same-age U. S. civilian population establishes the safety of the basic military training environment. This can be attributed to selection factors in inducting healthy recruits, a well-supervised training environment, the tremendous focus on safety during recruit training, and lack of access to alcohol and motor vehicles. Preventive measures focused on reducing heat stress during exercise may be effective in reducing high rates of exercise-related death.

UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

**"MORTALITY DURING U.S. ARMED FORCES BASIC TRAINING: A 25-YEAR
REVIEW (1977-2001)"**

A DISSERTATION SUBMITTED TO THE FACULTY OF THE
DEPARTMENT OF PREVENTIVE MEDICINE AND BIOMETRICS
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PUBLIC HEALTH

BY
STEPHANIE L. SCOVILLE

AUGUST 2002

ACKNOWLEDGMENTS

I am grateful to the coauthors of the manuscripts included in this dissertation, the Uniformed Services University of the Health Sciences, the Armed Forces Institute of Pathology, and the United States Army Center for Health Promotion and Preventive Medicine for the assistance, guidance, and support provided in making this study possible. Their commitment to preservation of military and public health has been instrumental in the development of this dissertation.

I would like to thank all the members of my committee for their guidance: David F. Cruess, Ph.D., Professor & Deputy Chairperson, Biometrics, Department of Preventive Medicine and Biometrics (Committee Chairperson); COL John Gardner, M.D., Dr.P.H., Professor, Division of Epidemiology and Biostatistics, Department of Preventive Medicine and Biometrics (Major Dissertation Advisor); COL(ret) John A. Kark, M.D., Associate Professor of Medicine, Hematology/Oncology Service, Howard University Hospital; Col Gary D. Gackstetter, D.V.M., M.P.H., Ph.D., Associate Professor and Director of Graduate Programs, Department of Preventive Medicine and Biometrics; Patricia A. Deuster, Ph.D., M.P.H., Professor and Director, Applied Human Biology Division, Department of Military and Emergency Medicine; and Col(ret) Michael R. Peterson, D.V.M., M.P.H., Dr.P.H., Deputy Director, Health Program Analysis and Evaluation, TRICARE Management Activity.

DEDICATION

To my wonderful parents - thank you for emotionally and financially supporting me through my baccalaureate and graduate education. I would also like to thank my best friend and soul mate, Rich, for all of the happiness he has brought me. Thanks Mom, Dad, and Rich for all of your love - you mean more to me than words can express!

TABLE OF CONTENTS

ABSTRACT iii

ACKNOWLEDGMENTS vi

LIST OF TABLES ix

LIST OF FIGURES xi

Chapter

1. INTRODUCTION 1

2. METHODOLOGY 9

3. MANUSCRIPT 1: TRAUMATIC DEATHS DURING U.S. ARMED
FORCES BASIC TRAINING: A 25-YEAR REVIEW (1977-2001)..... 17

4. MANUSCRIPT 2: NONTRAUMATIC DEATHS DURING U.S. ARMED
FORCES BASIC TRAINING: A 25-YEAR REVIEW (1977-2001)..... 49

5. CONCLUSION..... 75

 Discussion of Research Findings 75

 Public Health Relevance 76

 Recommendations for Future Research 77

 Summary 79

Appendix

1. REPORT OF CASUALTY (DD FORM 1300) 82

2. PRIMARY DATA ABSTRACTION FORM 83

3. SUPPLEMENTAL DATA ABSTRACTION FORMS 85

4. DATABASE DOCUMENTATION 87

5. DATABASE CODEBOOK 90

6.	TOTAL NONPRIOR SERVICE ACTIVE COMPONENT ENLISTED ACCESSIONS, FISCAL YEARS 1977-2001	96
7.	POPULATION DATA TABLES	97
8.	TOTAL NONPRIOR SERVICE MARINE CORPS RESERVE COMPONENT ENLISTED ACCESSIONS, FISCAL YEARS 1977-2000	123
9.	TOTAL NONPRIOR SERVICE MARINE CORPS ACTIVE COMPONENT ENLISTED ACCESSIONS, FISCAL YEARS 1977-2000	124
10.	LINE LISTING OF TRAUMATIC RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001	125
11.	LINE LISTING OF NONTRAUMATIC EXERCISE-RELATED RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001	130
12.	LINE LISTING OF NONTRAUMATIC (NONEXERCISE-RELATED) RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001	137
	BIBLIOGRAPHY	141

LIST OF TABLES

Table (Chapter 3)	Page
1. All-Service traumatic and overall mortality rates (per 100,000 nonprior service Active Component recruit-years) by 5-year categories, 1977-2001.....	36
2. Number of traumatic recruit deaths (n), recruit accessions (N), and category-specific mortality rates (per 100,000 nonprior service Active Component recruit-years), 1977-2001	37
3. Number of recruit suicides by method and Service, 1977-2001.....	38
4. Case summaries of recruit gunshot suicides by Service, 1977-2001.....	39
5. Case summaries of recruit hanging suicides by Service, 1977-2001.....	41
6. Case summaries of recruit jump or fall suicides by Service, 1977-2001.....	43
7. Proportion of recruit unintentional injuries by type and Service, 1977-2001	45
8. Case summaries of unintentional injury recruit deaths by type and Service, 1977-2001	46

LIST OF TABLES (Continued)

Table (Chapter 4)	Page
1. All-Service nontraumatic and overall mortality rates (per 100,000 nonprior service Active Component recruit-years) by 5-year categories, 1977-2001.....	67
2. Number of nontraumatic recruit deaths (n), recruit accessions (N), and category-specific mortality rates (per 100,000 nonprior service Active Component recruit-years), 1977-2001	68
3. Nontraumatic causes of recruit deaths, 1977-2001	69
4. Cardiac causes of recruit deaths, 1977-2001	70
5. Fatal streptococcal infections during basic military training by year, 1977-2001	71
6. <i>Neisseria meningitidis</i> recruit deaths by year, 1977-2001	72
7. Recruit deaths due to <i>Staphylococcus aureus</i> by year, 1977-2001.....	73
8. Other infectious disease recruit deaths by clinical diagnosis and year, 1977-2001	74

LIST OF FIGURES

Figure	Page
1. Distribution of traumatic recruit deaths by Service, 1977-2001	35

CHAPTER 1

INTRODUCTION

The Report of Casualty (DD Form 1300) is the official record of death for all military personnel who die while serving on active duty (appendix 1). The Military Service casualty offices collect some medical information (e.g., death certificates) and provide monthly automated data files containing an individual record for each completed DD Form 1300 to the Directorate for Information Operations and Reports (DIOR) at the Washington Headquarters Services of the Department of Defense (DoD) (1). These data are incorporated into the Worldwide Casualty System (WCS) that has been maintained and operated by the DIOR since 1979. The DIOR is the source of statistical information for the DoD and publishes periodic summaries of all active duty casualties by type (hostile and nonhostile) and manner of death, branch of Military Service, geographic location, and year of occurrence (2). These casualty data, routinely compiled on a fiscal year (FY) basis (October 1 through September 30), categorize manner of nonhostile deaths by accident (hereafter referred to as unintentional injury), illness, homicide, self-inflicted (hereafter referred to as suicide), undetermined, or pending. Also included is basic decedent demographic information such as sex, race, pay grade, and age at death.

Beary et al. (3) utilized data from the WCS to describe the ten leading causes of death for active duty military personnel for the two-year period 1981-1982. The purpose of their study was to calculate estimates of associated costs for major causes of mortality and to use these data to assist in the formulation of health policy. Unfortunately, neither the Beary et al. (3) study nor the DoD periodic summaries (2) provide detailed epidemiological or risk information.

In 1996, Helmkamp and Kennedy (4, 5) published the first epidemiologic analysis of deaths in the entire U.S. active duty military population. WCS data were obtained in electronic form for active duty deaths during the 14-year period of 01 January 1980 through 31 December 1993. Gardner et al. (6) expanded these analyses by obtaining WCS data for the 19-year period of 01 January 1980 through 31 December 1998, and concluded that military mortality rates had decreased during the past two decades by nearly half. They showed that the distribution of manner of death was about half due to unintentional injury, 20% due to illness, 20% due to suicide, and 5% due to homicide. One limitation of these analyses of military mortality was the limited medical information available from the WCS. The DD Form 1300 lacks specific information on medical and circumstantial causes of death, as well as risk factor information (4-8).

To overcome these limitations, the Armed Forces Institute of Pathology (AFIP) implemented the Department of Defense Medical Mortality Registry (DoD-MMR) at the Office of the Armed Forces Medical Examiner to provide the first comprehensive medical mortality surveillance system for the DoD (6). The goal of the DoD-MMR is to obtain complete medical and circumstantial information (i.e., medical records, autopsy reports, investigative reports, and eyewitness accounts) for every military active duty death. Establishment of the DoD-MMR has created new opportunities for prevention-oriented analyses and other intervention research.

Deaths occurring during basic military training (BMT) are of particular interest because these deaths are highly visible to the general public, often result in litigation, and can create immediate policy implications. Because recruits are younger than 36 years and are screened for good health, each death can be considered premature. Efforts to

understand and prevent the rare, but tragic, occurrence of death among recruits depend upon an active medical surveillance system and accurate determination of mortality rates by specific cause. However, epidemiologic information on mortality during BMT is limited. A search of all publications from 1977 through 2001 was conducted using the U.S. National Library of Medicine's MEDLINE® (Medical Literature, Analysis, and Retrieval System Online) to identify published analyses of U.S. Armed Forces (Air Force, Navy, Marine Corps, and Army) BMT deaths occurring since 1977. The literature search identified four population-based studies (9-12) and six isolated case reports (13-18). The population-based studies focused either on a single branch of Military Service or a specific cause of death. The case reports described three deaths related to exercise (13, 15, 17), four infectious disease deaths (14, 18), and one unintentional injury death (16).

Of the four population-based studies of mortality during BMT, two were Air Force studies (9, 11). Phillips et al. (11) published a 20-year review of sudden cardiac deaths during Air Force BMT at Lackland Air Force Base, Texas, the only training site for Air Force BMT. Retrospective review of autopsy records identified 21 cardiac deaths (19 sudden and two nonsudden) and 32 noncardiac deaths during the period of 1965 through 1985. Strenuous physical exertion was associated with sudden cardiac death in 17 of 19 cases. In addition to reviewing the case histories, clinical records, circumstances of death, and autopsy reports, microscopic heart sections (19 of the cardiac deaths and 17 noncardiac deaths) were independently reviewed by two masked cardiovascular pathologists. Drehner et al. (9) expanded this study population by conducting a descriptive analysis of recruit mortality from 1956 through 1996. All autopsy records

were retrospectively reviewed and screened for subjects with the rank of Airman Basic at the time of death. A total of 85 deaths were identified, with 81% being nontraumatic, 17% traumatic (11 suicides and three unintentional injuries), and 2% not classified. Of the nontraumatic deaths, 30 were attributed to cardiac causes (at least 23 of these were exercise-related) and 28 primarily caused by infections. Limitations to both studies by Drehner et al. (9) and Phillips et al. (11) include the retrospective identification of recruit deaths by individual review of autopsy records. Their methodology failed to identify recruit deaths with no postmortem examination. In addition, Drehner et al. (9) determined cause of death by using only one data source - autopsy reports. Because autopsy reports are not standardized, an accurate cause of death determination is difficult due to the wide variability in the amount and type of data collected. Although Phillips et al. (11) used multiple data sources to categorize their study deaths, only 43 of 53 underwent this critical review process.

One population-based study categorized the causes and circumstances of death occurring during BMT at two military training facilities. Wagner and Clark (10) captured 31 on-base recruit deaths from 1973 through 1985 at the Marine Corps Recruit Depot (MCRD) and the Recruit Training Command (RTC) in San Diego, California. Deaths from 1973 to 1981 were identified retrospectively by manually searching autopsy files. Deaths from 1981 through 1985 were identified prospectively by one of the authors who performed or supervised all autopsies on recruits who died during BMT. There were 22 (71%) nontraumatic deaths and nine traumatic deaths (four suicides, four unintentional injuries, and one homicide). Of the 22 nontraumatic deaths, there were ten infectious disease deaths and six exercise-related cardiac deaths. One significant strength of this

study was the comprehensive data review of autopsy reports, autopsy photographs, histopathology slides, investigative reports, and hospital records. However, Navy and Marine Corps recruit deaths occurring at the other training sites were not included (i.e., MCRD Parris Island, South Carolina; RTC Orlando, Florida; and RTC Great Lakes, Illinois). In addition, recruit deaths in females were excluded because only male recruits trained at the study sites during the study period. Therefore, this study only described the mortality experience of a narrow cross-section of the Navy and Marine Corps recruit population.

One population-based study of mortality during BMT was a Tri-Service study. Kark et al. (12) demonstrated a substantially higher risk of exercise-related sudden death unexplained by prior disease in recruits with sickle cell trait (SCT). Deaths in recruits undergoing U.S. Armed Forces BMT from 1977 through 1981 were identified by individually reviewing autopsy files, morgue logs, and patient administration logs of the 17 hospitals serving the 15 BMT sites. Military service records were used to confirm deaths among recruits during BMT. It was possible to miss some deaths because of the tendency to medically retire individuals with terminal illness to maximize financial benefits for their families. For this reason, deaths of retired enlisted personnel were also examined to determine whether retirement coincided with hospitalization during BMT. Although the generalizability of this study is limited by the small sample size over the five-year study period, a major strength was the methodology used to identify deaths occurring during BMT and the redundant data sources used for cause of death determination. Full autopsy protocols with toxicology, clinical records, eyewitness accounts, and legal reviews of training circumstances were critically reviewed for each

death. In addition, tissue specimens of the exercise-related and sudden deaths were reexamined by pathology subspecialists.

The results of these four population-based studies suggest that the three major causes of mortality during BMT are exercise-related deaths (ERDs), traumatic deaths (i.e., unintentional injuries, suicides, and homicides), and infectious disease deaths. However, the specific etiologies and risk factors for these categories of death are poorly documented. In an unpublished paper, Kark et al. (19) expanded the scope of their SCT study and analyzed all ERDs during BMT from 1977 through 1981. Of 41 ERDs, 14 (34%) were attributed to exertional heat illness (EHI) and 11 (27%) were attributed to preexisting heart disease. SCT was associated with 14 (34%) ERDs, of which half had EHI. These findings suggest that the role of existing cardiac disease, heat stress, and SCT in ERD during BMT require further evaluation over a longer study period to determine the focus for preventive interventions.

The current epidemiologic information on traumatic deaths during BMT lacks standardized data collection and cause of death coding. Drehner et al. (9) identified 11 completed suicides, three unintentional injuries, and no homicides for Air Force recruits undergoing BMT from 1956 through 1996. The most common modality for committing suicide was jumping from heights (seven cases), followed by hanging (two cases), exsanguination, and drug overdose. Two of the unintentional injuries were related to falling and one involved a pedestrian hit by a vehicle. Wagner and Clark (10) identified four suicides, four unintentional injuries, and one homicide in recruits undergoing BMT from 1973 through 1985 at the MCRD and RTC in San Diego, California. The methods of suicide included three gunshot wounds and one hanging. The four unintentional injury

deaths occurred during an artillery mishap (missile wound), self-defense training (blunt force trauma), and swim training (two drownings). The homicide occurred on the rifle range. A clear understanding of traumatic deaths within the Army recruit population is limited by the lack of published studies. The literature contains no case reports or comprehensive reviews of traumatic deaths during Army BMT. Koshes and Rothberg (20) examined the epidemiology of suicide attempts in Army active duty trainees assigned to a training post in a 16-month period between 1989 and 1991. However, this study did not examine completed suicides nor did it focus specifically on recruits undergoing BMT.

The etiologies and risk factors for infectious disease deaths during BMT also remain poorly documented. Infectious agents appear to account for approximately one-third of mortality during BMT (9, 10). Drehner et al. (9) identified 28 (33%) infectious disease deaths (11 cardiac, ten pulmonary, six central nervous system related, and one systemic) in Air Force recruits undergoing BMT from 1956 through 1996. Similarly, Wagner and Clark (10) identified ten (32%) infectious disease deaths (six pulmonary, three central nervous system related, and one other) in recruits undergoing BMT from 1973 through 1985 at the MCRD and the RTC in San Diego, California. Infectious agents are a significant concern because crowded living conditions during BMT may provide an ideal setting for infectious disease transmission. Recruits usually receive routine immunizations during their first week of training and often prophylactic penicillin. Benzathine penicillin G is often given for prophylaxis against infection with *Streptococcus pyogenes* but the protective effect diminishes after 3-4 weeks. Disease resulting from *S. pyogenes* persists as an important infectious cause of mortality in military recruits and no

vaccine has been developed (14, 21). In addition, adenoviral infection has become an emerging threat because the sole manufacturer of adenoviral vaccine (types 4 and 7) ceased production in 1995 and vaccine supplies were depleted in 1999. Since 1999, approximately 10-12% of all recruits have become ill with adenovirus infection during BMT, similar to the prevaccine era, and in 2000, two recruits died of adenovirus-related illness (18).

In conclusion, a critical review of the scientific literature published from 1977 through 2001 suggests that ERDs, traumatic deaths, and infectious disease deaths are three major causes of mortality in recruits undergoing BMT. However, these generalizations are based on a limited number of studies, each with methodological limitations.

The purpose of this dissertation is to create a Recruit Mortality Registry that includes all deaths that have occurred during U.S. Armed Forces BMT over the 25-year period 1977 through 2001. Cases are identified through the Defense Manpower Data Center (DMDC) and Military Service casualty offices. Standardized cause of death coding is facilitated by collection from multiple sources of information to determine cause of death (i.e., DD Form 1300, autopsy reports, AFIP consultations, medical records, and investigative reports). Mortality rates are calculated using recruit accession data from the DMDC. This Registry will become a unique resource for the DoD by providing the type of information regarding preventability of recruit deaths. When specific preventive measures are identified and implemented, this Registry will enable surveillance of the effectiveness of these intervention efforts.

CHAPTER 2

METHODOLOGY

The purpose of this chapter is to describe both the BMT process and the study methodology. BMT includes an in-processing period (usually 3-7 days) and a training period. The duration of the training period and location of training varies between the Military Services based upon their unique missions. As of 2001, the training period was six weeks for the Air Force, nine weeks for both the Navy and Army, and 12 weeks for the Marine Corps at a total of nine training installations. The Air Force conducts BMT at Lackland Air Force Base in San Antonio, Texas. The MCRD San Diego, California, trains only males and the Weapons and Field Training Battalion is located at Camp Pendleton, California. Both male and female recruits train at the MCRD Parris Island, South Carolina. Navy BMT is currently conducted only at the RTC Great Lakes, Illinois. There were additional bases in Orlando, Florida (through 1994), and San Diego, California (through 1993), that were operational during the study period. Presently the Army conducts BMT at Fort Jackson, South Carolina; Ft. Knox, Kentucky; Ft. Leonard Wood, Missouri; Ft. Benning, Georgia; and Ft. Sill, Oklahoma. Other sites that have been operational since 1977 include Ft. Gordon, Georgia (through 1981); Ft. McClellan, Alabama (through 1991); Ft. Dix, New Jersey (through 1992), and Ft. Bliss, Texas (through 1990). In addition, the Army also periodically conducted basic training cycles on a rotational basis at the “Forces Command Six Pack” sites (Ft. Lewis, Washington; Ft. Ord, California; Ft. Campbell, Kentucky; Ft. Hood, Texas; Ft. Polk, Louisiana; and Ft. Bragg, North Carolina) in the form of mobilization exercises through 1995. The Army is

unique in that it also conducts one station unit training (OSUT) for the combat arms military occupation specialties (i.e., infantry, armor, combat engineers, military police, and chemical). The soldier remains in the same unit 12-18 weeks and completes the basic training and advanced individual training phase at one location. OSUT is not available for Air Force, Navy, or Marine Corps recruits.

Recruits are organized into training companies (Army, Navy, and Marine Corps) or squadrons (Air Force) and further divided into platoons (Army and Marine Corps), divisions (Navy), or flights (Air Force), hereafter referred to as “companies” and “platoons.” Most recruits stay with the initially assigned platoon for the duration of training, but some may change platoons and/or companies due to “recycling.” Recycling may occur for several reasons, including behavior, performance, illness, and/or injury. Sometimes a recycled recruit is forced to repeat certain sections of training because of poor performance, which lengthens his or her time in BMT. Recruits can also be recycled into new platoons from “medical hold,” where they are placed when sick or injured. Recruits placed on medical hold will be recycled into a new platoon on approximately the same training day that they left the previous platoon, so although their actual training time is the same as that of nonrecycled recruits, the total duration at the BMT training site is increased. Approximately 10-30% of recruits do not complete BMT as a result of either discharge or death.

Deaths in recruits were counted in this study if the fatal incident occurred at a BMT site prior to completion of initial BMT while in an enlisted status in the Air Force, Navy, Marine Corps, or Army. Deaths were excluded if they occurred enroute to a BMT installation or during authorized or unauthorized leave status. Deaths during Army

OSUT were included only if the fatal incident occurred prior to the start of the advanced individual training phase.

The study received Institutional Review Board approval from Uniformed Services University of the Health Sciences on 09 November 2000 (Protocol T087NR). Deaths from 1977 through 2001 were identified through redundant sources. These included the active duty loss file at the DMDC; Military Service casualty office data; loss data from the Center for Naval Analysis (CNA); and shared data from both Maj Katerina Neuhauser (9) and COL(ret) John Kark (12).

The DMDC's active duty loss file was searched for nonprior service (NPS) Air Force, Navy, Marine Corps, and Army separations due to death between 01 January 1977 and 31 December 1999 with total active federal military service (TAFMS) less than six months and pay grade less than E5. A death was considered to be a possible recruit death if it occurred when the person was assigned to one of the unit identification codes (UICs) corresponding to an Air Force, Navy, or Marine Corps BMT site, or if no valid data were in the UIC field. Air Force BMT UICs, which are converted Personnel Accounting Symbol codes, were obtained from the U.S. Air Force Personnel Center. Navy BMT UICs were obtained from the Navy Comptroller Manual, Volume 2, Chapter 5. Marine Corps BMT UICs, which are converted Reporting Unit Codes, were obtained from the DMDC's Marine Corps military liaison. Due to the large number of Army recruit accessions and BMT locations, UIC data were not useful in identifying possible Army recruit deaths. Therefore, individual military service records, obtained from the National Personnel Records Center (NPRC), were reviewed for all Army deaths with pay grade less than E5 and TAFMS less than four months to determine duty assignment at the time

of death. Loss data through 1999 were available from the DMDC at the initiation of the study in 2000. Military Service casualty office data were used to identify deaths occurring in 2000 and 2001.

The DMDC's Reserve Components Common Personnel Data System file was not useful in identifying BMT deaths in personnel who enlisted in the Reserve Component (i.e., National Guard or Reserve). TAFMS was not a reliable indicator for Reserve Component recruits being recently shipped to BMT and an alternative surrogate data field could not be identified. Therefore, it was necessary to identify potential Reserve Component BMT deaths through the redundant sources listed above. Marine Corps loss data for both the Active and Reserve Component were obtained from the CNA. A boot camp loss was defined as separation due to death from the MCRD Parris Island, South Carolina, or the MCRD San Diego, California, among E1 and E2 personnel. Data were available for losses that occurred between September 1979 and December 2000. However, due to data tape parity errors, there were no data available for losses between July and September of 1986. Navy loss data were also obtained from the CNA for FYs 1982-2000. A boot camp loss was defined as separation due to death from the RTC Orlando, Florida; San Diego, California; or Great Lakes, Illinois. A database of Air Force recruit deaths used for a published retrospective descriptive study was obtained from Maj Katerina Neuhauser (9). In addition, case folders and a spreadsheet of Tri-Service recruit deaths from 1977 through 1989 were obtained from COL(ret) John Kark (12). Of the 1,200 deaths identified from computer files, paper records were reviewed for 600 potential recruit deaths to determine whether each death met the study criteria.

Recruit deaths were confirmed through review of the following records: DD Form 1300 and death certificates; autopsy reports, AFIP consultations, and toxicology studies; legal and criminal investigative reports; Army Risk Management Information System accident reports; medical records; and personnel records. These records were requested from the following sources: the DoD and Air Force mortality registries; AFIP; Military Service casualty offices; DIOR; Judge Advocate General (JAG) of the Navy; Army Criminal Investigation Command; Army Safety Center; NPRC; and military hospital pathology departments. Site visits were made to the DIOR; Navy, Army, and Marine Corps casualty offices; Navy JAG; and NPRC. COL(ret) John Kark's cases were obtained through multiple visits to all BMT installations during the 1980s.

Once a recruit death was confirmed, all available records mentioned above were sought to obtain a complete file. A primary data abstraction form was completed for each case, with supplemental data abstraction forms for traumatic and infectious disease deaths (appendices 2-3). The data abstraction forms, developed for this study, recorded demographic, circumstantial, and medical information. Demographic variables included: age, sex, race/ethnicity, pay grade, branch of Military Service, and training installation. Height, weight, marital status, and Armed Forces Qualification Test data recorded at the Military Entrance Processing Station (MEPS) were obtained from the DMDC's Military Entrance Processing Command (MEPCOM) file. However, height and weight data recorded on available Reports of Medical Examination (Standard Form 88) were used if they were more current than the MEPS data (i.e., measured immediately prior to arrival at BMT). Circumstantial information included clinical history, date and time of fatal incident (defined as admission to the emergency room for infectious disease deaths),

training status, and BMT duration (defined as total days at the BMT site at the time of fatal incident). Medical information included the date of death, time pronounced dead, and clinical/pathological diagnoses. Cause of death was determined after review of all available records and was categorized as traumatic (i.e., suicide, unintentional injury, homicide) or nontraumatic. Nontraumatic illness included cardiac deaths, EHI, idiopathic sudden deaths, infectious diseases, pulmonary causes (e.g., asthma), vascular causes (e.g., intracerebral hemorrhage), or other causes (e.g., autoimmune disease). EHI (i.e., heat stroke and rhabdomyolysis) was categorized as a nontraumatic injury to permit evaluation of ERD risk factors. All abstracted data were entered into an EpiInfo database (appendix 4) and coded according to the file documentation (appendix 5).

Annual Active Component NPS accession data were obtained from the DMDC edit version of the MEPCOM file for FYs 1977-2001. These data were stratified by branch of Military Service, sex, age, and race for calculating mortality rates. Race and age unknowns were deleted because they comprised no more than 0.1% of total accessions each year. FY data, versus calendar year data, were obtained from the DMDC because population data are routinely compiled on a FY basis. This permitted validation of the DMDC accession data with available accession data from the Navy and Marine Corps Recruiting Commands; Directorate for Accession Policy for Force Management Policy, Office of the Assistant Secretary of Defense (OASD/FMP); and the annual *Population Representation* report (22) to ensure the accuracy of the DMDC data. The OASD/FMP has produced an annual *Population Representation* report addressing the quality and representativeness of military personnel since FY 1975. There was no more than a 2% difference between the data in Table D-2 of *Population Representation*, and the data

obtained from the DMDC (appendix 6). In summary, 6.3 million Active Component NPS recruits were shipped to BMT installations from FYs 1977 through 2001 (appendix 7).

NPS Reserve Component accession data were excluded because the number of accessions shipped to a BMT installation for initial active duty for training (IADT) could not be accurately enumerated. There were two main concerns with using the DMDC's Reserve Component accession data. First, the DMDC expressed concern over the Reserve Component data quality for the earlier years of the study period and could not provide data prior to FY 1980. These inaccuracies were validated through a comparison of Reserve Component accession data from the Marine Corps Recruiting Command and DMDC. The DMDC data were up to 85% different, particularly in earlier years (appendix 8). In contrast, there was no more than a 5% difference in Active Component accession data obtained from the Marine Corps Recruiting Command and DMDC (appendix 9). Another concern with the DMDC's Reserve Component accession data was that it included Navy Reserve accessions not shipped to a RTC for BMT. In the past, Navy NPS personnel were enlisted in the Naval Reserve through two different accession programs: Advanced Paygrade (APG) and Accelerated Initial Accession. IADT consisted of a 12-day "APG School" at the Naval Reserve Professional Development Center in New Orleans, Louisiana. The APG School in New Orleans was replaced in 2000 by a two-week NPS accession course at the RTC Great Lakes, Illinois. Because of the uncertainty in tabulating NPS Reserve Component accessions, mortality rates were calculated as deaths per 100,000 NPS Active Component recruit-years. Recruit-years were calculated by dividing numeric death rates (number of deaths/number of recruits) by

exposure time (i.e., dividing the most frequent training period used by each Military Service over the 25-year study period by 52 weeks). The most frequent training period was eight weeks for Army and Navy, six weeks for Air Force, and 11 weeks for Marine Corps. All rates were calculated using calendar year numerator data for all BMT deaths and FY denominator data for Active Component accessions.

This study has several strengths including long-term, population-based ascertainment of Tri-Service recruit deaths, fairly complete review of medical and circumstantial investigative information, and standardized cause of death coding. An important limitation is that the tabulations of deaths contain all recruit deaths, which include Reserve and National Guard recruits who may not be in the denominator populations. Another limitation of the study methodology is that it could miss deaths in recruits who enlisted in the Reserve Component or recruits medically retired at the time of death because these populations were not consistently identified through the DMDC's active duty loss files.

CHAPTER 3

Traumatic Deaths During U.S. Armed Force Basic Training: a 25-Year Review (1977-2001)

*^{1,2,3} Stephanie L. Scoville, DrPH, ^{2,3} John W. Gardner, MD, DrPH, ³ Robert N. Potter, DVM, MPH

¹ United States Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD, ² Uniformed Services University of the Health Sciences, Bethesda, MD, ³ Armed Forces Institute of Pathology, Rockville, MD, *Corresponding author.

ABSTRACT

Background: A Recruit Mortality Registry, linked to the Department of Defense Medical Mortality Registry, was created to provide comprehensive medical surveillance data for deaths occurring during basic military training.

Methods: Recruit deaths from 1977 through 2001 were identified and confirmed through redundant sources. Complete demographic, circumstantial, and medical information was sought for each case and recorded on an abstraction form. Mortality rates per 100,000 recruit-years were calculated using recruit accession data from the Defense Manpower Data Center.

Results: There were 276 recruit deaths from 1977 through 2001 identified in the Recruit Mortality Registry. Age-specific recruit mortality rates were less than half of same-age U.S. civilian mortality rates. Only 29% (80/276) of

recruit deaths were classified as traumatic (suicide, unintentional injury, and homicide), in comparison to three-quarters in both the active duty military population and the U.S. civilian population (ages 15-34 years). The age-adjusted traumatic death rates were highest among the Army (four times higher than the Navy and Air Force, and 80% higher than the Marine Corps). The majority (58%) of traumatic deaths were due to suicide, followed by unintentional injuries (37%), and homicide (5%).

Conclusion: Traumatic death rates were lower in recruits than in the active duty military population and same-age U.S. civilian population. This can be attributed to a well-supervised training environment, the focus on safety during recruit training, and lack of access to alcohol and motor vehicles.

KEY WORDS: military personnel; death [epidemiology]; suicide [mortality]; accident [mortality]; homicide [mortality]

This manuscript has been completed in partial fulfillment of the degree of Doctor of Public Health, Department of Preventive Medicine and Biometrics, Uniformed Services University of the Health Sciences (USUHS), Bethesda, Maryland. The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the United States Department of Defense, USUHS, the Armed Forces Institute of Pathology, or the United States Army Center for Health Promotion and Preventive Medicine.

Introduction

In 1996, Helmkamp and Kennedy (1, 2) published the first epidemiologic analysis of deaths in the entire U.S. active duty military population, covering 1980 through 1993. Mortality data were obtained from the Worldwide Casualty System (WCS), operated by the Directorate of Information and Operations Reports (DIOR) at the Washington Headquarters Services of the Department of Defense (DoD) (3). The DIOR categorizes the manner of nonhostile deaths by accident (hereafter referred to as unintentional injury), illness, homicide, self-inflicted (hereafter referred to as suicide), undetermined, or pending.

Helmkamp's data were used in a 1996 landmark report of the Armed Forces Epidemiological Board (4) and a follow-on article describing the epidemiology of injury mortality in the military (5). Traumatic deaths (unintentional injury, suicide, and homicide) account for about three-quarters of active duty military deaths (1, 2, 4-8).

Traumatic deaths appear to occur less frequently during basic military training (BMT). Two population-based studies showed that 16% of Air Force recruit deaths (9) and 29% of combined Navy and Marine Corps recruit deaths (10) were traumatic deaths. The lower proportion of deaths due to traumatic causes in the recruit population is most likely attributed to the unique environment during BMT (e.g., close supervision and no access to motor vehicles and alcohol). Motor vehicle crashes (private- and government-owned vehicle accidents combined) are the leading cause of death in the general military population, accounting for 30-40% of fatalities (5).

A Recruit Mortality Registry (RMR), linked to the Department of Defense Medical Mortality Registry (DoD-MMR) (7), was created to provide comprehensive medical

surveillance data for deaths occurring during BMT. The RMR attempts to obtain complete medical and circumstantial information surrounding the fatal incident for all recruit deaths. In addition, cause of death coding is standardized across the Military Services. The purpose of this study is to provide an epidemiologic description of traumatic recruit deaths from 1977 through 2001.

Methods

BMT includes an in-processing period (usually 3-7 days) and a training period (6-12 weeks). The training period has varied by, and within, each branch of Military Service during the study period (with the exception of the Air Force's consistent six-week training period). As of 2001, the training period was six weeks for the Air Force, nine weeks for both the Navy and Army, and 12 weeks for the Marine Corps. In addition, the number of training installations has decreased over the study period. In 1977, there were a total of 15 different training sites. These included Lackland Air Force Base, TX*; Recruit Training Command (RTC) Great Lakes, IL*; RTC Orlando, FL; RTC San Diego, CA; Marine Corps Recruit Training Depot (MCRD) San Diego, CA* (including the Weapons and Field Training Battalion located at Camp Pendleton, CA); MCRD Parris Island, SC*; Fort Jackson, SC*; Ft. Knox, KY*; Ft. Leonard Wood, MO*; Ft. Benning, GA*; Ft. Sill, OK*; Ft. Gordon, GA; Ft. McClellan, AL; Ft. Dix, NJ; and Ft. Bliss, TX. In addition, the Army also periodically conducted basic training cycles on a rotational basis at the "Forces Command Six Pack" sites (Ft. Lewis, WA; Ft. Ord, CA; Ft. Campbell, KY; Ft. Hood, TX; Ft. Polk, LA; and Ft. Bragg, NC) in the form of

mobilization exercises through 1995. As of 2001, only nine of these remained operational (denoted by an asterisk).

This study considered a death to be a recruit death if the fatal incident occurred at a BMT site prior to completion of initial BMT while in an enlisted status in the Air Force, Navy, Marine Corps, or Army. Deaths were excluded if they occurred enroute to training or during authorized or unauthorized leave status. The Army is unique in that it also conducts one station unit training (OSUT) for the combat arms military occupation specialties (i.e., infantry, armor, combat engineers, military police, and chemical). The soldier remains in the same unit 12-18 weeks and completes the basic training and advanced individual training phase at one location. Deaths during Army OSUT were included only if the fatal incident occurred prior to the start of the advanced individual training phase.

Potential recruit deaths were identified through redundant sources in support of the DoD-MMR (7). Data sources included the active duty loss file at the Defense Manpower Data Center (DMDC); loss data from the Center for Naval Analysis; Military Service casualty office data; and shared data from both Maj Katerina Neuhauser (9) and COL(ret) John Kark (11). Recruit deaths were confirmed through review of the following records (when available): Reports of Casualty (DD Form 1300) and death certificates; autopsy reports, Armed Forces Institute of Pathology (AFIP) consultations, and toxicology studies; legal and criminal investigative reports; Army Risk Management Information System (RMIS) accident reports; medical records; and personnel records. These records were requested from the following sources: the DoD and Air Force mortality registries; AFIP; Military Service casualty offices; DIOR; Judge Advocate General of the Navy;

Army Criminal Investigation Command; Army Safety Center; and National Personnel Records Center.

Once a recruit death was confirmed, attempts were made to obtain all of the above records. A primary data abstraction form and a supplemental traumatic death abstraction form were completed for each case. The abstraction forms, developed for this study, recorded demographic, circumstantial, and medical information. Cause of death was determined after review of all available records and was categorized as traumatic (i.e., suicide, unintentional injury, homicide) or nontraumatic. The following information surrounding the fatal incident was abstracted: duty status (e.g., active training, inpatient, awaiting administrative separation), activity, location, type (unintentional injury) or method (suicide or homicide), circumstances, and information about firearms or items used in hanging, if applicable (4, 5). Exertional heat illness was excluded from this analysis because it was categorized as nontraumatic injury to permit comprehensive evaluation of exercise-related death risk factors.

Annual Active Component nonprior service accession data by branch of Military Service, sex, age, and race were obtained from the DMDC edit version of the Military Entrance Processing Command file for fiscal years (FYs) 1977-2001. Ethnicity was categorized as African American and non-African American. Non-African American recruits (e.g., Hispanics) were not consistently categorized in the population data files and thus were not evaluated separately. Crude, category-specific, and category-adjusted mortality rates were calculated as deaths per 100,000 recruit-years. Recruit-years were calculated by dividing numeric death rates (number of deaths/number of recruits) by exposure time (i.e., dividing the most frequent training period used by each Military

Service over the 25-year study period by 52 weeks). The most frequent training period was eight weeks for Army and Navy, six weeks for Air Force, and 11 weeks for Marine Corps. FY accession data were obtained from the DMDC to perform validation with Table D-2 in the annual *Population Representation* report by the Directorate for Accession Policy, Office of the Assistant Secretary of Defense for Force Management Policy (6). All rates were calculated using calendar year numerator data for all BMT deaths and FY denominator data for Active Component accessions. U.S. civilian mortality rates were obtained from the annual *Health, United States* report by the National Center for Health Statistics (12).

The age range of Active Component recruits is 17 to 35 but there are different age ceilings among the Military Services (6). Therefore, direct age adjustment (17-19, 20-24, 25+ age categories) was used to remove the influence that different age compositions may have on summary mortality rates (13). Age adjustment was performed using the total recruit population age distribution for weights in standardized summarization of the age-specific rates. This method was also used for race and sex adjustment.

Results

There were 276 deaths identified through the RMR in 6.3 million recruits over 25 years, who generated 972,000 recruit-years. This represents mortality rates of 27 and 55 deaths per 100,000 recruit-years from 1977 through 2001 in ages 17-24 and 25+ years, respectively. In comparison, U.S. civilian mortality rates exceed 81 and 108 deaths per 100,000 person-years in ages 15-24 and 25-34 years during the same period.

Traumatic causes accounted for 80 recruit deaths (29%) from 1977 through 2001. There was no trend in traumatic recruit mortality rates over time (table 1). The age-adjusted traumatic death rates were highest in the Army (4 times higher than the Navy and Air Force, and 80% higher than the Marine Corps) (table 2). There were no traumatic recruit deaths among females in the Air Force, Navy, and Marine Corps. However, the age- and race-adjusted traumatic mortality rate was double (rate ratio is 2.2) for males compared to females in the Army. Also, the age- and sex-adjusted traumatic mortality rate was 20% lower in African Americans compared to non-African Americans for all Services combined (rate ratio is 0.8).

The majority (58%) of traumatic deaths were due to suicide, causing 53-100% of the traumatic deaths among the Military Services (figure 1). Of the 46 suicides, 37 (80%) occurred while recruits were in training status. The other nine suicides occurred while recruits were inpatients in the hospital and/or awaiting administrative separation. Recruit suicide rates were 5 and 4 deaths per 100,000 recruit-years from 1977 through 2001 in ages 17-24 and 25+, respectively, which is less than half of those in U.S. civilians (exceeding 11 deaths per 100,000 person-years in ages 15-34 years during this period). The adjusted suicide rates were higher for males compared to females and lower for African Americans compared to non-African Americans.

Gunshots were the most common method of suicide used by both Army (54%) and Marine Corps (50%) recruits (table 3). Table 4 provides case summaries of the 19 gunshot suicides. Military issue M-16 rifles were used for all gunshot suicides and the majority (84%) occurred during marksmanship training, field training, or range detail. The remaining three gunshot suicides occurred outside the barracks after the recruit

obtained his weapon from the Unit Arms Room (both cases 6 and 14) or during field training while posted as the equipment guard (case 11).

Hangings were the most frequent method of suicide used by Navy recruits (67%) (table 3). Table 5 provides case summaries of the 14 hanging suicides; cases 32 and 28 were awaiting administrative separation. Items used in the hanging suicides included web belts/straps, elastic/athletic bandages, suspenders, bootlaces, electrical cords, neckerchiefs, ropes, and pillow cases. These items were attached to overhead pipes/beams, coat racks, closet clothes bar, bunks, stairwell handrails, and tree limbs.

All four Air Force suicides were due to jumps or falls (table 3). Table 6 provides case summaries of the 12 suicides by jump or fall. The fatal incident most commonly occurred at the training installation's hospital (50%) or barracks (42%). Cases 38 and 39 were in inpatient status; cases 34, 37, 40, and 41 were in inpatient status and awaiting administrative separation; and case 42 was awaiting administrative separation. There was one suicide due to drug overdose (not included in tables 4-6). This death occurred in an 18 year-old, white, male, Army recruit who had been prescribed benzonate (Tessalon).

Unintentional injuries accounted for 37% of all traumatic deaths, causing 0-40% of the traumatic deaths among the Military Services (figure 1). There was a wide distribution in the overall types of unintentional injury deaths including overdose, slip or fall, explosion, gunshot, electrocution, asphyxia, and close combat (table 7). Table 8 provides case summaries by type for the 30 unintentional injury deaths. The majority (93%) of unintentional injuries occurred during training status. However, case 48 occurred while the recruit was awaiting administrative separation, and case 73 occurred

while the recruit was assigned to an overnight evaluation unit that serves as an “extended training timeout.”

There were four (5%) homicides, causing 0-7% of traumatic deaths among the Military Services (figure 1). Two were a result of punishment-induced heat stroke among fellow Army recruits shortly after arriving to the company area from the reception station. The other two homicides were due to craniocerebral trauma. An Army recruit failed to report to formation after getting intoxicated during an on-post pass. Two fellow recruits demonstrated intent to harm in the process of bringing the intoxicated recruit downstairs to formation and “sobering him up” prior to lights out. The final homicide occurred when a Marine Corps recruit was struck with a fist on his head following a verbal altercation in the dining facility with a fellow recruit. The victim was standing in a platoon formation and struck his head on the asphalt parade ground after being hit. The three Army homicides occurred prior to 1980.

Discussion

The RMR was created to provide comprehensive medical surveillance data for deaths occurring among Air Force, Navy, Marine Corps, and Army recruits during BMT from 1977 through 2001. This analysis reviewed all traumatic deaths to provide an epidemiologic description of recruit mortality due to suicide, unintentional injury, and homicide. Only 29% of recruit deaths were classified as traumatic in comparison to three-quarters in both the active duty military population (1, 2, 4-8) and the U.S. civilian population aged 15-34 years (14). The lower proportion of traumatic deaths in recruits is most likely due to the close supervision, emphasis on safety, and the lack of access to

alcohol and motor vehicles during BMT. The higher rates of traumatic recruit deaths in both the Army and Marine Corps likely reflect the ground combat training environment (e.g., more frequent exposure to firearms and explosives, close combat training, and inclement weather exposure during field training).

Suicide accounted for the majority (58%) of traumatic recruit deaths, with methods including gunshots, hangings, and jumps or falls. Similar to the entire active duty military population (15), gunshots were the most common method of suicide in recruits (41%), but only occurred in Marine Corps and Army recruits (using military issue M-16 rifles). The most frequent method of suicide in the Navy was by hanging (67%) and all Air Force suicides were jumps or falls. The different training circumstances in the Military Services may explain these differences.

Unintentional injuries occurred less frequently (37%) and included overdoses, slips or falls, explosions, gunshots, electrocutions, asphyxiation, and close combat injuries. There were four unintentional overdose deaths attributed to prescription medications. Cases 46 and 48 were associated with overuse of prescription adrenergic bronchodilators (16-18). Of these two, the most recent occurred in 1994. After this time, individuals with a history of reliably diagnosed asthma at any age were disqualified for entry into the military (19). Case 47 overdosed on over-the-counter (OTC) salicylate and prescription Motrin in a suicide gesture (i.e., an attempt to gain command attention) that resulted in an unintentional injury death. During treatment at the hospital, she stated that she did not take the pills to commit suicide. As a result of this death, local recommendations included removing all OTC medications, which could be toxic when taken in overdose, from the branch post exchanges located in the trainee areas. The circumstances

surrounding case 51 are still under review but preliminary data suggest it was the result of an unintentional overdose of prescription isoniazid. Cases 49 and 50 were both exercise-related but were coded as traumatic deaths due to their overdose nature. Case 50 was due to ephedrine toxicity (20-22) in a female recruit undergoing the initial physical fitness assessment test while at the reception station. The ingredients of the OTC herbal diet pill were ephedra, extract from the kola nut containing caffeine, and other herbal extracts. Case 49 was the first known death of a recruit as a result of hyponatremia from acute water intoxication (23, 24).

There were two Marine Corps boxing-related unintentional injury deaths in recruits, both wearing proper protective gear. Case 74 occurred during a voluntary supervised recruit boxing match, the Recruit Athletics Boxing Smoker. Case 75 occurred during a supervised boxing program, Combat Hitting Skills (25). Neither case reported prior head injury nor concussions at the time of fatal incident, despite both having histories of such. Case 74 was hospitalized for a concussion prior to enlistment and case 75 was hit on the head two days earlier during Combat Hitting Skills and subsequently experienced headaches which he did not report to Drill Instructors. These two deaths suggest it is important to actively screen recruits for history of concussion or head injury before engaging in close combat events.

An important resource for unintentional injury prevention information is the RMIS. The steps of risk management are hazard identification, assessment, risk control, implementation, and evaluation. Army accident reports were available through the Army Safety Center's RMIS. The recommended corrective actions for Army deaths in which the recruit or recruit's supervisor made a mistake are summarized as follows:

1. Falls - ensure facility engineers make grating safe and inform recruits to enter the shower area wearing shower shoes to prevent slipping on the smooth tile surface. Falls during obstacle course training may be prevented through providing adequate demonstration of obstacles prior to recruit participation, paying special attention to overly nervous and apprehensive recruits, and identifying potential hazards with obstacles by confirming the correct construction and maintenance of obstacles. For example, case 55 was the result of a recruit failing to successfully mount an improperly constructed obstacle. After completing the investigation, the Army Safety Center released a "Safety Alert" that recommended commanders review maintenance and inspection procedures for all obstacles on confidence obstacle courses. Also, commanders should ensure that required safety nets, platforms, properly sized ropes, and other features identified in the Physical Fitness Training Field Manual (FM 21-20) and Corps of Engineers drawing (number 28-13-95 from Folio 1, "Training Facilities") are present before allowing soldiers to train on obstacles.

2. Fragmentation grenade explosions - remind recruits of the emergency procedures before each live grenade is thrown and maintain a training schedule that requires completion of the throwing aspect of grenade training prior to using live ordnance. For reasons unknown, case 57 ran back into the danger zone after being taken into the safety bay. He responded to directions from the tower to get down but then he rolled over and sat up facing the grenade at the time it detonated. Investigation revealed that the recruit may have lost his composure and panicked because he reportedly had an unpleasant experience with explosives prior to enlisting. Case 58 resulted in two fatalities because the recruit failed to maintain constant pressure against the grenade's safety lever. The

Drill Sergeant failed to notice that the grenade's safety pin was pulled as he was holding the recruit's arm in the throwing motion to show him the correct stance. The grenade detonated in the recruit's hand and killed both men.

3. Gunshots - stringent ammunition control procedures, a chamber block device for all M-16 firing, and placing weapons in racks immediately after coming off the line. For example, case 63 occurred after a fellow recruit left the firing line with a loaded weapon. The fellow recruit was playing with his weapon, pulled the trigger, and discharged a round that struck case 63 in the back.

4. Electrocution due to lightning - enforcement of the proper defensive position for lightning strikes, i.e., presenting only a single point of contact with the ground. For example, case 68 was in the prone position when the current from a bolt of lightning traveled into his shelter half tent. When lightning strikes an object, the electricity of the lightning discharge does not necessarily go straight down into the ground and will often travel along the surface of the ground for quite a large distance ("side flash"). Therefore, the surface area of the body relative to the ground should be kept to a minimum. The best way to accomplish this is with the feet and knees together while crouched down on balls of feet, hands on the knees, and head down as in the aircraft crash position. Do not allow hands (or other body parts) to touch the ground and keep feet as close to one another as possible.

The above summary demonstrates how RMIS data can be used to disseminate lessons learned for a specific occupational group within the active duty military population.

This study has several strengths which include: (1) long-term, population-based ascertainment of Tri-Service recruit deaths, (2) fairly complete review of medical and circumstantial investigative information, (3) standardized assessment and cause of death coding, and (4) relative uniformity of the training environment. We utilized more information for diagnosis than other medical mortality epidemiologic analyses of any active duty military population. An AFIP consultation and/or autopsy report were reviewed for 94% of the traumatic deaths; a legal and/or criminal investigation were reviewed for 71%. A limitation of the study is that the tabulations of deaths include recruits from the Reserve Component who may not be included in the denominator populations. This would result in an overestimate of the mortality rates, but further supports the conclusion that recruit mortality rates are lower than the same-age U.S. civilian population. Uncertainties in tabulating Reserve Component population data have not been fully resolved.

The rates of traumatic recruit deaths are lower than those in the active duty military population and same-age U.S. civilian population, likely due to the close supervision of recruits, emphasis on safety, and lack of access to alcohol and motor vehicles during BMT. This study described the methods of suicide and types of unintentional injury and homicide during Air Force, Navy, Marine Corps, and Army BMT for the 25-year period 1977 through 2001. Military commanders may find these data useful in directing appropriate prevention strategies that could reduce traumatic recruit death rates further. Detailed review and analysis of psychologic autopsies may prove useful in addressing social and medical factors in suicide prevention.

Acknowledgements

We wish to acknowledge Maj Katerina Neuhauser for sharing Air Force recruit death data. This work was supported in part by a grant from the Uniformed Services University of the Health Sciences (T087NR) and a grant from the DoD Global Emerging Infections Surveillance and Response System, Walter Reed Army Institute of Research, to the Uniformed Services University of the Health Sciences (G187KF). In addition, the Armed Forces Institute of Pathology and the U.S. Army Center for Health Promotion and Preventive Medicine dedicated resources in support of this study.

References

1. Helmkamp J, Kennedy R. Causes of death among U.S. military personnel: a 14-year summary, 1980-1993. *Mil Med* 1996; 161: p311-7.
2. Helmkamp J, Kennedy R. National Mortality Profile of Active Duty Personnel in the U.S. Armed Forces: 1980-1993. Cincinnati, OH: US Department of Health and Human Services, Publication no. 96-103, 1996.
3. Department of Defense. Military Personnel Casualty Matters, Policies, and Procedures. Washington, DC, Instruction No. 1300.18, 2000.
4. Jones B, Hansen B, eds. Injuries in the military: a hidden epidemic. Aberdeen Proving Ground, MD: U.S. Army Center for Health Promotion and Preventive Medicine, Tech Rep. 29 HA 4844 978, 1996.
5. Powell KE, Fingerhut LA, Branche CM, Perrotta DM. Deaths due to injury in the military. *Am J Prev Med* 2000; 18:26-32.
6. Department of Defense. Population Representation in the Military Services: Fiscal Year 1999. Washington, DC: Office of the Assistant Secretary of Defense for Force Management Policy, 2000.
7. Gardner J, Cozzini C, Kelley P, Kark J, Peterson M, Gackstetter G, Spencer J. The Department of Defense Medical Mortality Registry. *Mil Med* 2000; 165:1-5.
8. Atlas of injuries in the United States Armed Forces. *Mil Med* 1999; 164.
9. Drehner D. Death among U.S. Air Force basic trainees, 1956 to 1996. *Mil Med* 1999; 164: p841-7.
10. Wagner SA, Clark MA. U.S. Navy and Marine Corps recruit training deaths in San Diego, California, 1973-1985; a review of 31 cases. *J Forensic Sci* 1992; 37:185-94.
11. Kark J, Posey D, Schumacher H, Ruehle C. Sickle-cell trait as a risk factor for sudden death in physical training. *N Engl J Med* 1987; 317: p781-7.
12. Eberhardt M, Ingram D, Makuc D, et al. Health, United States, 2001 With Urban and Rural Health Chartbook. Hyattsville, Maryland: National Center for Health Statistics, 2001.
13. Rothman K. Standardization of rates. *Modern Epidemiology*. Boston: Little, Brown, and Company, 1986:41-5.
14. Hoyert D, Arias E, Smith B, Murphy S, Kochanek K. Deaths: Final Data for 1999. National vital statistics reports; vol 49 no 8. Hyattsville, Maryland: National Center for Health Statistics, 2001.
15. Helmkamp J. Suicides in the military: 1980-1992. *Mil Med* 1995; 160: p45-50.
16. Beasley R, Pearce N, Crane J, Burgess C. Beta-agonists: what is the evidence that their use increases the risk of asthma morbidity and mortality? *J Allergy Clin Immunol* 1999; 104: pS18-30.
17. Pearce N, Hensley M. Epidemiologic studies of beta agonists and asthma deaths. *Epidemiol Rev* 1998; 20: p173-86.
18. Sears M. Short-acting beta-agonist research: a perspective. 1997. *Can Respir J* 2001; 8: p349-55.
19. Clark K, Li Y, Krauss M, Kelley P. The asthma accession standard: a survival analysis of military recruits, 1995 to 1997. *Mil Med* 2000; 165: p852-4.

20. Samenuk D, Link M, Homoud M, Contreras R, Theohardes T, Wang P, Estes N. Adverse cardiovascular events temporally associated with ma huang, an herbal source of ephedrine. *Mayo Clin Proc* 2002; 77: p12-6.
21. Cupp M. Herbal remedies: adverse effects and drug interactions. *Am Fam Physician* 1999; 59: p1239-45.
22. Haller C, Benowitz N. Adverse cardiovascular and central nervous system events associated with dietary supplements containing ephedra alkaloids. *N Engl J Med* 2000; 343: p1833-8.
23. Garigan T, Ristedt D. Death from hyponatremia as a result of acute water intoxication in an Army basic trainee. *Mil Med* 1999; 164: p234-8.
24. Gardner J. Death by Water Intoxication. *Mil Med* 2002; 167:p432-4.
25. Ross R, Ochsner M. Acute intracranial boxing-related injuries in U.S. Marine Corps recruits: report of two cases. *Mil Med* 1999; 164: p68-70.

FIGURE 1

DISTRIBUTION OF TRAUMATIC RECRUIT DEATHS BY SERVICE, 1977-2001

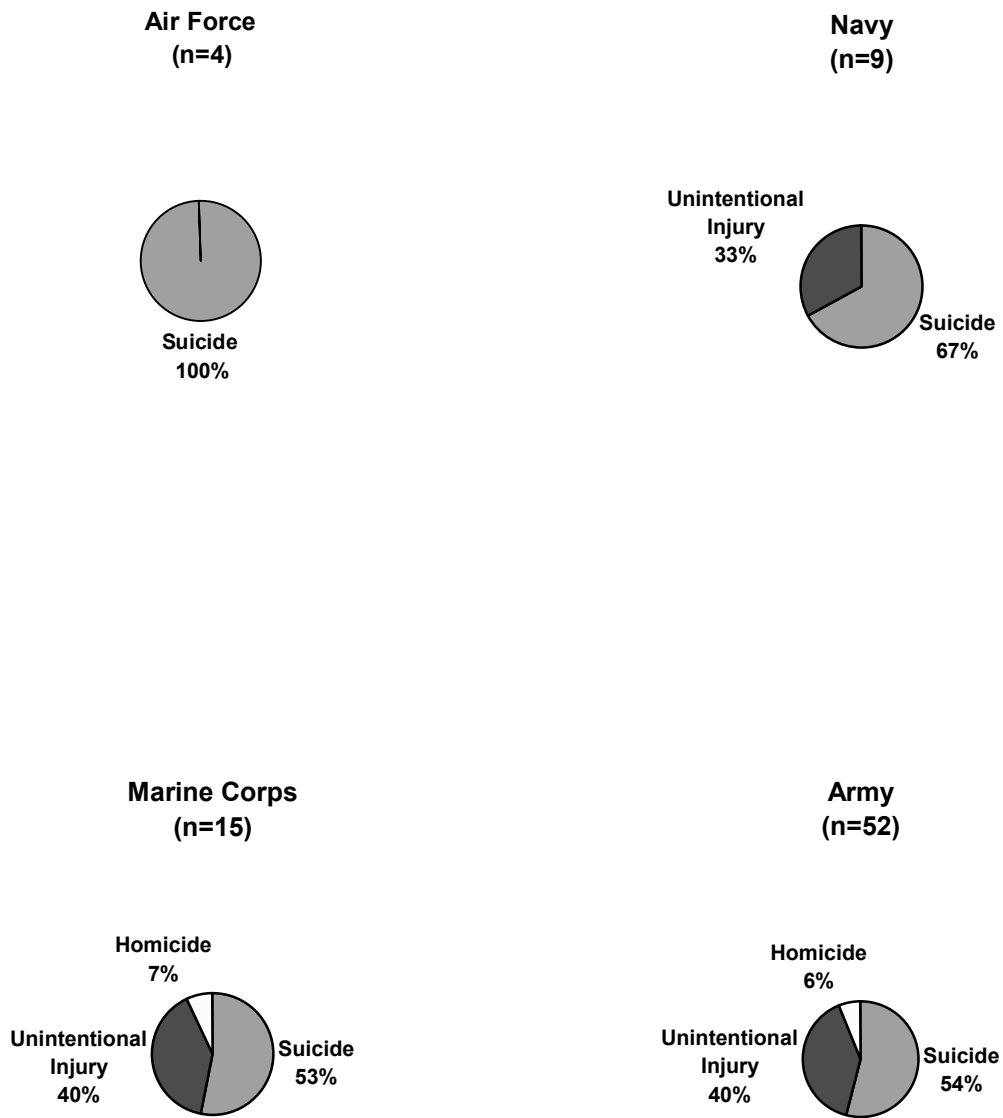


TABLE 1

ALL-SERVICE TRAUMATIC AND OVERALL MORTALITY RATES (PER 100,000 NONPRIOR SERVICE ACTIVE COMPONENT RECRUIT-YEARS) BY 5-YEAR CATEGORIES, 1977-2001

Years	Traumatic Deaths	Overall Deaths	Population x 10 ⁵	Traumatic Rate*	Overall Rate*
1977-1981	20	85	16.5	7.9	33.6
1982-1986	15	64	15.3	6.4	27.2
1987-1991	24	52	12.7	12.3	26.6
1992-1996	10	29	9.3	7.0	20.3
1997-2001	11	46	9.1	7.8	32.7
Total	80	276	62.9	8.3	28.5

*Calculated by multiplying the numeric death rate by 6.5 (reflecting the average of 8 weeks of basic military training for all Services combined)

TABLE 2

NUMBER OF TRAUMATIC RECRUIT DEATHS (n), RECRUIT ACCESSIONS (N), AND CATEGORY-SPECIFIC MORTALITY RATES (PER 100,000 NONPRIOR SERVICE ACTIVE COMPONENT RECRUIT-YEARS), 1977-2001

Category	Air Force			Navy			Marine Corps			Army			All-Service		
	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate
Age															
17-19	3	7.3	3.6	6	11.3	3.5	13	6.5	9.4	30	15.2	12.9	52	40.2	8.4
20+	1	4.5	1.9	3	6.2	3.2	2	2.2	4.3	22	9.7	14.7	28	22.6	8.0
Sex															
Male	4	9.5	3.6	9	15.4	3.8	15	8.2	8.7	48	21.2	14.7	76	54.3	9.1
Female	0	2.3	0.0	0	2.1	0.0	0	0.5	0	4	3.7	7.1	4	8.5	3.1
Ethnic group															
Non-African American	4	10.1	3.4	6	14.5	2.7	13	7.2	8.5	42	18.6	14.7	65	50.3	8.4
African American	0	1.7	0.0	3	3.0	6.5	2	1.5	6.4	10	6.3	10.3	15	12.5	7.8
Manner															
Suicide	4	11.8	2.9	6	17.5	2.2	8	8.7	4.3	28	24.9	7.3	46	62.9	4.8
Unintentional injury	0	-	-	3	17.5	1.1	6	8.7	3.3	21	24.9	5.5	30	62.9	3.1
Homicide	0	-	-	0	-	-	1	8.7	0.5	3	24.9	0.8	4	62.9	0.4
Total	4	11.8		9	17.5		15	8.7		52	24.9		80	62.9	
Unadjusted			2.9			3.3			8.2			13.6			8.3
Adjusted*			3.0			3.3			7.6			13.5			8.3
Rate Ratio			1.0			1.1			2.5			4.5			

*Age-adjusted using the total recruit age distribution as standard

TABLE 3

NUMBER OF RECRUIT SUICIDES BY METHOD AND SERVICE, 1977-2001

Method	Air Force	Navy	Marine Corps	Army	Total
Gunshot	0	0	4	15	19 (41%)
Hanging	0	4	3	7	14 (30%)
Fall/jump	4	2	1	5	12 (26%)
Other	0	0	0	1	1 (2%)
Total	4	6	8	28	46
Rate	2.9	2.2	4.3	7.3	4.8

TABLE 4
CASE SUMMARIES OF RECRUIT GUNSHOT SUICIDES BY SERVICE, 1977-2001*

Case	Demographics	Service	Activity	Circumstances
1	22/M/White	Army	Marksmanship training	Placed muzzle of weapon under his chin and pulled the trigger
2	24/M/White	Army	Marksmanship training	Placed muzzle of weapon under his chin and pulled the trigger
3	24/M/White	Army	Marksmanship training	Placed muzzle of weapon under his chin and pulled the trigger
4	18/M/White	Army	Work detail after marksmanship training	Found behind latrine with a gunshot wound to the head
5	20/F/White	Army	Prior to departure for marksmanship training	Found locked in a portable toilet with a gunshot wound to the head
6	18M/White	Army	Work detail after morning meal	Found outside barracks with a gunshot wound to the head
7	19/M/White	Army	Marksmanship training	Found in the holding area with a gunshot wound to the head
8	19/M/White	Army	Range detail	Observed taking the blank adaptor off his weapon prior to being found with a gunshot wound to the head
9	18/M/White	Army	Marksmanship training	Placed muzzle of weapon to his forehead and pulled the trigger
10	20/M/White	Army	Marksmanship training	Found slumped over against the bunker wall with a gunshot wound to the head
11	18/M/White	Army	Equipment guard during bivouac training	Found with a gunshot wound to the head in a wooded area near the bivouac area
12	18/M/Black	Army	Marksmanship training	Engaged several targets, placed muzzle of weapon under chin, and pulled the trigger
13	19/M/Polish	Army	Marksmanship training	Placed muzzle of the weapon in his mouth and pulled the trigger

Case	Demographics	Service	Activity	Circumstances
14	23/M/Vietnamese	Army	Retrieving gear from inside barracks after receiving an Article 15	Found with a gunshot wound to the head at the woodline near the barracks
15	18/M/Black	Army	Marksmanship training	Found behind the latrines with a gunshot wound to the head
16	19/M/White	Marine Corps	Work detail after marksmanship training	Found behind range shack with a gunshot wound to the abdomen
17	18/M/White	Marine Corps	Reveille during field training	Found lying in shelter half tent with a gunshot wound to the head
18	19/M/Hispanic	Marine Corps	Marksmanship training	Placed muzzle of weapon to his forehead and pulled the trigger while preparing to fire his weapon
19	18/M/Black	Marine Corps	Marksmanship training	Grabbed the rifle of another recruit, put the muzzle in his mouth, and pulled the trigger

*Year of death deleted for confidentiality

TABLE 5
CASE SUMMARIES OF RECRUIT HANGING SUICIDES BY SERVICE, 1977-2001*

Case	Demographics	Service	Activity and Location	Circumstances
20	19/M/White	Army	Unknown activity in barracks	Found hanging by a web belt from the ceiling
21	35/M/Lebanese	Army	Lights out in barracks	Found hanging by a thin white rope from the clothing bar in his closet
22	18/M/White	Army	Lights out at bivouac site	Found hanging by a tent rope from a tree limb
23	20/M/White	Army	Lights out in barracks	Found hanging by a web belt from the stairwell
24	19/M/White	Army	Lights out at pavilion near barracks	Found hanging by an electrical cord from a steel cross beam
25	20/M/White	Army	Reinforcement training in barracks	Found hanging by a protective mask carrying case canvas strap from the stairwell
26	19/M/Black	Army	Personal hygiene in barracks prior to formation	Found hanging by his dummy M-16's web strap from his top bunk
27	22/M/White	Marine Corps	Gear guard in barracks	Found hanging by two nylon belts buckled together from an overhead pipe in the shower (stepped off footlocker)
28	19/M/White	Marine Corps	Working party detail in Recruit Casual Section	Found hanging by a boot lace and web belt from an overhead pipe in the shower.
29	18/M/White	Marine Corps	Unknown activity in clinic	Found hanging by suspenders and an elastic/athletic bandage from an overhead pipe in bathroom (stepped off toilet)
30	17/M/Black	Navy	Personal time in barracks prior to taps	Found hanging by a web belt from his upper bunk
31	17/M/White	Navy	Marching party muster in barracks	Found hanging by a neckerchief from the coat rack attached to the bulkhead in an empty barracks

Case	Demographics	Service	Activity and Location	Circumstances
32	19/M/White	Navy	Stowing gear after checking in to Special Training Division	Found hanging by a web belt and pillow case from the coat rack attached to the bulkhead
33	20/M/Filipino	Navy	Lights out in barracks	Found hanging by a neckerchief from an electrical conduit pipe in the ceiling

*Year of death deleted for confidentiality

TABLE 6
CASE SUMMARIES OF RECRUIT JUMP OR FALL SUICIDES BY SERVICE, 1977-2001*

Case	Demographics	Service	Activity and Location	Circumstances
34	19/M/White	Air Force	Psychiatric ward inpatient for acute schizophrenic reaction	Signed out for a walk, left ward, then jumped through a ninth floor window
35	22/M/White	Air Force	Unknown activity in barracks	Observed standing on the third floor fire escape before striking the ground (diagnosed several days earlier with passive aggressive personality disorder)
36	17M/White	Air Force	Personal time in barracks (last seen polishing boots in dayroom)	Used a chair to climb out the third floor window and onto ledge before jumping
37	19/M/White	Air Force	Psychiatric ward inpatient for clinical depression	Left the ward and jumped from ninth floor window
38	26/M/White	Army	Psychiatric ward inpatient for traxene detoxication	Left the ward and jumped off the roof
39	22/M/White	Army	In-processing to the psychiatric ward for a suicidal attempt	Left the ward, broke out an eight floor window, and then jumped
40	18/M/White	Army	Psychiatric ward inpatient for a brief reactive psychosis	Jumped off the first floor balcony while working on a project
41	21/F/Black	Army	Psychiatric ward inpatient for a brief reactive psychosis, schizophreniform disorder	Left the ward dayroom after dinner and then jumped from the ninth floor window
42	18/M/White	Army	Lights out in barracks (under full unit suicide watch)	Opened a third floor window and then jumped during the fireguard changeover
43	24/M/White	Marine Corps	Sunday morning holiday routine in barracks	Observed leaning forward on the outside of the third floor guardrail before letting go
44	21/M/White	Navy	Lights out in barracks	Jumped off the roof

Case	Demographics	Service	Activity and Location	Circumstances
45	18/M/Filipino	Navy	Attending lecture in classroom	Requested to use the bathroom, left the room, ran down hall, climbed up on the second floor railing, and jumped

*Year of death deleted for confidentiality

TABLE 7
 PROPORTION OF RECRUIT UNINTENTIONAL INJURIES BY TYPE AND
 SERVICE, 1977-2001

Type	Air Force	Navy	Marine Corps	Army	Total
Overdose	0	1	0	5	6 (20%)
Fall	0	1	0	4	5 (17%)
Explosion	0	0	0	5	5 (17%)
Gunshot	0	0	2	3	5 (17%)
Electrocution	0	0	1	3	4 (13%)
Asphyxiation	0	1	1	1	3 (10%)
Close combat	0	0	2	0	2 (7%)
Total	0	3	6	21	30
Rate	0	1.1	3.3	5.5	3.1

TABLE 8
CASE SUMMARIES OF UNINTENTIONAL INJURY RECRUIT DEATHS BY TYPE AND SERVICE, 1977-2001*

Case	Demographics	Service	Activity and Location	Circumstances
OVERDOSE				
46	21/M/Puerto Rican	Army	Lights out in barracks	Observed having breathing problems, assisted to the Charge of Quarter's office for observation, then collapsed - prescribed medihaler (isoproterenol) two days earlier
47	20/F/White	Army	Lights out in barracks	Ingested ~100-200 aspirin plus several Motrin in an attempt to gain command attention (toxicology positive for salicylate)
48	23/M/Black	Army	Awaiting evening meal at dining facility	Observed having breathing problems standing in line outside, brought inside the air conditioned facility, then collapsed - prescribed medihaler (Metaprel) three weeks earlier
49	18/M/Eskimo	Army	Marksmanship training at range	Mild to moderate heat exhaustion treated with severe water overload (initial serum sodium of 121 mmol/l)
50	27/F/Black	Army	Physical training on track	Collapsed after one-mile run (toxicology positive for ephedrine)
51	20/M/Black	Navy	Unknown	Ingested a 30-day prescription of isoniazid in one dose
FALL				
52	19/M/White	Army	Releasing bird from air shaft in barracks	Stepped on improperly replaced grating, fell 25-ft, and struck head on concrete floor of air shaft
53	18/M/White	Army	Physical training at obstacle course	Descending from the top of obstacle, lost footing on the 4 th rung from the top, fell 25-ft, and struck the incline ladder at the base
54	18/M/White	Army	Cleaning detail in shower stalls in barracks	Slipped while wearing wool socks and struck head on adjacent shower stall wall

Case	Demographics	Service	Activity and Location	Circumstances
55	19/M/White	Army	Physical training at obstacle course	Released rope while negotiating obstacle, struck the first cross beam with left leg, and then struck the second beam with midsection
56	19/M/Puerto Rican	Navy	Lights out in barracks	Fell from top bunk while sleeping and struck head on the cement floor
EXPLOSION				
57	30/M/Peruvian	Army	Hand grenade training at range	Failed to throw the live fragmentation grenade out of the throwing bay, taken to safety bay, then ran into danger area
58	21/M/Black	Army	Hand grenade training at range	Detonated the live fragmentation grenade while still in the throwing position
59	21/M/White	Army	Bivouac training at administrative area	Unit formation hit by a 105 mm Howitzer shell that landed beyond range limits
60	18/M/White			
61	25/M/White			
GUNSHOT				
62	18/M/Black	Army	Marksmanship training in parking area	Struck by M-16 round that discharged during Drill and Ceremony class break
63	18/M/White	Army	Marksmanship training at range	Struck by improperly cleared M-16 in the staging/ready area
64	21/M/Black	Army	Night infiltration training at range	Struck by M-60 round from live overhead fire while navigating the obstacle course
65	18/M/Mexican	Marine Corps	Marksmanship training at range	Bent forward to pick up his data book on the yellow ready line and hit the trigger of his M-16 with his thumb [†]
66	18/M/Mexican	Marine Corps	Marksmanship training at range	Discharged round from .45 caliber pistol into right temple after firing one round down range [†]

Case	Demographics	Service	Activity and Location	Circumstances
ELECTROCUTION				
67	18/M/White	Army	Bivouac training at range	Struck by lightning while using an entrenching tool to cut camouflage for the shelter half tent
68	19/M/White	Army	Field training exercise	Struck by traveling lightning ground current while in the prone position in shelter half tent
69	18/M/White	Army	Hand grenade training at range	Struck by lightning while in the crouching and kneeling position in the lightning dispersal area
70	18/M/White	Marine Corps	Marksmanship training at range	Struck by lightning as the platoon was moving toward the lightning dispersal area
ASPHYXIATION				
71	17/M/White	Army	Lights out in barracks	Fire guard discovered him sitting up in bed choking (food particles found in larynx and trachea at autopsy)
72	18/M/Black	Marine Corps	2nd Class Water Survival Qualification Test in Training Tank	Observed "struggling" prior to going under the water
73	19/M/Black	Navy	Lights out near Recruit Special Quarters	Manic episode/panic attack, ran out of building, physically assaulted others, resisted arrest, and then physically restrained in prone position (positional asphyxia)
CLOSE COMBAT				
74	18/M/Mexican	Marine Corps	Boxing Smoker in physical training area	Collapsed after being assisted back into the ring after being injured by a blow
75	19/M/White	Marine Corps	Combat Hitting Skills in combat training area	Injured by a blow, inhaled an ammonia capsule, began swinging wildly, restrained by the referee, and then lost consciousness

* Year of death deleted for confidentiality

† Not enough evidence to establish manner of death as suicide

CHAPTER 4

Nontraumatic Deaths During U.S. Armed Force Basic Training: a 25-Year Review (1977-2001)

*^{1,2,3} Stephanie L. Scoville, DrPH, ^{2,5} John W. Gardner, MD, DrPH, ³ John A. Kark, MD,
⁴ Alan J. Magill, MD, ⁵ Robert N. Potter, DVM, MPH

¹ United States Army Center for Health Promotion and Preventive Medicine, Aberdeen Proving Ground, MD, ² Uniformed Services University of the Health Sciences, Bethesda, MD, ³ Howard University Hospital, Washington, DC, ⁴ Walter Reed Army Institute of Research, Silver Spring, MD, ⁵ Armed Forces Institute of Pathology, Rockville, MD,
*Corresponding author.

ABSTRACT

Background: A Recruit Mortality Registry, linked to the Department of Defense Medical Mortality Registry, was created to provide comprehensive medical surveillance data for deaths occurring during basic military training.

Methods: Recruit deaths from 1977 through 2001 were identified and confirmed through redundant sources. Complete demographic, circumstantial, and medical information was sought for each case and recorded on an abstraction form. Mortality rates per 100,000 recruit-years were calculated using recruit accession data from the Defense Manpower Data Center.

Results: There were 276 recruit deaths from 1977 through 2001 identified through the Recruit Mortality Registry. Age-specific recruit mortality rates were

less than half of same-age U.S. civilian mortality rates. The majority (71%) of recruit deaths were classified as nontraumatic and 69% (136/196) were related to exercise. Of these, 42% (57/136) were cardiac deaths. Exertional heat illness was either a primary or contributory cause of death in at least 45 cases. Infectious agents accounted for only 24% (48/196) of the nontraumatic deaths. The age-adjusted nontraumatic death rates per 100,000 recruit-years were similar among the Military Services with the Army 60% higher than the Air Force and Navy, and 30% higher than the Marine Corps.

Conclusions: The Recruit Mortality Registry is a unique resource for the Department of Defense and review of these data have demonstrated the overall safety of basic military training. Although recruit mortality rates are lower than same-age U.S. civilian population, preventive measures focused on reducing heat stress during exercise may be effective in decreasing the high rates of exercise-related death.

KEY WORDS: military personnel; death [epidemiology]; heart diseases [mortality]; infection [mortality]; exertion

This manuscript has been completed in partial fulfillment of the degree of Doctor of Public Health, Department of Preventive Medicine and Biometrics, Uniformed Services University of the Health Sciences (USUHS), Bethesda, Maryland. The opinions or

assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the United States Department of Defense, USUHS, the Armed Forces Institute of Pathology, or the United States Army Center for Health Promotion and Preventive Medicine.

Introduction

Deaths occurring during basic military training (BMT) are of particular interest because these deaths are highly visible to the general public, often result in litigation, and can create immediate policy implications. Because recruits are younger than 36 years and are screened for good health, each death can be considered premature and unexpected. Efforts to understand and prevent the rare, but tragic, occurrence of death among young adults trying to serve their country depend upon active surveillance of the population at risk and accurate determination of mortality rates by specific cause. However, epidemiologic information on mortality during BMT is limited. The published analyses of recruit deaths include isolated case reports (1-6), population-based studies within a single branch of Military Service (7, 8), or cause-specific population based studies (9, 10).

Of the four population-based studies of mortality during BMT, two were Air Force studies (8, 9). Drehner et al. (8) conducted a descriptive analysis of recruit mortality between 1956 and 1996 during Air Force BMT at Lackland Air Force Base, the only training site for Air Force BMT. A total of 85 deaths were identified, with 81% being nontraumatic, 17% traumatic (11 suicides and three accidents), and 2% not classified. In addition, Phillips et al. (9) reviewed a subset of these deaths in a 20-year review of sudden cardiac deaths. Wagner and Clark (7) identified 31 on-base male recruit deaths occurring during BMT at the Marine Corps Recruit Depot (MCRD) and the Naval Training Command (RTC) in San Diego, California from 1973 through 1985. There were 22 (71%) nontraumatic deaths and nine traumatic deaths (four suicides, four

unintentional injuries, and one homicide). One population-based study of mortality during BMT was a Tri-Service study. Kark et al. (10) demonstrated a substantially higher risk of exercise-related sudden death unexplained by prior disease in Army, Air Force, Navy, and Marine Corps recruits with sickle cell trait (SCT) from 1977 through 1981.

A data source for research on specific recruit mortality-related issues has not been available until now. A Recruit Mortality Registry (RMR), linked to the Department of Defense Medical Mortality Registry (DoD-MMR) (11), was created to provide comprehensive medical surveillance data for deaths occurring during BMT. The RMR attempts to obtain complete medical and circumstantial information surrounding the fatal incident for all recruit deaths. In addition, cause of death coding is standardized across the Military Services. The purpose of this study is to provide an epidemiologic description of nontraumatic recruit deaths from 1977 through 2001. A study of traumatic recruit deaths during the same time period has been previously published (cite in press reference).

Methods

BMT includes an in-processing period (usually 3-7 days) and a training period (6-12 weeks). The training period has varied by, and within, each branch of Military Service during the study period (with the exception of the Air Force's consistent six-week training period). As of 2001, the training period was six weeks for the Air Force, nine weeks for both the Navy and Army, and 12 weeks for the Marine Corps. In addition, the

number of training installations has decreased over the study period. In 1977, there were a total of 15 different training sites. These included Lackland Air Force Base, TX*; RTC Great Lakes, IL*; RTC Orlando, FL; RTC San Diego, CA; MCRD San Diego, CA* (including the Weapons and Field Training Battalion located at Camp Pendleton, CA); MCRD Parris Island, SC*; Fort Jackson, SC*; Ft. Knox, KY*; Ft. Leonard Wood, MO*; Ft. Benning, GA*; Ft. Sill, OK*; Ft. Gordon, GA; Ft. McClellan, AL; Ft. Dix, NJ; and Ft. Bliss, TX. In addition, the Army also periodically conducted basic training cycles on a rotational basis at the “Forces Command Six Pack” sites (Ft. Lewis, WA; Ft. Ord, CA; Ft. Campbell, KY; Ft. Hood, TX; Ft. Polk, LA; and Ft. Bragg, NC) in the form of mobilization exercises through 1995. As of 2001, only nine of these remained operational (denoted by an asterisk).

This study considered a death to be a recruit death if the fatal incident occurred at a BMT site prior to completion of initial BMT while in an enlisted status in the Air Force, Navy, Marine Corps, or Army. Therefore, deaths were excluded if they occurred enroute to training or during authorized or unauthorized leave status. The Army is unique in that it also conducts one station unit training (OSUT) for the combat arms military occupation specialties (i.e., infantry, armor, combat engineers, military police, and chemical). The soldier remains in the same unit 12-18 weeks and completes the basic training and advanced individual training phase at one location. Deaths during Army OSUT were included only if the fatal incident occurred prior to the start of the advanced individual training phase.

Potential recruit deaths were identified through redundant sources in support of the DoD-MMR (11). Data sources included the active duty loss file at the Defense

Manpower Data Center (DMDC); loss data from the Center for Naval Analysis; Military Service casualty office data; and shared data from both both Maj Katerina Neuhauser (8) and COL(ret) John Kark (10). Recruit deaths were confirmed through review of the following records (when available): Reports of Casualty (DD Form 1300) and death certificates; autopsy reports, Armed Forces Institute of Pathology (AFIP) consultations, and toxicology studies; legal and criminal investigative reports; Army Risk Management Information System accident reports; medical records; and personnel records. These records were requested from the following sources: the DoD and Air Force mortality registries; AFIP; Military Service casualty offices; Directorate of Information and Operation Reports; Judge Advocate General of the Navy; Army Criminal Investigation Command; Army Safety Center; and National Personnel Records Center.

Once a recruit death was confirmed, attempts were made to obtain all of the above records. A primary data abstraction form, developed for this study, was completed for each case. The abstraction form recorded demographic, circumstantial, and medical information. Cause of death was determined after review of all available records and was categorized as traumatic (i.e., suicide, unintentional injury, homicide) or nontraumatic.

Nontraumatic deaths were categorized as cardiac, exertional heat illness (EHI), idiopathic sudden death (ISD), infectious disease, vascular (e.g., intracerebral hemorrhage), asthma, and other (e.g., autoimmune disease). Deaths were defined as cardiac in origin if there was pathologically confirmed heart disease; they were grouped by atherosclerotic coronary vascular disease (ASCVD), coronary artery abnormality, myocarditis, cardiomyopathy, and other. Coronary artery abnormalities included abnormal coronary origin, hypoplastic coronary artery, tunnel coronary artery, coronary

aneurysm, and coronary dissection. Cardiomyopathies included hypertrophic cardiomyopathy, left ventricular hypertrophy, and right ventricular dysplasia. ISD was defined as any sudden death (based upon whether or not the patient was in unrelenting coma and/or life support within one hour of symptoms onset) unexplained both by preexisting disease and by current illness. EHI was defined to include all of the exertion-related heat illness syndromes. Heat stroke was diagnosed based on elevated body temperature and encephalopathy manifesting as delirium, obtundation, or coma, without other obvious cause. Severe rhabdomyolysis was diagnosed from histologic evidence of extensive muscle necrosis and/or from acute biochemical abnormalities. Primary biochemical indicators of severe rhabdomyolysis include markedly elevated serum creatine kinase or serum or urine myoglobin. Less specific indicators included marked elevation in serum uric acid, potassium, phosphate, creatinine, urea nitrogen, lactate dehydrogenase, aspartate aminotransferase, alanine aminotransferase, and/or low serum bicarbonate or calcium.

Annual Active Component nonprior service accession data by branch of Military Service, sex, age, and race were obtained from the DMDC edit version of the Military Entrance Processing Command file for fiscal years (FYs) 1977-2001. Ethnicity was categorized as African American and non-African American. Non-African American recruits (e.g., Hispanics) were not consistently categorized in the population data files and thus were not evaluated separately. Crude and category-specific mortality rates were calculated as deaths per 100,000 recruit-years. Recruit-years were calculated by dividing numeric death rates (number of deaths/number of recruits) by exposure time (i.e., dividing the most frequent training period used by each Military Service over the 25-year

study period by 52 weeks). The most frequent training period was eight weeks for Army and Navy, six weeks for Air Force, and 11 weeks for Marine Corps. FY accession data were obtained from the DMDC to perform validation with Table D-2 in the annual *Population Representation* report by the Directorate for Accession Policy, Office of the Assistant Secretary of Defense for Force Management Policy (12). All rates were calculated using calendar year numerator data for all BMT deaths and FY denominator data for Active Component accessions. U.S. civilian mortality rates were obtained from the annual *Health, United States* report by the National Center for Health Statistics (13).

The age range of Active Component recruits is 17 to 35 but there are different age ceilings among the Military Services (12). Therefore, direct age adjustment (17-19, 20-24, 25+ age categories) was used to remove the influence that different age compositions may have on summary mortality rates (14). Age adjustment was performed using the total recruit population age distribution for weights in standardized summarization of the age-specific rates. This method was also used for race and sex adjustment.

Results

There were 276 deaths identified through the RMR in 6.3 million recruits over 25 years, who generated 972,000 recruit-years. This represents mortality rates of 27 and 55 deaths per 100,000 recruit-years from 1977 through 2001 in ages 17-24 and 25+ years, respectively. In comparison, U.S. civilian mortality rates exceed 81 and 108 deaths per 100,000 person-years in ages 15-24 and 25-34 years during the same period.

Of the 276 recruit deaths, 196 (71%) were classified as nontraumatic. Cause of death could not be determined in three cases due to lack of records. Nontraumatic

mortality rates have decreased over time, with the exception of the last five years (table 1). The age-adjusted nontraumatic death rates were highest in the Army (60% higher than the Air Force and Navy, and 30% higher than the Marine Corps) (table 2). Except for Army <20 years and Marine Corps 20-24 years, the rate of nontraumatic death increased with age in all Military Services. The highest nontraumatic death rate was observed in the Army 25+ age group. There were no deaths among female Air Force recruits; males had 40% higher age- and race-adjusted mortality rates than females in both the Army and Navy, and there was no gender difference in the Marine Corps. The age- and sex-adjusted mortality rates were more than double for African Americans compared to non-African Americans in all Military Services (average rate ratio is 2.6).

Two-thirds (69%) of all nontraumatic deaths were exercise-related and 42% (57/136) were cardiac deaths (table 3). The most common cardiac exercise-related death (ERD) was due to coronary artery abnormality (45%), followed by myocarditis (19%), cardiomyopathy (10%), and ASCVD (9%) (table 4). EHI contributed to at least 22% of the cardiac ERDs, including coronary artery abnormality (7), myocarditis (2), cardiomyopathy (2), congenital mitral valve disease (1), and a conduction system abnormality (1). The death due to congenital mitral valve disease and EHI occurred in a recruit with SCT.

There were 30 additional heat-related deaths due to heat stroke and/or rhabdomyolysis in which no other pathologic cause of death was identified. These deaths occurred throughout the year, however they most frequently occurred from July through September (56%). Almost half (46%) of these deaths occurred in individuals with SCT. EHI also contributed to two vascular causes of death (intrathoracic hemorrhage and aortic

hypoplasia). Therefore, EHI was a primary or contributory cause in at least 45 ERDs (33%).

The majority (57%) of non-ERDs were due to infections. In addition to the 35 infectious disease deaths, there were 13 myocarditis deaths (included in the cardiac category). A clinical and/or etiological diagnosis was confirmed for 12 streptococcal infections (table 5), ten *Neisseria meningitides* infections (table 6), and five *Staphylococcus aureus* infections (table 7). There were also eight additional infectious disease deaths (table 8).

Additional categories of nontraumatic deaths included ISD, vascular, and asthma. There were 35 cases of ISD, which all occurred within one hour of symptoms and had no contributory medical history or autopsy findings that could explain cause of death. Of the 31 cases of exercise-related ISD, 11 recruits were identified with SCT. The four remaining cases of ISD did not have SCT and were not related to exercise, and remain unexplained despite availability of medical and autopsy information. Vascular causes included intracerebral hemorrhage (6), pulmonary embolism (2), intrathoracic hemorrhage (2), primary pulmonary hypertension (1), and aortic hypoplasia (1). All of these deaths were exercise-related with the exception of the pulmonary embolisms and primary pulmonary hypertension. All four deaths with acute asthma occurred prior to 1987 and one also had disseminated sarcoidosis. Of these, one death was not exercise-related and occurred in a recruit shortly after evening meal; he had been initially disqualified for military service due to childhood asthma.

Other causes of death included autoimmune diseases (4), sickle cell disease with sickle cell crisis (2, both exercise-related), Budd-Chiari's syndrome, Schmidt's syndrome (exercise-related), idiopathic encephalopathy, and adenocarcinoma (unknown site).

Discussion

This study reviewed all nontraumatic deaths among Air Force, Navy, Marine Corps, and Army recruits during basic training from 1977 through 2001 to provide an epidemiologic description of recruit mortality due to nontraumatic causes. The RMR was created to provide comprehensive medical surveillance for deaths occurring during BMT. Cause of death was determined by review of all available medical and circumstantial information and was standardized across the Military Services. We have previously published a paper on traumatic recruit deaths (cite in press reference). The purpose of this analysis is to describe the epidemiology of nontraumatic recruit deaths.

Comparison of recruit mortality rates with the same-age U.S. civilian population establishes the safety of the BMT environment. Recruit mortality rates are less than half U. S. civilian mortality rates. One can thus assure a parent that his/her son or daughter will be safer during BMT than in the civilian community. This can be ascribed to selection factors in inducting healthy recruits, a well-supervised training environment, the focus on safety, and lack of access to alcohol and motor vehicles during BMT. Two-thirds (136/196) of nontraumatic recruit deaths were related to exercise. There were two additional ERDs (water intoxication and ephedra toxicity) not included here that were classified as traumatic deaths due to their overdose nature (cite in press reference). Of the nontraumatic ERDs, 58 (43%) were cardiac deaths. EHI was either a primary or

contributory cause of death in at least one-third of the ERDs. An additional contribution of EHI remains possible because of the low frequency of screening for EHI among sudden deaths. Our finding that at least one-third of recruit ERDs are related to heat stress implies a greater importance for preventive measures directed at immediate risks during exercise (i.e., heat stress exposure). Preventive measures include maintaining adequate hydration (15), wet bulb globe temperature (WBGT) monitoring, work/rest cycles based on the WBGT and level of exercise, and utilizing shade and appropriate clothing to assist in heat loss. In addition, immediate medical attention to casualties on-site, with rapid cooling and rehydration, is very effective in preventing serious complications from EHI. Infections and certain medications (e.g., cold medicines and supplements containing ephedra alkaloids) increase susceptibility to heat injuries. A 1999 Air Force EHI death occurred during a 5.8-mile field march and hyponatremia was identified as a contributing condition. In addition, the recruit's clinical history suggested an upper respiratory infection the week prior to his death. Although this was difficult to confirm due to extensive organ harvesting, it is known that he had obtained the medications pseudoephedrine and doxycycline.

Infectious agents are another significant concern during BMT (accounting for one-quarter of the nontraumatic deaths) because recruits are pooled from diverse geographic locations into crowded living conditions and a high-stress atmosphere that may provide an ideal setting for infectious disease transmission. This risk has been greatly reduced because recruits receive multiple routine immunizations and often prophylactic benzathine penicillin G during their first week of training. Two Air Force recruit deaths and one Army recruit death attributable to *Streptococcus pyogenes* invasive disease

(cases 7, 8, and 9) occurred despite using threshold-driven prophylactic penicillin treatment protocols (2, 16-18). In these cases, the threshold surveillance system did not reach critical levels that would have led to mass penicillin prophylaxis of trainees prior to each death. Similarly, meningococcal meningitis remains a significant threat to recruits although the quadrivalent vaccine, which provides protection against serogroups A, C, Y, and W135, has been available since 1982. No vaccine effective against serogroup B is currently licensed in the U.S. and at least two deaths due to this serogroup were identified through the RMR (cases 17 and 21). Another important infectious disease threat to the recruit population includes adenoviral acute respiratory disease. Adenoviral infection has become an emerging threat to recruit health because the sole manufacturer of adenoviral vaccine (types 4 and 7) ceased production in 1995 (19) and supplies were completely depleted in 1999. Since 1996, several outbreaks of adenovirus illness were well documented at BMT installations (20-24) and two Navy recruits died of adenovirus-related illness in 2000 (cases 10 and 35) (6).

This study has several strengths which include: (1) long-term, population-based ascertainment of Tri-Service recruit deaths, (2) fairly complete review of medical and circumstantial investigative information, (3) standardized assessment and cause of death coding, and (4) relative uniformity of the training environment. In addition, more information was used for diagnosis than other medical mortality epidemiologic analyses of any active duty military population. An AFIP consultation and/or autopsy report was reviewed for 93% of nontraumatic deaths. At the minimum, a DD1300 or death certificate was obtained for the remainder. A limitation is that the tabulations of deaths include all recruit deaths, which includes some Reserve and National Guard recruits who

may not be included in the denominator populations. This would result in an overestimate of the mortality rates, but further supports the conclusion that recruit mortality rates are lower than the same-age U.S. civilian population. Uncertainties in tabulating Reserve Component population data have not been fully resolved.

The RMR is a unique resource for the DoD and review of these data have demonstrated the overall safety of BMT. Although recruit mortality rates are lower than the same-age U.S. civilian population, preventive measures focused on reducing heat stress during exercise may be effective in decreasing the high rates of ERD. The availability of 25-years of comprehensive recruit mortality data will permit the on-going evaluation of cause of death trends, effectiveness of preventive measures, and identification of emerging threats (e.g., adenoviral disease due to loss of vaccine). The finding that infectious agents accounted for only one-quarter of the nontraumatic deaths demonstrates the effectiveness of immunizations and prophylactic benzathine penicillin G. However, prophylactic benzathine penicillin G is not an optimal intervention strategy due to the potential development of penicillin-resistance, possible severe reaction after a penicillin injection, and the financial and logistical burden of providing intramuscular shots to recruits. Basic research to support a Group A streptococcal vaccine should receive high priority. Also, the current unavailability of adenovirus vaccine will continue to result in preventable outbreaks until adenovirus immunization programs are reinstated.

Acknowledgements

We wish to acknowledge Maj Katerina Neuhauser for sharing Air Force recruit death data. This work was supported in part by a grant from the Uniformed Services University of the Health Sciences (T087NR) and a grant from the DoD Global Emerging Infections Surveillance and Response System, Walter Reed Army Institute of Research, to the Uniformed Services University of the Health Sciences (G187KF). In addition, the Armed Forces Institute of Pathology and the U.S. Army Center for Health Promotion and Preventive Medicine dedicated resources in support of this study.

References

1. Kollef M. Sudden death in Air Force recruits [letter]. *Mil Med* 1990; 155: pA7.
2. Musser J, Kapur V, Peters J, Hendrix C, Drehner D, Gackstetter G, Skalka D, Fort P, Maffei J, Li L, et al. Real-time molecular epidemiologic analysis of an outbreak of *Streptococcus pyogenes* invasive disease in US Air Force trainees. *Arch Pathol Lab Med* 1994; 118: p128-33.
3. Murray M, Evans P. Sudden exertional death in a soldier with sickle cell trait. *Mil Med* 1996; 161: p303-5.
4. Ross R, Ochsner M. Acute intracranial boxing-related injuries in U.S. Marine Corps recruits: report of two cases. *Mil Med* 1999; 164: p68-70.
5. Garigan T, Ristedt D. Death from hyponatremia as a result of acute water intoxication in an Army basic trainee. *Mil Med* 1999; 164: p234-8.
6. Two fatal cases of adenovirus-related illness in previously healthy young adults--Illinois, 2000. *MMWR Morb Mortal Wkly Rep* 2001; 50: p553-5.
7. Wagner SA, Clark MA. U.S. Navy and Marine Corps recruit training deaths in San Diego, California, 1973-1985; a review of 31 cases. *J Forensic Sci* 1992; 37:185-94.
8. Drehner D. Death among U.S. Air Force basic trainees, 1956 to 1996. *Mil Med* 1999; 164: p841-7.
9. Phillips M, Robinowitz M, Higgins J, Boran K, Reed T, Virmani R. Sudden cardiac death in Air Force recruits. A 20-year review. *JAMA* 1986; 256: p2696-9.
10. Kark J, Posey D, Schumacher H, Ruehle C. Sickle-cell trait as a risk factor for sudden death in physical training. *N Engl J Med* 1987; 317: p781-7.
11. Gardner J, Cozzini C, Kelley P, Kark J, Peterson M, Gackstetter G, Spencer J. The Department of Defense Medical Mortality Registry. *Mil Med* 2000; 165:1-5.
12. Department of Defense. Population Representation in the Military Services: Fiscal Year 1999. Washington, DC: Office of the Assistant Secretary of Defense for Force Management Policy, 2000.
13. Eberhardt M, Ingram D, Makuc D, et al. Health, United States, 2001 With Urban and Rural Health Chartbook. Hyattsville, Maryland: National Center for Health Statistics, 2001.
14. Rothman K. Standardization of rates. *Modern Epidemiology*. Boston: Little, Brown, and Company, 1986:41-5.
15. Gardner J. Death by Water Intoxication. *Mil Med* 2002; 167:p432-4.
16. Peters J, Gackstetter G. *Streptococcus pyogenes* transmission among Air Force recruits: efficacy of surveillance and prophylaxis protocols. *Mil Med* 1998; 163: p667-71.
17. Gunzenhauser J, Brundage J, McNeil J, Miller R. Broad and persistent effects of benzathine penicillin G in the prevention of febrile, acute respiratory disease. *J Infect Dis* 1992; 166: p365-73.
18. Gunzenhauser J, Longfield J, Brundage J, Kaplan E, Miller R, Brandt C. Epidemic streptococcal disease among Army trainees, July 1989 through June 1991. *J Infect Dis* 1995; 172: p124-31.

19. Gaydos C, Gaydos J. Adenovirus vaccines in the U.S. military. *Mil Med* 1995; 160: p300-4.
20. Ryan M, Gray G, Smith B, McKeehan J, Hawksworth A, Malasig M. Large epidemic of respiratory illness due to adenovirus types 7 and 3 in healthy young adults. *Clin Infect Dis* 2002; 34: p577-82.
21. Hendrix R, Lindner J, Benton F, Monteith S, Tuchscherer M, Gray G, Gaydos J. Large, persistent epidemic of adenovirus type 4-associated acute respiratory disease in U.S. army trainees. *Emerg Infect Dis* 1999; 5: p798-801.
22. Barraza E, Ludwig S, Gaydos J, Brundage J. Reemergence of adenovirus type 4 acute respiratory disease in military trainees: report of an outbreak during a lapse in vaccination. *J Infect Dis* 1999; 179: p1531-3.
23. McNeill K, Ridgely BF, Monteith S, Tuchscherer M, Gaydos J. Epidemic spread of adenovirus type 4-associated acute respiratory disease between U.S. Army installations. *Emerg Infect Dis* 2000; 6: p415-9.
24. Gray G, Goswami P, Malasig M, Hawksworth A, Trump D, Ryan M, Schnurr D. Adult adenovirus infections: loss of orphaned vaccines precipitates military respiratory disease epidemics. For the Adenovirus Surveillance Group. *Clin Infect Dis* 2000; 31: p663-70.

TABLE 1

ALL-SERVICE NONTRAUMATIC AND OVERALL MORTALITY RATES (PER 100,000 NON-PRIOR SERVICE ACTIVE COMPONENT RECRUIT-YEARS) BY 5-YEAR CATEGORIES, 1977-2001

Years	Nontraumatic Deaths	Overall Deaths	Population x 10 ⁵	Nontraumatic Rate *	Overall Rate *
1977-1981	65	85	16.5	25.7	33.6
1982-1986	49	64	15.3	20.9	27.2
1987-1991	28	52	12.7	14.3	26.6
1992-1996	19	29	9.3	13.3	20.3
1997-2001	35	46	9.1	24.9	32.7
Total	196	276	62.9	20.3	28.5

*Calculated by multiplying the numeric death rate by 6.5 (reflecting the average of 8 weeks of basic military training for all Services combined)

TABLE 2

NUMBER OF NONTRAUMATIC RECRUIT DEATHS (n), RECRUIT ACCESSIONS (N), AND CATEGORY-SPECIFIC MORTALITY RATES (PER 100,000 NON-PRIOR SERVICE ACTIVE COMPONENT RECRUIT-YEARS), 1977-2001

Category	Air Force			Navy			Marine Corps			Army			All-Service		
	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate	n	N x 10 ⁵	Rate
Age															
17-19	11	7.3	13.1	19	11.3	10.9	21	6.5	15.2	59	15.2	25.3	110	40.2	17.8
20-24	8	4.1	17.1	17	5.2	21.4	12	2.0	28.6	24	7.8	19.9	61	19.0	20.8
25+	2	0.5	37.4	7	1.0	45.0	1	0.2	22.9	15	1.9	51.4	25	3.6	45.4
Sex															
Male	21	9.5	19.1	39	15.4	16.5	32	8.2	18.5	85	21.2	26.0	177	54.3	21.2
Female	0	2.3	0.0	4	2.1	12.5	2	0.5	18.7	13	3.7	23.0	19	8.5	14.5
Ethnic group															
Non-African American	15	10.1	12.9	24	14.5	10.8	22	7.2	14.4	54	18.6	18.9	115	50.3	14.8
African American	6	1.7	30.1	19	3.0	41.3	12	1.5	38.3	44	6.3	45.2	81	12.5	42.0
Type															
Exercise-related	15	11.8	11.0	27	17.5	10.0	24	8.7	13.0	70	24.9	18.3	136	62.9	14.1
Infectious disease	3	11.8	2.2	9	17.5	3.3	6	8.7	3.3	17	24.9	4.4	35	62.9	3.6
Total	21	11.8		43	17.5		34	8.7		98	24.9		196	62.9	
Unadjusted			15.4			16.0			18.5			25.6			20.3
Adjusted*			15.7			16.0			19.7			25.1			20.3
Rate Ratio			1.0			1.0			1.3			1.6			

*Age-adjusted using the total recruit population as standard

TABLE 3
NONTRAUMATIC CAUSES OF RECRUIT DEATHS, 1977-2001

Cause of death	Exercise-related	Not exercise-related	Total
Cardiac	57	10	67 (34%)
Infectious disease	1	34	35 (18%)
Idiopathic sudden death	31	4	35 (18%)
Exertional heat illness	30	0	30 (15%)
Vascular	9	3	12 (6%)
Other	3	7	10 (5%)
Asthma	3	1	4 (2%)
Undetermined	2	1	3 (2%)
TOTAL	136 (69%)	60 (31%)	196

TABLE 4
 CARDIAC CAUSES OF RECRUIT DEATHS, 1977-2001

Cause of death	Total (number exercise related)
Coronary artery abnormality (CAA)	30 (26)
Myocarditis	13 (11)
Cardiomyopathy	7 (4)
Atherosclerotic coronary vascular disease (ASCVD)	6 (5)
Combined (myocarditis and CAA, myocarditis and cardiomyopathy, myocarditis and ASCVD)	3 (3)
Conduction system abnormality	3 (3)
Cardiac valvular disease	3 (3)
Myocardial fibrosis	2 (2)
Total	67 (57)

TABLE 5
FATAL STREPTOCOCCAL INFECTIONS DURING BASIC MILITARY TRAINING BY YEAR, 1977-2001

Clinical Diagnosis	Case	Demographics*	Year	Service	Etiology	Laboratory Confirmation
Acute epiglottitis	1	19/B/M	1977	Army	Group A beta-hemolytic streptococcus (GABHS)	Blood culture
Pneumonia	2	19/H/M	1980	Marine Corps	GABHS	Sputum and wound (vesicle) cultures
Pneumonia	3	20/W/F	1980	Army	<i>Streptococcus pneumoniae</i>	Sputum culture; gram-positive diplococci in lung tissue
Pneumonia	4	18/H/M	1981	Army	“alpha streptococcus” Adenovirus (type 21)	Blood culture Viral culture of lung tissue
Pneumonia	5	21/H/M	1981	Marine Corps	GABHS	Blood and post-mortem lung tissue cultures
Pneumonia	6	23/W/M	1987	Army	GABHS	Blood culture
Necrotizing fasciitis	7	20/W/M	1991	Air Force	GABHS	Unknown [†]
Toxic Shock Syndrome	8	19/B/M	1991	Army	GABHS	Blood culture
Meningitis	9	22/W/M	1993	Air Force	GABHS	Blood and cerebral spinal fluid cultures
Pneumonia	10	18/W/M	2000	Navy	Probable GABHS Adenovirus	Sputum culture PCR-EIA of lung tissue
Meningitis	11	18/W/M	2001	Marine Corps	<i>S. pneumoniae</i>	Blood and cerebral spinal fluid cultures
Toxic Shock Syndrome	12	18/W/M	2001	Marine Corps	GABHS	Blood culture

*Age(years)/Ethnicity/Sex: W=Non-African American; B=African American; H=Hispanic; M=Male; F=Female

[†]Peters J, Gackstetter G. Streptococcus pyogenes transmission among Air Force recruits: efficacy of surveillance and prophylaxis protocols. Mil Med 1998;163: p667-71.

TABLE 6
NEISSERIA MENINGITIDIS RECRUIT DEATHS BY YEAR, 1977-2001*

Case	Demographics [†]	Year	Service	Laboratory Confirmation
13	19/W/M	1977	Army	Blood culture (Group Y)
14	18/W/M	1977	Navy	Blood culture (Group C)
15	18/W/M	1979	Navy	Blood and cerebral spinal fluid (CSF) cultures (group W-135)
16	20/B/M	1980	Army	Blood, CSF, and joint fluid cultures (Group Y)
17	20/W/M	1981	Navy	Blood culture (Group B)
18	17/W/M	1981	Navy	CSF culture (Group Y)
19	17/B/M	1981	Army	Brain and CSF cultures (Group Y)
20	19/B/M	1992	Army	Intracellular gram-negative diplococci in unfixed brain tissue
21	19/B/M	1997	Marine Corps	Blood and CSF cultures (Group B)
22	17/W/F	1999	Navy	Not available – diagnosis based on clinically consistent course

*Deaths in the shaded area occurred prior to the introduction of the quadrivalent meningococcal vaccine

[†]Age (years)/Ethnicity/Sex: W=Non-African American; B=African American; M=Male; F=Female

TABLE 7
 RECRUIT DEATHS DUE TO STAPHYLOCOCCUS AUREUS BY YEAR, 1977-2001

Clinical Diagnosis	Case	Demographics*	Year	Service	Laboratory Confirmation
Pneumonia	23	19/W/M	1977	Army	Blood culture
Pneumonia	24	18/B/M	1982	Army	Lung and throat cultures
Pneumonia	25	18/W/M	1984	Marine Corps	Blood and post-mortem lung tissue cultures
Toxic Shock Syndrome	26	26/W/M	1985	Army	Wound (vesicle), throat, and urine cultures
Staphylococcal sepsis	27	19/W/M	1997	Army	Blood culture

*Age (years)/Ethnicity/Sex: W=Non-African American; B=African American; M=Male

TABLE 8

OTHER INFECTIOUS DISEASE RECRUIT DEATHS BY CLINICAL DIAGNOSIS AND YEAR, 1977-2001

Clinical Diagnosis	Case	Demographics*	Year	Service	Diagnostic evidence
Pneumonia	28	17/W/M	1977	Air Force	Clinical history and Report of Casualty
Pneumonia	29	20/H/M	1977	Army	Clinical history, chest x-ray (CXR), and Report of Casualty
Pneumonia	30	18/W/M	1979	Navy	Clinical history, open lung biopsy, CXR, and death certificate
Undetermined	31	20/B/M	1982	Navy	Poorly documented death - cause of death on the Report of Casualty was septic shock syndrome. One week prior to death, the recruit was seen in the emergency room for sore throat, fever, chills, then returned sick in quarters.
Ruptured appendix	32	18/B/M	1982	Army	Gram-positive cocci in hematology and buffy coat smears
Pneumonia	33	20/W/M	1992	Army	Prescribed erythromycin for a respiratory infection. Two days later he died one hour after collapsing during a physical training run. Contribution of prescription erythromycin could not be confirmed.
Meningitis	34	20/W/M	1993	Army	CSF fluid obtained after initiation of antibiotic therapy
Adenoviral encephalitis	35	21/W/M	2000	Navy	Four-fold rise in neutralizing antibody and PCR of lung and brain tissue

*Age (years)/Ethnicity/Sex: W=Non-African American; B=African American; H=Hispanic; M=Male

CHAPTER 5

CONCLUSION

DISCUSSION OF RESEARCH FINDINGS

There were a total of 276 recruit deaths identified through the RMR using the methodology described in Chapter 2 (appendices 10-12). Age-adjusted recruit mortality rates per 100,000 recruit-years were less than half of same-age U.S. civilian mortality rates per 100,000 person-years. Between Military Services, the age-adjusted mortality rates per 100,000 recruit-years were highest in the Army and lowest in the Air Force and Navy, with the Marine Corps in between. There were 80 (29%) traumatic deaths (Chapter 3) and 196 (71%) nontraumatic deaths (Chapter 4). In Chapter 3, it was shown that suicides were the most common (58%) cause of traumatic death. The main methods of suicide included gunshots, hangings, and jumps or falls. Slightly more than one-third (37%) of the traumatic deaths were due to unintentional injury and included overdoses, falls, explosions, gunshots, electrocutions, asphyxiations, and close combat injuries. There were only four homicides identified in recruits. Chapter 4 detailed the causes of nontraumatic deaths and 69% (136/196) were related to exercise. Of these, 57 (42%) were cardiac deaths. EHI was either a primary or contributory cause of death in at least 45 cases. Infectious agents accounted for only 24% (48/196) of the nontraumatic deaths.

This study had several strengths which include: (1) long-term, population-based ascertainment of Tri-Service recruit deaths, (2) fairly complete review of medical and circumstantial investigative information, (3) standardized assessment and cause of death coding, and (4) relative uniformity of the training environment. A limitation is that the

tabulations of deaths include recruits from the Reserve Component who may not be included in the denominator populations. This would result in an overestimate of the mortality rates, but further supports the conclusion that recruit mortality rates are lower than the age-comparable civilian population.

PUBLIC HEALTH RELEVANCE

This research integrates the five core areas of public health: epidemiology, biostatistics, environmental health, behavioral health, and health service administration. The distribution, determinants, and frequency of mortality among recruits are described. Also, mortality rates are adjusted per 100,000 recruit-years to standardize BMT duration and remove the influence of the age, sex, and race/ethnicity composition of the four military populations. Research findings demonstrate the importance of surveillance for suicide and EHI, two important behavioral and environmental health problems in the recruit population. This study also demonstrated the effectiveness of the health screening at the MEPS because only a small number of recruit deaths were attributed to preexisting conditions for which screening is not possible (e.g., lupus).

The RMR incorporates the three levels of medical mortality surveillance. The first level of surveillance is to obtain population-based counts of deaths so that mortality rates can be determined. Next, cause of death is obtained on a relatively superficial basis (e.g., death certificate) for each death in second level surveillance. The third level of surveillance involves validation and review of detailed medical and circumstantial information surrounding each death, so that medical specifics can be obtained and risk factors evaluated. The AFIP implemented the DoD-MMR at the Office of the Armed

Forces Medical Examiner to provide the first comprehensive medical mortality surveillance system for the DoD (6). The RMR provides comprehensive medical mortality surveillance for recruits.

The mortality data contained in the RMR provide valuable epidemiologic information on all recruit deaths that can be used in three important ways. First, new or previously unrecognized risks can be identified. For example, RMR data show that EHI contributes to at least one-third of ERDs. Second, high-risk groups can be identified and targeted for further research and prevention efforts. The age- and sex- adjusted nontraumatic mortality rates were higher for African Americans compared to non-African Americans. This is in contrast to lower traumatic mortality rates in African Americans compared to non-African Americans. Finally, trends of cause-specific death rates can be followed and interpreted over time. Nontraumatic mortality rates have decreased over the 25-year period, with the exception of the last five years. However, there was no consistent trend in traumatic mortality rates over time. The RMR will be particularly useful in providing real-time mortality surveillance if it is resourced for continued operation.

RECOMMENDATIONS FOR FUTURE RESEARCH

The creation of the RMR has made it possible to research the following:

1. Investigate risk factors for recruit deaths related to exercise including hemoglobin phenotype, heat stress, initiation of cardiac monitoring and defibrillation for sudden cardiac arrest, recent or current illness, current medications, training duration, body mass index, enlistment physical waivers (e.g., overweight), and in-

processing fitness level (estimated by initial physical fitness test results). For example, the higher nontraumatic mortality rates in African Americans compared to non-African Americans may be related to higher risk in those with SCT. Kark et al. (12) demonstrated a substantially higher risk of exercise-related sudden death unexplained by prior disease in Army, Air Force, Navy, and Marine Corps recruits with SCT from 1977 through 1981. The creation of the RMR makes it possible to extend the study period to 25 years. This will require reexamination of the records and tissue specimens from the ERDs and sudden deaths by the Armed Forces Institute of Pathology's subspecialists in cardiovascular pathology, forensic pathology, and other specialties. Detailed clinical and pathologic review of these case records and tissues may result in a different cause of death from what was determined by review of currently available information in the RMR.

2. Review the immunization records for the infectious disease recruit deaths and describe the immunization and benzathine penicillin G protocols effective at that time in relationship to infectious disease death rates.
3. Determine social and medical risk factors of suicide during BMT through retrospective review of psychological autopsies.
4. Include U.S. Coast Guard recruits in the RMR and analyze these deaths.
5. Review the nontraumatic recruit deaths that were not exercise-related or infectious disease-related to determine if the medical screening process can be enhanced to decrease the enlistment of recruits with preexisting disease.
6. Compare cause-specific recruit and civilian mortality rates.

7. Evaluate the accuracy of cause of death information provided in the DD Form 1300 and autopsy. Kark et al. (19) diagnosed ERD in recruits from 1977 through 1981 by review of eyewitness accounts, examination of the circumstances of training, medical history, clinical records, toxicology studies, and examination of pathologic material by appropriate subspecialists. They made major revisions to the initial autopsy diagnosis for half of the ERDs and minor corrections of diagnosis for an additional quarter of the ERDs. These findings suggest that accurate diagnosis of ERD requires review of official investigations of ERD with eyewitness accounts and reexamination of pathologic materials by pathology subspecialists.
8. Acquire resourcing for operation of an active surveillance component to the RMR to identify emerging disease threats (e.g., meningococcal strains not covered by immunization or streptococcal antimicrobial resistance), acts of bioterrorism on a training installation, or other previously unrecognized hazards.
9. Identify an additional source for retrospectively capturing Army recruit deaths and Tri-Service recruit deaths in retired enlisted personnel to determine if retirement occurred during hospitalization due to recruit training (to maximize financial benefits for their families).
10. Obtain accurate denominator data for accessions of Reserve Component recruits for IADT for future prevention and etiologic research

SUMMARY

This dissertation has described the epidemiology of Air Force, Navy, Marine Corps, and Army recruit mortality for the 25-year period 1977 through 2001. Prior to this

research, the understanding of recruit mortality was based on isolated case reports, population-based studies within a single branch of Military Service, or population-based studies of a specific cause of mortality. The findings of this research, performed in partial fulfillment of the requirements for the degree of Doctor of Public Health, established the safety of the BMT environment. Based on the results of this research, one can assure a parent that his/her son or daughter will be safer during BMT than when in the civilian community.

Military commanders may find these data useful in developing, implementing, and evaluating prevention strategies for those causes of death that account for the highest proportion of recruit mortality and/or to focus interventions toward specific subgroups of the recruit population. The finding that at least one-third of recruit ERDs are related to heat stress implies a greater importance for preventive measures directed at immediate risks during exercise (i.e., heat stress exposure). Preventive measures include maintaining adequate hydration, wet bulb globe temperature (WBGT) monitoring, work/rest cycles based on the WBGT and level of exercise, and utilizing shade and appropriate clothing to assist in heat loss. In addition, immediate medical attention to casualties on-site, with rapid cooling and rehydration, is very effective in preventing serious complications from EHI. Infections and certain medications (e.g., cold medicines and supplements containing ephedra alkaloids) increase susceptibility to heat injuries and recruits should not participate in physical training when they are sick and should be actively screened during in-processing for use of these medications. The finding that infectious agents accounted for only 24% of the nontraumatic deaths demonstrates the effectiveness of policies regarding immunizations and prophylactic benzathine penicillin

G. However, until adenovirus immunization programs are reinstated, preventable outbreaks will continue to occur and will challenge existing medical and training resources to a degree not commonly seen in the era of adenovirus immunization use. Also, benzathine penicillin G prophylaxis is not an optimal intervention strategy, although it has proven to be extremely effective. Its limitations include the potential development of penicillin-resistance, possible severe reaction after a penicillin injection, and the financial and logistical burden of providing intramuscular shots to recruits. Basic research to support a Group A streptococcal vaccine should receive high priority.

Another lesson learned from this research is the need for each BMT installation to consult the AFIP for all recruit deaths. Force protection should minimize loss among recruits during BMT, especially deaths. This can be accomplished only through timely monitoring, accurate diagnosis of each death, and thorough evaluation and analysis of circumstances. Timely monitoring will not be possible until resourcing is established to maintain the RMR with an active surveillance component. Accurate diagnosis of death and circumstances cannot be accomplished through review of autopsy protocols alone and requires review of investigations with eyewitness reports, medical records, and pathologic materials to verify etiologies. Subspecialty pathologic examination of autopsy materials is also essential and all ERDs should have the heart examined by a cardiovascular subspecialist.

REPORT OF CASUALTY		REPORT CONTROL SYMBOL DD-P&R(AR)1664		
1. REPORT NUMBER		2. REPORT TYPE		3. DATE PREPARED
4. SERVICE IDENTIFICATION				
a. NAME (<i>Last, First, Middle and Suffix</i>)		b. SOCIAL SECURITY NO.	c. GRADE/RANK/RATE	d. OCCUPATION CODE
e. COMPONENT	f. BRANCH	g. ORGANIZATION		
5. CASUALTY INFORMATION				
a. TYPE	b. STATUS	c. CATEGORY	d. DATE OF CASUALTY	e. PLACE OF CASUALTY
f. CAUSE AND CIRCUMSTANCES				
g. DUTY STATUS			h. FLIGHT STATUS	i. BODY RECOVERED
6. BACKGROUND INFORMATION				
a. DATE OF BIRTH	b. PLACE OF BIRTH		c. COUNTRY OF CITIZENSHIP	
d. RACE	e. ETHNIC GROUP	f. SEX	g. RELIGIOUS PREFERENCE	
7. ACTIVE DUTY INFORMATION				
a. PLACE OF ENTRY		b. DATE OF ENTRY	c. HOME OF RECORD AT TIME OF ENTRY	
d. DATE TOUR COMMENCED	e. PRIOR SERVICE INFORMATION		f. RECORD OF EMERGENCY DATA FORM DATE	
8. PAY INFORMATION				
a. PAY GRADE	b. BASIC PAY	c. INCENTIVE/ADDITIONAL PAY (<i>State type</i>)		
9. INTERESTED PERSONS (<i>Name, Address, and Relationship</i>)				
10. REMARKS (<i>Continue on separate sheet, if necessary</i>)				
<p>FOOTNOTES FOR ITEMS 9 AND 10</p> <p>1 Adult next of kin.</p> <p>2 Beneficiary for gratuity pay in event there is no surviving spouse or child - as designated on record of emergency data.</p> <p>3 Beneficiary for unpaid pay and allowances - as designated on record of emergency data.</p>				
11. REPORTING INFORMATION				
a. COMMAND AGENCY		b. DATE RECEIVED	c. REPORT FOR VA TO FOLLOW	
12. DISTRIBUTION		13. SIGNATURE ELEMENT		
		NOTE: This form may be used to facilitate the cashing of bonds, the payment of commercial insurance, or in the settlement of any other claim in which proof of death is required.		

APPENDIX 2. PRIMARY DATA ABSTRACTION FORM

RECRUIT MORTALITY STUDY

Case ID _____

BACKGROUND

Name (Last, First, MI) _____ SSN: _____ - _____ - _____
 Date of birth (MM/DD/YYYY): ____/____/____ Age ____ Sex: M / F
 Race: W / B / O (If other, specify: _____) Pay Grade: E1 / E2 / E3 / E4
 Service: USAF / USN / USA / USMC Component: REG / RES / GUARD
 Y / N Recruit status confirmed (If yes, provide data source: _____)
 Marital status: Single / Married / Other AFQT score: _____
 MEPS Height (inches): _____ MEPS Weight (pounds): _____
 Training Base: _____ Arrival date (MM/DD/YYYY): ____/____/____

MORTALITY INFORMATION

Date (MM/DD/YYYY): ____/____/____ Time pronounced dead (24-hour clock): _____
 Day: M / Tu / W / Th / F / Sa / Su Month: _____

FATAL INCIDENT INFORMATION

Date (MM/DD/YYYY): ____/____/____ Time (24-hour clock): _____
 Day: M / Tu / W / Th / F / Sa / Su Month: _____
 Total days in boot camp: _____
 Field WBGT: _____ °F; time recorded (24-hour clock): _____
 Training status (check one): Check here if fatal incident occurred offsite
 On duty
 Awaiting administrative separation
 Potential administrative separation
 Authorized absence (e.g., exodus leave)
 AWOL
 Other (describe: _____)
 Unknown

RECORDS OBTAINED

Y / N DD1300
 Y / N Death Certificate
 Y / N Autopsy (Report number: _____)
 Y / N Toxicology Report
 Y / N AFIP Consultation (Accession number: _____)
 Y / N Legal Investigation
 Y / N Criminal Investigation
 Y / N Other (describe: _____)

APPENDIX 2 - CONTINUED

CASUALTY INFORMATION

DD1300 _____
 Death Certificate _____
 Autopsy Report _____

Did AFIP consult concur with autopsy findings? (check one):

- Yes
 No (Explain: _____)
 Undetermined (AFIP required additional information)

Synopsis of incident: _____

Presenting symptoms: _____

Synopsis of illness and medical treatment: _____

Synopsis of autopsy findings: _____

STUDY DIAGNOSIS

Check here if "COMBINED" (one primary diagnosis could not be identified)

Y / N TRAUMA (If yes, circle one): Suicide / Homicide / Unintentional injury
 Cause of traumatic death: _____

Complete the following only if NONTRAUMA:

Y / N Explained by prior condition
 Y / N Sickle cell trait (If yes, % Hb S _____)
 Y / N Exercise-related death (fatal event: _____)
 Y / N Illness in past two weeks: _____

Cause of nontraumatic death:

- Cardiac (circle one: ASCVD / coronary anomaly / myocarditis / cardiomyopathy / other: _____)
 EHI (circle all that apply: heat stroke / rhabdomyolysis / DIC / acute renal failure)
 Infection
 Pulmonary
 Vascular
 Idiopathic sudden death
 Other (describe: _____)

DoD-MMR detail cause of death #

DoD-MMR major cause of death #

Abstracted by:

APPENDIX 3. SUPPLEMENTAL DATA ABSTRACTION FORMS

Traumatic Recruit Deaths

Case ID _____

Check the type/method:

- Fall/jump
- Drowning
- Gunshot (describe firearm: _____)
- Explosion
- Electrocutation
- Close combat
- Overdose
- MVA – driver
- MVA – passenger
- MVA – pedestrian
- Hanging (describe item(s): _____)
- Poisoning
- Other

Activity: _____

Summary: _____

Location: _____

*Additional notes:***Abstracted by:**

APPENDIX 3 - CONTINUED

Infectious Disease Deaths

Case ID _____

Clinical diagnosis: _____

Etiology: _____

Microbiological confirmation: _____ Sterile site: Y / N

Pathological findings: _____

Co-pathogen(s): Y / N

If yes, please complete the following:

Etiology: _____

Microbiological confirmation: _____ Sterile site: Y / N

Additional notes:

Abstracted by:

APPENDIX 4. DATABASE DOCUMENTATION

DATA {CONFIRMED} <Y>

BACKGROUND

Case {ID} #####

LN <A > FN <A > MI <A> SSN #####

DOB <mm/dd/yyyy> Age ## Sex #

Race # {Race} {1} <A > Pay {Grade} #

Service # Component #

Confirmed {Recruit} <Y>

{Marital} status # {AFQT} score ###

MEPS {Height} ## MEPS {Weight} ###

MEPS {Waiver} #

Training {Base} ## Boot Camp {Arrival} Date <mm/dd/yyyy>

MORTALITY INFORMATION

DOD <mm/dd/yyyy> TOD #####

{Day} of {death} # {Month} of {death} ##

FATAL INCIDENT INFORMATION

DOI <mm/dd/yyyy> TOI #####

{Day} of incident # {Month} of incident ##

{Train}ing {dur}ation days ###

Field {WBGT} ###.# {WBGT} {1} #####

Training {status} #

Off site <Y>

RECORDS OBTAINED

DD1300 <Y>

{D}eath {C}ertificate <Y>

Autopsy <Y>

Autopsy ID _____

Toxicology <Y>

{AFIP} Consult <Y>

{AFIP} Accession {ID} #####

{Legal} Investigation <Y>

{Criminal} Investigation <Y>

Other {Records} <Y>

APPENDIX 4 - CONTINUED

CASUALTY INFORMATION

DD1300 Dx

<A >

DD1300 Dx2

<A >

{D}eath {C}ertificate {Dx}

<A >

{D}eath {C}ertificate {Dx2}

<A >

Autopsy Dx

<A >

Autopsy Dx2

<A >

{AFIP} Consult {Concur} #
 {AFIP Dx} <A >

STUDY DIAGNOSIS

Undetermined <Y>

{Combined} Cause of death <Y>

Trauma <Y> {T}rauma {Manner} #

{T}rauma {method} ##

{T}rauma {activity} <A >

{T}rauma {summary} <A >

{T}rauma {location} <A >

{T}rauma {Cause} <A >

If gunshot:

Describe {firearm} <A >

If hanging:

Describe {item} <A >

If non-trauma:

{Explained} by prior condition <A>

SCT <A> Percentage of {Hb S} ##.#

ERD <A>

If ERD:

Fatal {event} #

Recent {illness} (past 2 weeks) <A>

APPENDIX 4 - CONTINUED

{N}on {T}rauma {Cause} #

Cardiac #

{Cardiac} {O}ther <A >

{N}on {T}rauma {Other}

<A >

{N}on {T}rauma {Cause2} #

Cardiac2 #

{Cardiac2} {O}ther <A >

{N}on {T}rauma{2} {Other} <A >

If EHI:

Heat Stroke <A>

Disseminated Intravascular Coagulation {DIC} <A>

{Rhabdo}myolysis <A>

Acute Renal Failure {ARF} <A>

If infection:

{Infect}ion {Dx} <A >

Organism <A >

Site <A >

Sterile <Y>

Copathogen <Y>

Organism2 <A >

Site2 <A >

Sterile2 <Y>

MEDICAL MORTALITY REGISTRY

DoD-MMR {detail} cause ###

DoD-MMR {major} cause ##

APPENDIX 5. DATABASE CODEBOOK

Variable	Contents	Format
CONFIRMED	Data confirmed	Y/N, 1 digit
ID	Case Identification Number	numeric, 4 digits
LN	Last name	alphabetic, 20 characters
FN	First name	alphabetic, 20 characters
MI	Middle initial	alphabetic, 1 character
SSN	Social Security Number	numeric, 9 digits
DOB	Date of birth	mm/dd/yyyy, 10 digits
AGE	Age (years)	numeric, 2 digits
SEX	Sex 1=Male 2=Female	numeric, 1 digit
RACE	Race 1=White 2=Black 3=Other	numeric, 1 digit
RACE1	Race description for "other," if applicable	alphabetic, 15 characters
GRADE	Pay Grade 1=E1 2=E2 3=E3 4=E4	numeric, 1 digit
SERVICE	Military Service 1=USAF 2=USN 3=USA 4=USMC	numeric, 1 digit
COMPONENT	Military Component 1=Regular 2=Reserve 3=Guard	numeric, 1 digit
RECRUIT	Recruit Status Confirmed	Y/N, 1 digit
MARITAL	Marital status recorded at MEPS 1=Single 2=Married 3=Other	numeric, 1 digit
AFQT	Armed Forces Qualification Test Score (%)	numeric, 3 digits
HEIGHT	Height (inches) recorded at MEPS	numeric, 2 digits
WEIGHT	Weight (pounds) recorded at MEPS	numeric, 3 digits
WAIVER	MEPS Waiver for enlistment 0=None 1=Physical 2=Mental 3=Moral	numeric, 1 digit
BASE	Training Base 1=Lackland	numeric, 2 digits

Variable	Contents	Format
	2=Orlando 3=Great Lakes 4=San Diego 5=Parris Island 6=Fort Jackson 7=Fort Knox 8=Fort Leonard Wood 9=Fort Benning 10=Fort Sill 11=Fort Gordon 12=Fort McClellan 13=Fort Dix 14=Fort Bliss 15=Other	
ARRIVAL	Boot camp arrival date	mm/dd/yyyy, 10 digits
DOD	Date of death	mm/dd/yyyy, 10 digits
TOD	Time of death (24-hour clock)	numeric, 4 digit
DAYDEATH	Day of death 1=Monday 2=Tuesday 3=Wednesday 4=Thursday 5=Friday 6=Saturday 7=Sunday	numeric, 1 digit
MONTHDEATH	Month of death 1=January 2=February 3=March 4=April 5=May 6=June 7=July 8=August 9=September 10=October 11=November 12=December	numeric, 2 digits
DOI	Date of fatal incident	mm/dd/yyyy, 10 digits
TOI	Time of fatal incident (24-hour clock)	numeric, 4 digits
DAY	Day of fatal incident 1=Monday 2=Tuesday 3=Wednesday 4=Thursday 5=Friday 6=Saturday 7=Sunday	numeric, 1 digit

Variable	Contents	Format
MONTH	Month of fatal incident 1=January 2=February 3=March 4=April 5=May 6=June 7=July 8=August 9=September 10=October 11=November 12=December	numeric, 2 digits
TRAINDUR	Total days in boot camp at time of fatal event	numeric, 3 digits
WBGT	Field Wet-Bulb Globe Temperature Index at time of collapse (°F)	numeric, 5 digits (###.#)
WBGT1	Time WBGT recorded (24-hour clock), if applicable	numeric, 4 digits
STATUS	Training status at time of fatal event 1=On duty 2=Awaiting administrative separation 3=Potential administrative separation 4=Authorized absence 5=AWOL 6=Other 7=Unknown	numeric, 1 digit
OFFSITE	Death occurred off training installation site (Note: deaths onsite but while AWOL are coded as “offsite”)	Y/N, 1 digit
DD1300	DoD Casualty Report (DD1300)	Y/N, 1 digit
DC	Death certificate	Y/N, 1 digit
AUTOPSY	Autopsy report	Y/N, 1 digit
AUTOPSYID	Autopsy number, if applicable	alphabetic, 12 characters
TOXICOLOGY	Toxicology report	Y/N, 1 digit
AFIP	AFIP Consultation	Y/N, 1 digit
AFIPID	AFIP accession number, if applicable	numeric, 7 digits
LEGAL	Legal investigation	Y/N, 1 digit
CRIMINAL	Criminal investigation	Y/N, 1 digit
RECORDS	Other records obtained	Y/N, 1 digit
DD1300DX1	DD1300 casualty information, if applicable	alphabetic, 78 characters
DD1300DX3	DD1300 casualty information continued, if applicable	alphabetic, 78 characters
DCDX1	Death certificate casualty information, if applicable	alphabetic, 78 characters
DCDX3	Death certificate casualty information continued, if applicable	alphabetic, 78 characters

Variable	Contents	Format
AUTOPSYDX1	Autopsy casualty information, if applicable	alphabetic, 78 characters
AUTOPSYDX3	Autopsy casualty information continued, if applicable	alphabetic, 78 characters
AFIPCONCUR	AFIP consult concur with autopsy report, if applicable 1=Yes 2=No 3=Undetermined (AFIP required additional information)	numeric, 1 digit
AFIPDX	AFIP conclusion, if applicable	alphabetic, 68 characters
UNDETERMIN	Cause of death undetermined	Y/N, 1 digit
COMBINED	Combined cause of death (one primary diagnosis not possible)	Y/N, 1 digit
TRAUMA	Traumatic death	Y/N, 1 digit
<i>The following data are completed only for traumatic deaths (TRAUMA=Y)</i>		
TMANNER	Manner of traumatic death 1=Suicide 2=Homicide 3=Unintentional injury	numeric, 1 digit
TMETHOD	Type of unintentional injury/method of suicide 1=Fall or jump 2=Drowning 3=Gunshot 4=Explosion 5=Electrocution 6=Close combat 7=Overdose 8=MVA-driver 9=MVA-passenger 10=MVA-pedestrian 11=Other 12=Hanging 13=Poisoning	numeric, 2 digit
TACTIVITY	Activity at time of traumatic fatal incident	alphabetic, 50 characters
TSUMMARY	Traumatic fatal incident circumstances	alphabetic, 50 characters
TLOCATION	Location of traumatic fatal incident	alphabetic, 50 characters
TCAUSE	Cause of traumatic death	alphabetic, 50 characters
FIREARM	If gunshot (TMETHOD=3), describe firearm	alphabetic, 20 characters
ITEM	If hanging (TMETHOD=12), describe item(s) used	alphabetic, 40 characters
<i>The following data are completed only for nontraumatic (TRAUMA=N) deaths</i>		

Variable	Contents	Format
EXPLAINED	Death explained by prior condition	Y/N/B/U, 1 digit
SCT	Sickle cell trait	Y/N/U, 1 digit
HBS	Hemoglobin S (%), if applicable	numeric, 4 digits (##.##)
ERD	Exercise-related death	Y/N/U, 1 digit
<i>The following data are completed if ERD (ERD=Y)</i>		
EVENT	Fatal event 1=Diagnostic Physical Fitness Test (PFT) run 2=Routine (PT) physical training run 3=March 4=Obstacle course/confidence course 5=Double timing 6=Other 7=Unknown 8=Water survival	numeric, 1 digit
ILLNESS	Recent illness (past 2 weeks)	Y/N/U, 1 digit
<i>The following data are completed if nontraumatic (TRAUMA=N) death</i>		
NTCAUSE	Cause of death category 1=Sudden cardiac death 2=Exertional heat illness 3=Infection 4=Pulmonary 5=Vascular 6=Idiopathic sudden death 7=Other	numeric, 1 digit
CARDIAC	Cardiac (NTCAUSE=1) category: 1=ASCVD 2=Coronary artery anomaly 3=Myocarditis 4=Cardiomyopathy 5=Other 6=Combined cardiac	numeric, 1 digit
CARDIACO	Cause of sudden cardiac death if CARDIAC=5	alphabetic, 50 characters
NTOTHER1	Cause of death if NTCAUSE=7	alphabetic, 78 characters
<i>The following data are completed if COMBINED=N</i>		
NTCAUSE2	Cause of death category (second diagnosis) 1=Sudden cardiac death 2=Exertional heat illness 3=Infection 4=Pulmonary	numeric, 1 digit

Variable	Contents	Format
	5=Vascular 6=Idiopathic sudden death 7=Other	
CARDIAC2	Cardiac (NTCAUSE2=1) category: 1=ASCVD 2=Coronary artery anomaly 3=Myocarditis 4=Cardiomyopathy 5=Other 6=Combined cardiac	numeric, 1 digit
CARDIAC2O	Cause of sudden cardiac death if (CARDIAC2=5)	alphabetic, 50 characters
NT2OTHER	Cause of death if (NTCAUSE2=7)	alphabetic, 50 characters
<i>The following data are completed if EHI (NTCAUSE=2 or NTCAUSE2=2)</i>		
HEATSTROKE	Heatstroke	Y/N/U, 1 digit
DIC	Disseminated intravascular coagulation	Y/N/U, 1 digit
RHABDO	Rhabdomyolysis	Y/N/U, 1 digit
ARF	Acute renal failure	Y/N/U, 1 digit
<i>The following data are completed if infectious disease (NTCAUSE=3) death</i>		
INFECTDX	Clinical diagnosis	alphabetic, 50 characters
ORGANISM	Etiology	alphabetic, 50 characters
SITE	Culture site (e.g., blood, CSF, throat) or microbiological confirmation (e.g., PCR)	alphabetic, 50 characters
STERILE	Sterile culture site	Y/N, 1 digit
COPATHOGEN	Copathogen identified	Y/N, 1 digit
ORGANISM2	Etiology of copathogen	alphabetic, 50 characters
SITE2	Culture site (e.g., blood, CSF, throat) of copathogen or microbiological confirmation (e.g., PCR)	alphabetic, 50 characters
STERILE2	Sterile culture site of copathogen	Y/N, 1 digit
<i>The following data are completed for all deaths</i>		
DETAIL	DoD-MMR detail cause	numeric, 3 digit
MAJOR	DoD-MMR major cause	numeric, 2 digit

APPENDIX 6. TOTAL NONPRIOR SERVICE ACTIVE COMPONENT ENLISTED
ACCESSIONS, FISCAL YEARS 1977-2001

Fiscal Year	Population Representation Table D-2*	Defense Manpower Data Center†	Difference (%)
1977	374,828	374,789	0.0
1978	303,734	303,665	0.0
1979	306,758	306,447	0.1
1980	351,693	357,980	1.8
1981	300,970	303,837	1.0
1982	300,955	304,907	1.3
1983	299,455	303,035	1.2
1984	305,063	304,849	0.1
1985	297,354	300,692	1.1
1986	312,621	313,613	0.3
1987	295,225	295,984	0.3
1988	270,994	270,912	0.0
1989	277,113	277,053	0.0
1990	223,401	223,337	0.0
1991	204,882	204,799	0.0
1992	201,565	201,477	0.0
1993	202,909	202,759	0.1
1994	176,409	176,334	0.0
1995	167,287	167,207	0.0
1996	179,133	179,031	0.1
1997	188,895	188,634	0.1
1998	180,031	179,788	0.1
1999	183,768	183,674	0.1
2000	unavailable	178,807	-
2001	unavailable	182,937	-

* Population Representation in the Military Services: Fiscal Year 1999. Washington, DC: Office of the Assistant Secretary of Defense for Force Management Policy, 2000

† Age and race unknowns deleted

APPENDIX 7. POPULATION DATA TABLES

FISCAL YEAR 1977

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	72,861	6,296	79,157	60,894	2,422	63,316	26,342	848	27,190	37,046	4,636	41,682	197,143	14,202	211,345
AGE 20 - 24	22,390	3,764	26,154	16,104	1,415	17,519	4,895	333	5,228	13,815	3,066	16,881	57,204	8,578	65,782
AGE 25 - 29	3,128	752	3,880	1,731	271	2,002	393	56	449	1,148	491	1,639	6,400	1,570	7,970
AGE 30+	642	322	964	194	30	224	18	2	20	15	1	16	869	355	1,224
TOTAL	99,021	11,134	110,155	78,923	4,138	83,061	31,648	1,239	32,887	52,024	8,194	60,218	261,616	24,705	286,321

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	29,901	1,617	31,518	6,896	214	7,110	6,365	88	6,453	4,143	460	4,603	47,305	2,379	49,684
AGE 20 - 24	13,160	1,187	14,347	3,296	197	3,493	2,265	61	2,326	2,408	472	2,880	21,129	1,917	23,046
AGE 25 - 29	1,602	284	1,886	461	44	505	254	12	266	257	82	339	2,574	422	2,996
AGE 30+	237	75	312	27	4	31	0	0	0	3	1	4	267	80	347
TOTAL	44,900	3,163	48,063	10,680	459	11,139	8,884	161	9,045	6,811	1,015	7,826	71,275	4,798	76,073

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,903	150	3,053	2,182	44	2,226	1,024	24	1,048	1,030	94	1,124	7,139	312	7,451
AGE 20 - 24	1,458	124	1,582	1,086	50	1,136	374	11	385	533	83	616	3,451	268	3,719
AGE 25 - 29	487	36	523	249	8	257	45	0	45	90	21	111	871	65	936
AGE 30+	249	12	261	27	1	28	0	0	0	0	0	0	276	13	289
TOTAL	5,097	322	5,419	3,544	103	3,647	1,443	35	1,478	1,653	198	1,851	11,737	658	12,395

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	105,665	8,063	113,728	69,972	2,680	72,652	33,731	960	34,691	42,219	5,190	47,409	251,587	16,893	268,480
AGE 20 - 24	37,008	5,075	42,083	20,486	1,662	22,148	7,534	405	7,939	16,756	3,621	20,377	81,784	10,763	92,547
AGE 25 - 29	5,217	1,072	6,289	2,441	323	2,764	692	68	760	1,495	594	2,089	9,845	2,057	11,902
AGE 30+	1,128	409	1,537	248	35	283	18	2	20	18	2	20	1,412	448	1,860
TOTAL	149,018	14,619	163,637	93,147	4,700	97,847	41,975	1,435	43,410	60,488	9,407	69,895	344,628	30,161	374,789

APPENDIX 7 - CONTINUED

FISCAL YEAR 1978

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	46,447	6,703	53,150	46,520	2,816	49,336	21,334	1,175	22,509	31,838	5,798	37,636	146,139	16,492	162,631
AGE 20 - 24	15,248	3,783	19,031	12,427	1,638	14,065	3,935	484	4,419	12,054	3,651	15,705	43,664	9,556	53,220
AGE 25 - 29	2,170	800	2,970	1,391	299	1,690	303	68	371	1,094	675	1,769	4,958	1,842	6,800
AGE 30+	397	313	710	117	36	153	9	0	9	12	2	14	535	351	886
TOTAL	64,262	11,599	75,861	60,455	4,789	65,244	25,581	1,727	27,308	44,998	10,126	55,124	195,296	28,241	223,537

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	24,092	2,793	26,885	6,006	354	6,360	6,386	224	6,610	4,416	774	5,190	40,900	4,145	45,045
AGE 20 - 24	10,991	1,903	12,894	2,685	247	2,932	2,169	147	2,316	2,618	761	3,379	18,463	3,058	21,521
AGE 25 - 29	1,362	424	1,786	453	61	514	217	23	240	295	163	458	2,327	671	2,998
AGE 30+	177	119	296	22	8	30	3	1	4	1	0	1	203	128	331
TOTAL	36,622	5,239	41,861	9,166	670	9,836	8,775	395	9,170	7,330	1,698	9,028	61,893	8,002	69,895

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,319	229	2,548	1,183	71	1,254	1,173	49	1,222	960	144	1,104	5,635	493	6,128
AGE 20 - 24	1,236	156	1,392	810	49	859	356	18	374	491	100	591	2,893	323	3,216
AGE 25 - 29	305	44	349	171	17	188	40	3	43	76	22	98	592	86	678
AGE 30+	174	19	193	16	2	18	0	0	0	0	0	0	190	21	211
TOTAL	4,034	448	4,482	2,180	139	2,319	1,569	70	1,639	1,527	266	1,793	9,310	923	10,233

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	72,858	9,725	82,583	53,709	3,241	56,950	28,893	1,448	30,341	37,214	6,716	43,930	192,674	21,130	213,804
AGE 20 - 24	27,475	5,842	33,317	15,922	1,934	17,856	6,460	649	7,109	15,163	4,512	19,675	65,020	12,937	77,957
AGE 25 - 29	3,837	1,268	5,105	2,015	377	2,392	560	94	654	1,465	860	2,325	7,877	2,599	10,476
AGE 30+	748	451	1,199	155	46	201	12	1	13	13	2	15	928	500	1,428
TOTAL	104,918	17,286	122,204	71,801	5,598	77,399	35,925	2,192	38,117	53,855	12,090	65,945	266,499	37,166	303,665

APPENDIX 7 - CONTINUED

FISCAL YEAR 1979

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	47,869	5,663	53,532	42,253	4,157	46,410	20,664	1,047	21,711	30,142	5,698	35,840	140,928	16,565	157,493
AGE 20 - 24	15,595	2,964	18,559	10,913	2,545	13,458	3,658	388	4,046	10,269	3,639	13,908	40,435	9,536	49,971
AGE 25 - 29	2,098	668	2,766	1,299	472	1,771	279	62	341	940	768	1,708	4,616	1,970	6,586
AGE 30+	348	276	624	67	53	120	5	0	5	7	5	12	427	334	761
TOTAL	65,910	9,571	75,481	54,532	7,227	61,759	24,606	1,497	26,103	41,358	10,110	51,468	186,406	28,405	214,811

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	26,443	3,911	30,354	6,972	683	7,655	7,758	372	8,130	5,197	985	6,182	46,370	5,951	52,321
AGE 20 - 24	11,772	2,519	14,291	3,134	463	3,597	2,196	149	2,345	2,808	852	3,660	19,910	3,983	23,893
AGE 25 - 29	1,583	459	2,042	470	101	571	199	14	213	316	202	518	2,568	776	3,344
AGE 30+	230	119	349	21	10	31	4	1	5	2	0	2	257	130	387
TOTAL	40,028	7,008	47,036	10,597	1,257	11,854	10,157	536	10,693	8,323	2,039	10,362	69,105	10,840	79,945

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,937	301	3,238	1,192	110	1,302	1,290	68	1,358	1,145	189	1,334	6,564	668	7,232
AGE 20 - 24	1,410	197	1,607	751	61	812	364	28	392	507	132	639	3,032	418	3,450
AGE 25 - 29	381	61	442	161	20	181	56	2	58	62	42	104	660	125	785
AGE 30+	182	19	201	18	4	22	1	0	1	0	0	0	201	23	224
TOTAL	4,910	578	5,488	2,122	195	2,317	1,711	98	1,809	1,714	363	2,077	10,457	1,234	11,691

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	77,249	9,875	87,124	50,417	4,950	55,367	29,712	1,487	31,199	36,484	6,872	43,356	193,862	23,184	217,046
AGE 20 - 24	28,777	5,680	34,457	14,798	3,069	17,867	6,218	565	6,783	13,584	4,623	18,207	63,377	13,937	77,314
AGE 25 - 29	4,062	1,188	5,250	1,930	593	2,523	534	78	612	1,318	1,012	2,330	7,844	2,871	10,715
AGE 30+	760	414	1,174	106	67	173	10	1	11	9	5	14	885	487	1,372
TOTAL	110,848	17,157	128,005	67,251	8,679	75,930	36,474	2,131	38,605	51,395	12,512	63,907	265,968	40,479	306,447

APPENDIX 7 - CONTINUED

FISCAL YEAR 1980

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	63,559	7,008	70,567	45,846	5,024	50,870	22,376	1,138	23,514	32,744	6,069	38,813	164,525	19,239	183,764
AGE 20 - 24	22,504	3,963	26,467	15,580	2,960	18,540	5,444	436	5,880	13,442	4,008	17,450	56,970	11,367	68,337
AGE 25 - 29	3,193	862	4,055	1,916	582	2,498	431	77	508	1,157	716	1,873	6,697	2,237	8,934
AGE 30+	564	373	937	162	90	252	11	1	12	25	6	31	762	470	1,232
TOTAL	89,820	12,206	102,026	63,504	8,656	72,160	28,262	1,652	29,914	47,368	10,799	58,167	228,954	33,313	262,267

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	24,632	4,911	29,543	6,721	926	7,647	6,859	307	7,166	5,281	1,040	6,321	43,493	7,184	50,677
AGE 20 - 24	11,380	3,136	14,516	3,052	563	3,615	2,119	141	2,260	2,857	961	3,818	19,408	4,801	24,209
AGE 25 - 29	1,685	601	2,286	500	108	608	196	26	222	328	216	544	2,709	951	3,660
AGE 30+	270	145	415	35	17	52	2	1	3	1	1	2	308	164	472
TOTAL	37,967	8,793	46,760	10,308	1,614	11,922	9,176	475	9,651	8,467	2,218	10,685	65,918	13,100	79,018

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	4,717	630	5,347	1,728	182	1,910	1,441	73	1,514	1,187	226	1,413	9,073	1,111	10,184
AGE 20 - 24	2,158	412	2,570	1,146	140	1,286	449	26	475	611	163	774	4,364	741	5,105
AGE 25 - 29	547	105	652	231	35	266	63	6	69	99	36	135	940	182	1,122
AGE 30+	188	54	242	32	6	38	3	0	3	1	0	1	224	60	284
TOTAL	7,610	1,201	8,811	3,137	363	3,500	1,956	105	2,061	1,898	425	2,323	14,601	2,094	16,695

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	92,908	12,549	105,457	54,295	6,132	60,427	30,676	1,518	32,194	39,212	7,335	46,547	217,091	27,534	244,625
AGE 20 - 24	36,042	7,511	43,553	19,778	3,663	23,441	8,012	603	8,615	16,910	5,132	22,042	80,742	16,909	97,651
AGE 25 - 29	5,425	1,568	6,993	2,647	725	3,372	690	109	799	1,584	968	2,552	10,346	3,370	13,716
AGE 30+	1,022	572	1,594	229	113	342	16	2	18	27	7	34	1,294	694	1,988
TOTAL	135,397	22,200	157,597	76,949	10,633	87,582	39,394	2,232	41,626	57,733	13,442	71,175	309,473	48,507	357,980

APPENDIX 7 - CONTINUED

FISCAL YEAR 1981

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	43,030	5,705	48,735	44,797	3,996	48,793	22,593	1,057	23,650	33,034	4,772	37,806	143,454	15,530	158,984
AGE 20 - 24	17,243	3,117	20,360	16,421	2,569	18,990	5,292	488	5,780	15,400	2,911	18,311	54,356	9,085	63,441
AGE 25 - 29	2,827	812	3,639	2,187	559	2,746	438	75	513	1,240	330	1,570	6,692	1,776	8,468
AGE 30+	481	284	765	357	166	523	9	0	9	19	5	24	866	455	1,321
TOTAL	63,581	9,918	73,499	63,762	7,290	71,052	28,332	1,620	29,952	49,693	8,018	57,711	205,368	26,846	232,214

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	16,219	3,699	19,918	6,239	720	6,959	4,953	257	5,210	5,332	724	6,056	32,743	5,400	38,143
AGE 20 - 24	6,474	2,035	8,509	2,824	502	3,326	1,406	128	1,534	2,944	599	3,543	13,648	3,264	16,912
AGE 25 - 29	1,134	430	1,564	477	117	594	151	18	169	327	90	417	2,089	655	2,744
AGE 30+	201	114	315	96	27	123	0	0	0	2	0	2	299	141	440
TOTAL	24,028	6,278	30,306	9,636	1,366	11,002	6,510	403	6,913	8,605	1,413	10,018	48,779	9,460	58,239

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,599	459	3,058	1,926	173	2,099	1,346	75	1,421	1,480	140	1,620	7,351	847	8,198
AGE 20 - 24	1,259	225	1,484	1,065	105	1,170	368	28	396	800	126	926	3,492	484	3,976
AGE 25 - 29	329	80	409	335	34	369	59	9	68	107	17	124	830	140	970
AGE 30+	114	26	140	89	7	96	1	0	1	2	1	3	206	34	240
TOTAL	4,301	790	5,091	3,415	319	3,734	1,774	112	1,886	2,389	284	2,673	11,879	1,505	13,384

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	61,848	9,863	71,711	52,962	4,889	57,851	28,892	1,389	30,281	39,846	5,636	45,482	183,548	21,777	205,325
AGE 20 - 24	24,976	5,377	30,353	20,310	3,176	23,486	7,066	644	7,710	19,144	3,636	22,780	71,496	12,833	84,329
AGE 25 - 29	4,290	1,322	5,612	2,999	710	3,709	648	102	750	1,674	437	2,111	9,611	2,571	12,182
AGE 30+	796	424	1,220	542	200	742	10	0	10	23	6	29	1,371	630	2,001
TOTAL	91,910	16,986	108,896	76,813	8,975	85,788	36,616	2,135	38,751	60,687	9,715	70,402	266,026	37,811	303,837

APPENDIX 7 - CONTINUED

FISCAL YEAR 1982

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	47,374	5,291	52,665	38,533	3,282	41,815	21,491	1,118	22,609	29,195	3,683	32,878	136,593	13,374	149,967
AGE 20 - 24	22,728	3,458	26,186	17,413	2,532	19,945	5,708	509	6,217	16,766	2,593	19,359	62,615	9,092	71,707
AGE 25 - 29	4,246	890	5,136	2,644	529	3,173	557	88	645	1,517	386	1,903	8,964	1,893	10,857
AGE 30+	809	319	1,128	508	172	680	11	0	11	27	5	32	1,355	496	1,851
TOTAL	75,157	9,958	85,115	59,098	6,515	65,613	27,767	1,715	29,482	47,505	6,667	54,172	209,527	24,855	234,382

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	15,654	2,256	17,910	5,769	705	6,474	4,577	267	4,844	5,329	787	6,116	31,329	4,015	35,344
AGE 20 - 24	7,471	1,671	9,142	3,107	544	3,651	1,441	130	1,571	3,246	636	3,882	15,265	2,981	18,246
AGE 25 - 29	1,495	495	1,990	581	108	689	201	26	227	362	122	484	2,639	751	3,390
AGE 30+	286	137	423	144	31	175	0	1	1	2	2	4	432	171	603
TOTAL	24,906	4,559	29,465	9,601	1,388	10,989	6,219	424	6,643	8,939	1,547	10,486	49,665	7,918	57,583

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,567	311	2,878	1,642	166	1,808	1,276	55	1,331	1,264	152	1,416	6,749	684	7,433
AGE 20 - 24	1,491	200	1,691	941	108	1,049	362	26	388	851	120	971	3,645	454	4,099
AGE 25 - 29	434	77	511	330	40	370	49	5	54	142	27	169	955	149	1,104
AGE 30+	182	25	207	84	12	96	1	1	2	1	0	1	268	38	306
TOTAL	4,674	613	5,287	2,997	326	3,323	1,688	87	1,775	2,258	299	2,557	11,617	1,325	12,942

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	65,595	7,858	73,453	45,944	4,153	50,097	27,344	1,440	28,784	35,788	4,622	40,410	174,671	18,073	192,744
AGE 20 - 24	31,690	5,329	37,019	21,461	3,184	24,645	7,511	665	8,176	20,863	3,349	24,212	81,525	12,527	94,052
AGE 25 - 29	6,175	1,462	7,637	3,555	677	4,232	807	119	926	2,021	535	2,556	12,558	2,793	15,351
AGE 30+	1,277	481	1,758	736	215	951	12	2	14	30	7	37	2,055	705	2,760
TOTAL	104,737	15,130	119,867	71,696	8,229	79,925	35,674	2,226	37,900	58,702	8,513	67,215	270,809	34,098	304,907

APPENDIX 7 - CONTINUED

FISCAL YEAR 1983

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	54,345	5,832	60,177	33,022	3,126	36,148	20,556	967	21,523	23,951	3,556	27,507	131,874	13,481	145,355
AGE 20 - 24	26,542	3,979	30,521	16,882	2,483	19,365	6,168	472	6,640	16,797	2,799	19,596	66,389	9,733	76,122
AGE 25 - 29	4,746	1,051	5,797	2,672	552	3,224	482	85	567	1,715	437	2,152	9,615	2,125	11,740
AGE 30+	955	409	1,364	571	193	764	8	0	8	35	3	38	1,569	605	2,174
TOTAL	86,588	11,271	97,859	53,147	6,354	59,501	27,214	1,524	28,738	42,498	6,795	49,293	209,447	25,944	235,391

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	14,934	2,128	17,062	5,462	751	6,213	4,277	223	4,500	3,821	795	4,616	28,494	3,897	32,391
AGE 20 - 24	7,733	1,849	9,582	2,966	600	3,566	1,396	126	1,522	2,841	771	3,612	14,936	3,346	18,282
AGE 25 - 29	1,448	527	1,975	547	130	677	180	27	207	377	117	494	2,552	801	3,353
AGE 30+	309	142	451	129	30	159	3	0	3	3	2	5	444	174	618
TOTAL	24,424	4,646	29,070	9,104	1,511	10,615	5,856	376	6,232	7,042	1,685	8,727	46,426	8,218	54,644

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,668	279	2,947	1,604	172	1,776	1,112	52	1,164	975	132	1,107	6,359	635	6,994
AGE 20 - 24	1,564	213	1,777	1,302	159	1,461	383	24	407	797	118	915	4,046	514	4,560
AGE 25 - 29	447	86	533	307	31	338	59	8	67	167	22	189	980	147	1,127
AGE 30+	165	36	201	104	14	118	0	0	0	0	0	0	269	50	319
TOTAL	4,844	614	5,458	3,317	376	3,693	1,554	84	1,638	1,939	272	2,211	11,654	1,346	13,000

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	71,947	8,239	80,186	40,088	4,049	44,137	25,945	1,242	27,187	28,747	4,483	33,230	166,727	18,013	184,740
AGE 20 - 24	35,839	6,041	41,880	21,150	3,242	24,392	7,947	622	8,569	20,435	3,688	24,123	85,371	13,593	98,964
AGE 25 - 29	6,641	1,664	8,305	3,526	713	4,239	721	120	841	2,259	576	2,835	13,147	3,073	16,220
AGE 30+	1,429	587	2,016	804	237	1,041	11	0	11	38	5	43	2,282	829	3,111
TOTAL	115,856	16,531	132,387	65,568	8,241	73,809	34,624	1,984	36,608	51,479	8,752	60,231	267,527	35,508	303,035

APPENDIX 7 - CONTINUED

FISCAL YEAR 1984

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	54,609	5,913	60,522	34,757	2,993	37,750	21,846	1,054	22,900	24,131	3,466	27,597	135,343	13,426	148,769
AGE 20 - 24	24,150	3,662	27,812	17,709	2,145	19,854	6,291	446	6,737	16,201	2,807	19,008	64,351	9,060	73,411
AGE 25 - 29	3,956	907	4,863	2,548	465	3,013	519	61	580	1,683	401	2,084	8,706	1,834	10,540
AGE 30+	839	370	1,209	579	175	754	4	1	5	12	3	15	1,434	549	1,983
TOTAL	83,554	10,852	94,406	55,593	5,778	61,371	28,660	1,562	30,222	42,027	6,677	48,704	209,834	24,869	234,703

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	15,658	2,818	18,476	6,177	780	6,957	4,795	286	5,081	3,558	762	4,320	30,188	4,646	34,834
AGE 20 - 24	6,984	1,907	8,891	3,110	658	3,768	1,477	139	1,616	2,596	765	3,361	14,167	3,469	17,636
AGE 25 - 29	1,122	439	1,561	538	110	648	147	27	174	362	126	488	2,169	702	2,871
AGE 30+	236	134	370	119	21	140	0	0	0	0	1	1	355	156	511
TOTAL	24,000	5,298	29,298	9,944	1,569	11,513	6,419	452	6,871	6,516	1,654	8,170	46,879	8,973	55,852

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,950	382	3,332	1,849	171	2,020	1,378	66	1,444	904	152	1,056	7,081	771	7,852
AGE 20 - 24	1,619	220	1,839	1,510	135	1,645	486	35	521	825	142	967	4,440	532	4,972
AGE 25 - 29	389	83	472	378	36	414	49	6	55	174	23	197	990	148	1,138
AGE 30+	144	34	178	134	20	154	0	0	0	0	0	0	278	54	332
TOTAL	5,102	719	5,821	3,871	362	4,233	1,913	107	2,020	1,903	317	2,220	12,789	1,505	14,294

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	73,217	9,113	82,330	42,783	3,944	46,727	28,019	1,406	29,425	28,593	4,380	32,973	172,612	18,843	191,455
AGE 20 - 24	32,753	5,789	38,542	22,329	2,938	25,267	8,254	620	8,874	19,622	3,714	23,336	82,958	13,061	96,019
AGE 25 - 29	5,467	1,429	6,896	3,464	611	4,075	715	94	809	2,219	550	2,769	11,865	2,684	14,549
AGE 30+	1,219	538	1,757	832	216	1,048	4	1	5	12	4	16	2,067	759	2,826
TOTAL	112,656	16,869	129,525	69,408	7,709	77,117	36,992	2,121	39,113	50,446	8,648	59,094	269,502	35,347	304,849

APPENDIX 7 - CONTINUED

FISCAL YEAR 1985

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	49,413	4,880	54,293	38,235	3,633	41,868	18,678	1,019	19,697	25,572	4,502	30,074	131,898	14,034	145,932
AGE 20 - 24	23,068	3,334	26,402	17,339	2,596	19,935	5,093	494	5,587	16,528	3,366	19,894	62,028	9,790	71,818
AGE 25 - 29	3,610	798	4,408	2,357	601	2,958	396	72	468	1,628	413	2,041	7,991	1,884	9,875
AGE 30+	824	330	1,154	553	224	777	6	0	6	20	4	24	1,403	558	1,961
TOTAL	76,915	9,342	86,257	58,484	7,054	65,538	24,173	1,585	25,758	43,748	8,285	52,033	203,320	26,266	229,586

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	13,172	2,504	15,676	6,720	1,027	7,747	4,282	293	4,575	4,287	1,091	5,378	28,461	4,915	33,376
AGE 20 - 24	6,890	2,045	8,935	3,283	896	4,179	1,518	164	1,682	3,234	981	4,215	14,925	4,086	19,011
AGE 25 - 29	1,136	494	1,630	514	163	677	136	20	156	389	157	546	2,175	834	3,009
AGE 30+	302	157	459	142	49	191	2	0	2	2	0	2	448	206	654
TOTAL	21,500	5,200	26,700	10,659	2,135	12,794	5,938	477	6,415	7,912	2,229	10,141	46,009	10,041	56,050

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,789	394	3,183	1,988	252	2,240	1,247	81	1,328	1,166	224	1,390	7,190	951	8,141
AGE 20 - 24	1,705	280	1,985	1,223	195	1,418	474	30	504	985	177	1,162	4,387	682	5,069
AGE 25 - 29	418	74	492	625	66	691	38	1	39	192	26	218	1,273	167	1,440
AGE 30+	161	39	200	177	28	205	1	0	1	0	0	0	339	67	406
TOTAL	5,073	787	5,860	4,013	541	4,554	1,760	112	1,872	2,343	427	2,770	13,189	1,867	15,056

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	65,374	7,778	73,152	46,943	4,912	51,855	24,207	1,393	25,600	31,025	5,817	36,842	167,549	19,900	187,449
AGE 20 - 24	31,663	5,659	37,322	21,845	3,687	25,532	7,085	688	7,773	20,747	4,524	25,271	81,340	14,558	95,898
AGE 25 - 29	5,164	1,366	6,530	3,496	830	4,326	570	93	663	2,209	596	2,805	11,439	2,885	14,324
AGE 30+	1,287	526	1,813	872	301	1,173	9	0	9	22	4	26	2,190	831	3,021
TOTAL	103,488	15,329	118,817	73,156	9,730	82,886	31,871	2,174	34,045	54,003	10,941	64,944	262,518	38,174	300,692

APPENDIX 7 - CONTINUED

FISCAL YEAR 1986

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	49,900	4,701	54,601	39,851	3,129	42,980	18,733	1,055	19,788	24,835	4,876	29,711	133,319	13,761	147,080
AGE 20 - 24	26,698	3,465	30,163	18,983	2,320	21,303	5,405	396	5,801	15,441	3,488	18,929	66,527	9,669	76,196
AGE 25 - 29	4,397	998	5,395	2,898	491	3,389	486	65	551	1,605	497	2,102	9,386	2,051	11,437
AGE 30+	1,058	443	1,501	701	231	932	8	1	9	15	2	17	1,782	677	2,459
TOTAL	82,053	9,607	91,660	62,433	6,171	68,604	24,632	1,517	26,149	41,896	8,863	50,759	211,014	26,158	237,172

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	13,660	2,163	15,823	8,235	1,087	9,322	3,941	325	4,266	4,698	1,188	5,886	30,534	4,763	35,297
AGE 20 - 24	8,057	2,059	10,116	4,155	870	5,025	1,416	136	1,552	2,916	1,046	3,962	16,544	4,111	20,655
AGE 25 - 29	1,354	549	1,903	672	184	856	140	14	154	368	137	505	2,534	884	3,418
AGE 30+	405	191	596	158	50	208	2	0	2	1	0	1	566	241	807
TOTAL	23,476	4,962	28,438	13,220	2,191	15,411	5,499	475	5,974	7,983	2,371	10,354	50,178	9,999	60,177

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	3,099	339	3,438	1,751	181	1,932	1,756	106	1,862	1,259	287	1,546	7,865	913	8,778
AGE 20 - 24	2,026	278	2,304	1,429	177	1,606	560	40	600	944	211	1,155	4,959	706	5,665
AGE 25 - 29	482	85	567	431	51	482	67	8	75	186	41	227	1,166	185	1,351
AGE 30+	203	40	243	199	26	225	0	0	0	1	1	2	403	67	470
TOTAL	5,810	742	6,552	3,810	435	4,245	2,383	154	2,537	2,390	540	2,930	14,393	1,871	16,264

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	66,659	7,203	73,862	49,837	4,397	54,234	24,430	1,486	25,916	30,792	6,351	37,143	171,718	19,437	191,155
AGE 20 - 24	36,781	5,802	42,583	24,567	3,367	27,934	7,381	572	7,953	19,301	4,745	24,046	88,030	14,486	102,516
AGE 25 - 29	6,233	1,632	7,865	4,001	726	4,727	693	87	780	2,159	675	2,834	13,086	3,120	16,206
AGE 30+	1,666	674	2,340	1,058	307	1,365	10	1	11	17	3	20	2,751	985	3,736
TOTAL	111,339	15,311	126,650	79,463	8,797	88,260	32,514	2,146	34,660	52,269	11,774	64,043	275,585	38,028	313,613

APPENDIX 7 - CONTINUED

FISCAL YEAR 1987

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	46,762	4,889	51,651	39,668	2,842	42,510	18,216	865	19,081	21,501	4,364	25,865	126,147	12,960	139,107
AGE 20 - 24	23,996	3,497	27,493	18,542	1,920	20,462	5,188	336	5,524	13,631	2,912	16,543	61,357	8,665	70,022
AGE 25 - 29	4,222	957	5,179	2,840	466	3,306	439	74	513	1,568	474	2,042	9,069	1,971	11,040
AGE 30+	954	477	1,431	716	208	924	12	2	14	16	3	19	1,698	690	2,388
TOTAL	75,934	9,820	85,754	61,766	5,436	67,202	23,855	1,277	25,132	36,716	7,753	44,469	198,271	24,286	222,557

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	12,823	2,480	15,303	8,924	1,057	9,981	4,120	248	4,368	3,318	1,086	4,404	29,185	4,871	34,056
AGE 20 - 24	7,985	2,349	10,334	4,923	708	5,631	1,409	119	1,528	2,246	771	3,017	16,563	3,947	20,510
AGE 25 - 29	1,373	579	1,952	791	150	941	146	19	165	270	123	393	2,580	871	3,451
AGE 30+	412	216	628	221	47	268	1	0	1	2	0	2	636	263	899
TOTAL	22,593	5,624	28,217	14,859	1,962	16,821	5,676	386	6,062	5,836	1,980	7,816	48,964	9,952	58,916

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,888	347	3,235	1,440	130	1,570	1,612	89	1,701	1,002	215	1,217	6,942	781	7,723
AGE 20 - 24	1,862	308	2,170	1,215	114	1,329	535	35	570	797	171	968	4,409	628	5,037
AGE 25 - 29	438	80	518	523	41	564	49	2	51	162	26	188	1,172	149	1,321
AGE 30+	185	44	229	186	14	200	0	0	0	1	0	1	372	58	430
TOTAL	5,373	779	6,152	3,364	299	3,663	2,196	126	2,322	1,962	412	2,374	12,895	1,616	14,511

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	62,473	7,716	70,189	50,032	4,029	54,061	23,948	1,202	25,150	25,821	5,665	31,486	162,274	18,612	180,886
AGE 20 - 24	33,843	6,154	39,997	24,680	2,742	27,422	7,132	490	7,622	16,674	3,854	20,528	82,329	13,240	95,569
AGE 25 - 29	6,033	1,616	7,649	4,154	657	4,811	634	95	729	2,000	623	2,623	12,821	2,991	15,812
AGE 30+	1,551	737	2,288	1,123	269	1,392	13	2	15	19	3	22	2,706	1,011	3,717
TOTAL	103,900	16,223	120,123	79,989	7,697	87,686	31,727	1,789	33,516	44,514	10,145	54,659	260,130	35,854	295,984

APPENDIX 7 - CONTINUED

FISCAL YEAR 1988

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	41,399	4,318	45,717	41,224	3,803	45,027	18,967	953	19,920	16,722	3,768	20,490	118,312	12,842	131,154
AGE 20 - 24	19,675	2,649	22,324	16,437	2,205	18,642	5,080	405	5,485	9,338	2,128	11,466	50,530	7,387	57,917
AGE 25 - 29	3,383	716	4,099	2,479	526	3,005	463	69	532	1,096	319	1,415	7,421	1,630	9,051
AGE 30+	763	331	1,094	657	193	850	9	1	10	10	2	12	1,439	527	1,966
TOTAL	65,220	8,014	73,234	60,797	6,727	67,524	24,519	1,428	25,947	27,166	6,217	33,383	177,702	22,386	200,088

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	12,633	2,677	15,310	10,030	1,458	11,488	4,317	360	4,677	2,476	798	3,274	29,456	5,293	34,749
AGE 20 - 24	6,993	2,066	9,059	4,550	948	5,498	1,431	137	1,568	1,417	550	1,967	14,391	3,701	18,092
AGE 25 - 29	1,186	480	1,666	707	199	906	156	22	178	174	81	255	2,223	782	3,005
AGE 30+	312	184	496	214	49	263	2	1	3	1	0	1	529	234	763
TOTAL	21,124	5,407	26,531	15,501	2,654	18,155	5,906	520	6,426	4,068	1,429	5,497	46,599	10,010	56,609

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,825	432	3,257	1,721	216	1,937	1,804	110	1,914	849	210	1,059	7,199	968	8,167
AGE 20 - 24	1,615	268	1,883	1,207	123	1,330	568	41	609	588	119	707	3,978	551	4,529
AGE 25 - 29	356	74	430	453	57	510	49	2	51	88	35	123	946	168	1,114
AGE 30+	132	35	167	221	17	238	0	0	0	0	0	0	353	52	405
TOTAL	4,928	809	5,737	3,602	413	4,015	2,421	153	2,574	1,525	364	1,889	12,476	1,739	14,215

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	56,857	7,427	64,284	52,975	5,477	58,452	25,088	1,423	26,511	20,047	4,776	24,823	154,967	19,103	174,070
AGE 20 - 24	28,283	4,983	33,266	22,194	3,276	25,470	7,079	583	7,662	11,343	2,797	14,140	68,899	11,639	80,538
AGE 25 - 29	4,925	1,270	6,195	3,639	782	4,421	668	93	761	1,358	435	1,793	10,590	2,580	13,170
AGE 30+	1,207	550	1,757	1,092	259	1,351	11	2	13	11	2	13	2,321	813	3,134
TOTAL	91,272	14,230	105,502	79,900	9,794	89,694	32,846	2,101	34,947	32,759	8,010	40,769	236,777	34,135	270,912

APPENDIX 7 - CONTINUED

FISCAL YEAR 1989

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	43,776	4,887	48,663	40,145	4,266	44,411	18,216	956	19,172	18,059	4,386	22,445	120,196	14,495	134,691
AGE 20 - 24	19,415	2,769	22,184	15,219	2,458	17,677	4,501	347	4,848	9,364	2,414	11,778	48,499	7,988	56,487
AGE 25 - 29	3,163	717	3,880	2,261	499	2,760	386	43	429	1,052	368	1,420	6,862	1,627	8,489
AGE 30+	698	295	993	538	197	735	8	3	11	9	2	11	1,253	497	1,750
TOTAL	67,052	8,668	75,720	58,163	7,420	65,583	23,111	1,349	24,460	28,484	7,170	35,654	176,810	24,607	201,417

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	13,592	3,514	17,106	10,640	1,660	12,300	3,951	406	4,357	2,497	888	3,385	30,680	6,468	37,148
AGE 20 - 24	7,790	2,263	10,053	4,800	962	5,762	1,245	131	1,376	1,286	558	1,844	15,121	3,914	19,035
AGE 25 - 29	1,264	509	1,773	789	186	975	134	17	151	166	80	246	2,353	792	3,145
AGE 30+	303	154	457	233	73	306	1	0	1	0	1	1	537	228	765
TOTAL	22,949	6,440	29,389	16,462	2,881	19,343	5,331	554	5,885	3,949	1,527	5,476	48,691	11,402	60,093

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	3,197	452	3,649	2,033	245	2,278	1,770	142	1,912	869	272	1,141	7,869	1,111	8,980
AGE 20 - 24	1,853	316	2,169	1,473	156	1,629	550	43	593	577	151	728	4,453	666	5,119
AGE 25 - 29	438	70	508	313	48	361	46	3	49	109	31	140	906	152	1,058
AGE 30+	142	38	180	170	32	202	2	0	2	2	0	2	316	70	386
TOTAL	5,630	876	6,506	3,989	481	4,470	2,368	188	2,556	1,557	454	2,011	13,544	1,999	15,543

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	60,565	8,853	69,418	52,818	6,171	58,989	23,937	1,504	25,441	21,425	5,546	26,971	158,745	22,074	180,819
AGE 20 - 24	29,058	5,348	34,406	21,492	3,576	25,068	6,296	521	6,817	11,227	3,123	14,350	68,073	12,568	80,641
AGE 25 - 29	4,865	1,296	6,161	3,363	733	4,096	566	63	629	1,327	479	1,806	10,121	2,571	12,692
AGE 30+	1,143	487	1,630	941	302	1,243	11	3	14	11	3	14	2,106	795	2,901
TOTAL	95,631	15,984	111,615	78,614	10,782	89,396	30,810	2,091	32,901	33,990	9,151	43,141	239,045	38,008	277,053

APPENDIX 7 - CONTINUED

FISCAL YEAR 1990

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	32,214	3,975	36,189	31,667	3,245	34,912	17,657	791	18,448	15,951	3,665	19,616	97,489	11,676	109,165
AGE 20 - 24	15,458	2,310	17,768	12,797	1,739	14,536	5,126	314	5,440	7,266	1,783	9,049	40,647	6,146	46,793
AGE 25 - 29	2,453	562	3,015	1,720	363	2,083	450	42	492	706	252	958	5,329	1,219	6,548
AGE 30+	552	261	813	462	122	584	11	0	11	11	4	15	1,036	387	1,423
TOTAL	50,677	7,108	57,785	46,646	5,469	52,115	23,244	1,147	24,391	23,934	5,704	29,638	144,501	19,428	163,929

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	10,168	2,569	12,737	8,338	1,263	9,601	3,920	321	4,241	2,143	772	2,915	24,569	4,925	29,494
AGE 20 - 24	5,222	1,639	6,861	3,570	682	4,252	1,270	94	1,364	986	425	1,411	11,048	2,840	13,888
AGE 25 - 29	931	408	1,339	638	134	772	168	18	186	133	77	210	1,870	637	2,507
AGE 30+	270	120	390	215	53	268	3	0	3	2	0	2	490	173	663
TOTAL	16,591	4,736	21,327	12,761	2,132	14,893	5,361	433	5,794	3,264	1,274	4,538	37,977	8,575	46,552

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,583	404	2,987	1,547	201	1,748	1,809	110	1,919	729	186	915	6,668	901	7,569
AGE 20 - 24	1,508	249	1,757	1,113	95	1,208	639	52	691	419	111	530	3,679	507	4,186
AGE 25 - 29	295	53	348	298	28	326	82	4	86	57	16	73	732	101	833
AGE 30+	108	20	128	122	16	138	1	0	1	1	0	1	232	36	268
TOTAL	4,494	726	5,220	3,080	340	3,420	2,531	166	2,697	1,206	313	1,519	11,311	1,545	12,856

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	44,965	6,948	51,913	41,552	4,709	46,261	23,386	1,222	24,608	18,823	4,623	23,446	128,726	17,502	146,228
AGE 20 - 24	22,188	4,198	26,386	17,480	2,516	19,996	7,035	460	7,495	8,671	2,319	10,990	55,374	9,493	64,867
AGE 25 - 29	3,679	1,023	4,702	2,656	525	3,181	700	64	764	896	345	1,241	7,931	1,957	9,888
AGE 30+	930	401	1,331	799	191	990	15	0	15	14	4	18	1,758	596	2,354
TOTAL	71,762	12,570	84,332	62,487	7,941	70,428	31,136	1,746	32,882	28,404	7,291	35,695	193,789	29,548	223,337

APPENDIX 7 - CONTINUED

FISCAL YEAR 1991

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	26,906	3,291	30,197	30,079	2,599	32,678	14,866	730	15,596	12,015	2,976	14,991	83,866	9,596	93,462
AGE 20 - 24	18,013	2,467	20,480	15,678	1,698	17,376	6,060	314	6,374	7,279	1,901	9,180	47,030	6,380	53,410
AGE 25 - 29	3,986	735	4,721	2,426	344	2,770	892	70	962	712	232	944	8,016	1,381	9,397
AGE 30+	1,182	296	1,478	765	138	903	81	4	85	4	1	5	2,032	439	2,471
TOTAL	50,087	6,789	56,876	48,948	4,779	53,727	21,899	1,118	23,017	20,010	5,110	25,120	140,944	17,796	158,740

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	6,747	1,919	8,666	6,541	788	7,329	2,748	237	2,985	1,423	639	2,062	17,459	3,583	21,042
AGE 20 - 24	3,872	1,306	5,178	2,774	435	3,209	941	69	1,010	698	327	1,025	8,285	2,137	10,422
AGE 25 - 29	841	341	1,182	534	83	617	174	17	191	70	50	120	1,619	491	2,110
AGE 30+	302	116	418	216	31	247	11	1	12	0	0	0	529	148	677
TOTAL	11,762	3,682	15,444	10,065	1,337	11,402	3,874	324	4,198	2,191	1,016	3,207	27,892	6,359	34,251

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,021	346	2,367	1,479	154	1,633	1,493	105	1,598	597	187	784	5,590	792	6,382
AGE 20 - 24	1,430	253	1,683	1,151	91	1,242	652	54	706	425	109	534	3,658	507	4,165
AGE 25 - 29	383	73	456	223	20	243	94	5	99	76	26	102	776	124	900
AGE 30+	171	48	219	129	9	138	4	0	4	0	0	0	304	57	361
TOTAL	4,005	720	4,725	2,982	274	3,256	2,243	164	2,407	1,098	322	1,420	10,328	1,480	11,808

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	35,674	5,556	41,230	38,099	3,541	41,640	19,107	1,072	20,179	14,035	3,802	17,837	106,915	13,971	120,886
AGE 20 - 24	23,315	4,026	27,341	19,603	2,224	21,827	7,653	437	8,090	8,402	2,337	10,739	58,973	9,024	67,997
AGE 25 - 29	5,210	1,149	6,359	3,183	447	3,630	1,160	92	1,252	858	308	1,166	10,411	1,996	12,407
AGE 30+	1,655	460	2,115	1,110	178	1,288	96	5	101	4	1	5	2,865	644	3,509
TOTAL	65,854	11,191	77,045	61,995	6,390	68,385	28,016	1,606	29,622	23,299	6,448	29,747	179,164	25,635	204,799

APPENDIX 7 - CONTINUED

FISCAL YEAR 1992

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	27,716	3,658	31,374	24,048	3,479	27,527	17,335	808	18,143	13,737	3,583	17,320	82,836	11,528	94,364
AGE 20 - 24	17,489	2,926	20,415	13,448	2,116	15,564	6,024	322	6,346	8,800	2,192	10,992	45,761	7,556	53,317
AGE 25 - 29	2,707	615	3,322	1,388	287	1,675	402	41	443	730	286	1,016	5,227	1,229	6,456
AGE 30+	642	274	916	372	105	477	9	1	10	2	1	3	1,025	381	1,406
TOTAL	48,554	7,473	56,027	39,256	5,987	45,243	23,770	1,172	24,942	23,269	6,062	29,331	134,849	20,694	155,543

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	6,418	2,101	8,519	5,233	1,048	6,281	2,765	197	2,962	1,697	628	2,325	16,113	3,974	20,087
AGE 20 - 24	4,188	1,635	5,823	2,835	570	3,405	992	72	1,064	983	406	1,389	8,998	2,683	11,681
AGE 25 - 29	691	336	1,027	409	114	523	94	10	104	102	63	165	1,296	523	1,819
AGE 30+	225	118	343	137	32	169	0	0	0	1	0	1	363	150	513
TOTAL	11,522	4,190	15,712	8,614	1,764	10,378	3,851	279	4,130	2,783	1,097	3,880	26,770	7,330	34,100

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,051	382	2,433	1,136	235	1,371	1,734	115	1,849	651	210	861	5,572	942	6,514
AGE 20 - 24	1,489	302	1,791	948	141	1,089	744	26	770	495	154	649	3,676	623	4,299
AGE 25 - 29	310	69	379	180	35	215	62	2	64	77	14	91	629	120	749
AGE 30+	145	29	174	82	14	96	1	1	2	0	0	0	228	44	272
TOTAL	3,995	782	4,777	2,346	425	2,771	2,541	144	2,685	1,223	378	1,601	10,105	1,729	11,834

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	36,185	6,141	42,326	30,417	4,762	35,179	21,834	1,120	22,954	16,085	4,421	20,506	104,521	16,444	120,965
AGE 20 - 24	23,166	4,863	28,029	17,231	2,827	20,058	7,760	420	8,180	10,278	2,752	13,030	58,435	10,862	69,297
AGE 25 - 29	3,708	1,020	4,728	1,977	436	2,413	558	53	611	909	363	1,272	7,152	1,872	9,024
AGE 30+	1,012	421	1,433	591	151	742	10	2	12	3	1	4	1,616	575	2,191
TOTAL	64,071	12,445	76,516	50,216	8,176	58,392	30,162	1,595	31,757	27,275	7,537	34,812	171,724	29,753	201,477

APPENDIX 7 - CONTINUED

FISCAL YEAR 1993

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	25,295	3,601	28,896	27,700	3,670	31,370	19,469	801	20,270	12,210	3,107	15,317	84,674	11,179	95,853
AGE 20 - 24	18,063	2,622	20,685	14,195	1,770	15,965	6,477	306	6,783	7,527	1,952	9,479	46,262	6,650	52,912
AGE 25 - 29	3,152	679	3,831	1,296	248	1,544	345	26	371	690	221	911	5,483	1,174	6,657
AGE 30+	782	225	1,007	315	107	422	7	5	12	10	1	11	1,114	338	1,452
TOTAL	47,292	7,127	54,419	43,506	5,795	49,301	26,298	1,138	27,436	20,437	5,281	25,718	137,533	19,341	156,874

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	5,830	1,856	7,686	5,951	1,134	7,085	2,825	187	3,012	1,627	749	2,376	16,233	3,926	20,159
AGE 20 - 24	4,336	1,575	5,911	2,855	589	3,444	1,028	81	1,109	989	458	1,447	9,208	2,703	11,911
AGE 25 - 29	792	354	1,146	333	110	443	87	9	96	95	57	152	1,307	530	1,837
AGE 30+	250	120	370	126	24	150	1	0	1	1	0	1	378	144	522
TOTAL	11,208	3,905	15,113	9,265	1,857	11,122	3,941	277	4,218	2,712	1,264	3,976	27,126	7,303	34,429

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	1,650	368	2,018	1,215	201	1,416	2,025	118	2,143	635	243	878	5,525	930	6,455
AGE 20 - 24	1,325	298	1,623	827	106	933	793	55	848	465	158	623	3,410	617	4,027
AGE 25 - 29	343	53	396	153	28	181	57	4	61	56	18	74	609	103	712
AGE 30+	140	25	165	87	9	96	1	0	1	0	0	0	228	34	262
TOTAL	3,458	744	4,202	2,282	344	2,626	2,876	177	3,053	1,156	419	1,575	9,772	1,684	11,456

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	32,775	5,825	38,600	34,866	5,005	39,871	24,319	1,106	25,425	14,472	4,099	18,571	106,432	16,035	122,467
AGE 20 - 24	23,724	4,495	28,219	17,877	2,465	20,342	8,298	442	8,740	8,981	2,568	11,549	58,880	9,970	68,850
AGE 25 - 29	4,287	1,086	5,373	1,782	386	2,168	489	39	528	841	296	1,137	7,399	1,807	9,206
AGE 30+	1,172	370	1,542	528	140	668	9	5	14	11	1	12	1,720	516	2,236
TOTAL	61,958	11,776	73,734	55,053	7,996	63,049	33,115	1,592	34,707	24,305	6,964	31,269	174,431	28,328	202,759

APPENDIX 7 - CONTINUED

FISCAL YEAR 1994

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	20,532	3,343	23,875	22,004	3,869	25,873	17,135	872	18,007	11,469	3,182	14,651	71,140	11,266	82,406
AGE 20 - 24	14,002	2,371	16,373	10,985	2,036	13,021	5,845	303	6,148	6,504	1,828	8,332	37,336	6,538	43,874
AGE 25 - 29	2,524	577	3,101	1,101	270	1,371	354	41	395	570	206	776	4,549	1,094	5,643
AGE 30+	650	255	905	270	102	372	7	1	8	18	1	19	945	359	1,304
TOTAL	37,708	6,546	44,254	34,360	6,277	40,637	23,341	1,217	24,558	18,561	5,217	23,778	113,970	19,257	133,227

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	4,785	1,787	6,572	4,943	1,393	6,336	2,586	210	2,796	1,753	833	2,586	14,067	4,223	18,290
AGE 20 - 24	3,990	1,613	5,603	2,538	678	3,216	1,083	84	1,167	1,006	494	1,500	8,617	2,869	11,486
AGE 25 - 29	708	426	1,134	312	142	454	83	11	94	64	46	110	1,167	625	1,792
AGE 30+	214	167	381	103	34	137	4	0	4	0	0	0	321	201	522
TOTAL	9,697	3,993	13,690	7,896	2,247	10,143	3,756	305	4,061	2,823	1,373	4,196	24,172	7,918	32,090

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	1,296	310	1,606	1,199	264	1,463	2,060	137	2,197	687	285	972	5,242	996	6,238
AGE 20 - 24	1,141	215	1,356	783	152	935	806	53	859	524	185	709	3,254	605	3,859
AGE 25 - 29	264	65	329	163	25	188	61	7	68	65	21	86	553	118	671
AGE 30+	109	33	142	89	18	107	0	0	0	0	0	0	198	51	249
TOTAL	2,810	623	3,433	2,234	459	2,693	2,927	197	3,124	1,276	491	1,767	9,247	1,770	11,017

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	26,613	5,440	32,053	28,146	5,526	33,672	21,781	1,219	23,000	13,909	4,300	18,209	90,449	16,485	106,934
AGE 20 - 24	19,133	4,199	23,332	14,306	2,866	17,172	7,734	440	8,174	8,034	2,507	10,541	49,207	10,012	59,219
AGE 25 - 29	3,496	1,068	4,564	1,576	437	2,013	498	59	557	699	273	972	6,269	1,837	8,106
AGE 30+	973	455	1,428	462	154	616	11	1	12	18	1	19	1,464	611	2,075
TOTAL	50,215	11,162	61,377	44,490	8,983	53,473	30,024	1,719	31,743	22,660	7,081	29,741	147,389	28,945	176,334

APPENDIX 7 - CONTINUED

FISCAL YEAR 1995

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	19,549	3,185	22,734	17,548	3,891	21,439	16,284	962	17,246	11,201	3,237	14,438	64,582	11,275	75,857
AGE 20 - 24	12,352	2,161	14,513	9,405	1,748	11,153	5,965	319	6,284	6,686	1,843	8,529	34,408	6,071	40,479
AGE 25 - 29	2,176	527	2,703	1,142	260	1,402	564	43	607	586	229	815	4,468	1,059	5,527
AGE 30+	507	196	703	295	104	399	25	5	30	31	3	34	858	308	1,166
TOTAL	34,584	6,069	40,653	28,390	6,003	34,393	22,838	1,329	24,167	18,504	5,312	23,816	104,316	18,713	123,029

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	4,712	1,835	6,547	4,103	1,760	5,863	2,593	242	2,835	1,850	911	2,761	13,258	4,748	18,006
AGE 20 - 24	3,566	1,498	5,064	2,441	819	3,260	1,171	82	1,253	1,071	529	1,600	8,249	2,928	11,177
AGE 25 - 29	599	427	1,026	354	132	486	140	14	154	79	53	132	1,172	626	1,798
AGE 30+	187	136	323	94	43	137	8	0	8	0	0	0	289	179	468
TOTAL	9,064	3,896	12,960	6,992	2,754	9,746	3,912	338	4,250	3,000	1,493	4,493	22,968	8,481	31,449

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	1,387	372	1,759	1,236	380	1,616	2,262	137	2,399	974	372	1,346	5,859	1,261	7,120
AGE 20 - 24	1,206	313	1,519	881	175	1,056	938	66	1,004	765	235	1,000	3,790	789	4,579
AGE 25 - 29	273	64	337	148	37	185	91	10	101	91	29	120	603	140	743
AGE 30+	118	33	151	111	19	130	1	0	1	5	0	5	235	52	287
TOTAL	2,984	782	3,766	2,376	611	2,987	3,292	213	3,505	1,835	636	2,471	10,487	2,242	12,729

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	25,648	5,392	31,040	22,887	6,031	28,918	21,139	1,341	22,480	14,025	4,520	18,545	83,699	17,284	100,983
AGE 20 - 24	17,124	3,972	21,096	12,727	2,742	15,469	8,074	467	8,541	8,522	2,607	11,129	46,447	9,788	56,235
AGE 25 - 29	3,048	1,018	4,066	1,644	429	2,073	795	67	862	756	311	1,067	6,243	1,825	8,068
AGE 30+	812	365	1,177	500	166	666	34	5	39	36	3	39	1,382	539	1,921
TOTAL	46,632	10,747	57,379	37,758	9,368	47,126	30,042	1,880	31,922	23,339	7,441	30,780	137,771	29,436	167,207

APPENDIX 7 - CONTINUED

FISCAL YEAR 1996

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	21,797	4,312	26,109	17,333	2,888	20,221	16,190	1,048	17,238	10,513	3,191	13,704	65,833	11,439	77,272
AGE 20 - 24	14,805	2,681	17,486	9,406	1,276	10,682	5,823	341	6,164	6,337	2,021	8,358	36,371	6,319	42,690
AGE 25 - 29	2,885	673	3,558	1,440	228	1,668	652	53	705	680	270	950	5,657	1,224	6,881
AGE 30+	602	256	858	385	74	459	44	9	53	33	3	36	1,064	342	1,406
TOTAL	40,089	7,922	48,011	28,564	4,466	33,030	22,709	1,451	24,160	17,563	5,485	23,048	108,925	19,324	128,249

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	5,907	2,595	8,502	4,339	1,148	5,487	2,641	315	2,956	1,735	1,035	2,770	14,622	5,093	19,715
AGE 20 - 24	4,424	1,811	6,235	2,552	553	3,105	1,177	104	1,281	1,121	598	1,719	9,274	3,066	12,340
AGE 25 - 29	797	489	1,286	444	94	538	158	17	175	99	68	167	1,498	668	2,166
AGE 30+	271	194	465	154	45	199	17	2	19	0	0	0	442	241	683
TOTAL	11,399	5,089	16,488	7,489	1,840	9,329	3,993	438	4,431	2,955	1,701	4,656	25,836	9,068	34,904

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	1,955	538	2,493	1,651	317	1,968	2,505	194	2,699	1,074	415	1,489	7,185	1,464	8,649
AGE 20 - 24	1,687	411	2,098	1,173	178	1,351	1,016	71	1,087	869	312	1,181	4,745	972	5,717
AGE 25 - 29	438	117	555	233	36	269	102	16	118	115	39	154	888	208	1,096
AGE 30+	176	57	233	148	22	170	9	2	11	1	1	2	334	82	416
TOTAL	4,256	1,123	5,379	3,205	553	3,758	3,632	283	3,915	2,059	767	2,826	13,152	2,726	15,878

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	29,659	7,445	37,104	23,323	4,353	27,676	21,336	1,557	22,893	13,322	4,641	17,963	87,640	17,996	105,636
AGE 20 - 24	20,916	4,903	25,819	13,131	2,007	15,138	8,016	516	8,532	8,327	2,931	11,258	50,390	10,357	60,747
AGE 25 - 29	4,120	1,279	5,399	2,117	358	2,475	912	86	998	894	377	1,271	8,043	2,100	10,143
AGE 30+	1,049	507	1,556	687	141	828	70	13	83	34	4	38	1,840	665	2,505
TOTAL	55,744	14,134	69,878	39,258	6,859	46,117	30,334	2,172	32,506	22,577	7,953	30,530	147,913	31,118	179,031

APPENDIX 7 - CONTINUED

FISCAL YEAR 1997

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	23,054	4,753	27,807	17,869	2,647	20,516	16,546	1,197	17,743	9,917	3,382	13,299	67,386	11,979	79,365
AGE 20 - 24	15,064	2,748	17,812	9,887	1,434	11,321	6,014	396	6,410	5,892	1,848	7,740	36,857	6,426	43,283
AGE 25 - 29	3,286	759	4,045	1,379	196	1,575	698	57	755	557	244	801	5,920	1,256	7,176
AGE 30+	732	262	994	311	82	393	39	1	40	20	3	23	1,102	348	1,450
TOTAL	42,136	8,522	50,658	29,446	4,359	33,805	23,297	1,651	24,948	16,386	5,477	21,863	111,265	20,009	131,274

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	6,461	2,660	9,121	4,803	1,101	5,904	2,793	341	3,134	1,966	1,314	3,280	16,023	5,416	21,439
AGE 20 - 24	4,595	1,844	6,439	2,853	634	3,487	1,278	107	1,385	1,133	645	1,778	9,859	3,230	13,089
AGE 25 - 29	1,106	608	1,714	458	102	560	222	15	237	95	81	176	1,881	806	2,687
AGE 30+	361	206	567	166	33	199	11	2	13	1	1	2	539	242	781
TOTAL	12,523	5,318	17,841	8,280	1,870	10,150	4,304	465	4,769	3,195	2,041	5,236	28,302	9,694	37,996

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,644	695	3,339	2,382	394	2,776	2,651	224	2,875	1,120	534	1,654	8,797	1,847	10,644
AGE 20 - 24	2,175	507	2,682	1,582	238	1,820	1,100	89	1,189	814	311	1,125	5,671	1,145	6,816
AGE 25 - 29	637	141	778	313	44	357	110	9	119	119	42	161	1,179	236	1,415
AGE 30+	262	61	323	136	22	158	6	0	6	1	1	2	405	84	489
TOTAL	5,718	1,404	7,122	4,413	698	5,111	3,867	322	4,189	2,054	888	2,942	16,052	3,312	19,364

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	32,159	8,108	40,267	25,054	4,142	29,196	21,990	1,762	23,752	13,003	5,230	18,233	92,206	19,242	111,448
AGE 20 - 24	21,834	5,099	26,933	14,322	2,306	16,628	8,392	592	8,984	7,839	2,804	10,643	52,387	10,801	63,188
AGE 25 - 29	5,029	1,508	6,537	2,150	342	2,492	1,030	81	1,111	771	367	1,138	8,980	2,298	11,278
AGE 30+	1,355	529	1,884	613	137	750	56	3	59	22	5	27	2,046	674	2,720
TOTAL	60,377	15,244	75,621	42,139	6,927	49,066	31,468	2,438	33,906	21,635	8,406	30,041	155,619	33,015	188,634

APPENDIX 7 - CONTINUED

FISCAL YEAR 1998

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	22,683	4,264	26,947	16,842	3,470	20,312	16,848	1,264	18,112	10,903	3,373	14,276	67,276	12,371	79,647
AGE 20 - 24	12,215	2,096	14,311	7,814	1,569	9,383	5,676	342	6,018	5,785	1,662	7,447	31,490	5,669	37,159
AGE 25 - 29	2,578	606	3,184	1,158	235	1,393	646	69	715	592	227	819	4,974	1,137	6,111
AGE 30+	589	213	802	233	74	307	37	1	38	25	6	31	884	294	1,178
TOTAL	38,065	7,179	45,244	26,047	5,348	31,395	23,207	1,676	24,883	17,305	5,268	22,573	104,624	19,471	124,095

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	6,677	2,352	9,029	4,329	1,594	5,923	2,755	313	3,068	2,314	1,430	3,744	16,075	5,689	21,764
AGE 20 - 24	3,734	1,399	5,133	2,206	701	2,907	1,019	97	1,116	1,257	562	1,819	8,216	2,759	10,975
AGE 25 - 29	901	458	1,359	393	124	517	190	25	215	113	65	178	1,597	672	2,269
AGE 30+	288	177	465	142	40	182	24	2	26	0	0	0	454	219	673
TOTAL	11,600	4,386	15,986	7,070	2,459	9,529	3,988	437	4,425	3,684	2,057	5,741	26,342	9,339	35,681

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,876	701	3,577	2,646	660	3,306	2,555	274	2,829	1,255	529	1,784	9,332	2,164	11,496
AGE 20 - 24	1,993	428	2,421	1,600	334	1,934	1,045	86	1,131	883	333	1,216	5,521	1,181	6,702
AGE 25 - 29	578	142	720	306	68	374	126	10	136	119	47	166	1,129	267	1,396
AGE 30+	212	58	270	119	18	137	9	1	10	1	0	1	341	77	418
TOTAL	5,659	1,329	6,988	4,671	1,080	5,751	3,735	371	4,106	2,258	909	3,167	16,323	3,689	20,012

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	32,236	7,317	39,553	23,817	5,724	29,541	22,158	1,851	24,009	14,472	5,332	19,804	92,683	20,224	112,907
AGE 20 - 24	17,942	3,923	21,865	11,620	2,604	14,224	7,740	525	8,265	7,925	2,557	10,482	45,227	9,609	54,836
AGE 25 - 29	4,057	1,206	5,263	1,857	427	2,284	962	104	1,066	824	339	1,163	7,700	2,076	9,776
AGE 30+	1,089	448	1,537	494	132	626	70	4	74	26	6	32	1,679	590	2,269
TOTAL	55,324	12,894	68,218	37,788	8,887	46,675	30,930	2,484	33,414	23,247	8,234	31,481	147,289	32,499	179,788

APPENDIX 7 - CONTINUED

FISCAL YEAR 1999

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	21,820	4,148	25,968	18,187	3,582	21,769	16,884	1,115	17,999	10,969	3,593	14,562	67,860	12,438	80,298
AGE 20 - 24	11,763	2,086	13,849	8,596	1,534	10,130	5,484	334	5,818	5,937	1,763	7,700	31,780	5,717	37,497
AGE 25 - 29	2,536	587	3,123	1,520	262	1,782	600	42	642	706	217	923	5,362	1,108	6,470
AGE 30+	657	206	863	424	77	501	47	9	56	66	7	73	1,194	299	1,493
TOTAL	36,776	7,027	43,803	28,727	5,455	34,182	23,015	1,500	24,515	17,678	5,580	23,258	106,196	19,562	125,758

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	6,431	2,573	9,004	4,709	1,666	6,375	2,682	325	3,007	2,417	1,529	3,946	16,239	6,093	22,332
AGE 20 - 24	3,756	1,484	5,240	2,448	720	3,168	1,026	91	1,117	1,180	569	1,749	8,410	2,864	11,274
AGE 25 - 29	946	499	1,445	534	129	663	182	19	201	124	72	196	1,786	719	2,505
AGE 30+	323	202	525	180	45	225	17	1	18	3	1	4	523	249	772
TOTAL	11,456	4,758	16,214	7,871	2,560	10,431	3,907	436	4,343	3,724	2,171	5,895	26,958	9,925	36,883

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	2,793	771	3,564	3,198	742	3,940	2,696	277	2,973	1,298	569	1,867	9,985	2,359	12,344
AGE 20 - 24	1,898	464	2,362	1,819	396	2,215	929	78	1,007	805	319	1,124	5,451	1,257	6,708
AGE 25 - 29	573	155	728	383	72	455	127	7	134	110	47	157	1,193	281	1,474
AGE 30+	235	67	302	153	38	191	9	1	10	4	0	4	401	106	507
TOTAL	5,499	1,457	6,956	5,553	1,248	6,801	3,761	363	4,124	2,217	935	3,152	17,030	4,003	21,033

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	31,044	7,492	38,536	26,094	5,990	32,084	22,262	1,717	23,979	14,684	5,691	20,375	94,084	20,890	114,974
AGE 20 - 24	17,417	4,034	21,451	12,863	2,650	15,513	7,439	503	7,942	7,922	2,651	10,573	45,641	9,838	55,479
AGE 25 - 29	4,055	1,241	5,296	2,437	463	2,900	909	68	977	940	336	1,276	8,341	2,108	10,449
AGE 30+	1,215	475	1,690	757	160	917	73	11	84	73	8	81	2,118	654	2,772
TOTAL	53,731	13,242	66,973	42,151	9,263	51,414	30,683	2,299	32,982	23,619	8,686	32,305	150,184	33,490	183,674

APPENDIX 7 - CONTINUED

FISCAL YEAR 2000

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	19,975	4,000	23,975	15,299	3,032	18,331	14,510	970	15,480	11,030	3,253	14,283	60,814	11,255	72,069
AGE 20 - 24	11,261	1,977	13,238	7,219	1,312	8,531	4,095	276	4,371	5,566	1,553	7,119	28,141	5,118	33,259
AGE 25 - 29	2,224	500	2,724	1,111	222	1,333	400	28	428	581	178	759	4,316	928	5,244
AGE 30+	566	206	772	301	64	365	25	1	26	39	9	48	931	280	1,211
TOTAL	34,026	6,683	40,709	23,930	4,630	28,560	19,030	1,275	20,305	17,216	4,993	22,209	94,202	17,581	111,783

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	5,720	2,836	8,556	4,734	1,695	6,429	2,501	286	2,787	2,789	1,601	4,390	15,744	6,418	22,162
AGE 20 - 24	3,494	1,566	5,060	2,345	661	3,006	845	82	927	1,209	558	1,767	7,893	2,867	10,760
AGE 25 - 29	785	456	1,241	464	125	589	130	14	144	106	66	172	1,485	661	2,146
AGE 30+	242	187	429	179	49	228	13	3	16	1	2	3	435	241	676
TOTAL	10,241	5,045	15,286	7,722	2,530	10,252	3,489	385	3,874	4,105	2,227	6,332	25,557	10,187	35,744

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	4,449	1,268	5,717	5,232	1,287	6,519	4,071	370	4,441	1,849	814	2,663	15,601	3,739	19,340
AGE 20 - 24	2,798	636	3,434	2,689	527	3,216	1,321	98	1,419	1,042	396	1,438	7,850	1,657	9,507
AGE 25 - 29	760	178	938	477	94	571	162	16	178	144	63	207	1,543	351	1,894
AGE 30+	238	72	310	181	26	207	11	0	11	8	3	11	438	101	539
TOTAL	8,245	2,154	10,399	8,579	1,934	10,513	5,565	484	6,049	3,043	1,276	4,319	25,432	5,848	31,280

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	30,144	8,104	38,248	25,265	6,014	31,279	21,082	1,626	22,708	15,668	5,668	21,336	92,159	21,412	113,571
AGE 20 - 24	17,553	4,179	21,732	12,253	2,500	14,753	6,261	456	6,717	7,817	2,507	10,324	43,884	9,642	53,526
AGE 25 - 29	3,769	1,134	4,903	2,052	441	2,493	692	58	750	831	307	1,138	7,344	1,940	9,284
AGE 30+	1,046	465	1,511	661	139	800	49	4	53	48	14	62	1,804	622	2,426
TOTAL	52,512	13,882	66,394	40,231	9,094	49,325	28,084	2,144	30,228	24,364	8,496	32,860	145,191	33,616	178,807

APPENDIX 7 - CONTINUED

FISCAL YEAR 2001

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	20,816	3,895	24,711	15,150	3,071	18,221	14,443	941	15,384	11,788	3,231	15,019	62,197	11,138	73,335
AGE 20 - 24	12,289	2,167	14,456	7,288	1,301	8,589	4,311	304	4,615	6,086	1,576	7,662	29,974	5,348	35,322
AGE 25 - 29	2,357	538	2,895	1,055	163	1,218	409	21	430	723	214	937	4,544	936	5,480
AGE 30+	603	213	816	314	91	405	25	2	27	41	22	63	983	328	1,311
TOTAL	36,065	6,813	42,878	23,807	4,626	28,433	19,188	1,268	20,456	18,638	5,043	23,681	97,698	17,750	115,448

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	5,478	2,691	8,169	5,037	1,645	6,682	2,386	271	2,657	2,662	1,448	4,110	15,563	6,055	21,618
AGE 20 - 24	3,812	1,678	5,490	2,342	634	2,976	795	69	864	1,279	570	1,849	8,228	2,951	11,179
AGE 25 - 29	830	477	1,307	476	116	592	120	9	129	128	64	192	1,554	666	2,220
AGE 30+	276	202	478	138	41	179	11	1	12	5	3	8	430	247	677
TOTAL	10,396	5,048	15,444	7,993	2,436	10,429	3,312	350	3,662	4,074	2,085	6,159	25,775	9,919	35,694

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	4,637	1,367	6,004	5,580	1,463	7,043	4,158	368	4,526	1,702	691	2,393	16,077	3,889	19,966
AGE 20 - 24	2,937	667	3,604	2,639	546	3,185	1,243	89	1,332	1,039	336	1,375	7,858	1,638	9,496
AGE 25 - 29	710	177	887	468	94	562	126	18	144	167	54	221	1,471	343	1,814
AGE 30+	213	72	285	171	31	202	14	2	16	9	7	16	407	112	519
TOTAL	8,497	2,283	10,780	8,858	2,134	10,992	5,541	477	6,018	2,917	1,088	4,005	25,813	5,982	31,795

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	30,931	7,953	38,884	25,767	6,179	31,946	20,987	1,580	22,567	16,152	5,370	21,522	93,837	21,082	114,919
AGE 20 - 24	19,038	4,512	23,550	12,269	2,481	14,750	6,349	462	6,811	8,404	2,482	10,886	46,060	9,937	55,997
AGE 25 - 29	3,897	1,192	5,089	1,999	373	2,372	655	48	703	1,018	332	1,350	7,569	1,945	9,514
AGE 30+	1,092	487	1,579	623	163	786	50	5	55	55	32	87	1,820	687	2,507
TOTAL	54,958	14,144	69,102	40,658	9,196	49,854	28,041	2,095	30,136	25,629	8,216	33,845	149,286	33,651	182,937

APPENDIX 7 - CONTINUED

1977-2001

RACE - WHITE

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	943,701	118,511	1,062,212	799,471	84,932	884,403	468,179	24,751	492,930	490,473	99,347	589,820	2,701,824	327,541	3,029,365
AGE 20 - 24	452,026	73,016	525,042	336,687	49,319	386,006	133,558	9,405	142,963	258,711	61,704	320,415	1,180,982	193,444	1,374,426
AGE 25 - 29	78,003	18,286	96,289	45,959	9,390	55,349	11,984	1,428	13,412	25,276	9,051	34,327	161,222	38,155	199,377
AGE 30+	17,396	7,405	24,801	10,167	3,108	13,275	475	50	525	522	104	626	28,560	10,667	39,227
TOTAL	1,491,126	217,218	1,708,344	1,192,284	146,749	1,339,033	614,196	35,634	649,830	774,982	170,206	945,188	4,072,588	569,807	4,642,395

RACE - BLACK

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	308,747	65,245	373,992	157,851	27,657	185,508	99,776	6,901	106,677	78,729	24,267	102,996	645,103	124,070	769,173
AGE 20 - 24	162,669	46,037	208,706	77,644	15,834	93,478	34,113	2,740	36,853	46,329	15,864	62,193	320,755	80,475	401,230
AGE 25 - 29	27,671	11,549	39,220	12,849	3,066	15,915	4,005	443	4,448	5,199	2,458	7,657	49,724	17,516	67,240
AGE 30+	6,889	3,832	10,721	3,411	886	4,297	140	17	157	34	15	49	10,474	4,750	15,224
TOTAL	505,976	126,663	632,639	251,755	47,443	299,198	138,034	10,101	148,135	130,291	42,604	172,895	1,026,056	226,811	1,252,867

RACE - OTHER

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	68,800	12,227	81,027	50,740	8,411	59,151	48,248	3,419	51,667	26,661	7,472	34,133	194,449	31,529	225,978
AGE 20 - 24	42,843	7,940	50,783	32,363	4,551	36,914	17,055	1,202	18,257	17,851	4,772	22,623	110,112	18,465	128,577
AGE 25 - 29	11,015	2,242	13,257	7,852	1,065	8,917	1,869	163	2,032	2,850	785	3,635	23,586	4,255	27,841
AGE 30+	4,348	996	5,344	2,985	425	3,410	75	8	83	38	14	52	7,446	1,443	8,889
TOTAL	127,006	23,405	150,411	93,940	14,452	108,392	67,247	4,792	72,039	47,400	13,043	60,443	335,593	55,692	391,285

TOTAL

	<u>ARMY</u>			<u>NAVY</u>			<u>MARINE CORPS</u>			<u>AIR FORCE</u>			<u>TOTAL</u>		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AGE 15 - 19	1,321,248	195,983	1,517,231	1,008,062	121,000	1,129,062	616,203	35,071	651,274	595,863	131,086	726,949	3,541,376	483,140	4,024,516
AGE 20 - 24	657,538	126,993	784,531	446,694	69,704	516,398	184,726	13,347	198,073	322,891	82,340	405,231	1,611,849	292,384	1,904,233
AGE 25 - 29	116,689	32,077	148,766	66,660	13,521	80,181	17,858	2,034	19,892	33,325	12,294	45,619	234,532	59,926	294,458
AGE 30+	28,633	12,233	40,866	16,563	4,419	20,982	690	75	765	594	133	727	46,480	16,860	63,340
TOTAL	2,124,108	367,286	2,491,394	1,537,979	208,644	1,746,623	819,477	50,527	870,004	952,673	225,853	1,178,526	5,434,237	852,310	6,286,547

APPENDIX 8. TOTAL NONPRIOR SERVICE MARINE CORPS RESERVE
COMPONENT ENLISTED ACCESSIONS, FYS 1977-2000

FY	Marine Corps Recruiting Command	Defense Manpower Data Center	Difference (%)
1977	7,620	unavailable	-
1978	7,733	unavailable	-
1979	7,053	unavailable	-
1980	8,067	5,036	38
1981	8,384	7,681	8
1982	8,916	1,870	79
1983	8,291	3,611	56
1984	8,692	1,329	85
1985	8,839	5,331	40
1986	8,416	8,814	5
1987	8,270	8,375	1
1988	8,263	8,402	2
1989	7,679	7,487	3
1990	7,789	7,818	0
1991	7,103	7,172	1
1992	5,180	5,091	2
1993	5,954	4,996	16
1994	5,869	5,646	4
1995	5,421	5,413	0
1996	5,988	6,238	4
1997	6,169	6,316	2
1998	6,081	6,132	1
1999	5,818	5,778	1
2000	6,133	6,141	0

APPENDIX 9. TOTAL NONPRIOR SERVICE MARINE CORPS ACTIVE
COMPONENT ENLISTED ACCESSIONS, FYS 1977-2000

FY	Marine Corps Recruiting Command	Defense Manpower Data Center *	Difference (%)
1977	45,048	43,410	3.6
1978	39,629	38,117	3.8
1979	40,230	38,605	4.0
1980	41,807	41,626	0.4
1981	40,926	38,751	5.3
1982	38,054	37,900	0.4
1983	36,863	36,608	0.7
1984	40,211	39,113	2.7
1985	34,470	34,045	1.2
1986	35,234	34,660	1.6
1987	34,033	33,516	1.5
1988	35,557	34,947	1.7
1989	33,030	32,901	0.4
1990	33,236	32,882	1.1
1991	29,297	29,622	1.1
1992	31,839	31,757	0.3
1993	34,805	34,707	0.3
1994	31,967	31,743	0.7
1995	32,513	31,922	1.8
1996	33,122	32,506	1.9
1997	34,210	33,906	0.9
1998	33,872	33,414	1.4
1999	33,153	32,982	0.5
2000	31,676	30,228	4.6

* Age and race unknowns deleted

APPENDIX 10. LINE LISTING OF TRAUMATIC RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001

Case	Year*	Demographics†	Service‡	Training Days	Cause of Death	Method/Type
34	1	19/W/M	USAF	45	Jump or fall	Suicide§
1	1	22/W/M	USA	34	Gunshot wound	Suicide
2	1	24/W/M	USA	35	Gunshot wound	Suicide
20	1	19/W/M	USA	10	Hanging	Suicide
38	1	26/W/M	USA	12	Jump or fall	Suicide
21	1	35/Lebanese/M	USA	19	Hanging	Suicide
16	1	19/W/M	USMC	57	Gunshot wound	Suicide
44	1	21/W/M	USN	14	Jump or fall	Suicide
30	1	17/B/M	USN	45	Hanging	Suicide
31	1	17/W/M	USN	43	Hanging	Suicide
35	2	22/W/M	USAF	19	Jump or fall	Suicide
36	2	17/W/M	USAF	9	Jump or fall	Suicide
22	2	18/W/M	USA	58	Hanging	Suicide
3	2	24/W/M	USA	36	Gunshot wound	Suicide
4	2	18/W/M	USA	37	Gunshot wound	Suicide
39	2	22/W/M	USA	62	Jump or fall	Suicide
-	2	18/W/M	USA	27	Drug Overdose	Suicide

Case	Year*	Demographics†	Service‡	Training Days	Cause of Death	Method/Type
23	2	20/W/M	USA	45	Hanging	Suicide
5	2	20/W/F	USA	58	Gunshot wound	Suicide
32	2	19/W/M	USN	21	Hanging	Suicide [§]
37	3	19/W/M	USAF	59	Jump or fall	Suicide [§]
6	3	18/W/M	USA	50	Gunshot wound	Suicide
7	3	19/W/M	USA	49	Gunshot wound	Suicide
40	3	18/W/M	USA	37	Jump or fall	Suicide [§]
8	3	19/W/M	USA	68	Gunshot wound	Suicide
9	3	18/W/M	USA	24	Gunshot wound	Suicide
10	3	20/W/M	USA	53	Gunshot wound	Suicide
11	3	18/W/M	USA	57	Gunshot wound	Suicide
41	3	21/B/F	USA	56	Jump or fall	Suicide [§]
12	3	18/B/M	USA	36	Gunshot wound	Suicide
24	3	19/W/M	USA	13	Hanging	Suicide
25	3	20/W/M	USA	53	Hanging	Suicide
17	3	18/W/M	USMC	51	Gunshot wound	Suicide
18	3	19/Mexican/M	USMC	40	Gunshot wound	Suicide
27	3	22/W/M	USMC	71	Hanging	Suicide

Case	Year*	Demographics†	Service‡	Training Days	Cause of Death	Method/Type
28	3	19/W/M	USMC	88	Hanging	Suicide [§]
45	3	18/Filipino/M	USN	8	Jump or fall	Suicide
13	4	19/Polish/M	USA	31	Gunshot wound	Suicide
14	4	23/Vietnamese/M	USA	53	Gunshot wound	Suicide
26	4	19/B/M	USA	36	Hanging	Suicide
43	4	24/W/M	USMC	14	Jump or fall	Suicide
33	4	20/Filipino/M	USN	45	Hanging	Suicide
15	5	18/B/M	USA	37	Gunshot wound	Suicide
42	5	18/W/M	USA	55	Jump or fall	Suicide [§]
19	5	18/B/M	USMC	67	Gunshot wound	Suicide
29	5	18/W/M	USMC	15	Hanging	Suicide
62	1	18/B/M	USA	25	Gunshot wound	Unintentional injury
52	1	19/W/M	USA	24	Fall	Unintentional injury
57	1	30/Peruvian/M	USA	49	Blast and fragment injuries	Unintentional injury
53	1	18/W/M	USA	undetermined	Fall	Unintentional injury
65	1	18/Mexican/M	USMC	30	Gunshot wound	Unintentional injury
73	1	18/B/M	USMC	65	Drowning	Unintentional injury
66	1	18/Mexican/M	USMC	36	Gunshot wound	Unintentional injury

Case	Year*	Demographics†	Service‡	Training Days	Cause of Death	Method/Type
74	2	17/W/M	USA	20	Choking	Unintentional injury
46	2	21/Puerto Rican/M	USA	10	Overdose	Unintentional injury
67	2	18/W/M	USA	24	Blast and fragment injuries	Unintentional injury
54	2	18/W/M	USA	47	Fall	Unintentional injury
63	2	18/W/M	USA	39	Gunshot wound	Unintentional injury
58	3	21/B/M	USA	38	Blast and fragment injuries	Unintentional injury
59	3	21/W/M	USA	56	Blast and fragment injuries	Unintentional injury
60	3	18/W/M	USA	55	Blast and fragment injuries	Unintentional injury
61	3	25/W/M	USA	undetermined	Blast and fragment injuries	Unintentional injury
47	3	20/W/F	USA	44	Overdose	Unintentional injury
72	3	18/Mexican/M	USMC	68	Blow to head	Unintentional injury
64	4	21/B/M	USA	58	Gunshot wound	Unintentional injury
48	4	23/B/M	USA	27	Overdose	Unintentional injury [§]
68	4	19/W/M	USA	60	Electrocution	Unintentional injury
70	4	18/W/M	USMC	38	Electrocution	Unintentional injury
56	4	19/Puerto Rican/M	USN	56	Fall	Unintentional injury
49	5	18/Eskimoan/M	USA	36	Overdose	Unintentional injury
69	5	18/W/M	USA	56	Electrocution	Unintentional injury

Case	Year*	Demographics†	Service‡	Training Days	Cause of Death	Method/Type
55	5	19/W/M	USA	37	Fall	Unintentional injury
50	5	27/B/F	USA	6	Overdose	Unintentional injury
71	5	19/W/M	USMC	12	Blow to head	Unintentional injury
75	5	19/B/M	USN	10	Asphyxia (death in custody)	Unintentional injury
51	5	20/B/M	USN	4	Overdose	Unintentional injury
-	1	18/B/M	USA	4	Heat stroke induced by punishment	Homicide
-	1	18/W/M	USA	4	Heat stroke induced by punishment	Homicide
-	1	22/W/M	USA	42	Craniocerebral trauma	Homicide
-	3	18/W/M	USMC	88	Blow to head	Homicide

* Year of death: 1977-1981=1; 1982-1986=2; 1987-1991=3; 1992-1996=4; 1997-2001=5

† Age (years)/Ethnicity/Gender; M=Male, F=Female, W=Non-African American, B=African American

‡ USAF=U.S. Air Force; USN=U.S. Navy; USMC=U.S. Marine Corps; USA=U.S. Army

§ Awaiting administrative separation

APPENDIX 11. LINE LISTING OF NONTRAUMATIC EXERCISE-RELATED RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001

Case	Year**	Demographics†	Service§	Training Days	Cause of Death	Additional Detail
-	1	17/B/M	USA	59	Cardiac	Coronary Artery Abnormality (CAA)
-	1	19/Mexican/M	USA	74	Cardiac	Cardiac Valvular Disease
-	1	18/W/M	USA	29	Cardiac*	Myocarditis
-	1	25/W/M	USA	21	Cardiac*	Myocarditis
-	1	34/Mexican/M	USA	16	Cardiac	Atherosclerotic coronary vascular disease (ASCVD)
-	1	18/W/M	USA	14	Cardiac*	CAA
-	1	18/B/M	USAF	44	Cardiac**	Cardiac Valvular Disease
-	1	19/W/M	USAF	43	Cardiac	CAA
-	1	18/W/M	USAF	26	Cardiac	Myocarditis
-	1	19/B/M	USMC	77	Cardiac	CAA
-	1	22/W/M	USN	16	Cardiac	ASCVD
-	2	18/B/M	USA	17	Cardiac	Myocarditis
-	2	18/Native American/M	USA	20	Cardiac	CAA
-	2	18/W/M	USA	6	Cardiac*	CAA
-	2	22/W/M	USA	46	Cardiac	CAA
-	2	19/B/F	USA	45	Cardiac	CAA
-	2	21/W/M	USA	14	Cardiac	Myocarditis and CAA
-	2	35/B/M	USA	26	Cardiac	Myocarditis and ASCVD
-	2	31/Honduran/M	USA	33	Cardiac	CAA
-	2	20/B/M	USA	31	Cardiac	Myocarditis
-	2	24/W/M	USA	10	Cardiac	Myocarditis

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	2	18/W/M	USAF	24	Cardiac	CAA
-	2	18/W/M	USAF	15	Cardiac	Cardiomyopathy
-	2	19/W/M	USAF	9	Cardiac	Cardiac valvular disease
-	2	21/W/M	USN	12	Cardiac	CAA
-	2	32/Filipino/M	USN	24	Cardiac	ASCVD
-	2	19/W/M	USN	48	Cardiac	CAA
-	3	19/W/M	USA	45	Cardiac*	Cardiomyopathy
-	3	17/B/M	USA	43	Cardiac	CAA
-	3	18/W/M	USA	21	Cardiac	Myocarditis
-	3	19/B/F	USA	46	Cardiac	CAA
-	3	17/W/M	USA	14	Cardiac	Myocarditis
-	3	24/B/M	USA	23	Cardiac	Cardiomyopathy
-	3	21/W/M	USA	15	Cardiac	Myocarditis
-	3	18/W/M	USAF	41	Cardiac	CAA
-	3	19/B/M	USMC	18	Cardiac	CAA
-	3	20/Hispanic/M	USMC	22	Cardiac	Myocarditis
-	3	24/W/M	USN	56	Cardiac	Conduction System Abnormality
-	3	18/B/M	USN	17	Cardiac	Myocarditis and Cardiomyopathy
-	3	18/W/M	USN	32	Cardiac	CAA
-	4	20/W/M	USA	36	Cardiac	ASCVD
-	4	20/W/M	USA	12	Cardiac	CAA
-	4	19/B/F	USA	32	Cardiac*	CAA

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	4	19/B/M	USA	51	Cardiac*	CAA
-	4	19/W/M	USMC	65	Cardiac*	CAA
-	4	18/B/M	USMC	40	Cardiac*	CAA
-	5	31/W/M	USA	78	Cardiac*	CAA
-	5	18/B/F	USA	34	Cardiac	Conduction System Abnormality
-	5	21/W/M	USA	10	Cardiac	CAA
-	5	18/W/M	USA	4	Cardiac	Myocardial Fibrosis
-	5	34/B/M	USA	58	Cardiac	Myocardial Fibrosis
-	5	19/W/M	USA	59	Cardiac	Myocarditis
-	5	28/Filipino/M	USA	20	Cardiac	ASCVD
-	5	20/B/M	USAF	4 th week	Cardiac*	Cardiomyopathy
-	5	19/W/M	USMC	20	Cardiac	CAA
-	5	29/B/M	USMC	5	Cardiac*	Conduction System Abnormality
-	5	21/B/M	USN	59	Cardiac	CAA
-	1	19/W/M	USA	15	Exertional Heat Illness (EHI)	-
-	1	18/W/M	USA	4	EHI	-
-	1	22/B/F	USA	25	EHI†	-
-	1	19/W/M	USA	9	EHI	-
-	1	22/W/M	USA	13	EHI	-
-	1	20/B/M	USA	50	EHI†	-
-	1	17/W/M	USA	55	EHI	-
-	1	20/Eskimoan/M	USMC	6	EHI	-

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	1	17/B/M	USMC	23	EHI†	-
-	1	23/B/M	USN	75	EHI†	-
-	1	24/B/M	USN	59	EHI†	-
-	1	19/W/M	USN	50	EHI	-
-	1	24/B/M	USN	25	EHI†	-
-	2	17/B/M	USA	44	EHI	-
-	2	21/W/M	USA	13	EHI	-
-	2	17/W/M	USMC	19	EHI	-
-	2	19/B/M	USN	53	EHI†	-
-	2	18/W/M	USN	58	EHI	-
-	2	25/B/M	USN	undetermined	EHI†	-
-	3	18/W/M	USA	12	EHI	-
-	3	18/W/M	USMC	18	EHI	-
-	3	20/B/M	USN	undetermined	EHI†	-
-	4	19/B/M	USA	6	EHI†	-
-	4	22/B/M	USAF	45	EHI†	-
-	5	17/B/M	USA	3	EHI†	-
-	5	18/B/M	USA	8	EHI†	-
-	5	23/W/M	USA	8	EHI	-
-	5	25/B/M	USA	7	EHI†	-
-	5	18/W/M	USAF	38	EHI	-
-	5	18/W/M	USMC	44	EHI	-

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	1	17/B/M	USA	27	Idiopathic Sudden Death (ISD)†	-
-	1	18/B/F	USA	39	ISD	-
-	1	19/B/M	USA	27	ISD†	-
-	1	18/B/M	USA	18	ISD	-
-	1	23/B/F	USA	51	ISD†	-
-	1	28/B/M	USA	14	ISD†	-
-	1	17/W/M	USA	3	ISD	-
-	1	18/B/M	USMC	8	ISD†	-
-	1	21/Filipino/M	USMC	59	ISD	-
-	1	17/B/M	USMC	55	ISD	-
-	1	18/B/M	USMC	30	ISD	-
-	1	23/W/M	USN	9	ISD	-
-	1	18/B/M	USN	42	ISD	-
-	1	20/B/M	USN	23	ISD†	-
-	2	20/B/M	USAF	16	ISD	-
-	2	18/W/M	USAF	21	ISD	-
-	2	19/W/M	USMC	12	ISD	-
-	2	20/W/M	USMC	60	ISD	-
-	2	20/W/M	USMC	55	ISD	-
-	2	18/B/F	USN	undetermined	ISD†	-
-	3	19/B/M	USA	19	ISD	-
-	3	25/W/M	USAF	26	ISD	-

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	4	25/B/M	USA	13	ISD	-
-	4	19/W/M	USA	57	ISD	-
-	4	21/B/M	USAF	37	ISD†	-
-	4	22/B/M	USAF	6	ISD†	-
-	4	34/B/M	USN	58	ISD†	-
-	5	18/B/F	USA	7	ISD	-
-	5	29/B/M	USA	13	ISD	-
-	5	19/B/M	USA	5	ISD†	-
-	5	19/W/M	USN	57	ISD	-
-	1	18/B/M	USA	17	Vascular	Intracerebral Hemorrhage
-	1	18/W/F	USA	15	Vascular	Intracerebral Hemorrhage
-	1	20/B/M	USA	33	Vascular	Intracerebral Hemorrhage
-	2	18/W/M	USA	39	Vascular*	Intrathoracic Hemorrhage
-	2	19/W/M	USA	11	Vascular	Intracerebral Hemorrhage
-	2	18/W/M	USA	19	Vascular	Intracerebral Hemorrhage
-	2	19/W/M	USMC	38	Vascular*	Aortic Hypoplasia
-	3	25/Puerto Rican/M	USN	40	Vascular	Intracerebral Hemorrhage
-	5	19/B/M	USMC	4	Vascular	Intracerebral Hemorrhage
-	2	20/B/M	USMC	18	Asthma	-
-	2	21/W/M	USMC	20	Asthma	-
-	2	26/B/M	USN	67	Asthma/Sarcoidosis	-
-	1	18/B/M	USA	11	Other	Sickle Cell Disease

Case	Year**	Demographics‡	Service§	Training Days	Cause of Death	Additional Detail
-	4	20/B/F	USN	13	Other	Sickle Cell Disease
-	5	24/W/M	USC	5	Other	Schmidt's Syndrome
33	4	20/W/M	USA	29	Infection (Pneumonia)	Role of erythromycin not confirmed
-	5	18/B/M	USN	8	Undetermined	-
-	5	31/B/M	USN	undetermined	Undetermined	-

** Year of death: 1977-1981=1; 1982-1986=2; 1987-1991=3; 1992-1996=4; 1997-2001=5

‡ Age (years)/Ethnicity/Gender; M=Male, F=Female, W=Non-African American, B=African American

§ USAF=U.S. Air Force; USN=U.S. Navy; USMC=U.S. Marine Corps; USA=U.S. Army

* Exertional heat illness was a contributory cause of death

† Sickle cell trait

APPENDIX 12. LINE LISTING OF NONTRAUMATIC (NONEXERCISE-RELATED) RECRUIT DEATHS BY CAUSE, YEAR, AND SERVICE, 1977-2001

Case	Year*	Demographics†	Service	Training Days	Cause of Death	Additional Detail
28	1	17/W/M	Air Force	7	Infection	Pneumonia
13	1	19/W/M	Army	18	Infection	Meningococemia
23	1	19/W/M	Army	13	Infection	Pneumonia
1	1	19/B/M	Army	25	Infection	Acute Epiglottitis
29	1	20/Puerto Rican/M	Army	48	Infection	Pneumonia
14	1	18/W/M	Navy	10	Infection	Meningococemia
15	1	18/W/M	Navy	26	Infection	Meningococemia
30	1	18/W/M	Navy	31	Infection	Pneumonia
3	1	20/W/F	Army	24	Infection	Pneumonia
16	1	20/B/M	Army	33	Infection	Meningococemia
2	1	19/Mexican/M	Marine Corps	80	Infection	Pneumonia
4	1	18/Puerto Rican/M	Army	51	Infection	Pneumonia
19	1	17/B/M	Army	53	Infection	Meningococemia
5	1	21/Cuban/M	Marine Corps	8	Infection	Pneumonia
17	1	20/W/M	Navy	41	Infection	Meningococemia
18	1	17/W/M	Navy	51	Infection	Meningococemia
32	2	18/B/M	Army	4	Infection	Ruptured Appendix

Case	Year*	Demographics†	Service	Training Days	Cause of Death	Additional Detail
24	2	18/B/M	Army	18	Infection	Pneumonia
31	2	20/B/M	Navy	35	Infection	Undetermined
25	2	18/W/M	Marine Corps	30	Infection	Pneumonia
26	2	26/W/M	Army	50	Infection	Toxic Shock Syndrome
6	3	23/W/M	Army	61	Infection	Pneumonia
7	3	20/W/M	Air Force	30	Infection	Necrotizing Fasciitis
8	3	19/B/M	Army	57	Infection	Toxic Shock Syndrome
20	4	19/B/M	Army	59	Infection	Meningococemia
9	4	22/W/M	Air Force	24	Infection	Meningitis
34	4	20/W/M	Army	55	Infection	Meningitis
27	5	19/W/M	Army	54	Infection	Staphylococcal Sepsis
21	5	19/B/M	Marine Corps	82	Infection	Meningococemia
22	5	17/W/F	Navy	55	Infection	Meningococemia
10	5	18/W/M	Navy	49	Infection	Pneumonia
35	5	21/W/M	Navy	37	Infection	Encephalitis
11	5	18/W/M	Marine Corps	55	Infection	Meningitis
12	5	18/W/M	Marine Corps	57	Infection	Toxic Shock Syndrome
-	1	18/B/M	Navy	13	Cardiac	Coronary Artery Abnormality

Case	Year*	Demographics†	Service	Training Days	Cause of Death	Additional Detail
-	1	19/W/M	Air Force	9	Cardiac	Myocarditis
-	2	17/W/M	Marine Corps	43	Cardiac	Cardiomyopathy
-	2	17/B/M	Army	10	Cardiac	Coronary Artery Abnormality
-	2	21/W/F	Marine Corps	1	Cardiac	Coronary Artery Abnormality
-	3	17/Hispanic/M	Army	3	Cardiac	Myocarditis
-	3	27/W/M	Army	59	Cardiac	Atherosclerosis
-	3	18/W/M	Navy	24	Cardiac	Cardiomyopathy
-	3	33/Eskimoan/M	Army	41	Cardiac	Cardiomyopathy
-	3	17/W/M	Army	32	Cardiac	Coronary Artery Abnormality
-	1	18/W/M	Army	16	Other	Budd-Chairi's Syndrome
-	1	19/B/F	Army	11	Other	Autoimmune Disorder
-	1	21/B/M	Marine Corps	undetermined	Other	Adenocarcinoma
-	2	23/W/F	Marine Corps	58	Other	Idiopathic Encephalopathy
-	2	26/W/M	Air Force	6	Other	Autoimmune Disorder
-	3	22/W/M	Navy	28	Other	Autoimmune Disorder
-	5	20/B/M	Navy	4	Other	Autoimmune Disorder
-	1	18/W/M	Navy	8	Idiopathic Sudden Death	-
-	2	22/W/M	Air Force	28	Idiopathic Sudden Death	-

Case	Year*	Demographics†	Service	Training Days	Cause of Death	Additional Detail
-	2	19/B/M	Army	28	Idiopathic Sudden Death	-
-	4	21/W/F	Navy	2	Idiopathic Sudden Death	-
-	1	22/W/F	Army	7	Vascular	Primary pulmonary hypertension
-	2	25/B/F	Army	56	Vascular	Pulmonary embolism
-	5	18/W/M	Army	50	Vascular	Pulmonary embolism
-	5	20/W/M	Army	5	Undetermined	-
-	2	26/W/M	Navy	53	Asthma	-

* Year of death: 1977-1981=1; 1982-1986=2; 1987-1991=3; 1992-1996=4; 1997-2001=5

† Age (years)/Ethnicity/Gender; M=Male, F=Female, W=Non-African American, B=African American

BIBLIOGRAPHY

1. Department of Defense. Military Personnel Casualty Matters, Policies, and Procedures. Washington, DC, Instruction No. 1300.18, 2000.
2. Department of Defense. Worldwide U.S. Active Duty Military Personnel Casualties, October 1979 through September 1998. Washington, DC: Directorate for Information Operations and Reports (DIOR), DIOR/M07-98/04, 1998.
3. Beary J, Walter L, Johns J. Leading causes of death for active duty military personnel. *Mil Med* 1984; 149: p316-7.
4. Helmkamp J, Kennedy R. Causes of death among U.S. military personnel: a 14-year summary, 1980-1993. *Mil Med* 1996; 161: p311-7.
5. Helmkamp J, Kennedy R. National Mortality Profile of Active Duty Personnel in the U.S. Armed Forces: 1980-1993. Cincinnati, OH: US Department of Health and Human Services, Publication no. 96-103, 1996.
6. Gardner J, Cozzini C, Kelley P, Kark J, Peterson M, Gackstetter G, Spencer J. The Department of Defense Medical Mortality Registry. *Mil Med* 2000; 165:1-5.
7. Helmkamp J. Suicides in the military: 1980-1992. *Mil Med* 1995; 160: p45-50.
8. Helmkamp J. Homicide victims in the military: 1980-1992. *Mil Med* 1995; 160: p51-6.
9. Drehner D. Death among U.S. Air Force basic trainees, 1956 to 1996. *Mil Med* 1999; 164: p841-7.
10. Wagner SA, Clark MA. U.S. Navy and Marine Corps recruit training deaths in San Diego, California, 1973-1985; a review of 31 cases. *J Forensic Sci* 1992; 37:185-94.
11. Phillips M, Robinowitz M, Higgins J, Boran K, Reed T, Virmani R. Sudden cardiac death in Air Force recruits. A 20-year review. *JAMA* 1986; 256: p2696-9.
12. Kark J, Posey D, Schumacher H, Ruele C. Sickle-cell trait as a risk factor for sudden death in physical training. *N Engl J Med* 1987; 317: p781-7.
13. Kollef M. Sudden death in Air Force recruits [letter]. *Mil Med* 1990; 155: pA7.
14. Musser J, Kapur V, Peters J, Hendrix C, Drehner D, Gackstetter G, Skalka D, Fort P, Maffei J, Li L, et al. Real-time molecular epidemiologic analysis of an outbreak of *Streptococcus pyogenes* invasive disease in US Air Force trainees. *Arch Pathol Lab Med* 1994; 118: p128-33.
15. Murray M, Evans P. Sudden exertional death in a soldier with sickle cell trait. *Mil Med* 1996; 161: p303-5.
16. Ross R, Ochsner M. Acute intracranial boxing-related injuries in U.S. Marine Corps recruits: report of two cases. *Mil Med* 1999; 164: p68-70.
17. Garigan T, Ristedt D. Death from hyponatremia as a result of acute water intoxication in an Army basic trainee. *Mil Med* 1999; 164: p234-8.
18. Two fatal cases of adenovirus-related illness in previously healthy young adults--Illinois, 2000. *MMWR Morb Mortal Wkly Rep* 2001; 50: p553-5.
19. Kark J, Posey D, Gardner J, Darcy T, Ward F, Peterson B, Robinowitz M, Virmani R. Exercise-related deaths during military basic training. *Unpublished*.

20. Koshes R, Rothberg J. Parasuicidal behavior on an active duty army training post. *Mil Med* 1992; 157: p350-3.
21. Peters J, Gackstetter G. Streptococcus pyogenes transmission among Air Force recruits: efficacy of surveillance and prophylaxis protocols. *Mil Med* 1998; 163: p667-71.
22. Department of Defense. Population Representation in the Military Services: Fiscal Year 1999. Washington, DC: Office of the Assistant Secretary of Defense for Force Management Policy, 2000.