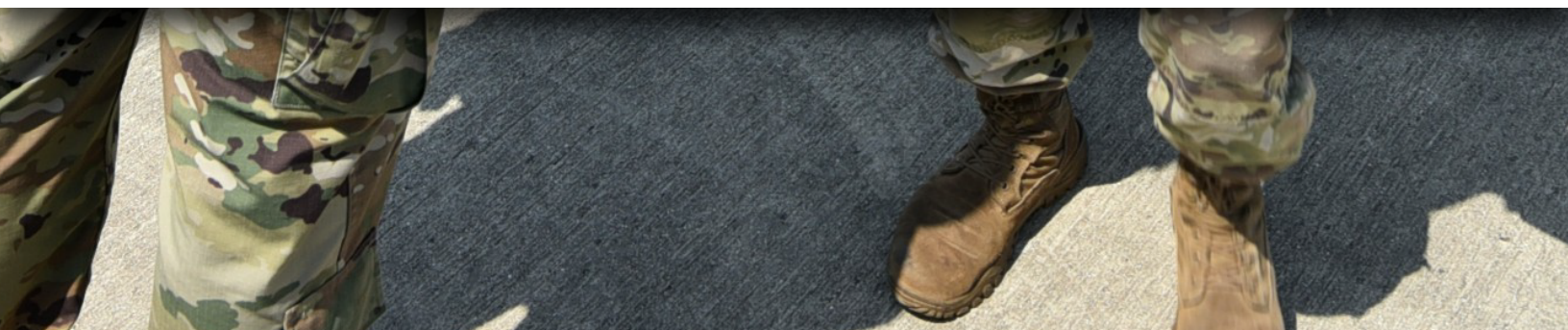# DoD HEALTH OF THE FORCE

2020

INTRODUCTION

The *Department of Defense (DoD) Health of the Force* report represents a coordinated effort by the Defense Health Agency and the Army, Navy, and Air Force public health centers to provide a snapshot of active component (AC) Service member health and well-being. It is meant to be a resource for military leaders and decision makers to help identify changes in the health status of AC Service members, emerging health problems, and gaps in prevention and treatment efforts. It may also be of interest to program planners, health practitioners, researchers, and others interested in the well-being of Service members.

The current report focuses on ten subject areas: acute and cumulative traumatic injury, traumatic brain injury, noise-induced hearing injury, heat illness, behavioral health (BH), sexually transmitted infections (STIs), sleep disorders, obesity, acute respiratory illnesses, and coronavirus disease 2019 (COVID-19). It is based on data from calendar year 2020. The intent of the annual *DoD Health of the Force* report is to provide timely, concise, and useful information to generate ideas and drive progress toward enhancing the vitality and lethality of our fighting force.

ORGANIZATION OF THIS REPORT

This report is divided into two sections, Health Metrics and Service Profiles. The Health Metrics section provides health index measures for each of the ten subject areas; the Service Profiles section compares measures across Services.

Methodology is critical to understanding and using health care metrics, especially because of the growing number of sources of health care data. The appendices of this report present detailed information about the methods used to analyze data in each of the ten subject areas as well as specific limitations associated with the data analysis.

LIMITATIONS

There are many challenges associated with processing and interpreting health care data.[1,2] Variability in the collec-tion, collation, and processing of data; differences in study design and analytic methods; and the inherent intrica-cies of defining and measuring health itself contribute to complexity that cannot be fully resolved or explained in a summary report. Accordingly, this report is meant to be an adjunct to, rather than a substitute for, other reports related to Service member health, deployability, readiness, and total force fitness. Specific limitations include those associated with using electronic medical records for surveillance data (e.g., missing data, underrepresentation of conditions that do not come to the attention of the health care delivery system, miscoding) and failure to account for potentially important covariates such as age and sex when comparing Service populations. In 2020, the COVID-19 pandemic impacted the military health system as well as the entire world. Restrictions on appointments, in-per-son staffing, and social distancing, as well as changes to health care-seeking behavior as a result of these restric-tions, would be expected to cause a decrease in the ascertainment of many medical conditions in 2020.

This report is meant to evolve over time. It is anticipated that specific measures will change over time to account for data-related limitations and changing paradigms related to public health surveillance. Input related to improv-ing this report is critical and welcomed.

HIGHLIGHTS

- There were 211 acute and 948 cumulative traumatic injuries per 1,000 AC Service members in 2020. Sprains and strains were the most common acute injuries, and the lower extremities were the most commonly affected body region. The rate of acute injuries decreased by 30% between 2016 and 2020. The rate of cumulative traumatic injuries was similar between 2016 and 2019, but decreased 18.9% between 2019 and 2020.

- In 2020, a total of 16,914 (1.3%) of AC Service members had an encounter for traumatic brain injury. The majority (74.5%) of these were mild in severity, followed by 24.7% moderate, 0.5% severe, and 0.28% penetrating.

- The prevalence of noise-induced hearing injury was 4.1% in 2020. Prevalence was higher in male (4.4%) compared to female Service members (2.7%) and increased with increasing age group among both sexes.

- A total of 1,667 AC Service members (0.13%) suffered from heat exhaustion in 2020, and 476 (0.04%) suffered from heat stroke. The percentage of AC Service members affected by heat exhaustion increased from 2017 to 2018 and decreased from 2019 to 2020, whereas the percentage affected by heat stroke remained stable between 2016 and 2020. Overall, heat illnesses were more common among younger Service members and those in the Marine Corps.

- In 2020, 8.7% of AC Service members had a behavioral health (BH) disorder. The prevalence of BH disorders remained stable between 2016 and 2020. Adjustment disorder was the most common BH disorder among both male and female AC Service members.

- Approximately 25 per 1,000 AC Service members were diagnosed with or tested positive for a sexually transmitted infection (STI) (chlamydia, gonorrhea, or trichomoniasis) in 2020. Chlamydia was the most common STI (21 per 1,000), followed by gonorrhea (4 per 1,000), and trichomoniasis (1 per 1,000). The incidence of chlamydia and gonorrhea increased between 2016 and 2019, but decreased between 2019 and 2020. Younger and female Service members had higher rates compared to their respective counterparts.

- In 2020, 12% of AC Service members had a sleep disorder. The prevalence of sleep disorders remained stable between 2016 and 2020. The most common sleep disorder among male Service members was sleep apnea; the most common sleep disorder among female Service members was insomnia.

- The overall prevalence of obesity was 19% among AC Service members in 2020. The overall prevalence of obesity increased slightly between 2016 and 2020. Overall obesity prevalence was higher among male (20%) compared to female (15%) and older compared to younger Service members.

- On average, 20 per 1,000 AC Service members were diagnosed with acute respiratory infections each month during 2020, with rates highest in March and lowest in May (39 and 6.5 per 1,000, respectively). On average, female Service members had higher monthly rates of acute respiratory infections and respiratory symptoms compared to male Service members. Those in the youngest age group had the highest rates of acute respiratory infections, but those in the oldest age group had the highest rates of respiratory symptoms.

- The overall incidence of reported or laboratory-confirmed COVID-19 infection was 5.9% in 2020. Service members in the younger age groups had a higher incidence of COVID-19 than those in the older age groups.

Acute and Cumulative Traumatic Injury

Injuries consistently rank among the top health care bur-dens in the DoD. In this report, non-battle injury was eval-uated using two broad categories: acute injury (which includes musculoskeletal and other types of injury) and cumulative traumatic injury (musculoskeletal injury result-ing from repeated microtrauma).

Acute injuries and cumulative traumatic musculoskeletal injuries were identified in inpatient and outpatient medical records using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) injury codes described in the Army Public Health Center's taxonomy of injuries for public health monitoring and reporting.[3] The taxonomy defines body regions and nature-of-injury groups (i.e., the type of anatomic or physiologic disruption that occurred to the body region, such as a fracture, dislocation, open wound, burn, internal organ injury, or poisoning). Both acute and cumulative traumatic injuries were described by body region and nature-of-injury groups (e.g., fracture, open wound, sprain, musculoskeletal tissue damage).

In 2020, there were 278,580 acute and 1,251,989 cumulative traumatic injuries among AC Service members, with rates of 211 per 1,000 and 948 per 1,000 AC service members, respectively. Injury rates were higher in females as compared to males in all Services and in both injury categories. Acute and cumulative traumatic injury rates were highest in the oldest age group among both sexes. Cumulative traumatic injury rates were markedly higher among older Service members, especially males, where the rate among males aged 45 years or older was more than triple that of males less than 25 years.

Among AC Service members who suffered **acute injuries,** the top five body regions and the top five nature-of-injury categories were similar for all Services and accounted for 99% and 81% of injuries, respectively. **The rate of acute injuries decreased by 30% between 2016 and 2020.**

During 2020, 3,012 (1.4%) of the acute injury cases were hospitalized, and 1,700 (0.31%) of the cumulative traumatic cases were hospitalized. These hospitalizations resulted in 13,741 total bed days for acute injury and 5,571 total bed days for cumulative traumatic injury.

Among AC Service members who suffered **cumulative traumatic injuries**, the most commonly injured body regions were the trunk (43%) and lower extremities (34%). Musculoskeletal tissue damage (e.g., cervical disc disorders, pain in joints, tendonitis, bursitis, chondromalacia) was the most common nature-of-injury category, accounting for 88% of all cumulative traumatic injuries. **The rate of cumulative traumatic injuries decreased by 19% from 2019 to 2020.**

Non-combat musculoskeletal injuries have been found to be associated with increased limited duty days, decreased readiness, and increased medical costs to the U.S. government.[4,5] Of particular concern are injuries sustained during physical training, which is one of the leading cause of injuries in Service members. Many of these types of injuries are preventable and can be mitigated by proper training techniques, use of protective equipment, and program and policy implementation to address risk factors.[6–8]
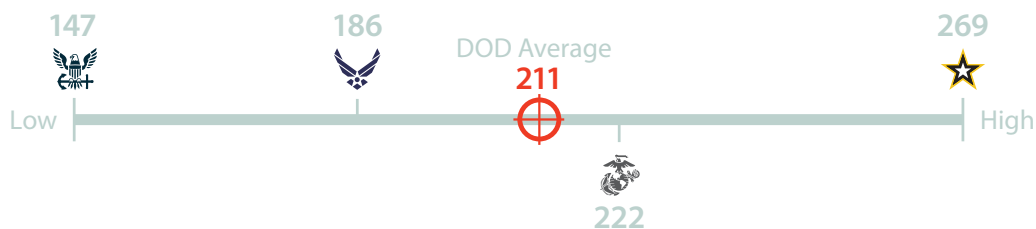
Overall, there were 211 acute injuries per 1,000 AC Service members in 2020.
*Rates by service ranged from 147 to 269 per 1,000 AC Service members.*
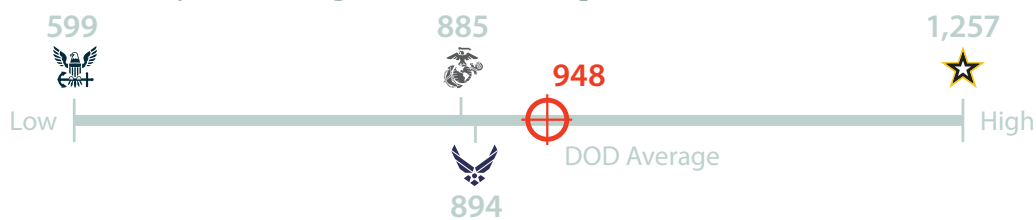
Overall, there were 948 cumulative traumatic injuries per 1,000 AC Service members in 2020.
Rates by service ranged from 599 to 1,257 per 1,000 AC Service members.

Army   Navy   Marine Corps   Air Force

Incidence of Acute Injury by Sex and Age Group, AC Service Members, 2020

Overall, acute injury rates were higher for female compared to male Service members (239 and 205 per 1,000, respectively). Among both male and female Service members, acute injury rates were highest in the oldest age group (45+ years).
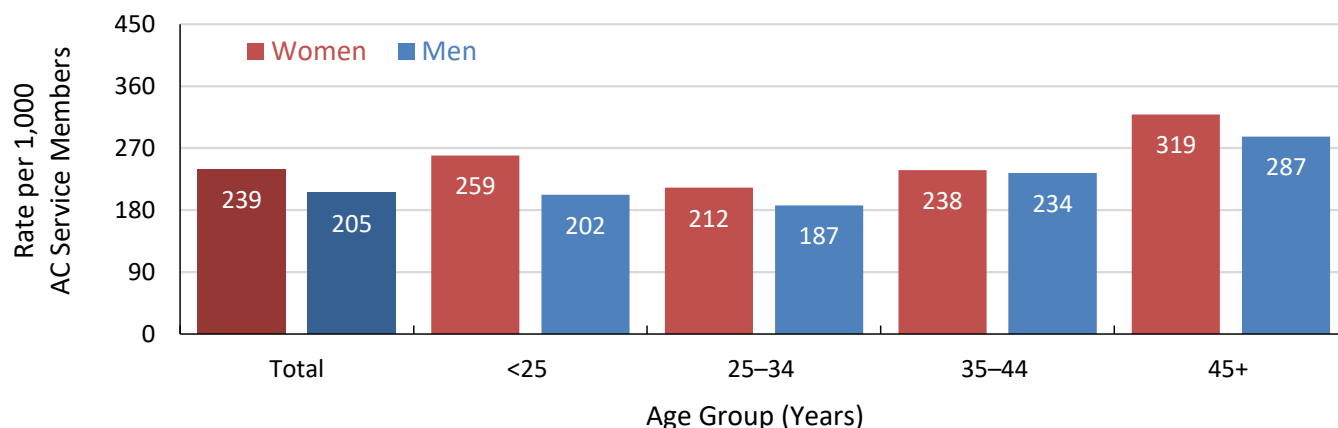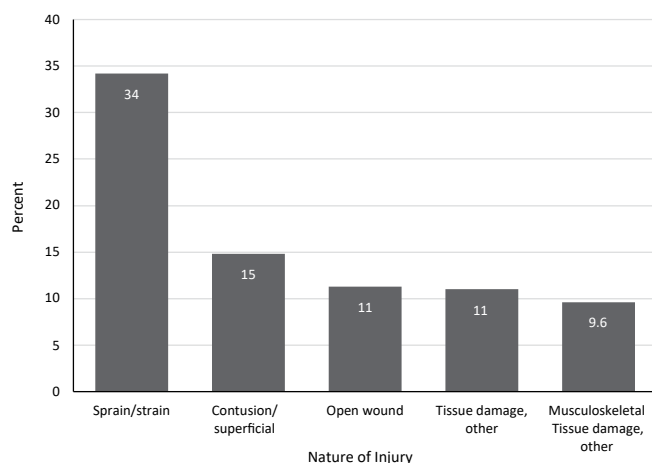

Incidence of Cumulative Traumatic Injury by Sex and Age Group, AC Service Members, 2020

Cumulative traumatic injury rates were higher for older compared to younger Service members and higher for female compared to male Service members (1,262 and 883 per 1,000, respectively).
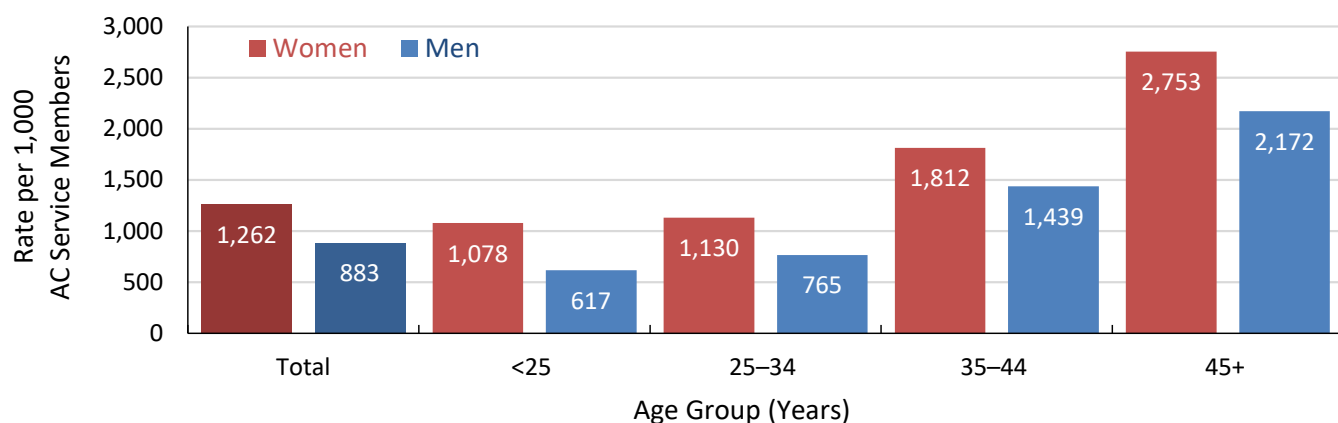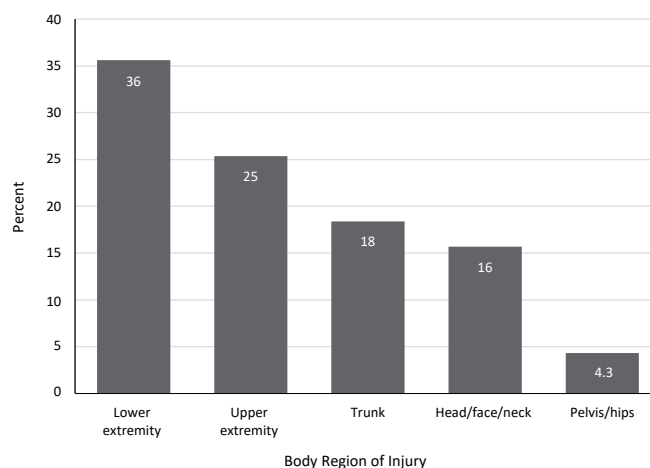

Nature of Acute Injury, Top Five Categories, AC Service Members, 2020

Sprains and strains was the most common nature-of-injury category, accounting for 34% of all incident acute injuries.
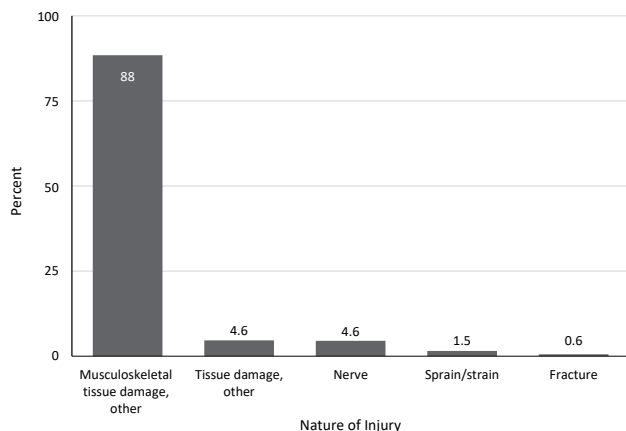

Body Region of Acute Injury, Top Five Categories, AC Service Members, 2020

Lower extremity was the most common region affected by acute injury, accounting for 36% of all incident acute injuries.
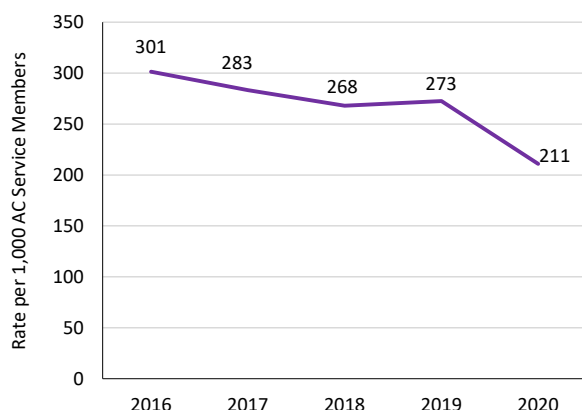
Nature of Cumulative Traumatic Injury, AC Service Members, 2020

Musculoskeletal tissue damage, other was the most common nature-of-injury category, accounting for 88% of all incident cumulative traumatic injuries.

Body Region of Cumulative Traumatic Injury, Top Five Categories, AC Service Members, 2020

The trunk (43%) and lower extremity (34%) were the most common regions affected by cumulative traumatic injury.
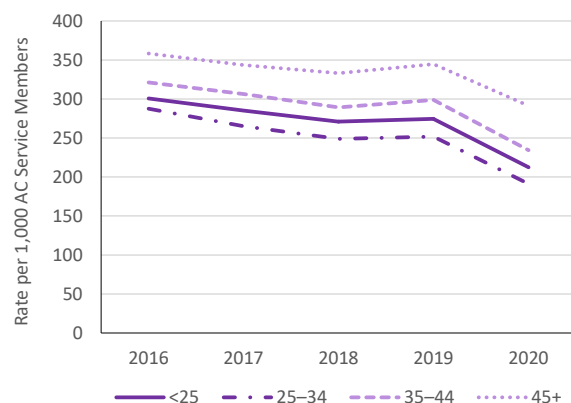

Incidence of Acute Injury, AC Service Members, 2016–2020

The rate of acute injuries decreased from 301 per 1,000 to 211 per 1,000 (30%) between 2016 and 2020.

Incidence of Cumulative Traumatic Injury, AC Service Members, 2016–2020

The rate of cumulative traumatic injuries was similar between 2016 and 2019, but decreased from 1,169 per 1,000 to 948 per 1,000 (19%) between 2019 and 2020.
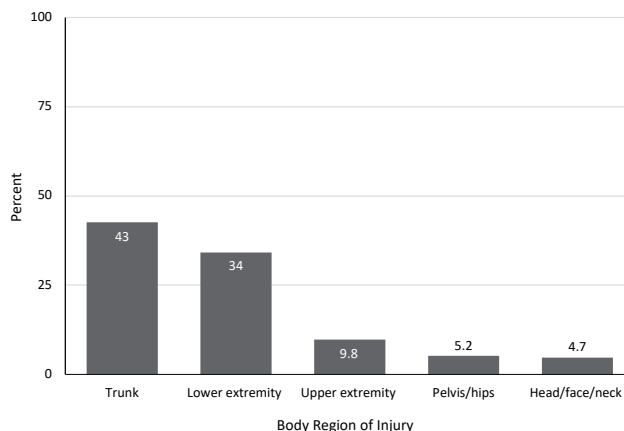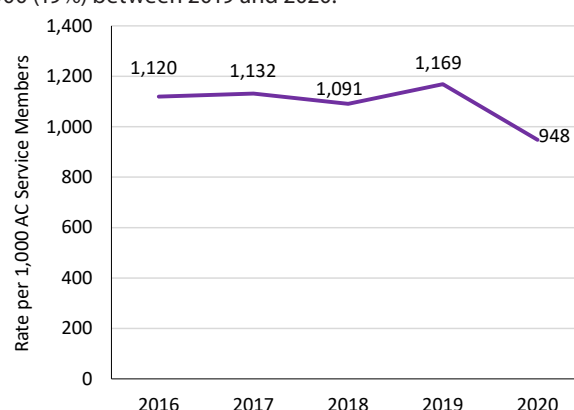

Incidence of Acute Injury by Age Group, AC Service Members, 2016–2020

The rate of acute injuries decreased among Service members in all age groups between 2016 and 2020.

Incidence of Cumulative Traumatic Injury by Age Group, AC Service Members, 2016–2020

The rate of cumulative traumatic injuries increased among Service members in all age groups between 2016 and 2019 before decreasing in 2020.
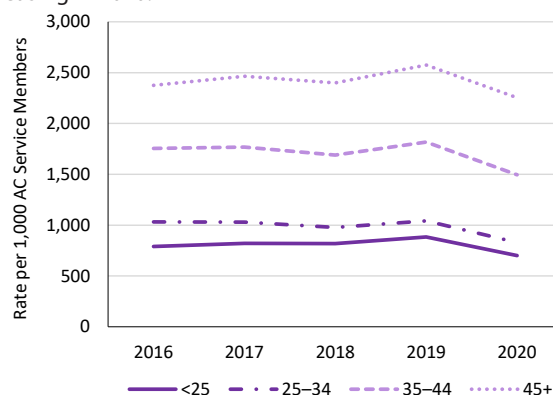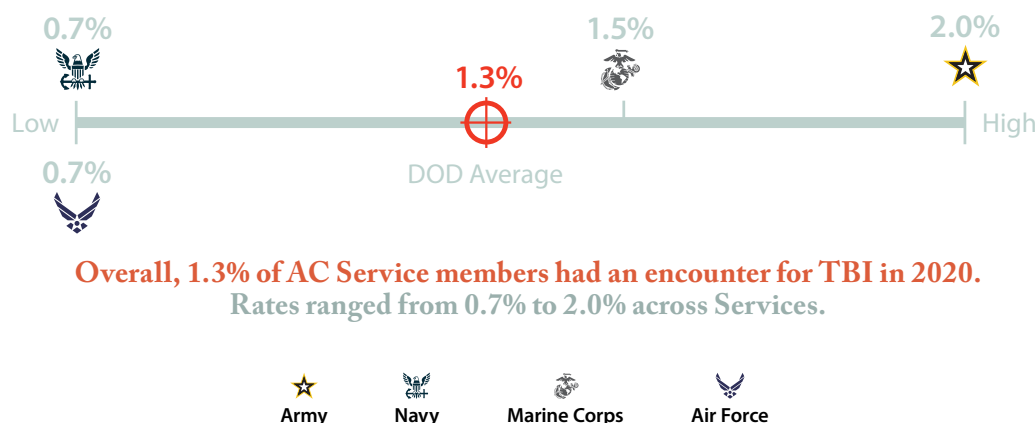
Traumatic Brain Injury

Traumatic brain injury (TBI) is structural alteration of the brain or physiological disruption of brain function caused by an external force.[9] TBI is the most common traumatic injury in the U.S. military and can be attributed to both deployment and non-deployment causes, including blast-related injuries, motor vehicle accidents, falls, contact sports, training activities, and combative actions.[10] The effects of TBI vary depending upon the severity of the injury and may include physical (headaches, sleep disturbances), cognitive (concentration and attention problems), and emotional (anxiety, depression) dysfunction. TBI can contribute to prolonged and permanent disability and may lead to military duty limitations or separation from service.

In 2020, a total of 16,914 AC Service members (1.3%) had medical encounters for TBI. Overall, similar percentages of male and female AC Service members had an encounter for TBI (1.3% and 1.4%, respectively). Male Service members aged 45 years or older (2.4%) were more than twice as likely to have an encounter for TBI as their counterparts aged 34 years or younger (1.1%). However, the percentage of female Service members with encounters for TBI did not increase with increasing age group. The association between increasing age and prevalence of TBI among male Service members may be related to these members seeking medical care at the end of their service in order to document their eligibility for Veterans disability compensation or follow-up medical care after separation, which could contribute to the identification of TBIs that were sustained earlier in service. Among those with TBI encounters, the most common severity was mild (74.5%) followed by moderate (24.7%), severe (0.5%), and penetrating (0.28%). **The annual prevalence of TBI remained stable from 2017 to 2019 and decreased slightly in 2020.**

A previous *MSMR* report evaluating TBI diagnoses from 2001 to 2016 found that incidence rates were highest among those aged 24 years or younger and among Service members in the Army or Marine Corps.[11] Prevention, awareness, and education about mild TBI is important since many TBIs are sustained as a result of non-combat related activities such as motor vehicle crashes or sports injuries.[10] Early detection, diagnosis, and treatment of mild TBIs will result in the best clinical outcome and help to prevent long-term neurological injury.

0.7%   1.5%   2.0%

1.3%

Low   DOD Average   High

0.7%

Overall, 1.3% of AC Service members had an encounter for TBI in 2020.
Rates ranged from 0.7% to 2.0% across Services.

Army   Navy   Marine Corps   Air Force

Prevalence of TBI by Sex and Age Group, AC Service Members, 2020

Among male Service members, those aged 45 years or older were more likely to have an encounter for TBI than those in younger age groups. Among female Service members, those in the youngest and the oldest age groups were more likely to have an encounter for TBI compared to those in intermediate age groups.
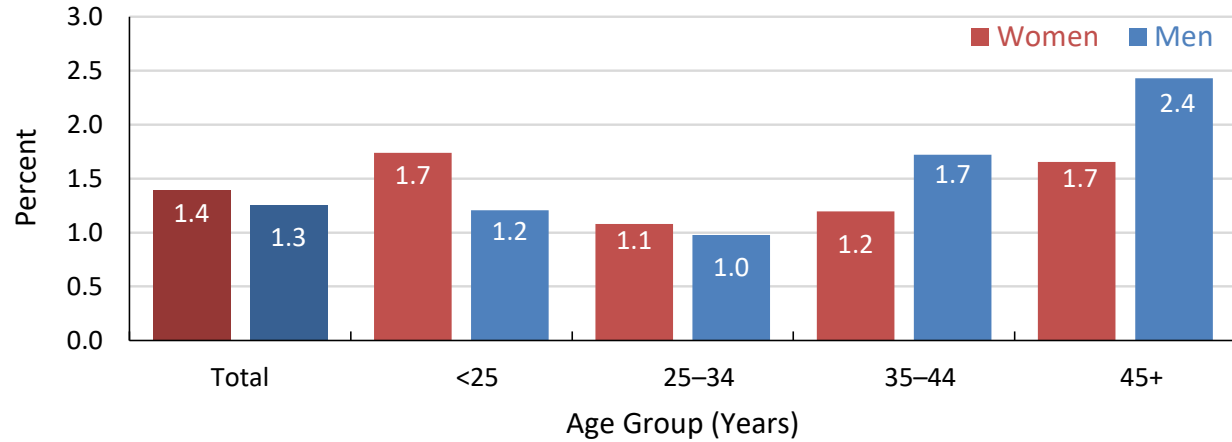
Severity of TBI, AC Service Members, 2020

Mild TBI was the most commonly diagnosed severity, accounting for 75% of all TBI diagnoses.
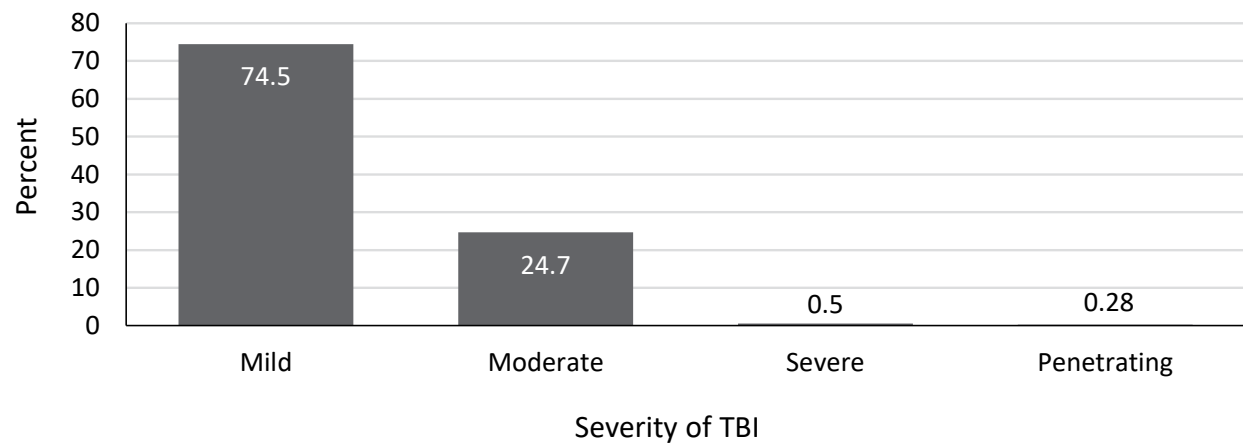
Prevalence of TBI, AC Service Members, 2016–2020

The prevalence of TBI remained relatively stable between 2016 and 2019 but decreased slightly in 2020.
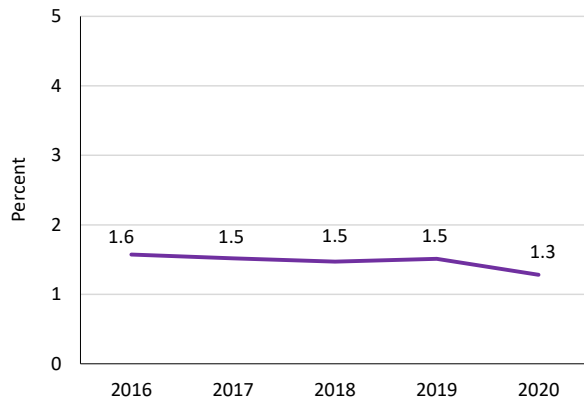
Prevalence of TBI by Age Group, Female AC Service Members, 2016–2020

Between 2016 and 2020, the percentages of female Service members who had encounters for TBI remained stable for those less than 45 years old and decreased slightly for those aged 45 years or older.
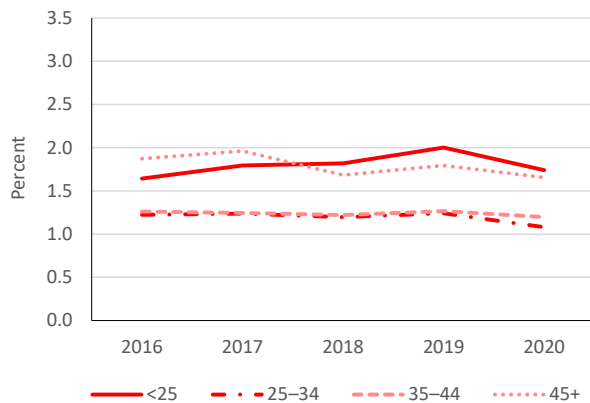
Prevalence of TBI by Age Group, Male AC Service Members, 2016–2020

Between 2016 and 2020, the percentages of male Service members who had encounters for TBI decreased in all age groups.

Noise-induced Hearing Injury

Noise-induced hearing injury refers to acoustic trauma that can be caused by single exposure to an intense "impulse" sound such as an explosion or weapons fire, or by continuous or intermittent noise exposure over an extended period of time. Steady state exposures include military vehicles and aircraft, military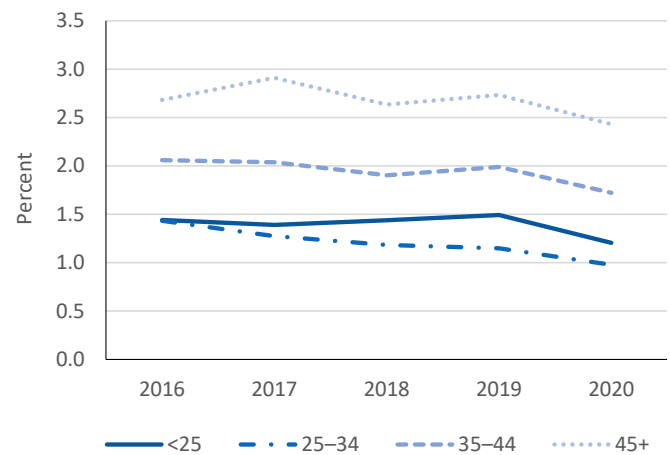 equipment, and tools found in both military and civilian industrial environments.[12] Service members may also experience harmful noise exposure from recreational sources including motorcycles, target shooting and hunting, snowmobiles, and power tools.[13] Noise-induced hearing injury can significantly affect the health and operational effectiveness of Service members. Epidemiological estimates suggest that noise-induced hearing injuries are a growing problem among military personnel as well as the general population.[14] The Veteran's Benefits Administration reported that auditory disabilities were the second-most common service-related disability type among veterans in 2020, accounting for 13% of all disabilities.[15] Common types of noise-induced hearing injuries include tinnitus, a ringing or buzzing noise in one or both ears, and sensorineural hearing loss, which is hearing loss caused by damage to the inner ear. It should be noted that sensorineural hearing loss is typically considered a form of noise-induced hearing loss; however, for the purposes of this report, the two conditions are defined separately.

In 2020, a total of 53,958 AC service members (4.1%) had medical encounters for noise-induced hearing injuries. The prevalence of noise-induced hearing injuries was higher among male compared to female Service members (4.4% and 2.7%, respectively). Service members in the oldest age group had the highest prevalence of noise-induced hearing injuries in both sexes. Tinnitus (2.4%) was the most common specific noise-induced hearing injury sustained by service members in 2020, followed by sensorineural hearing loss (1.6%). **The annual prevalence of noise-induced hearing injuries decreased slightly between 2016 and 2020.**

Previous studies have shown that rates of noise-induced hearing injuries are higher among male Service members, those 40 years or older, and those in combat-related occupations.[16] Hearing injuries can be reduced or prevented by the use of and compliance with hearing protection devices, distance and physical barriers to noise exposure, and follow-up audiological tests.[17,18]

2.7%	3.3%		5.2%

Low ————————————————————— High

4.1%
DOD Average

5.2%
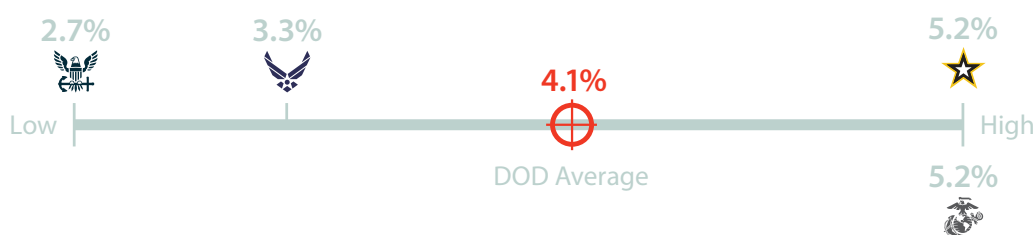
Overall, 4.1% of AC Service members had medical encounters for noise-induced hearing injuries in 2020.
Rates ranged from 2.7% to 5.2% across Services.

Army   Navy   Marine Corps   Air Force

Prevalence of Noise-induced Hearing Injury by Sex and Age Group, AC Service Members, 2020

The prevalence of noise-induced hearing injuries was higher among male (4.4%) compared to female Service members (2.7%) and increased with increasing age in both sexes.
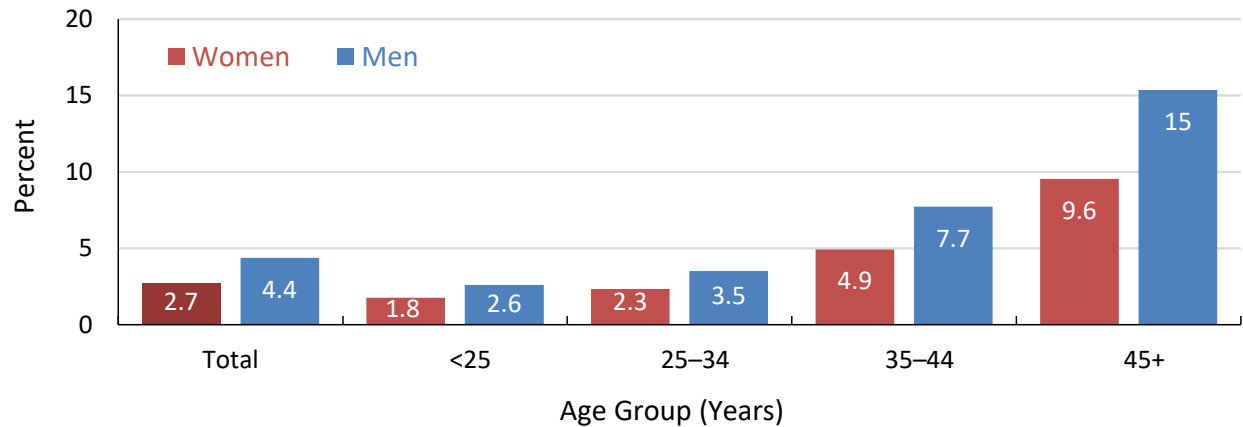
Prevalence of Tinnitus by Sex and Age Group, AC Service Members, 2020

The prevalence of tinnitus was higher among males (2.5%) compared to female Service members (1.8%), and the prevalence increased with increasing age in both sexes.

Prevalence of Sensorineural Hearing Loss[a] by Sex and Age Group, AC Service Members, 2020

The prevalence of sensorineural hearing loss was higher among males (1.8%) compared to female Service members (0.7%), and prevalence increased with increasing age in both sexes.
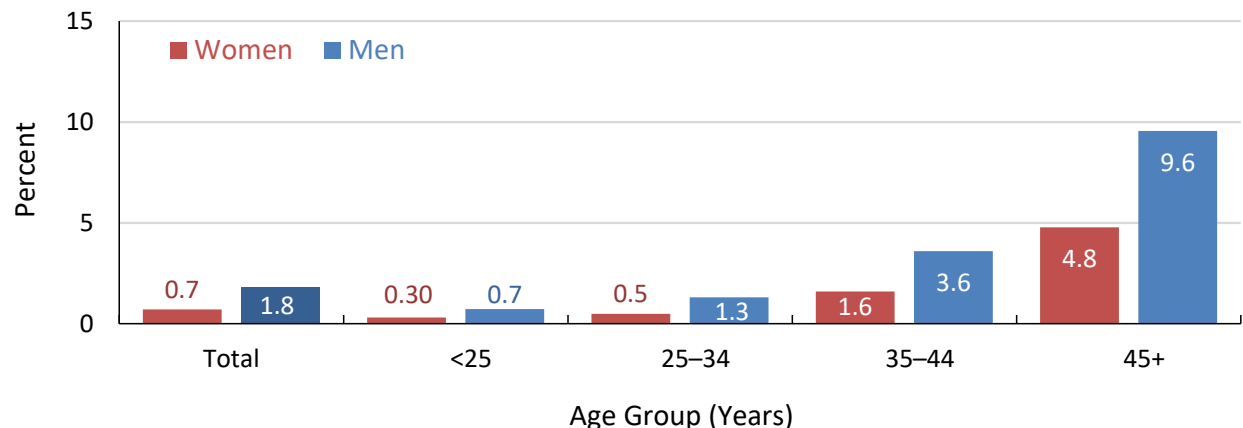
[a]Sensorineural hearing loss is typically considered a form of noise-induced hearing loss; however, for the purposes of this report, the two conditions are defined separately.

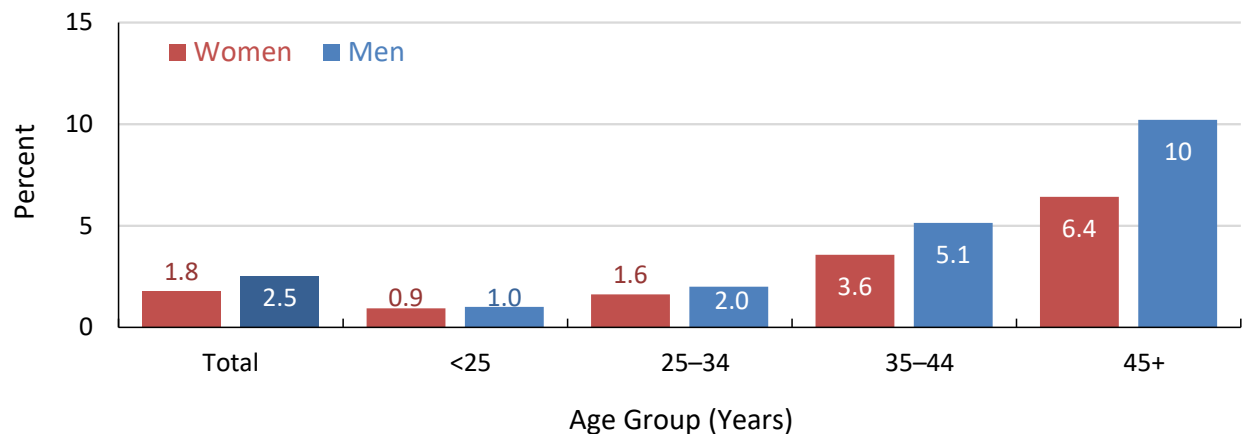## Prevalence of Noise-induced Hearing Injury, AC Service Members, 2016–2020

The prevalence of noise-induced hearing injuries among Service members decreased slightly between 2016 and 2020.

Prevalence of Noise-induced Hearing Injury by Age Group, Female AC Service Members, 2016–2020

Between 2016 and 2020, the prevalence of noise-induced hearing injuries increased slightly among female Service members 35 years or older.
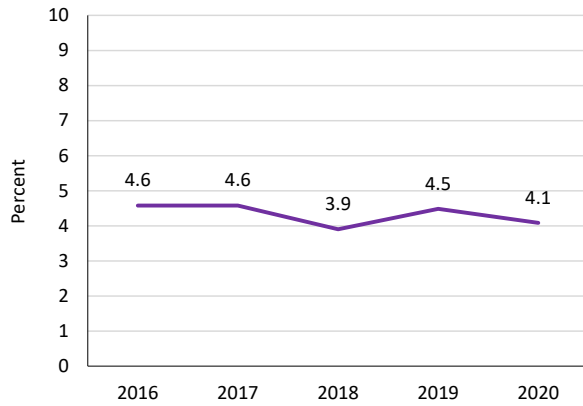
Prevalence of Noise-induced Hearing Injury by Age Group, Male AC Service Members, 2016–2020

Between 2016 and 2020, the prevalence of noise-induced hearing injuries decreased slightly among male Service members less than 45 years old.

Heat Illness

Heat illness refers to a group of disorders that occur when the elevation of core body temperature surpasses the compensatory limits of thermoregulation. The Armed Forces routinely perform surveillance for the most common of these disorders, namely heat exhaustion and heat stroke. Heat exhaustion is caused by the inability to maintain adequate cardiac output because of strenuous phy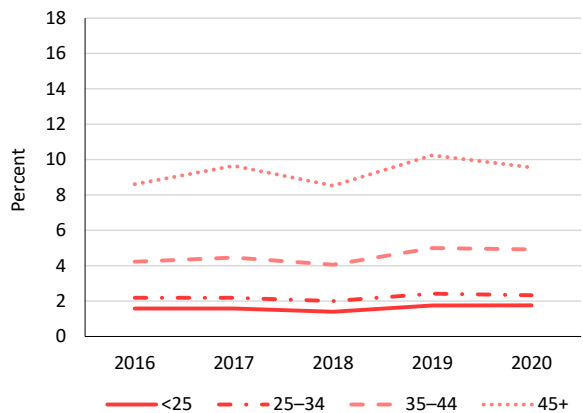sical exertion and environmental heat stress and is often accompanied by acute dehydration. Heat stroke is a debilitating illness characterized clinically by severe hyperthermia (i.e., a core body temperature of 104ºF/40ºC or greater), profound central nervous system dysfunction (e.g., delirium, seizures, or coma), and additional organ and tissue damage. The onset of heat stroke requires aggressive clinical treatments including rapid cooling and supportive therapies such as fluid resuscitation to stabilize organ function and prevent multiorgan system failure, which is the ultimate case of mortality due to heat stroke.

In 2020, a total of 1,667 AC Service members (0.13%) were diagnosed with heat exhaustion, and 476 (0.04%) were diagnosed with heat stroke. Overall, heat illnesses were more common among Service members under 25 years old, who accounted for 71% of all cases. Male Service members (0.17%) were slightly more affected by heat illnesses compared to female members (0.12%). **The percentages of AC Service members affected by heat exhaustion increased slightly between 2017 and 2018, leveled off in 2019, and then decreased between 2019 and 2020, while the percentages affected by heat stroke remained stable throughout the period.**

During 2020, 121 (25%) heat stroke cases were hospitalized and 22 (1.3%) heat exhaustion cases were hospitalized. These hospitalizations resulted in 349 total bed days for heat stroke and 44 total bed days for heat exhaustion.

Rates of heat illness have previously been found to be highest among recruit trainees and those serving in combat specific occupational fields.[19] Efforts at preventing heat illnesses need to focus especially on these groups of Service members, who may engage in higher levels of demanding physical exertion during warm weather. In particular, trainees at basic training installations may not be acclimated to the heat or may not be physically fit.

0.04%   0.16%   0.35%

Low   DOD Average   High

0.04%   0.26%
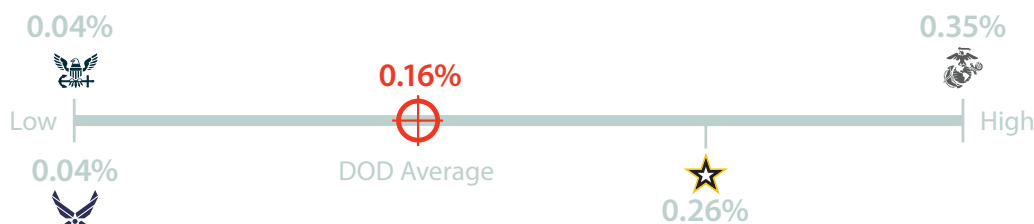
Overall, 0.16% of AC Service members had a heat illness in 2020.

Rates ranged from 0.04% to 0.35% across Services.

Army   Navy   Marine Corps   Air Force

Incidence of Heat Illness by Sex and Age Group, AC Service Members, 2020

Younger Service members had higher incidence of heat illness compared to older members, and males had higher incidence compared to females.
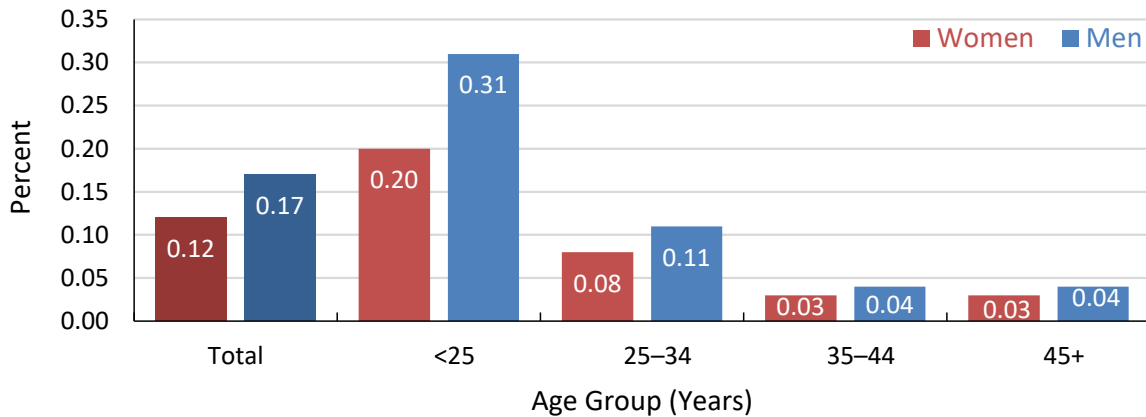
Incidence of Heat Stroke and Heat Exhaustion, AC Service Members, 2016–2020

The percentages of Service members affected by heat exhaustion increased slightly between 2017 and 2018, leveled off in 2019, and then decreased in 2020, while the percentages who experienced heat stroke remained stable during the five-year period.

Incidence of Heat Stroke by Age Group, AC Service Members, 2016–2020

The percentages of Service members from all age groups who experienced heat stroke remained relatively stable between 2016 and 2020.

Incidence of Heat Exhaustion by Age Group, AC Service Members, 2016–2020

The percentages of Service members under 25 years old who experienced heat exhaustion increased slightly between 2017 and 2018, leveled off in 2019, and then decreased in 2020.
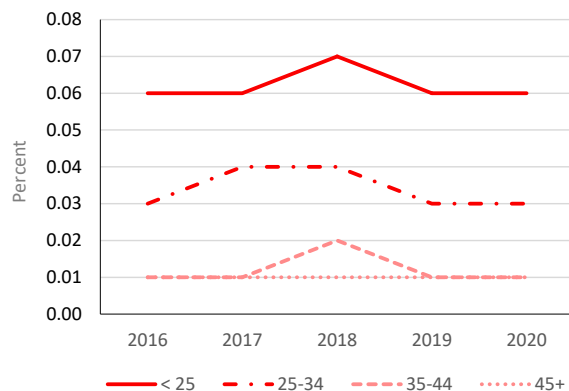
Behavioral Health

Like injury, behavioral health (BH) conditions are a leading cause of morbidity among AC Service members, accounting for over 2 million (11% of total) outpatient encounters and nearly 18,000 inpatient encounters (29% of total) in 2020.[20,21]

To determine the proportion of AC Service members (including those who were deployed) with a BH diagnosis during a given 12-month period, the annual prevalence of BH conditions was calculated. A Service member was identified as having a BH disorder if they had at least two inpatient, outpatient, or in-theater encounters for a BH condition of any type within 365 days with at least one of the diagnoses occurring during 2020.[6]

Prevalence estimates of specific BH conditions (adjustment disorders, alcohol-related disorders, substance-related disorders, anxiety disorders, bipolar disorder, depressive disorder, psychoses, and posttraumatic stress disorder [PTSD]) during 2020 were also calculated.[22] To be considered a case, two encounters for the same BH condition within a 365-day period were required.

To determine the proportion of AC Service members that had ever been diagnosed with a BH condition, the "lifetime" prevalence of BH disorders was calculated. Service members on active duty during December 2020 were used for this analysis and were considered to have a lifetime history of a BH condition if they had two BH disorder diagnoses of the same type within 365 days at any time between 2002 and 2020.

Overall, 8.7% of AC Service members had medical encounters for a BH disorder in 2020. The annual prevalence of BH disorders remained relatively stable from 2016 to 2020, fluctuating between 8.3% and 8.7%. Female Service members were more likely to have medical encounters for BH disorders (14%) when compared to male members (7.5%). Service members in the youngest age category (less than 25 years) had the highest prevalence of BH disorders in both sexes.

Almost 12% of Service members with any BH disorder were hospitalized, resulting in a total of 158,827 bed days in 2020. Cases of psychoses had the highest hospitalization rate (29%), followed by bipolar disorder (19%). However, cases of depressive disorders had the highest total number of bed days (46,350), followed by alcohol-related disorders (39,129).

Among both male and female AC Service members, adjustment disorder was the leading BH diagnosis in 2020 followed by anxiety disorder and depressive disorder.

Among AC Service members on active duty during December 2020, 27% of female and 16% of male members (18% overall) had a history (lifetime prevalence) of a BH disorder. The lifetime prevalence of BH disorders ranged from 11% to 21% across Services.

A previous *MSMR* report looking at trends of BH diagnoses between 2007 and 2016 found incidence of most BH conditions to be higher in female Service members, except for alcohol- and substance-related disorders which were higher in male members.[23] The *MSMR* report also found the incidence of several BH conditions to be higher among Army members and those in motor transport occupations. To provide help for Service member with BH issues or concerns, the MHS offers several resources including free hotlines (e.g., Military OneSource, DoD Safe Helpline, Military Crisis Line),[24] outreach centers (e.g., Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury Outreach Center), and connections to additional support programs (e.g., National Resource Directory).

7.3%	**8.5%**	**10%**

Low ———————————————————⊕————————————————————— High

7.5%

8.7%
DOD Average
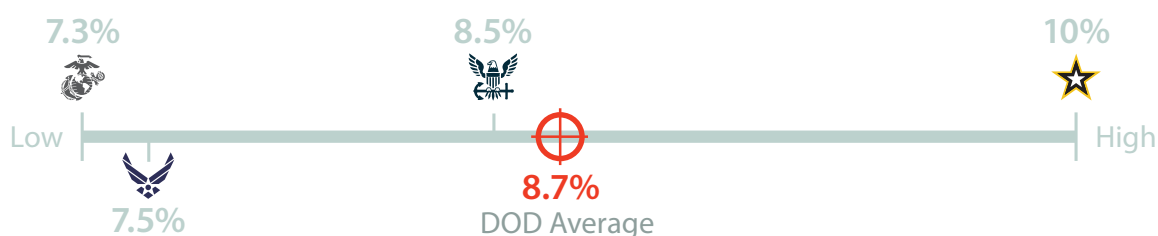
Overall, 8.7% of AC Service members had an encounter for a BH disorder in 2020.

Rates ranged from 7.3% to 10% across Services.

Army   Navy   Marine Corps   Air Force

Prevalence of BH Disorders by Sex and Age Group, AC Service Members, 2020

Female Service members were more likely to be diagnosed with BH disorders compared to male members, and those in the youngest age group were more likely to be diagnosed compared to older Service members.
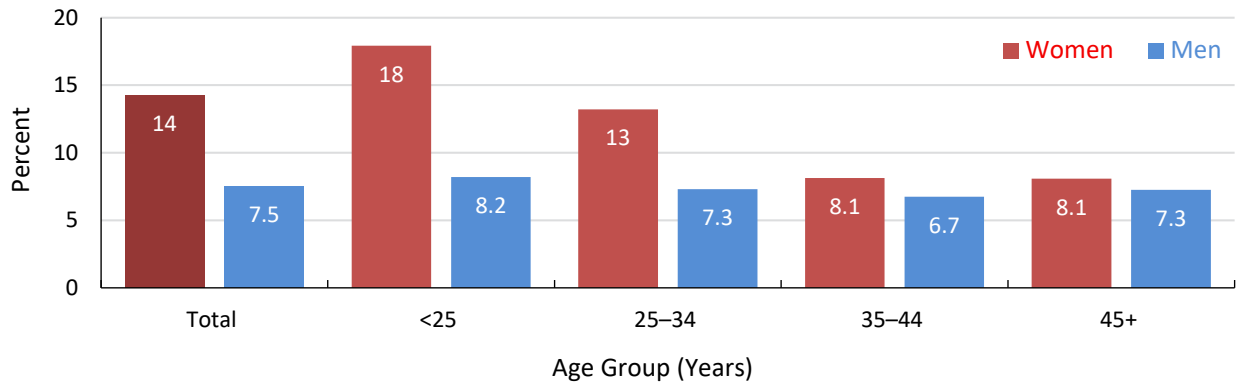
Annual and Lifetime Prevalence of BH Disorders by Sex and Condition, AC Service Members, 2020

Overall, 18% of Service members (27% of female and 16% of male members) received diagnoses of a BH disorders between 2002 and 2020. The percentages were higher for female compared to male Service members for most BH disorders.

	2020	Lifetime
Any BH Disorder	14 / 7.5	27 / 16
Adjustment Disorders	8.6 / 4.0	18 / 8.5
Anxiety Disorders	5.6 / 2.3	11 / 5.0
Depressive Disorders	5.4 / 2.4	10 / 4.5
PTSD	2.9 / 1.3	3.9 / 2.0
Alcohol-related Disorders	1.1 / 1.5	2.2 / 3.3
Bipolar Disorder	0.32 / 0.10	0.35 / 0.13
Substance-related Disorders	0.13 / 0.19	0.21 / 0.28
Psychoses	0.10 / 0.10	0.10 / 0.10
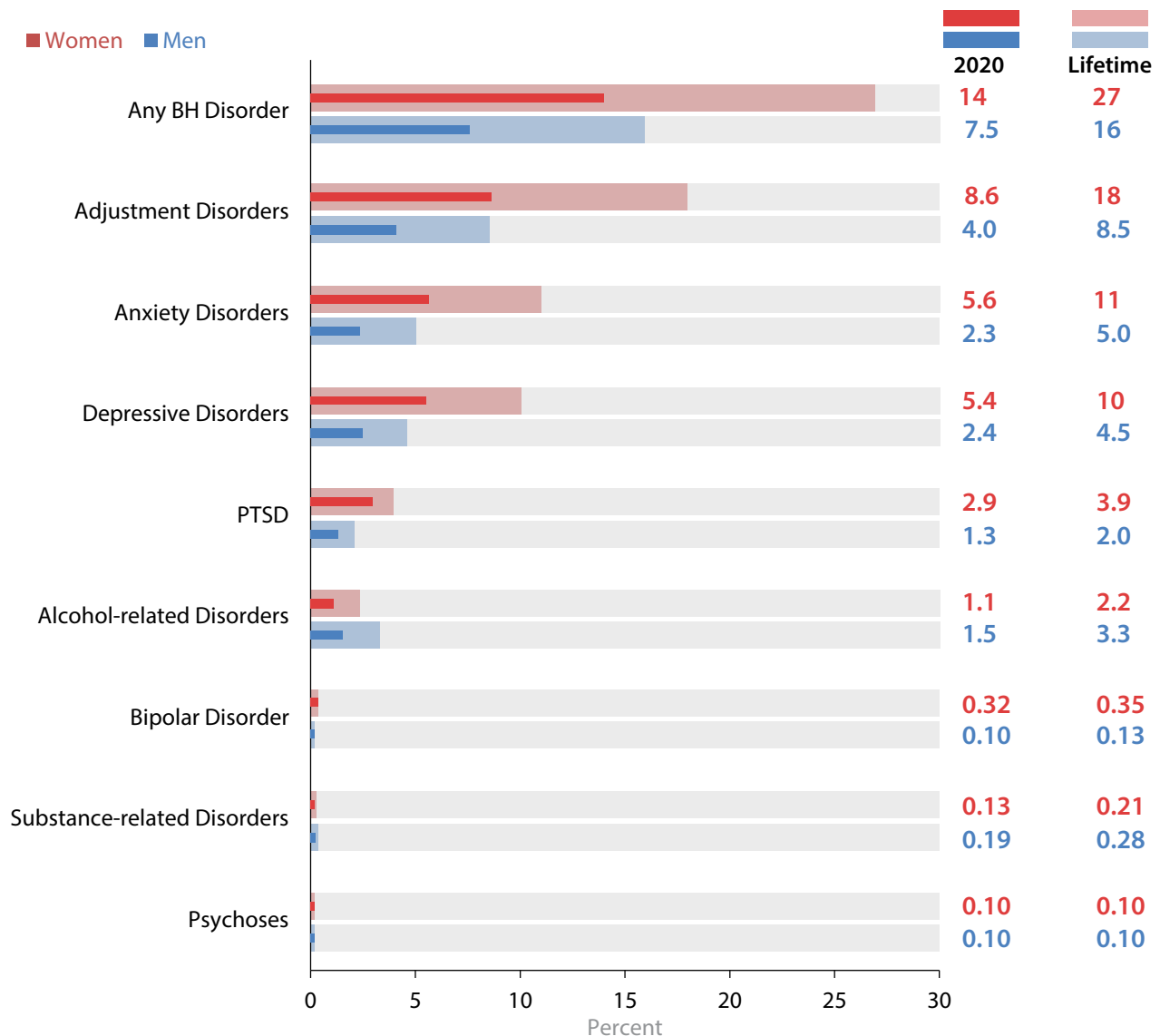
Prevalence of BH Disorders, AC Service Members, 2016–2020

The prevalence of BH disorders remained relatively stable between 2016 and 2020.
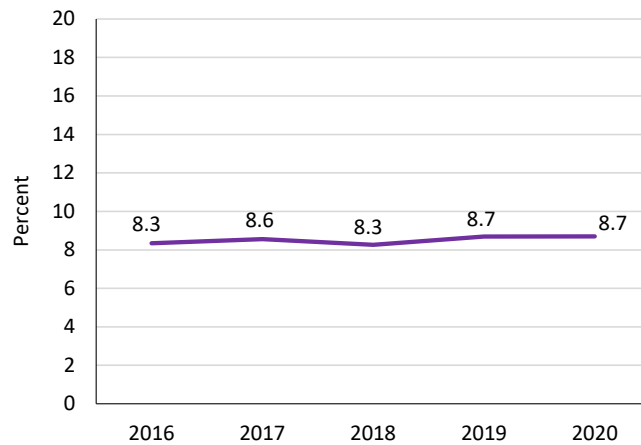
Prevalence of BH Disorder by Age Group, Male AC Service Members, 2016–2020

Between 2016 and 2020, the prevalence of BH disorders remained relatively stable among male Service members in all age groups.
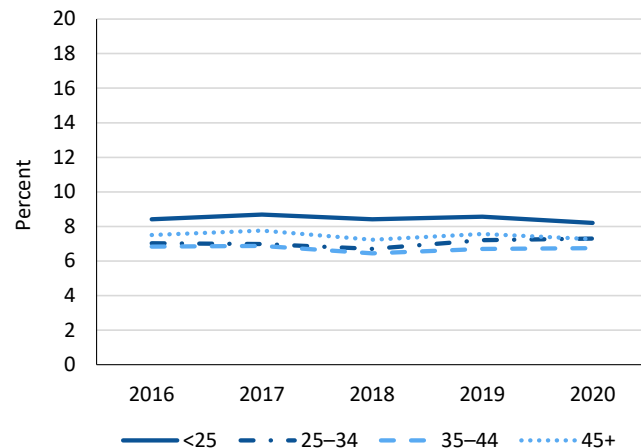
Prevalence of BH Disorder by Age Group, Female AC Service Members, 2016–2020

The prevalence of BH disorders increased slightly between 2016 and 2020 among female Service members under age 34, and remained relatively stable for those in the oldest age groups.
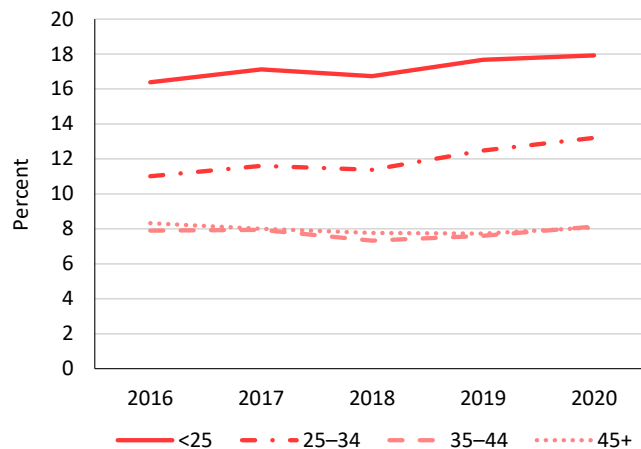
Sexually Transmitted Infections

Sexually transmitted infections (STIs) are relevant to Service members because of their relatively high incidence, adverse impact on individual readiness, and potential for serious medical sequelae if left untreated.[25] Two of the most common bacterial STIs are caused by *Chlamydia trachomatis* (chlamydia) and *Neisseria gonorrhoeae* (gonorrhea). Trichomoniasis, caused by the parasite *Trichomonas vaginalis,* is another common STI. The overall incidence and time trends related to these three STIs (chlamydia, gonorrhea, and trichomoniasis) among AC Service members in 2020 are reported here.

In 2020, 25 per 1,000 AC Service members were diagnosed with or tested positive for one of the three STIs. Female Service members had higher rates of STIs compared to male members, particularly among the younger age groups. **Chlamydia was most common (21 per 1,000), followed by gonorrhea (3.7 per 1,000) and trichomoniasis (0.7 per 1,000).** Among both male and female Service members, STIs were most common in the youngest age groups. AC Service members less than 25 years of age were almost three times more likely to have an STI compared to those aged 25–34 years.

The annual incidence rates of chlamydia and gonorrhea among AC Service members increased between 2016 and 2019, but decreased from 2019 to 2020. These trends were primarily attributed to Service members under age 25. Rates of trichomoniasis decreased between 2016 and 2020.

Previous studies have demonstrated increases in the incidence rates of chlamydia and gonorrhea among AC Service members during the past five years,[25] with consistently higher rates among female Service members. The decline in STI rates in 2020 is likely related to the COVID-19 pandemic, since there were limitations on appointments during this time and Service members may have avoided coming in for appointments. The pandemic may have also caused a temporary reduction in sexual risk behaviors as sexual networks may have been limited as a result of social distancing recommendations. However, at the time of the analysis, no data were available to test this hypothesis. Higher rates of most STIs among female compared to male Service members can likely be attributed to implementation of the Services' screening programs. Continued behavioral risk reduction interventions are needed to counter the increasing incidence of some STIs and maintain any decreases.

Overall, there were 25 cases of STIs (chlamydia, gonorrhea, or trichomoniasis) per 1,000 AC Service members in 2020.

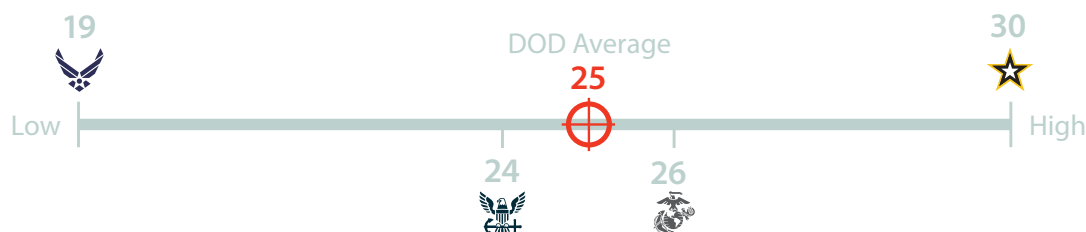Rates ranged from 19 per 1,000 to 30 per 1,000 across Services.

Army   Navy   Marine Corps   Air Force

Incidence of Chlamydia by Sex and Age Group, AC Service Members, 2020

In 2020, female Service members had higher rates of chlamydia compared to male members, particularly among those in younger age groups.
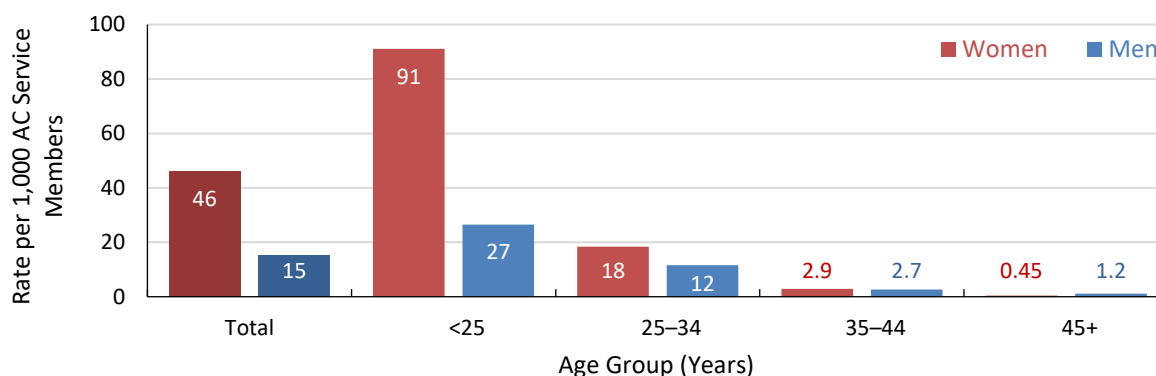
Incidence of Gonorrhea by Sex and Age Group, AC Service Members, 2020

In 2020, female Service members had higher overall rates of gonorrhea compared to male members; this difference was driven by those in the youngest age group.
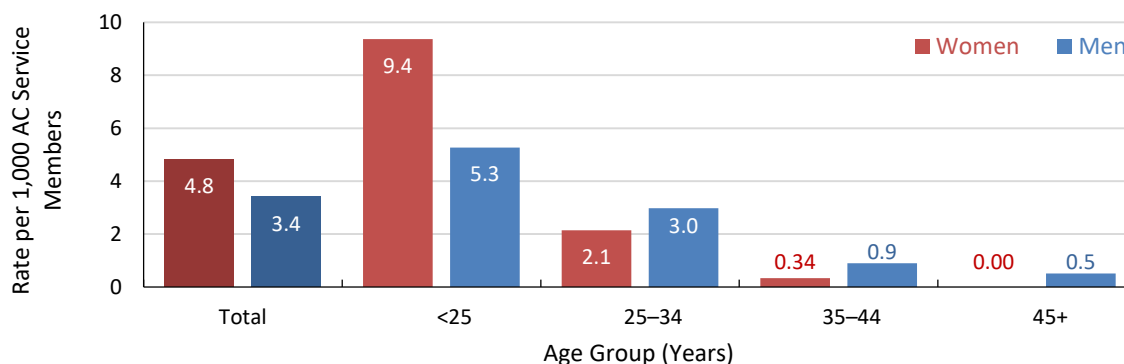
Incidence of Trichomoniasis by Sex and Age Group, AC Service Members, 2020

Overall, female Service members had higher rates of trichomoniasis compared to male members.
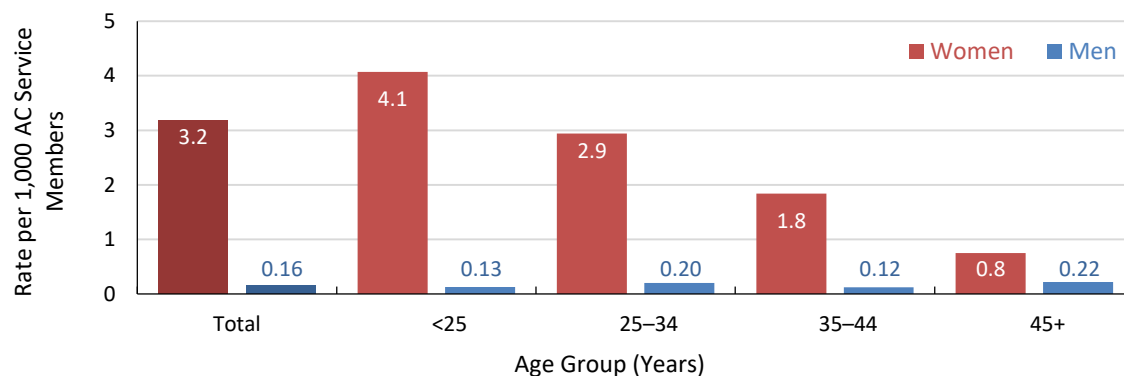
Incidence of Chlamydia and Gonorrhea, AC Service Members, 2016–2020

The incidence of chlamydia and gonorrhea increased from 2016 to 2019, and decreased slightly between 2019 and 2020.
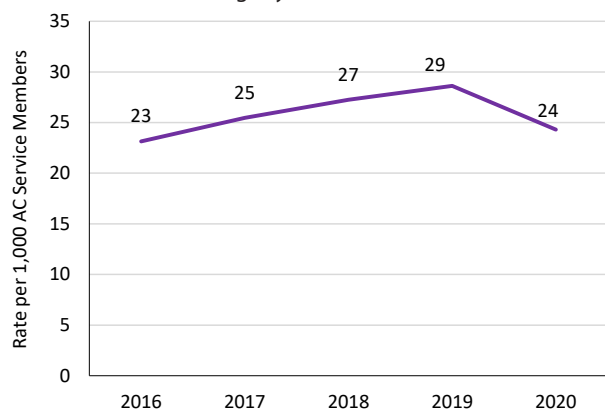
Incidence of Chlamydia and Gonorrhea by Age Group and Sex, AC Male Service Members, 2016–2020

Among male Service members in the youngest age groups, the incidence of chlamydia and gonorrhea increased between 2016 and 2019 and then decreased slightly between 2019 and 2020.
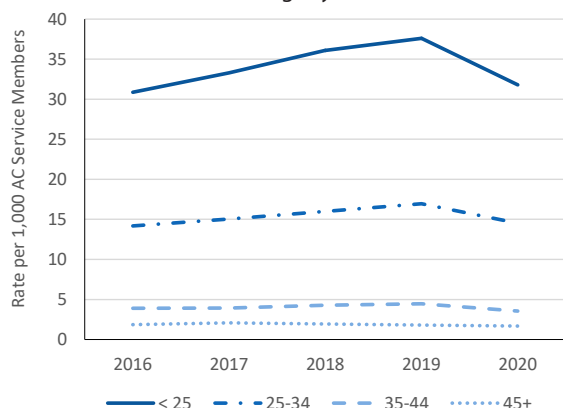
Incidence of Chlamydia and Gonorrhea by Age Group and Sex, AC Female Service Members, 2016–2020

The incidence of chlamydia and gonorrhea increased between 2016 and 2019 and then decreased slightly between 2019 and 2020 among female Service members less than 25 years old.
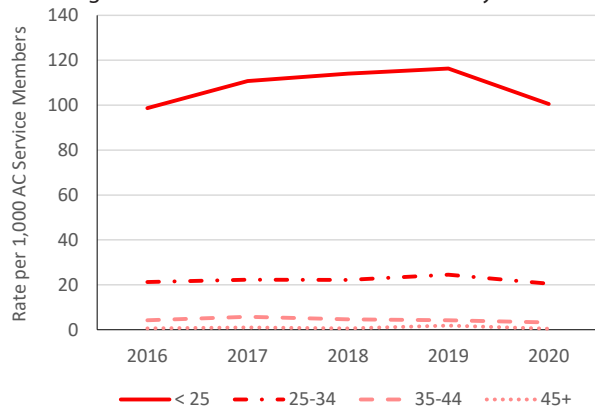
Incidence of Trichomoniasis, AC Service Members, 2016–2020

The incidence of trichomoniasis decreased between 2016 and 2020.
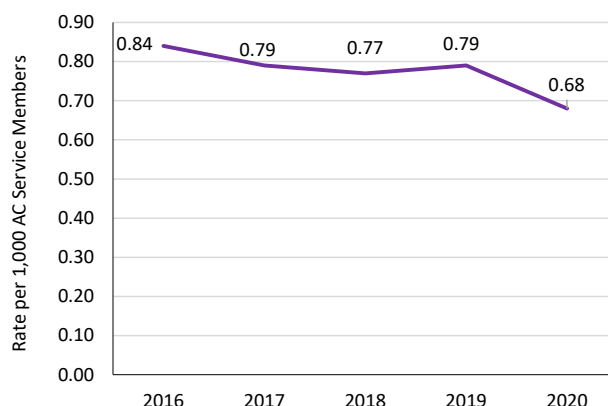
Incidence of Trichomoniasis by Age Group, AC Male Service Members, 2016–2020

The incidence of trichomoniasis decreased between 2016 and 2020 among male Service members less than 35 years old.
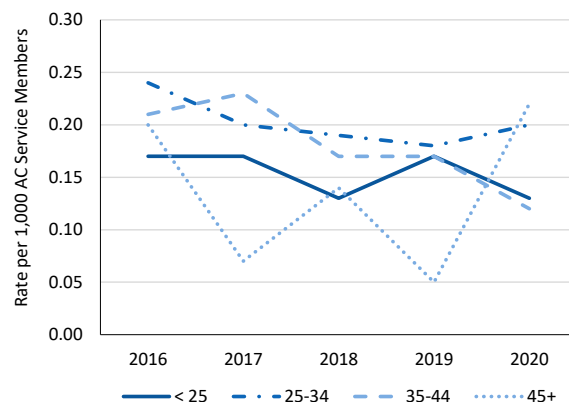
Incidence of Trichomoniasis by Age Group, AC Female Service Members, 2016–2020

Between 2016 and 2020, the incidence of trichomoniasis decreased among female Service members under 45 years old. Among those 45 years or older, the incidence of trichomoniasis increased from 2016 to 2019 and then decreased between 2019 and 2020.
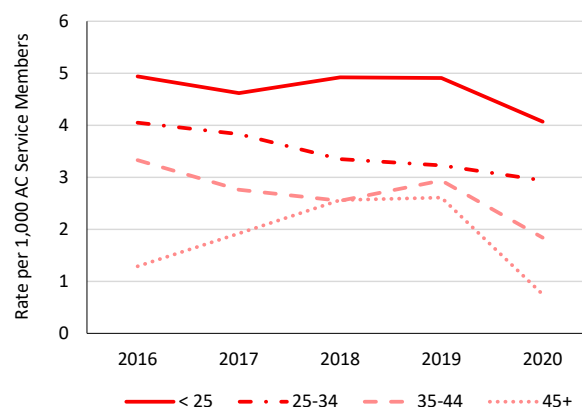
Sleep Disorders

The American Academy of Sleep Medicine recommends at least seven hours of sleep per night for adults aged 18–60 years.[26] Lack of sleep can impair cognitive function, decreasing performance and increasing the risk for injury and accidents. Insufficient sleep is also associated with a number of chronic diseases including diabetes, heart disease, obesity, and depression.[27] The overall prevalence and time trends related to sleep disorders (including sleep apnea, insomnia, hypersomnia, circadian rhythm disorders, narcolepsy, parasomnia, and sleep-related movement disorders) among AC Service members in 2020 are reported here, along with the prevalence of the most commonly diagnosed sleep disorders.

In 2020, 12% of AC Service members had a medical encounter for at least one sleep disorder. Proportions were similar for male and female Service members (13% and 11%, respectively). **The most commonly diagnosed sleep disorders were sleep apnea and insomnia (6.8% and 4.5%, respectively).** Male

Service members were more likely to have an encounter for sleep apnea than female members (7.6% and 3.2%, respectively), while a greater percentage of female than male Service members had a medical encounter for insomnia (6.3% and 4.1%, respectively).

The prevalence of sleep disorders among AC Service members remained relatively stable during 2016–2020. However, the prevalence of sleep disorders among male Service members 45 years or older increased slightly from 45% in 2016 to 49% in 2020.

Previous studies have demonstrated increases in the incidence rates of some conditions, including sleep disorders, when comparing rates during the early, middle, and last phases of Service members' careers.[12] These increases were independent of age and thought to be due in part to increased reporting during separation and retirement physicals.[28] The impact of career phase was not evaluated here and may be important to consider in the future.

6.9%		11%	12%		16%
Low					High

12%
DOD Average
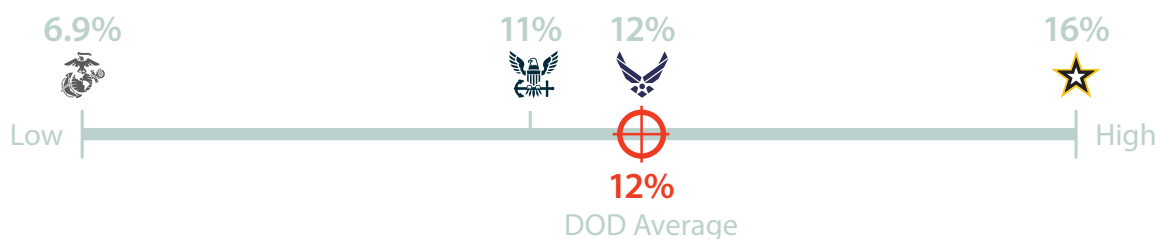
Overall, 12% of AC Service members had a sleep disorder in 2020.

Rates ranged from 6.9% to 16% across Services.

Army   Navy   Marine Corps   Air Force

Prevalence of Sleep Disorders by Sex and Age Group, AC Service Members, 2020

The prevalence of sleep disorders was similar among male (13%) and female Service members (11%) and increased with increasing age among both sexes.

Chart: Prevalence of sleep disorders (Percent) by Age Group (Years)

Age Group	Women	Men
Total	11	13
<25	7.5	4.6
25–34	10	10
35–44	20	27
45+	34	49
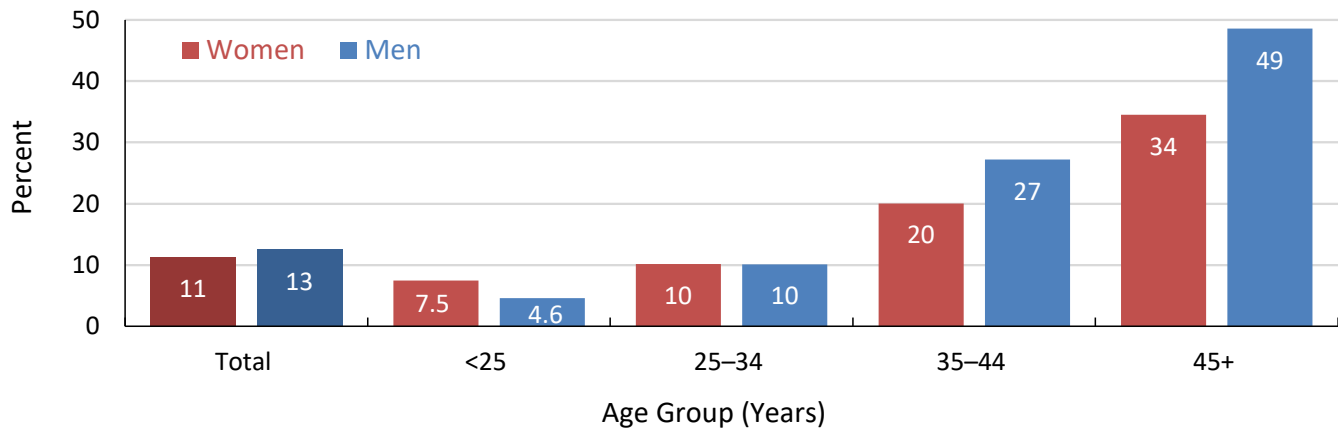
Prevalence of Sleep Apnea by Sex and Age Group, AC Service Members, 2020

The prevalence of sleep apnea was higher for male (7.6%) compared to female Service members (3.2%), and the prevalence increased with increasing age among both sexes.

Chart: Prevalence of sleep apnea (Percent) by Age Group (Years)

Age Group	Women	Men
Total	3.2	7.6
<25	0.7	0.9
25–34	2.3	4.9
35–44	8.7	21
45+	21	42
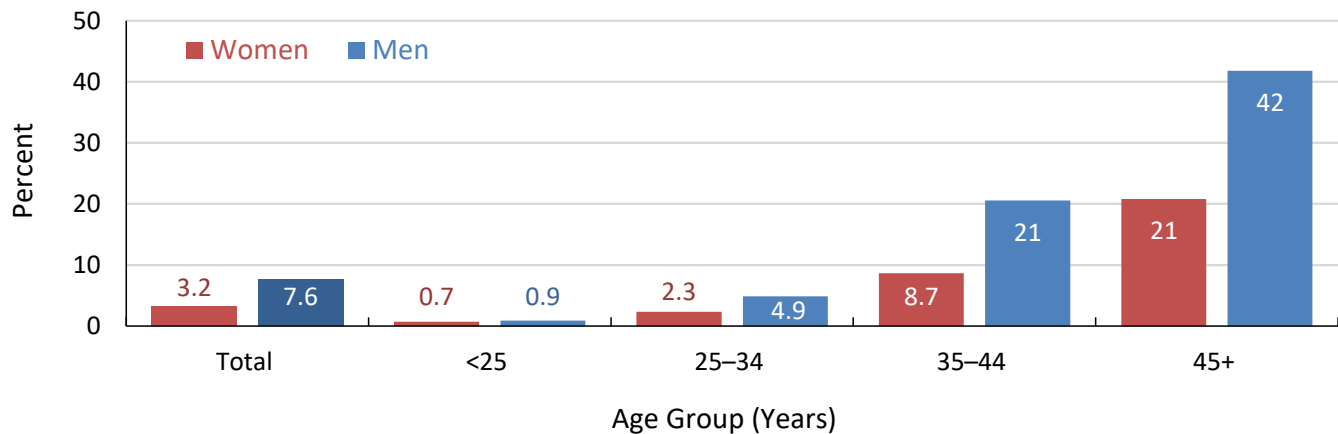
Prevalence of Insomnia by Sex and Age Group, AC Service Members, 2020

The prevalence of insomnia was higher for female (6.3%) compared to male Service members (4.1%), and the prevalence increased with increasing age among both sexes.

Chart: Prevalence of insomnia (Percent) by Age Group (Years)

Age Group	Women	Men
Total	6.3	4.1
<25	4.7	2.6
25–34	5.6	3.6
35–44	10	7.2
45+	15	10

Prevalence of Sleep Disorders, AC Service Members, 2016–2020

The prevalence of sleep disorders among Service members remained relatively stable between 2016 and 2020.
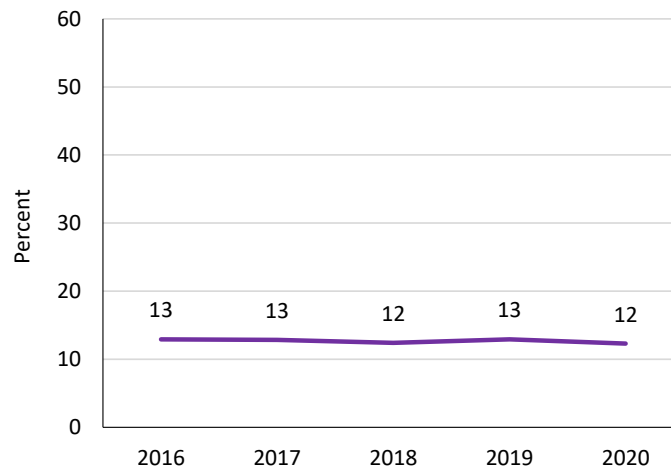
Prevalence of Sleep Disorders by Age Group, Male AC Service Members, 2016–2020

The prevalence of sleep disorders among male Service members remained relatively constant for all age groups between 2016 and 2020, except for those 45 years or older, for whom prevalence increased slightly from 45% in 2016 to 49% in 2020.
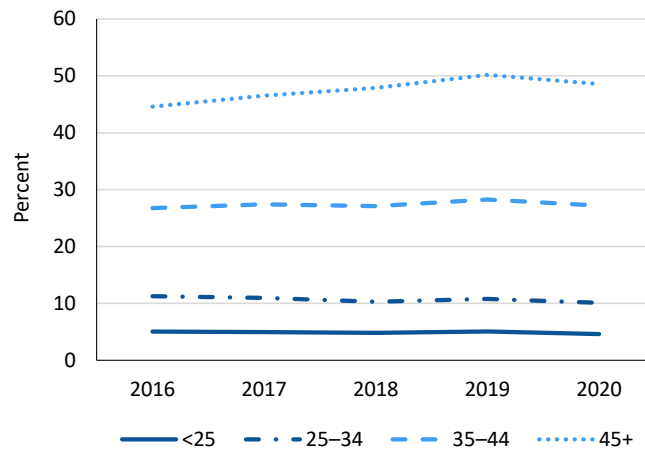
Prevalence of Sleep Disorders by Age Group, Female AC Service Members, 2016–2020

Between 2016 and 2020, the prevalence of sleep disorders remained relatively stable among female Service members under 45 years old. Among those in the oldest age group, prevalence increased slightly between 2016 and 2019 and then decreased slightly in 2020.
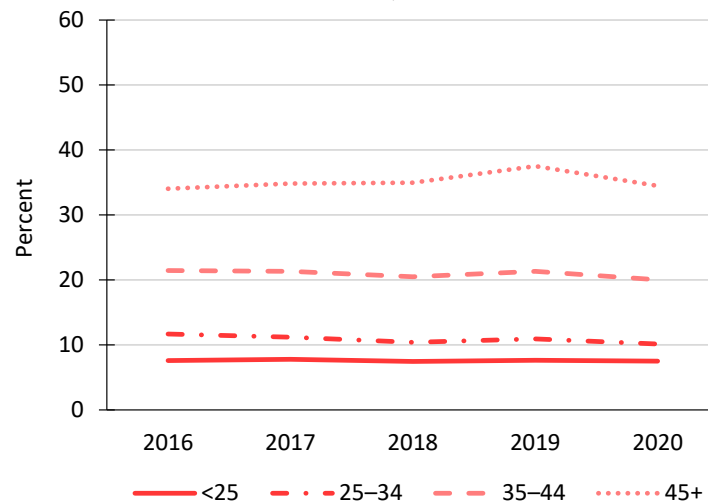
Obesity

Obesity negatively impacts physical performance and military readiness and is associated with long-term health problems such as hypertension, diabetes, coronary heart disease, stroke, cancer, and risk for all-cause mortality. Studies also suggest that health care utiliza-tion is higher among obese Service members than their normal-weight counterparts.[29]

The Clinical Data Repository (CDR) vital sign table and Genesis vitals table within the MHS Data Repository (MDR) were used to identify all records for AC Service members with a height and weight measurement available on the same day; pregnant Service members were excluded. Body mass index (BMI) was calculated utilizing the latest height and weight record in a given year. In accordance with the Centers for Disease Control and Prevention (CDC), a BMI ≥30 was considered obese.[30]

The overall prevalence of obesity among AC Service members was 19% in 2020. Obesity rates were higher among male (20%) compared to female Service members (15%). The lowest prevalence of obesity was in Service members less than 25 years old (11%) and the highest was among those aged 35–44 years (30%). **The overall prevalence of obesity increased slightly between 2016 and 2020.**

Prior studies have demonstrated an increasing trend of obesity among Service members in all branches and sociodemographic groups.[31,32] To combat this concerning rise, there should be an increased focus on evidence-based initiatives to reduce obesity such as programs to provide healthier food and beverage options on military bases, technology-based approaches to improving fitness, and sustainable weight management training and follow-up services.[33]

9.8%   DOD Average   20%   25%

19%

Low   High

19%
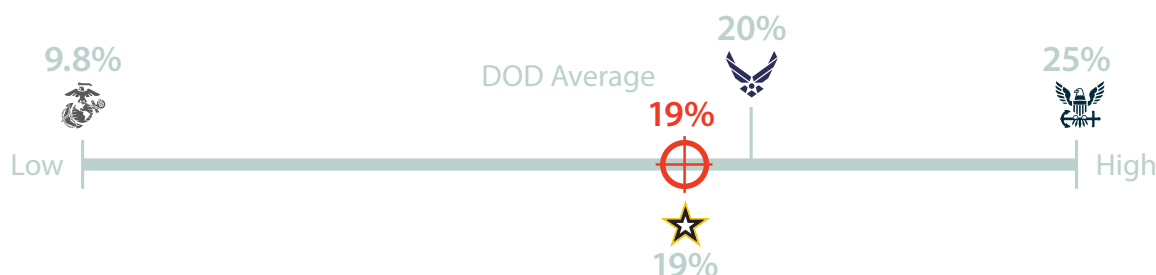
Overall, 19% of AC Service members were classified as obese in 2020.

Rates ranged from 9.8% to 25% across Services.

Army   Navy   Marine Corps   Air Force

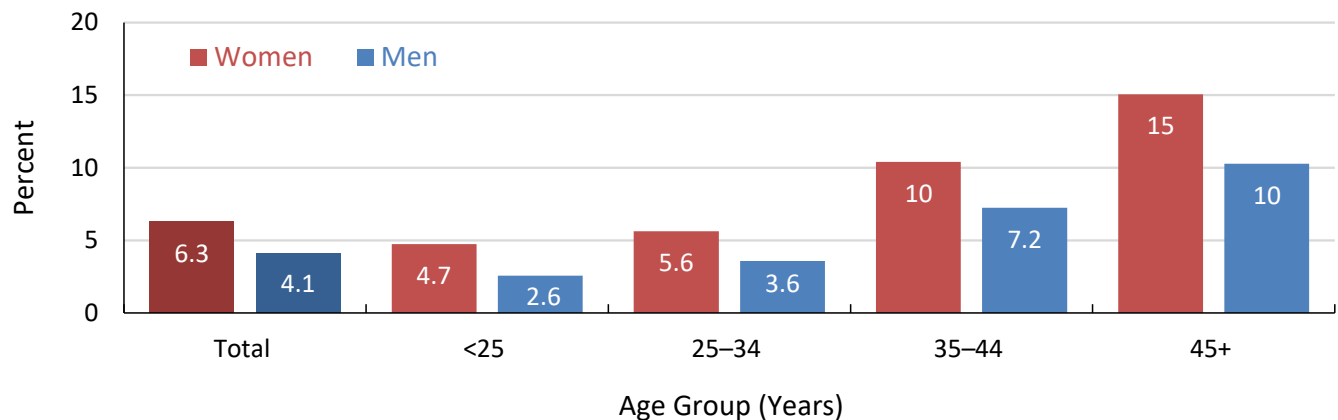### Prevalence of Obesity by Sex and Age Group, AC Service Members, 2020

Obesity rates were higher among male (20%) compared to female Service members (15%). The prevalence of obesity increased with increasing age through 35–44 years then decreased among those aged 45 years or older.

Bar chart — Prevalence of Obesity by Sex and Age Group. Y-axis: Percent (0–35). X-axis: Age Group (Years). Legend: Women (red), Men (blue).

Age Group	Women	Men
Total	15	20
<25	10	12
25–34	17	22
35–44	25	32
45+	21	30
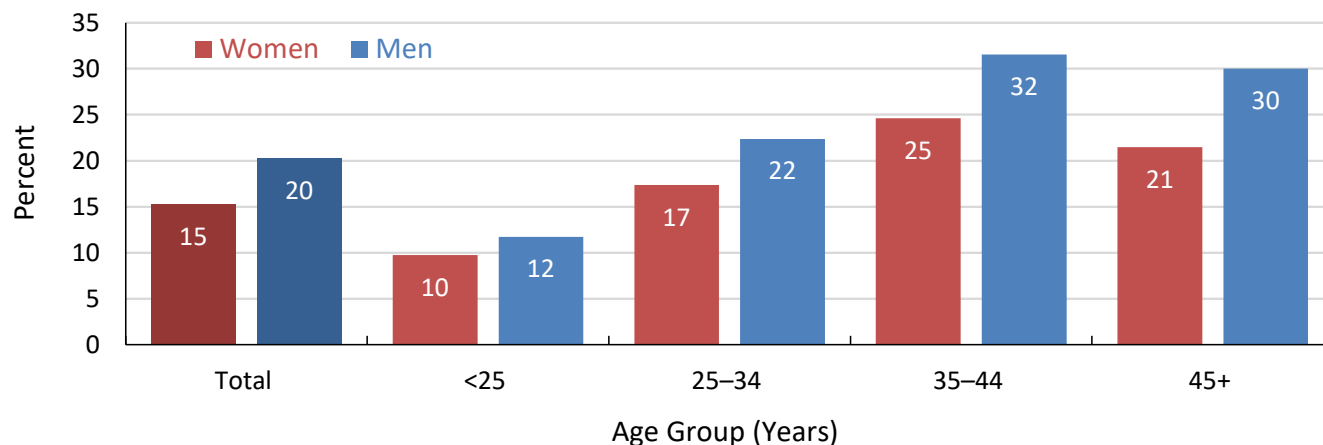
Prevalence of Obesity, AC Service Members, 2016–2020

The prevalence of obesity increased from 17% in 2016 to 19% in 2020.
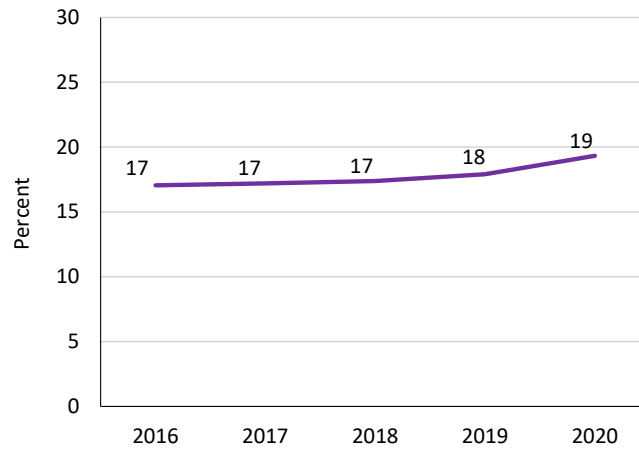
Prevalence of Obesity by Age Group, Male AC Service Members, 2016–2020

Between 2016 and 2020, the prevalence of obesity increased among male Service members in all age groups.
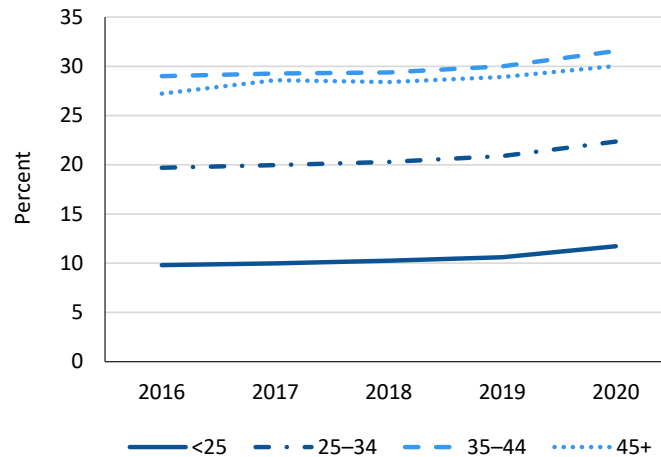
Prevalence of Obesity by Age Group, Female AC Service Members, 2016-2020

Between 2016 and 2020, the prevalence of obesity increased among female Service members in all age groups.
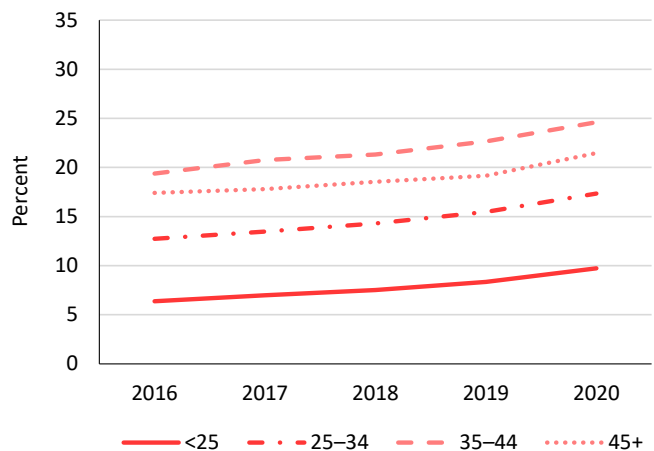
Acute Respiratory Illnesses

Outbreaks and epidemics of acute respiratory illnesses can have adverse effects on individual and military unit readiness. The Armed Forces have long recognized the special risks of respiratory illnesses among Service members who live in congregate settings, mix with Service members from other geographic regions, undergo the stresses of military training and operations, and travel to foreign countries. To counter the threat of such illnesses, the Armed Forces have for many years emphasized both preventive measures as well as continuous surveillance for respiratory infections. Vaccines are required for or offered to new Service members to prevent a variety of respiratory diseases caused by bacteria (diphtheria, pertussis, and meningococcal infections) and viruses (adenovirus, influenza, measles, mumps, rubella, varicella, and most recently, COVID-19). This report summarizes temporal trends of specific respiratory infections and syndromes as well as specific symptoms of respiratory illness. For this metric, data are also presented separately for recruits.

On average, 20 per 1,000 AC Service members were diagnosed with acute respiratory infections each month during 2020, with rates highest in March (39 per 1,000) and lowest in May (6.5 per 1,000). Female Service members had higher monthly rates of acute respiratory infections and respiratory symptoms compared to male members. Those in the youngest age category (less than 25 years old) had the highest rates of acute respiratory infections, but those in the oldest age group had the highest rate of respiratory symptoms. **Com-pared to AC Service members overall, recruits had higher average monthly rates of acute respiratory infections (53 per 1,000), but lower average rates of respiratory symptoms (9.3 per 1,000) in 2020**.

Monthly rates of respiratory infections among AC Service members remained relatively stable between 2016 and 2019, but decreased sharply in April 2020. Recruits had consistently higher rates of acute respiratory infections compared to AC Service members, with an even more pronounced decline in April 2020. The decline in April 2020 coincides with the beginning of the COVID-19 pandemic, when Military Treatment Facilities (MTFs) began limiting access to non-essential services.[34] The required use of face masks and social distancing likely also reduced rates of other respiratory infections besides COVID-19 during this time period. Monthly rates of respiratory symptoms were relatively stable among AC Service members between 2016 and 2019, but spiked in March 2020, again coinciding with the COVID-19 pandemic. Recruits had higher rates of respiratory symptoms compared to AC Service members throughout most of the period, except in 2020. **There were noteworthy patterns of seasonal increases (in winter) and declines (in summer) for both AC Service members overall and for recruits**.

A total of 270,314 Service members had at least one acute respiratory infection diagnosis in 2020. Of these Service members, 1,204 (0.5%) were hospitalized, resulting in 5,774 total bed days.

Rates among trainees were likely higher because of the spread of infections among trainees in congregate settings during basic training, strict requirements for sick trainees to receive medical care, and more thorough surveillance of trainees, including collection of specimens to identify etiologic pathogens. For both the trainees and AC service members, the rates of diagnoses of respiratory symptoms were considerably lower than the rates of specific acute respiratory illnesses. This observation indicates that health care providers recorded specific diagnoses much more often than nonspecific symptom diagnoses during encount-ers for acute respiratory illnesses.

18	20	21	23

Low — DOD Average **20** — High

On average, 20 per 1,000 AC Service member per month were diagnosed with acute respiratory infections in 2020.

Average monthly rates varied by Service and ranged from 18 to 23 per 1,000 AC Service members.

8.2	14	15

Low — **8.4** — **12** DOD Average — High
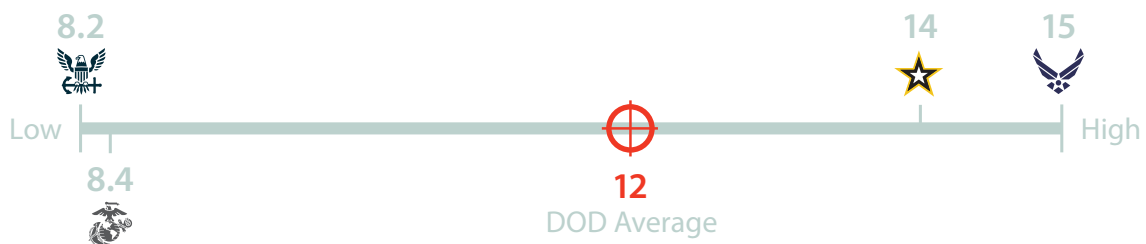
On average, 12 per 1,000 AC Service members per month were diagnosed with respiratory symptoms in 2020.

Average monthly rates varied by Service and ranged from 8.2 to 15 per 1,000 AC Service members.

Army   **Navy**   **Marine Corps**   **Air Force**

Average Monthly Incidence of Acute Respiratory Infections by Sex and Age Group, AC Service Members, 2020

Service members in the younger age groups had higher average monthly rates of acute respiratory infections than those in the older groups. Compared to male Service members, female members had higher rates within each age group.
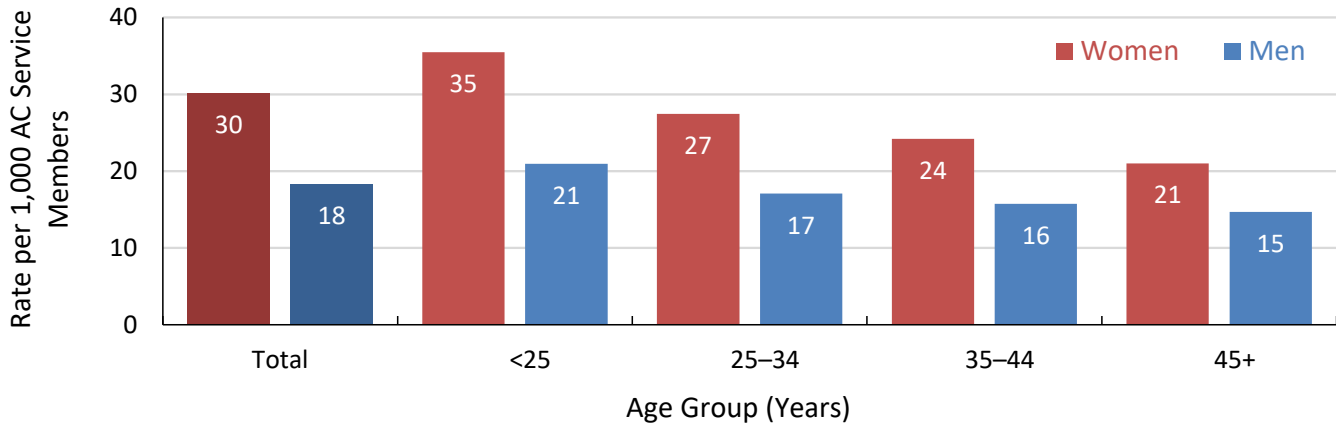
Average Monthly Incidence of Respiratory Symptoms by Sex and Age Group, AC Service Members, 2020

Female Service members had higher rates of respiratory symptoms compared to male members. Rates were highest among Service members aged 45 years or older.
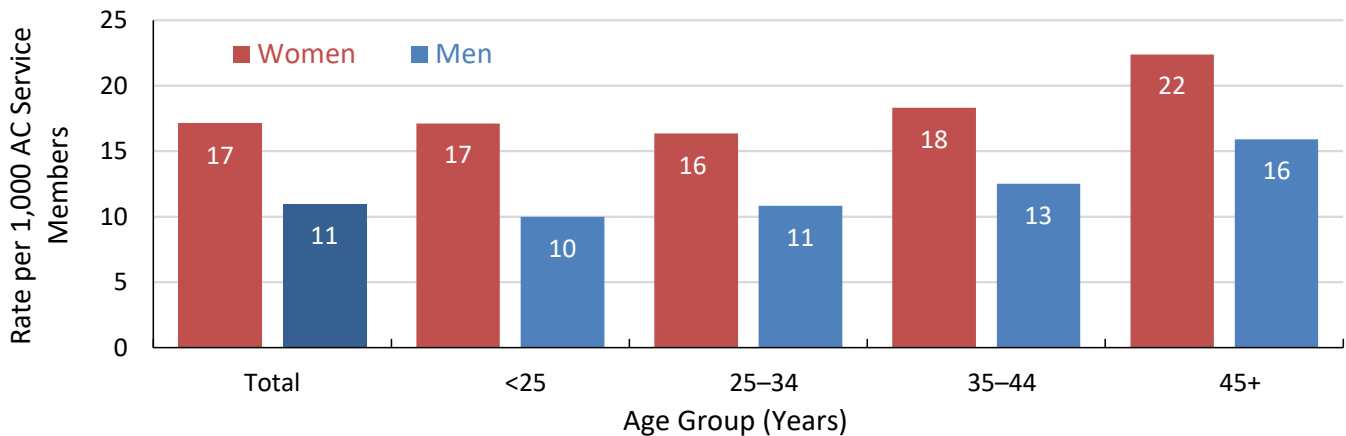
Incidence of Acute Respiratory Infections, AC Service Members and Recruit Trainees, 2016–2020

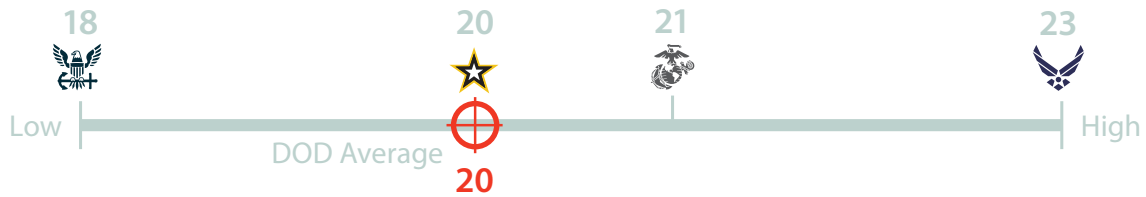Monthly rates of respiratory infections among AC Service members remained relatively stable between 2016 and 2019, but declined in April 2020. Recruits had consistently higher rates of acute respiratory infections compared to AC Service members, with an even more pronounced decline in April 2020.
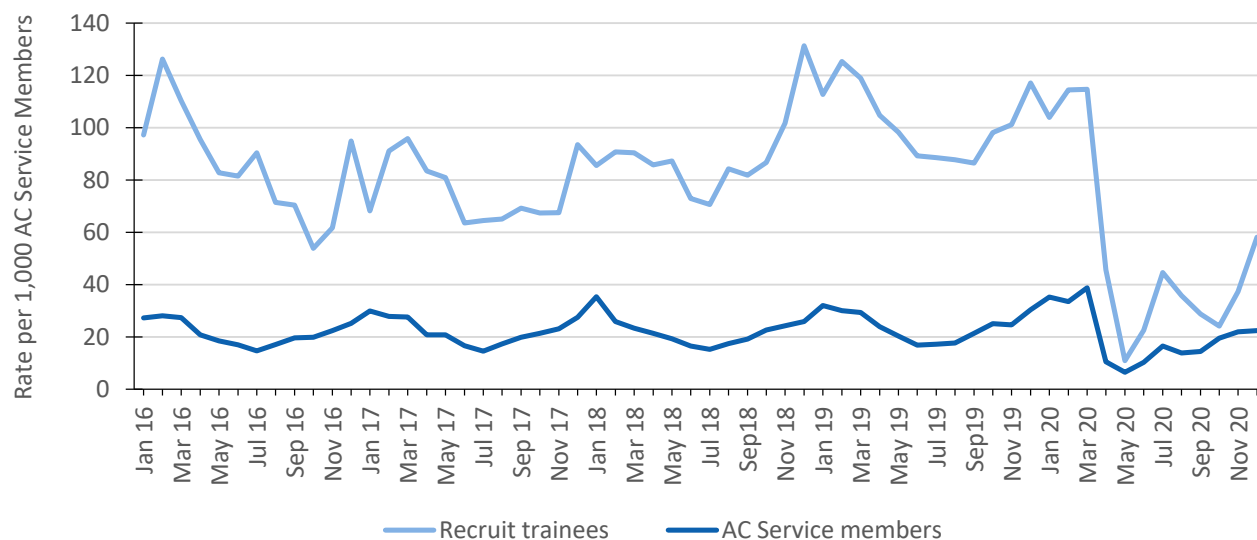
Incidence of Respiratory Symptoms, AC Service Members and Recruit Trainees, 2016–2020

Similar to acute respiratory infections, rates of respiratory symptoms displayed seasonal increases in winter months and declines in summer months. Monthly rates of respiratory symptoms were relatively stable among AC Service members between 2016 and 2019, spiked in March 2020, and then decreased through May 2020. Recruits had higher rates of respiratory symptoms compared to AC Service members throughout most of the period, except in 2020.
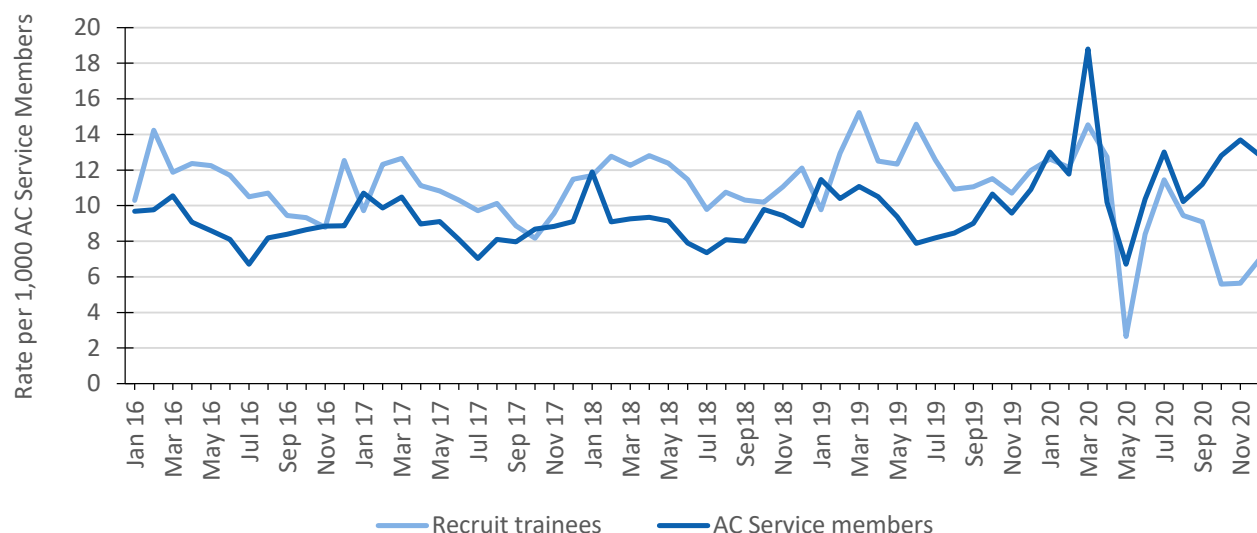
COVID-19

COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Continuous person-to-person spread of the virus has occurred worldwide since December 2019. On January 31, 2020, the U.S. Secretary of Health and Human Services declared a public health emergency in the U.S. in response to the spread of COVID-19.[35] COVID-19 spreads primarily through respiratory droplets produced when an infected person breathes, coughs or sneezes, and is more likely to infect people in close contact with one another. Infected individuals may be asymptomatic or experience mild to severe illness.[36] By the end of 2020, over 19.7 million cases had been reported domestically.[37] The COVID-19 pandemic has significantly affected military operations through movement restrictions, workspace capacity limits, and testing protocols for Service members.[38]

The overall incidence of reported or laboratory-confirmed COVID-19 infection was 5.9% in 2020.

Female Service members (6.5%) had a higher incidence of COVID-19 infection compared to male members (5.8%). Younger Service members had a higher incidence of COVID-19 infection than those in older age groups.

A total of 412 (0.5%) AC Service members were hospitalized for COVID-19 in 2020, resulting in 2,512 total bed days. However, this is likely an underestimate since it relied on the diagnosis of COVID-19 using ICD-10 code U07.1, which did not become available until several weeks after the beginning of the pandemic.

Surveillance of COVID-19 among Service members and other DoD personnel is ongoing. Information and resources on latest DoD policy, guidance, and resources, as well as case counts, information about vaccine availability, and travel restrictions for DoD installations are available at https://www.defense.gov/explore/spotlight/coronavirus/.

5.3%	5.5%			6.6%
Low				High
	5.6%	5.9%		
		DOD Average		
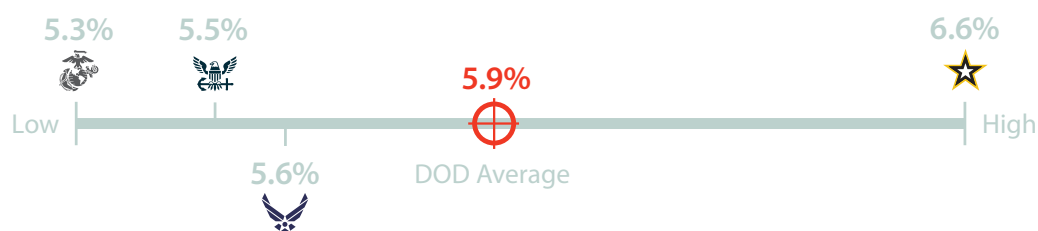
Overall, 5.9% of AC Service members were infected with COVID-19 in 2020.

Rates ranged from 5.3% to 6.6% across Services.

Army   Navy   Marine Corps   Air Force

Incidence of COVID-19 by Sex and Age Group, AC Service Members, 2020

Service members in the younger age groups had a higher incidence of COVID-19 than those in the older age groups. Female Service members (6.5%) had a higher incidence compared to males (5.8%).
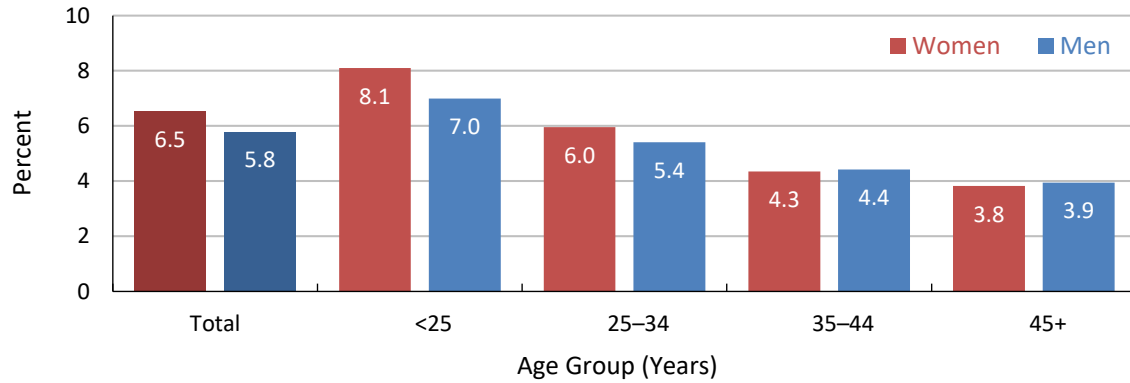
Incidence of Reported or Laboratory-Confirmed COVID-19 Infection by Month, AC Service Members, 2020

Monthly incidence of COVID-19 peaked in July 2020 and December 2020 for AC Service members and recruits. Incidence was higher among recruits compared to overall AC Service members since the start of the pandemic.
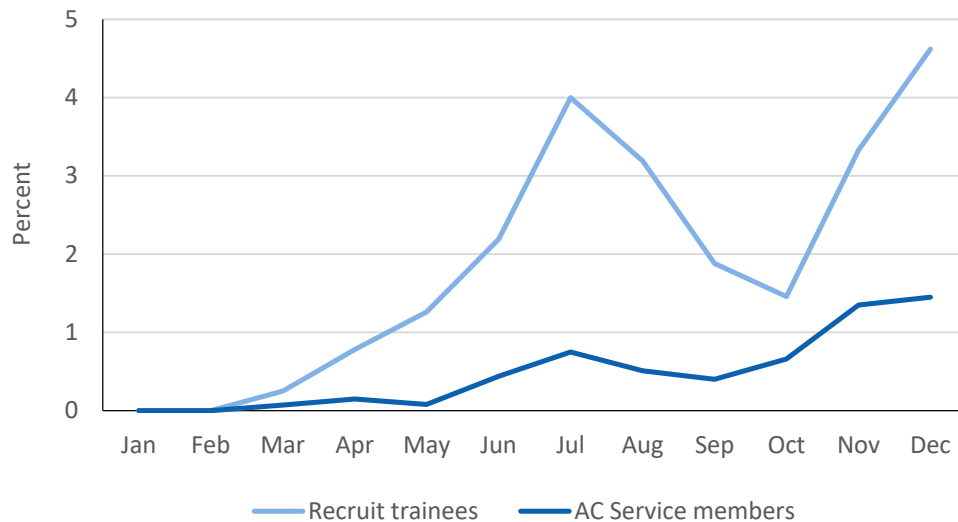
▶ Army

Service Profile (2020):[a]

Population: Approximately 473,000 Army Service members
77% under 35 years old, 15% female

HEALTH INDEX MEASURES[b]

MEASURE	ARMY VALUE[c]	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	**269**	211	147–269
Cumulative Traumatic Injury (rate per 1,000)	**1,257**	948	599–1,257
TBI (%)	**2.0**	1.3	0.7-2.0
Noise-induced Hearing Injury (%)	**5.2**	4.1	2.7-5.2
Heat Illness (%)	**0.26**	0.16	0.04–0.35
Behavioral Health 1-Year (%)	**10**	8.7	7.3–10.2
Behavioral Health Lifetime (%)	**21**	18	11–21
STIs (rate per 1,000)	**30**	25	19–30
Sleep Disorders (%)	**16**	12	6.9–15.8
Obesity (%)	19	19	9.8–24.8
Acute Respiratory Illness (average rate per 1,000 per month)	20	20	18–23
Respiratory Symptoms (avgerage rate per 1,000 per month)	**14**	12	8.2–15.3
COVID-19 (%)	**6.6**	5.9	5.3-6.6

◆ ◆ ◆

ADDITIONAL INFORMATION

Injury rates including TBI and noise-induced hearing were found to be higher in the Army than in the other Services. Mission-specific training and operational requirements likely contribute to the risk for injury among Soldiers. Rates of BH conditions, STIs, and sleep disorders were also higher among Soldiers than in Sailors, Airmen, and Marines. Given the potential for each of these conditions to contribute to decreased performance, disability, and separation, further exploration of potential causes and interventions is warranted.

DEMOGRAPHICS
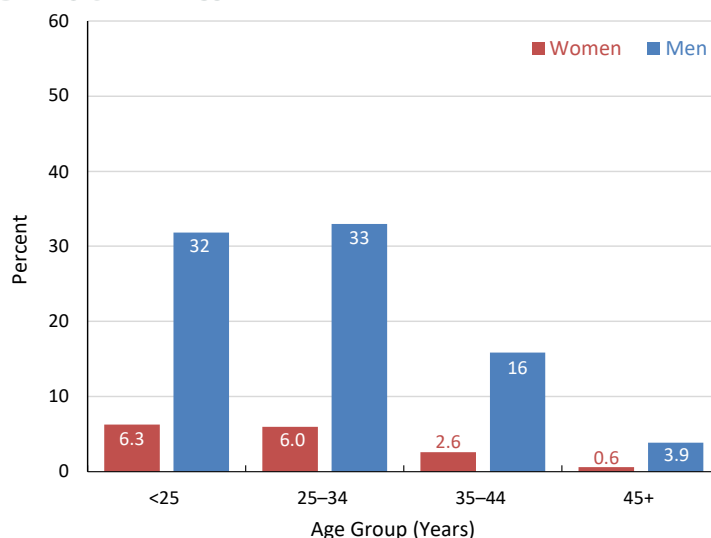
[a] Number of AC Service members, June 2020; see Appendix for details.
[b] See Appendix for details regarding measure computations.
[c] Values ≥ 10 are rounded to the nearest integer. Bold values represent Service values above the DoD average.

▶ Navy

Service Profile (2020):[a]

Population: Approximately 335,000 Navy Service members
77% under 35 years old, 20% female

HEALTH INDEX MEASURES[b]

MEASURE	NAVY VALUE[c]	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	147	211	147–269
Cumulative Traumatic Injury (rate per 1,000)	599	948	599–1,257
TBI (%)	0.7	1.3	0.7-2.0
Noise-induced Hearing Injury (%)	2.7	4.1	2.7-5.2
Heat Illness (%)	0.04	0.16	0.04–0.35
Behavioral Health 1-Year (%)	8.5	8.7	7.3–10.2
Behavioral Health Lifetime (%)	17	18	11–21
STIs (rate per 1,000)	24	25	19–30
Sleep Disorders (%)	11	12	6.9–15.8
Obesity (%)	**25**	19	9.8–24.8
Acute Respiratory Illness (average rate per 1,000 per month)	18	20	18–22
Respiratory Symptoms (average rate per 1,000 per month)	8.2	12	8.2–15.3
COVID-19 (%)	5.5	5.9	5.3-6.6

◆ ◆ ◆

ADDITIONAL INFORMATION

While injury, sleep disorders, and BH conditions remain important threats to Navy readiness, this report highlights obesity as an important health concern among Sailors. Obesity contributes to hypertension, diabetes, coronary heart disease, stroke, cancer, all-cause mortality, and increased health care costs. It also contributes to failure of Sailors to meet physical fitness standards.

DEMOGRAPHICS
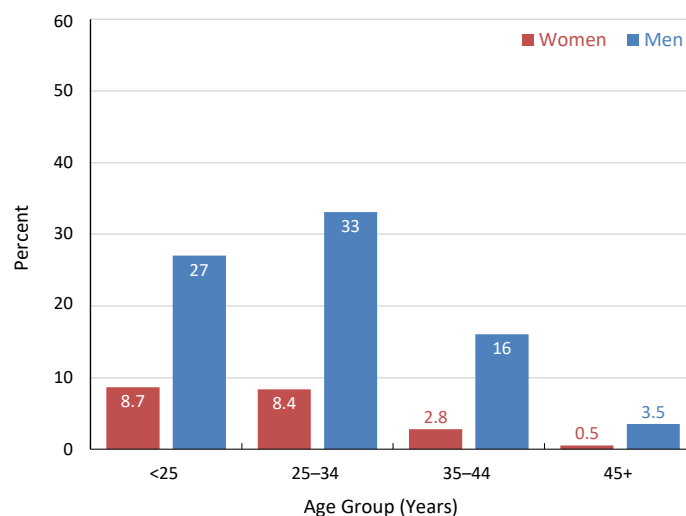
[a] Number of AC Service members, June 2020; see Appendix for details.
[b] See Appendix for details regarding measure computations.
[c] Values ≥ 10 are rounded to the nearest integer. Bold values represent Service values above the DoD average.

▶ Air Force

Service Profile (2020):[a]

Population: Approximately 329,000 Air Force Service members
77% under 35 years old, 21% female

HEALTH INDEX MEASURES[b]

MEASURE	AIR FORCE VALUE[c]	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	186	211	147–269
Cumulative Traumatic Injury (rate per 1,000)	894	948	599–1,257
TBI (%)	0.7	1.3	0.7-2.0
Noise-induced Hearing Injury (%)	3.3	4.1	2.7-5.2
Heat Illness (%)	0.04	0.16	0.04–0.35
Behavioral Health 1-Year (%)	7.5	8.7	7.3–10.2
Behavioral Health Lifetime (%)	**18**	18	11–21
STIs (rate per 1,000)	19	25	19–30
Sleep Disorders (%)	12	12	6.9–15.8
Obesity (%)	**20**	19	9.8–24.8
Acute Respiratory Illness (average rate per 1,000 per month)	**23**	20	18–23
Respiratory Symptoms (average rate per 1,000 per month)	**15**	12	8.2–15.3
COVID-19 (%)	5.6	5.9	5.3-6.6

◆ ◆ ◆

ADDITIONAL INFORMATION

In this analysis, acute respiratory infections, respiratory symptoms, obesity, and lifetime BH disorders were found to affect Airmen at higher than average rates. Airmen should continue to take preventive measures to protect against respiratory infections. Future efforts to address obesity and efforts to better understand the interplay of obesity with other comorbidities also have the potential to improve the readiness of Airmen.

DEMOGRAPHICS
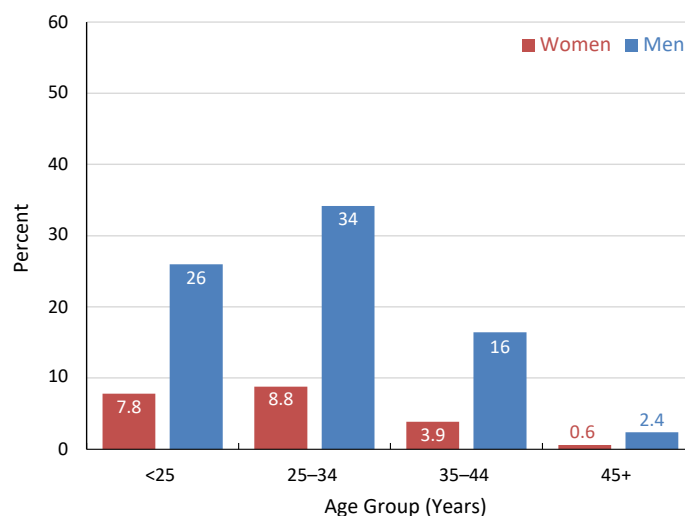
[a] Number of AC Service members, June 2020; see Appendix for details.
[b] See Appendix for details regarding measure computations.
[c] Values ≥ 10 are rounded to the nearest integer. Bold values represent Service values above the DoD average.

▶ **Marine Corps**

Service Profile (2020):[a]

Population: Approximately 183,000 Marine Corps Service members
88% under 35 years old, 9.0% female

HEALTH INDEX MEASURES[b]

MEASURE	MARINE CORPS VALUE[c]	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	**222**	211	147–269
Cumulative Traumatic Injury (rate per 1,000)	885	948	599–1,257
TBI (%)	**1.5**	1.3	0.7-2.0
Noise-induced Hearing Injury (%)	**5.2**	4.1	2.7-5.2
Heat Illness (%)	**0.35**	0.16	0.04–0.35
Behavioral Health 1-Year (%)	7.3	8.7	7.3–10.2
Behavioral Health Lifetime (%)	11	18	11–21
STIs (rate per 1,000)	**26**	25	19–30
Sleep Disorders (%)	6.9	12	6.9–15.8
Obesity (%)	9.8	19	9.8–24.8
Acute Respiratory Illness (average rate per 1,000 per month)	**21**	20	18–23
Respiratory Symptoms (average rate per 1,000 per month)	8.4	12	8.2–15.3
COVID-19 (%)	5.3	5.9	5.3-6.6

◆ ◆ ◆

ADDITIONAL INFORMATION

Marines had relatively low rates of BH diagnoses, sleep disorders, and obesity compared to the other Services. However, heat illnesses, TBI, and noise-induced hearing injuries emerged as important areas of focus for prevention efforts. Attention to reducing these injuries as well as acute injuries in the field and in recruit training has the potential to improve health and readiness of Marines.

DEMOGRAPHICS
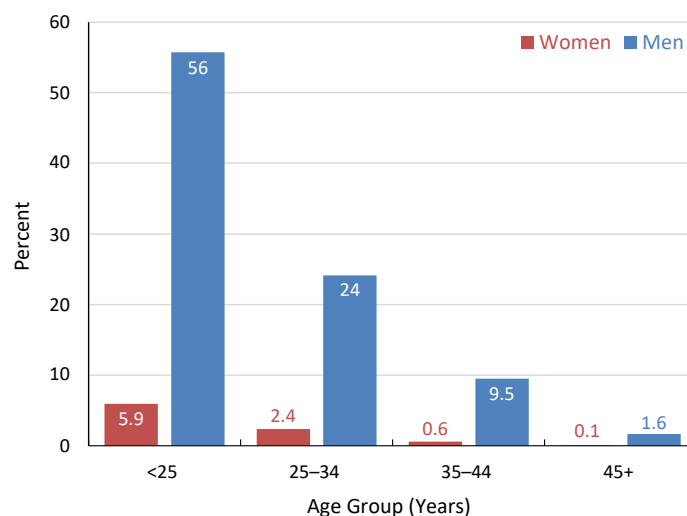
[a] Number of AC Service members, June 2020; see Appendix for details.
[b] See Appendix for details regarding measure computations.
[c] Values ≥ 10 are rounded to the nearest integer. Bold values represent Service values above the DoD average.

METHODS

Acute and Cumulative Traumatic Injury

Data were derived from records routinely maintained in the Defense Medical Surveillance System (DMSS). These records document ambulatory encounters and hospitalizations of AC Service members in fixed military and civilian (if reimbursed through the MHS) treatment facilities worldwide. Acute and cumulative traumatic injuries were identified using ICD-10-CM diagnosis codes from the U.S. Army Public Health Center's (APHC) 2021 Injury Taxonomy.[3] Service members were identified as having an injury if they had a qualifying injury diagnosis in any position of an inpatient or outpatient medical encounter. A 60-day gap rule was used to identify incident injuries. To be counted as a new case, at least 60 days must have passed since the last qualifying injury for the same nature of injury and body region affected, as defined by the injury taxonomy. Encounters with a documented "war"- or "battle"-related cause of injury were excluded from the analysis. Causes of injuries were assessed based on North Atlantic Treaty Organization Standard Agreement (STANAG) 2050 and ICD-10-CM "external cause of injury" codes. The denominator was all AC Service members during June of the year of interest.

Among those who were identified as an incident acute or cumulative traumatic injury case in 2020, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for an acute or cumulative traumatic injury if they had an inpatient encounter in 2020 with an injury diagnosis in the primary diagnostic position. Bed days were calculated among all inpatient encounters with an injury diagnosis in the primary diagnostic position in 2020. In addition, for all incident injuries, the frequency and percentage of the nature of injury and body region affected were described.

Limitations:

1. The transition from International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to ICD-10-CM in October 2015 presented a significant artifact for acute injury surveillance. ICD-10-CM has more than 15 times the number of acute injury codes than ICD-9-CM, and they are far more specific. It is not possible to directly compare rates of highly specific acute injuries captured in ICD-10-CM to the non-specific injuries captured in ICD-9-CM. For this reason, rates of acute injuries captured under ICD-9-CM were not reported here.

2. This report is meant to describe nondeployment-related injuries; however, some deployment-related injuries may have been captured if the war- or battle-related cause of injury was not documented.

3. Diagnosing an acute injury is subjective and provider-dependent. Incident and subsequent diagnoses rendered by different providers introduces error that can result in both undercounting and overcounting of injuries.

4. It is not always possible to differentiate incident injuries from reinjuries using surveillance data. The 60-day gap rule is sufficient for the vast majority of injuries, which are generally not severe, but may lead to overcounting of severe injuries if the subsequent encounters are erroneously coded as incident injuries.

Noise-Induced Hearing Injury

Data were derived from records routinely maintained in the DMSS. A case of noise-induced hearing injury was defined as having an inpatient, outpatient, or Theater Medical Data Store (TMDS) medical encounter with a diagnosis for sensorineural hearing loss (ICD-9: 389.10, 389.11, 389.15-389.18; ICD-10: H90.3, H90.41, H90.42, H90.5), noise-induced hearing loss (ICD-9: 388.10-388.12; ICD-10: H83.3*, S09.31*), tinnitus (ICD-9: 388.3, 388.30-388.32; ICD-10: H93.1*), or significant threshold shift (ICD-9: 794.15, ICD-10: R94.120) in any diagnostic position.[39] A Service member could be counted as a case of noise-induced hearing injury once per calendar year for each of the specific types of injury, and could be counted as a case of noise-induced hearing injury (any type) once per year. The denominator was all AC Service members during June of the year of interest.

> **Limitations:**
>
> 1. Data from audiometric testing were not included.
>
> 2. Hearing injuries associated with blasts or head injuries, such as ear drum perforation, were not included.

TBI

Data were derived from records routinely maintained in the DMSS. A case of TBI was defined as having an inpatient, outpatient, or TMDS medical encounter with a diagnosis of TBI in any diagnostic position.[40] For the full list of ICD-9 and ICD-10 codes used in the analysis, please refer to the Armed Forces Health Surveillance Division (AFHSD) surveillance case definition.[40] Note that for this analysis, the "personal history of traumatic brain injury" codes were not included because the intent was to capture Service members who had an encounter for a prevalent TBI. However, the ICD-10 codes indicating "subsequent encounter" and "sequelae" for a TBI were included. A Service member could be counted as a case of TBI once per calendar year, with more severe cases being counted over more mild cases (i.e., penetrating cases were counted over severe cases, which were counted over moderate cases, and moderate cases were counted over mild cases). The denominator was all AC Service members during June of the year of interest.

Among those who were identified as a TBI case in 2020, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for a TBI if they had an inpatient encounter in 2020 with a TBI diagnosis in the primary diagnostic position. Bed days were calculated among inpatient encounters with a TBI diagnosis in the primary diagnostic position in 2020.

> **Limitations:**
>
> 1. Cases were identified using administrative records of medical care if reimbursed through the MHS. Records of care outside of this system would not be captured.
>
> 2. Ascertainment of the severity of the TBI relies on accurate coding and documentation by the medical provider.

Heat Illness

Data were derived from records routinely maintained in the DMSS. A case of heat illness was defined as having an inpatient or outpatient medical encounter with a diagnosis for heat stroke (ICD-9: 992.0; ICD-10: T67.0*) or heat exhaustion (ICD-9: 992.3–992.5; ICD-10: T67.3*–T67.5*) in the first or second diagnostic position or by having a reportable medical event report for heat illness. A service member could be counted as a case of heat illness once per calendar year. Heat stroke was prioritized over heat exhaustion if the individual had indication of both occurring in the same year. These methods are consistent with those applied in the annual *MSMR* reports on heat illness.[19] The denominator was all AC Service members during June of the year of interest.

Among those who were identified as a heat illness case in 2020, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for a heat illness if they had an inpatient encounter in 2020 with a heat illness diagnosis in the primary diagnostic position. Bed days were calculated among inpatient encounters with a heat illness diagnosis in the primary diagnostic position in 2020.

Limitations:

1. Similar heat-related clinical illnesses are likely managed and reported differently at different locations and in different clinical settings.

2. Heat illness during deployment was not ascertained.

3. Reporting guidelines for heat illnesses were modified in the 2017 and 2020 revisions of the Armed Forces guidelines. In these updated guidelines, the heat injury category was removed, leaving only case classifications for heat stroke and heat exhaustion. This may cause some variations in reporting.

BH Disorders

Data were derived from records routinely maintained in the DMSS. Health care encounters of deployed Service mem-bers are documented in records that are maintained in the Theater Medical Data Store (TMDS), which is included in the DMSS. It is important to note that because the TMDS has not fully transitioned to ICD-10-CM, ICD-9-CM codes appear in this analysis.

Service members were identified as having a BH disorder if they had at least two BH disorder diagnoses (ICD-9-CM: 290–319.; ICD-10-CM: F01-F99) within 365 days in any diagnostic position. However, diagnoses for postconcussion syndrome, intellectual disabilities, nicotine dependence, and pervasive and specific developmental disorders were excluded (ICD-9: 299.*, 305.1, 310.2, 315.*, 317.* –319.*; ICD-10-CM: F07.81, F70–F79, F17.*, F80.*–F82.*, F84.*, F88–F89).[23] Diagnoses could occur in inpatient, outpatient, or in-theater medical encounters. At least one of these diagnoses had to occur during of the year of interest. The denominator was all AC Service members during June of the year of interest.

For specific BH conditions (adjustment disorders, alcohol-related disorders, anxiety disorders, bipolar disorder, depres-sive disorders, psychoses, PTSD, and substance-related disorders), ICD-9-CM and ICD-10-CM codes from the AFHSD surveillance case definitions were used.[22] A Service member was considered to have a specific BH condition if they had two diagnoses for the same condition within 365 days of each other. At least one of these diagnoses had to occur during of the year of interest. The denominator was all AC Service members during June of the year of interest.

History ("lifetime" prevalence) of a BH disorder was also measured. Service members were considered to have a his-tory of BH disorder if they had two BH disorder diagnoses within 365 days at any time between 2002 and 2020 and were in service during December 2020 (the last month of the surveillance period). The denominator was all AC Service members during December 2020.

Among those who were identified as a BH disorder case in 2020, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for a BH disorder if they had an inpatient encounter in 2020 with a BH disorder diagnosis in the primary diagnostic position. Bed days were calculated among inpatient encoun-ters with a BH disorder diagnosis in the primary diagnostic position in 2020.

Limitations:

1. Service members do not always seek or receive care for a BH condition within the MHS, and BH disor-ders may be underestimated here.

2. Some diagnoses may be miscoded or incorrectly transcribed on centrally transmitted records.

3. Some encounters (e.g., screening visits) may have been erroneously diagnosed or miscoded as BH disorders.

STIs

Diagnoses of STIs were ascertained from medical administrative data and reports of notifiable medical events routinely maintained in the DMSS for surveillance purposes. STI cases were also derived from positive laboratory test results recorded in the Health Level 7 (HL7) chemistry and microbiology databases maintained by the Navy and Marine Corps Public Health Center at the EpiData Center.

An incident case of chlamydia or trichomoniasis was defined by any of the following: 1) a case defining diagnosis of chlamydia (ICD-9: 099.41, 099.5*; ICD-10: A56.*) or trichomoniasis (ICD-9: 131.*; ICD-10: A59.*) in the first or second diagnostic position of a record of an outpatient or in-theater medical encounter, 2) a confirmed notifiable disease report (for chlamydia only), or 3) a positive laboratory test for chlamydia or trichomoniasis (any specimen source or test type). An incident case of gonorrhea was similarly defined by 1) a case-defining diagnosis (ICD-9: 098.*; ICD-10: A54.*) in the first or second diagnostic position of a record of an inpatient, outpatient, or in-theater encounter, 2) a confirmed notifiable disease report for gonorrhea, or 3) a positive laboratory test for gonorrhea (any specimen source or test type). For each type of STI, an individual could be counted as having a subsequent case only if there were more than 30 days between the dates on which the case-defining diagnoses were recorded. These case definitions were derived from those used in the *MSMR* annual STI report.[25]

The denominator was all AC Service members during June of the year of interest.

Limitations:

1. STI cases may not be captured if coded in the medical record using symptom codes (e.g., urethritis) rather than STI-specific codes.

2. Cases may be underestimated because some affected Service members may be diagnosed and treated through nonreimbursed, non-military care providers (e.g., county health departments or family planning centers). In addition, laboratory tests that are performed in a purchased care setting, a shipboard facility, a battalion aid station, or an in-theater facility are not captured.

3. Differences in rates between Services may be at least partially due to different practices regarding screening, testing, treatment, and reporting.

Sleep Disorders

Data were derived from records routinely maintained in the DMSS; TMDS data were included. Service members were identified as having a sleep disorder if they had a qualifying diagnosis **(Table 1)** in any diagnostic position during the year of interest. It is important to note that because the TMDS has not fully transitioned to ICD-10-CM, ICD-9-CM codes appear in this analysis. The denominator was all AC Service members during June of the year of interest.

> **Limitations:**
>
> 1. Service members do not always seek care for sleep disorders, and sleep disorders may be underrepresented here.
>
> 2. Increased screening associated with required medical encounters such as retirement and separation physicals may result in an increased frequency of diagnoses of sleep disorders.

Table 1. ICD-9-CM/ICD-10-CM codes used to identify sleep disorders.

	ICD-9-CM	ICD-10-CM
Any sleep disorder	780.5*, 327.00–327.02, 327.09, 327.10–327.15, 327.19, 327.2*,327.3*, 327.4*, 327.5*, 327.8, 347.*, 307.4*	G47*, F51*
Insomnia	780.52, 327.00, 327.01, 327.09	G47.0*
Hypersomnia	327.10–327.14, 327.19, 780.54	G47.1*
Circadian rhythm sleep disorders	327.30–327.37, 327.39, 780.55	G47.2*
Sleep apnea	327.20–327.27, 327.29, 780.51, 780.53, 780.57	G47.3*
Narcolepsy	347.00, 347.01, 347.10, 347.11	G47.4*
Parasomnia	327.40–327.44, 327.49	G47.5*
Sleep-related movement disorders	327.51–327.53, 327.59	G47.6*

*Represents any subsequent digit/character.

Obesity

The CDR vital sign table and Genesis vitals table within the MDR were used to identify all records for AC Service members with a height and weight measurement available on the same day. Female Service members with an ICD-9-CM or ICD-10-CM code for pregnancy during any inpatient or outpatient encounter in the same year were excluded. Height and weight data were then matched to the AFHSD DMSS to identify the date of birth, sex, and Service for all records. If the Service member could not be identified in the DMSS or any demographic information was missing from the DMSS, then the height and weight record was excluded. Only the latest height and weight record for each Service member per year was retained. BMI was then calculated from height and weight. Records with BMI measurements less than 12 and greater than 45 and records with erroneous heights or weights (e.g., a weight of 8 pounds) were excluded from the analysis. Cases of obesity were assigned using BMI greater than or equal to 30, according to the CDC definition of obesity.[30]

The CDR and Genesis vitals data were used to assess BMI because not all Services had complete height and weight records available from Service members' Physical Fitness Tests (PFTs). BMIs calculated from CDR data were reviewed by APHC and U.S. Air Force School of Aerospace Medicine (USAFSAM) in a previous analysis and found to be comparable to BMIs from PFTs. This method of estimating obesity is similar to the Defense Health Agency's Better Health Prevalence Measure of overweight and obesity.[41]

Limitations:

1. Service members with higher lean body mass may be misclassified as obese based on their BMI.

2. Not all Service members had a height or weight measurement available in the CDR Vital sign data each year.

3. BMI measures should be interpreted with caution, as some of them can be based on self-reported height and weight.

Respiratory Conditions

Data were derived from records routinely maintained in the DMSS. Service members were identified as having an acute respiratory infection if they had an inpatient, outpatient, or TMDS encounter with a qualifying diagnosis **(Table 2)** in the first diagnostic position. For cases of respiratory symptoms, an individual was required to have an inpatient, outpatient, or TMDS encounter with a qualifying diagnosis **(Table 3)** in any diagnostic position. For both acute respiratory infections and respiratory symptoms, at least 14 days had to have passed between encounters to count as a new case. The denominator was AC Service members in service during the month and year of interest. To calculate rates among recruits, the denominator was the number of people with a recruit training period overlapping with the month and year of interest. To qualify as a case for a recruit, the qualifying encounter also needed to have occurred within the recruit basic training period.

Among those who were identified with an acute respiratory infection in 2020, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for an acute respiratory infection if they had an inpatient encounter in 2020 with an acute respiratory infection in the primary diagnostic position. Bed days were calculated among inpatient encounters with an acute respiratory infection diagnosis in the primary diagnostic position in 2020.

Limitations:

1. Laboratory confirmation of cases was not ascertained.

2. Rates could be overestimated if miscoded as screening encounters.

3. Rates could be underestimated because of service members not seeking care for mild illness.

Table 2. ICD-9-CM/ICD-10-CM codes used to identify acute respiratory infections.

	ICD-9-CM	ICD-10-CM
Nasopharyngitis	460*	J00*
Sinusitis	461*	J01*
Acute pharyngitis	462*	J02*
Acute laryngitis and tracheitis	464.0, 464.10, 464.20, 464.30, 464.50	J04*
Acute obstructive laryngitis and epiglottitis	464.01, 464.11, 464.21, 464.31, 464.4, 464.51	J05*
Acute upper respiratory infections of unspecified site	465*	J06*
Influenza due to certain identified flu viruses	488*	J09*
Influenza due to other identified flu virus	487*	J10*
Influenza due to unidentified flu virus	NA	J11*
Viral pneumonia not elsewhere classified	480*	J12*
Pneumonia due to Streptococcus pneumoniae	481*	J13*
Pneumonia due to Haemophilus influenzae	482.2	J14*
Bacterial pneumonia not elsewhere classified	482*	J15*
Pneumonia due to other infectious organisms	484*, 483.0, 483.1, 483.8	J16*
Pneumonia in diseases classified elsewhere	517.1, 484.8, 484.7, 115.95, 115.15, 073.0	J17*
Pneumonia unspecified organism	486, 485	J18*
Acute bronchitis	466	J20*
Acute bronchiolitis	466.1*	J21*
Unspecified acute lower respiratory tract infection	519.8	J22*
Acute tonsillitis	463, 034.0	J03*
Peritonsillar abscess	475	J36
Retropharyngeal and parapharyngeal abscess	478.22, 478.24	J39.0
Other abscess of pharynx	478.21	J39.1
Diphtheria	032.0, 032.1, 032.3, 032.9	A36.0, A36.1, A36.2, A36.9
Scarlet fever	34.1	A38*
Whooping cough	033.0, 033.9, 033.8	A37*
Adenovirus	NA	B34.0
Measles	055.0, 055.1, 055.2, 055.8, 055.9	B05*
Rubella	056.00, 056.01, 056.09, 056.79, 056.9	B06*
Streptococcus group A	41.01	B95.0
Streptococcus pneumoniaeas the cause of disease classified elsewhere	41.09	B95.3
Mycoplasma pneumoniae	41.81	B96.0
Klebsiella pneumoniae	41.3	B96.1
Haemophilus influenzae	41.5	B96.3
Adenovirus	79	B97.0
Coronavirus	NA	B97.2*, B34.2, U07.1
Respiratory syncytial virus (RSV)	79.6	B97.4
Otitis media	381.0*, 382.00, 382.01	H65.0*, H65.1*, H66.00*. H66.01*

*Represents any subsequent digit/character.
NA, not applicable.

Table 3. ICD-9-CM/ICD-10-CM codes used to identify respiratory symptoms.

	ICD-9-CM	ICD-10-CM
Cough	786.2	R05
Dyspnea	786.02, 786.05, 786.09	R06.0*
Wheezing	786.07	R06.2
Sneezing	NA	R06.7
Sore throat	784.1	R07.0
Pleurodynia	786.52	R07.81
Pleurisy	511.*	R09.1
Abnormal sputum	786.4	R09.3
Nasal congestion	NA	R09.81
Postnasal drip	784.91	R09.82
Fever	780.60	R50.9

*Represents any subsequent digit/character
NA, not applicable.

COVID-19

Cases of COVID-19 were identified using the AFHSD surveillance case list of MHS beneficiaries with COVID-19. This list is updated daily and comprises Composite Health Care System (CHCS) Health Level 7 (HL7)-formatted and MHS Genesis laboratory positive antigen and PCR positive test results extracted by the Navy and Marine Corps Public Health Center EpiData Center, as well as medical event reports of laboratory confirmed and probable COVID-19 infections reported to the Disease Reporting System Internet (DRSi), and validated by the U.S. Army Public Health Center and the U.S. Air Force School of Aerospace Medicine. The COVID-19 incident date is defined as the date of onset reported in DRSi, or the earliest positive PCR or antigen test specimen collection date. For this analysis, cases were included if they occurred within 90 days of an active component Service member demographic record maintained in the DMSS. The denominator was AC Service members in service during June of 2020. To calculate rates among recruits, the denominator was the number of people with a recruit training period overlapping with 2020. To qualify as a case for a recruit, the COVID-19 incident date needed to have occurred within the recruit basic training period.

Among those who were identified as a case of COVID-19, hospitalization status and total number of hospital bed days were determined. An individual was counted as being hospitalized for COVID-19 if they had an inpatient encounter in 2020 with a diagnosis of COVID-19 (ICD-10: U07.1) in the primary diagnostic position. Bed days were calculated among inpatient encounters with a COVID-19 diagnosis in the primary diagnostic position in 2020.

Limitations:

1. Services members tested for COVID-19 outside of the MHS system were not captured and the number of infections was likely underestimated in this report.

2. Hospitalizations for COVID-19 were likely underestimated in this report because the ICD-10 code for COVID-19 (ICD-10: U07.1) was not in use until several weeks after the beginning of the COVID-19 pandemic.

References

1. Lee CH, Yoon HJ. Medical big data: promise and challenges. *Kidney Res Clin Pract*. 2017;36(1):3–11.

2. Kruse CS, Goswamy R, Raval Y, Marawi S. Challenges and opportunities of big data in health care: a systematic review. *JMIR Med Inform*. 2016 Nov 21;4(4):e38.

3. U.S. Army Public Health Center. Fiscal Year (FY) 2021 UPDATE: A Taxonomy of Injuries for Public Health Monitoring and Reporting. Public Health Information Paper (PHIP) No.12-01-0717.

4. Molloy JM, Pendegrass TL, Lee IE, Hauret KG, Rhon DI. Musculoskeletal Injuries and United States Army Readiness Part I: Overview of Injuries and their Strategic Impact. *Mil Med*. 2020;185(9-10):e1461–e1471.

5. Armed Forces Health Surveillance Division. Absolute and relative morbidity burdens attributable to various illnesses and injuries, active component, U.S. Armed Forces, 2020. *MSMR*. 2021;28(5):2–9.

6. Army Public Health Center. Active Living. Physical Training Injury Prevention. Accessed 21 May 2021. https://phc.amedd.army.mil/topics/healthyliving/al/Pages/InjuryPrevention.aspx

7. Navy Marine Corps Public Health Center. Injury prevention. Accessed 21 May 2021. https://www.med.navy.mil/Navy-Marine-Corps-Public-Health-Center/Population-Health/Health-Promotion-and-Wellness/Wounded-Ill-and-Injured/Injury-Prevention/

8. Jones BH, Hauschild VD, Canam-Chervak M. Musculoskeletal training injury prevention in the U.S. Army: Evolution of the science and the public health approach. 2018. *J Sci Med Sport*. 21(11):1139–1146.

9. Menon DK, Schwab K, Wright DW, Maas AI. Position statement: definition of traumatic brain injury. *Arch Phys Med Rehabil*. 2010;91(11):1637–1640.

10. Helmick KM, Spells CA, Malik SZ, Davies CA, Marion DW, Hinds SR. Traumatic brain injury in the US military: epidemiology and key clinical and research programs. *Brain Imaging Behav*. 2015;9(3):358–366.

11. Williams VF, Stahlman S, Hunt DJ, O'Donnell FL. Diagnoses of traumatic brain injury not clearly associated with deployment, active component, U.S. Armed Forces, 2001-2016. *MSMR*. 2017;24(3):2–8.

12. U.S. Department of Health and Human Services, National Institutes of Health, National Institute on Deafness and Other Communication Disorders. (2014). Noise-Induced Hearing Loss (NIH Publication No. 14-4234). Bethesda, MD: U.S. Government Printing Office.

13. Helfer TM, Canham-Chervak M, Canada S, Mitchener TA. Epidemiology of Hearing Impairment and Noise-Induced Hearing Injury Among U.S. Military Personnel, 2003–2005. *Am J Prev Med*. 2010;38(1 Suppl):S71–7.

14. Alamgir H, Turner CA, Wong NJ, et al. The impact of hearing impairment and noise-induced hearing injury on quality of life in the active-duty military population: challenges to the study of this issue. *Mil Med Res*. 2016;12;3:11.

15. Veterans Benefits Administration. VBA Annual Benefits Report Fiscal Year 2020. Accessed 21 May 2021. https://www.benefits.va.gov/REPORTS/abr/docs/2020_compensation.pdf

16. Helfer TM. Noise-induced hearing injuries, active component, U.S. Armed Forces, 2007-2010. *MSMR*. 2011;18(6):7-10.

17. Yankaskas K. Prelude: noise-induced tinnitus and hearing loss in the military. *Hear Res*. 2013;295:3–8.

18. Yong JS, Wang D. Impact of noise on hearing in the military. *Mil Med Res*. 2015;25;2:6.

19. Armed Forces Health Surveillance Branch. Update: Heat illness, active component, U.S. Armed Forces, 2020. *MSMR*. 2021;28(4):10–15.

20. Armed Forces Health Surveillance Branch. Ambulatory visits, active component, U.S. Armed Forces, 2020. *MSMR*. 2021;28(5):18–25.

21. Armed Forces Health Surveillance Division. Hospitalizations, active component, U.S. Armed Forces, 2020. *MSMR*. 2021;28(5):10-17.

22. Armed Forces Health Surveillance Branch. Surveillance case definitions. https://www.health.mil/Military-Health-Topics/Combat-Support/Armed-Forces-Health-Surveillance-Division/Epidemiology-and-Analysis/Surveillance-Case-Definitions. Accessed 15 July 2020.

23. Stahlman S, Oetting AA. Mental health disorders and mental health problems, active component, U.S. Armed Forces, 2007-2016. *MSMR*. 2018;25(3):2–11.

24. U.S. Department of Health and Human Services. MentalHealth.gov. Let's talk about it. Accessed 21 May 2021. https://www.mentalhealth.gov/get-help/veterans

25. Armed Forces Health Surveillance Division. Update: Sexually transmitted infections, active component, U.S. Armed Forces, 2012–2020. MSMR. 2021;28(3)13–22.

26. Watson NF, Badr MS, Belenky G, et al. Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. *J Clin Sleep Med*. 2015;38(6):843–844.

27. Centers for Disease Control and Prevention. Sleep and sleep disorders. Sleep and chronic disease. https://www.cdc.gov/sleep/about_sleep/chronic_disease.html. Accessed 21 May 2021.

28. Uptegraft CC, Stahlman S. Variations in the incidence and burden of illnesses and injuries among non-retiree service members in the earliest, middle, and last 6 months of their careers, active component, U.S. Armed Forces, 2000–2015. *MSMR*. 2018;25(6):10–17.

29. Shiozawa B, Madsen C, Banaag A, Patel A, Koehlmoos T. Body mass index effect on health service utilization among active duty male United States Army soldiers. *Mil Med*. 2019;184(9–10):447–453.

30. Centers for Disease Control and Prevention. Overweight and obesity. Defining adult overweight and obesity. https://www.cdc.gov/obesity/adult/defining.html. Accessed 20 July 2020.

31. Armed Forces Health Surveillance Center. Diagnoses of overweight/obesity, active component, U.S. Armed Forces, 1998-2010. *MSMR*. 2011;18(1):7–11.

32. Clark LC, Taubman SB. Update: Diagnoses of overweight and obesity, active component, U.S. Armed Forces, 2011–2015. *MSMR*. 2016;23(9):9–13.

33. Defense Health Board. Implications of Trends in Obesity and Overweight for the Department of Defense. "Fit to fight, fit for life." 22 November 2013.

34. Office of the Secretary of Defense. Memorandum for Senior Pentagon Leadership, Commanders of the Combatant Commands, Defense Agency and DOD Field Activity Directors. Guidance for Commanders' Risk-Based Responses and Implementation of the Health Protection Condition Framework During the Coronavirus Disease 2019 Pandemic. 29 April 2021.

35. Stidham RA, Stahlman S, Salzar TL. Cases of Coronavirus Disease 2019 and Comorbidities Among Military Health System Beneficiaries, 1 January 2020 through 30 September 2020. *MSMR*. 2020;27(12):2–8.

36. Centers for Disease Control and Prevention. COVID-19 (Coronavirus Disease). Frequently Asked Questions. Accessed 26 May 2021. https://www.cdc.gov/coronavirus/2019-ncov/faq.html

37. COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins. 2021. Accessed 26 May 2021. https://coronavirus.jhu.edu/map.html

38. Office of the Under Secretary of Defense, Personnel and Readiness. Force Health Protection Guidance (Supplement 14) – Department of Defense Guidance for Personnel Traveling During the Coronavirus Disease 2019 Pandemic. 29 December 2020

39. Armed Forces Health Surveillance Branch. Surveillance case definitions: Hearing Injuries; Noise-Induced. Accessed 26 May 2021. https://cms.health.mil/Reference-Center/Publications/2016/10/01/Hearing-Injuries-Noise-Induced

40. Armed Forces Health Surveillance Branch. Surveillance case definitions: Traumatic brain injury. Accessed 26 May 2021. https://cms.health.mil/Reference-Center/Publications/2015/12/01/Traumatic-Brain-Injury

41. Defense Health Agency. Methodology document. Technical specification. Better health: overweight and obesity—child/adolescent and adult. Falls Church, VA: Defense Health Agency; 2018.

HEALTH
OF
THE
FORCE
2020