
DoD
HEALTH
OF THE
FORCE
2018

INTRODUCTION

The Health of the DoD Force represents a coordinated effort by the Defense Health Agency, and the Army, Navy, and Air Force public health centers to provide a snapshot of 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 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 four subject areas: injury, behavioral health, sleep disorders, and obesity. Future reports will expand on the number of subject areas covered. The intent is to develop an annual report that provides 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 based on data from calendar year 2018. It is divided into two sections, Health Metrics and Service Profiles. The Health Metrics section provides health index measures for each of the four subject areas; the Service Profiles section compares measures across Services.

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

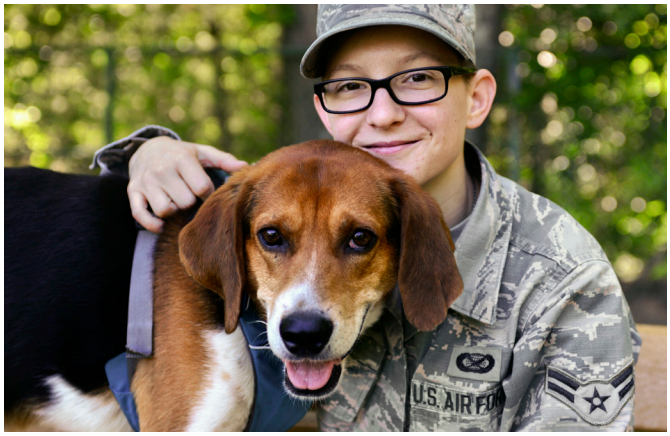
LIMITATIONS

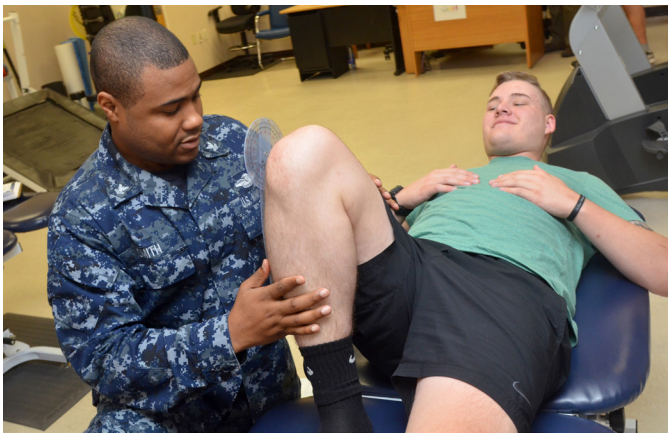
There are many challenges associated with processing and interpreting healthcare data.[1, 2] Variability in the collection, collation, and processing of data, differences in study design and analytic methods, and the inherent intricacies of defining and measuring health itself contribute to complexity 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, under-representation of conditions that do not come to the attention of the healthcare delivery system, miscoding) and failure to account for potentially important covariates such as age and sex when comparing Service populations.

This report is meant to evolve over time. In addition to adding subject areas, 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 improving this report is critical and welcomed.

HIGHLIGHTS

- There were 305 acute and 988 cumulative traumatic injuries per 1,000 Service members in 2018. Sprains and strains were the most common acute injury and the lower extremities were the most commonly affected body region. The rate of acute injuries decreased by 12.9% between 2016 and 2018 and the rate of cumulative traumatic injuries decreased 3.9% between 2016 and 2018.
- In 2018, 8.3% of Service members had a behavioral health disorder. The prevalence of behavioral health disorders remained stable between 2014 and 2018. Adjustment disorder was the most common behavioral health disorder among both male and female Service members.
- In 2018, 11.8% of Service members had a sleep disorder. The prevalence of sleep disorders remained stable between 2014 and 2018. 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 17.4% in 2018. The overall prevalence of obesity has increased steadily since 2014. Obesity rates were higher among males (18.4%) compared to females (12.6%), and in older compared to younger Service members.





Acute and Cumulative Traumatic Injury

Injuries consistently rank among the top healthcare burdens in the DoD. In this report, non-battle injury was evaluated using two broad categories: acute injury (which includes musculoskeletal and other types of injury) and cumulative traumatic injury (musculoskeletal injury resulting from repeated micro-trauma).

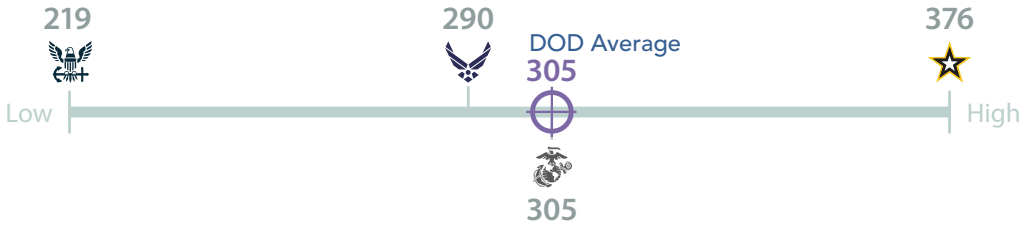
Acute injuries were identified in inpatient and outpatient medical records using the *International Classification of Diseases, Tenth Revision, Clinical Modification* (ICD-10-CM) injury codes ("S" and "T" codes) and further described utilizing the injury diagnosis matrix proposed by the National Center for Health Statistics (NCHS).[3] This matrix consists of rows composed of body regions and columns representing 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, burns, internal organ injury, or poisoning.

Cumulative traumatic musculoskeletal injuries were identified in inpatient and outpatient medical records using ICD-10-CM musculoskeletal condition ("M") codes. Cumulative traumatic injuries were also described by body region and nature-of-injury groups, i.e., inflammation and pain (overuse), joint derangement with and without neurological involvement, stress fracture, sprain/strain/rupture, and dislocation.[4]

In 2018 there were 395,127 acute and 1,280,028 cumulative traumatic injuries among active component (AC) Service members, with rates of 305 per 1,000 persons and 988 per 1,000 persons, respectively. Injury rates were higher in females as compared to males in all Services and in both injury categories. Acute injury rates were highest in the youngest age group for both males and females. 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.

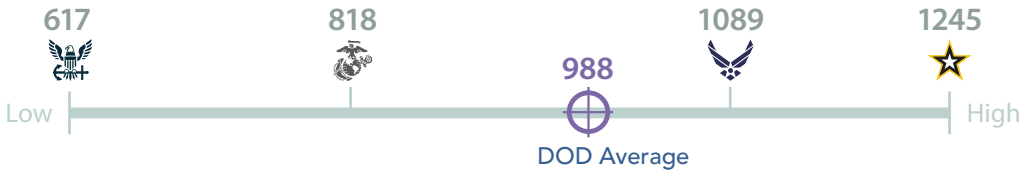
Among Service members who suffered **acute injuries,** the top five body regions and the top five nature-of-injury categories were similar for all Services and accounted for 89.3% and 80.1% of injuries, respectively. **The rate of acute injuries decreased by 12.9% between 2016 and 2018.**

Among Service members who suffered **cumulative traumatic injuries**, the most commonly injured body regions were the lumbar region (22.6%), knee and lower leg (22.1%), ankle and foot (15.2%), and shoulder (10.6%). Inflammation and pain was the most common nature-of-injury category accounting for 86.6% of all cumulative traumatic injuries. **The rate of cumulative traumatic injuries decreased 3.9% between 2016 and 2018.**



Overall, there were 305 acute injuries per 1,000 AC Service members in 2018.

Rates ranged from 219 to 376 per 1,000 AC Service members.



Overall, there were 988 cumulative traumatic injuries per 1,000 AC Service members in 2018.

Rates ranged from 617 to 1245 per 1,000 AC Service members.

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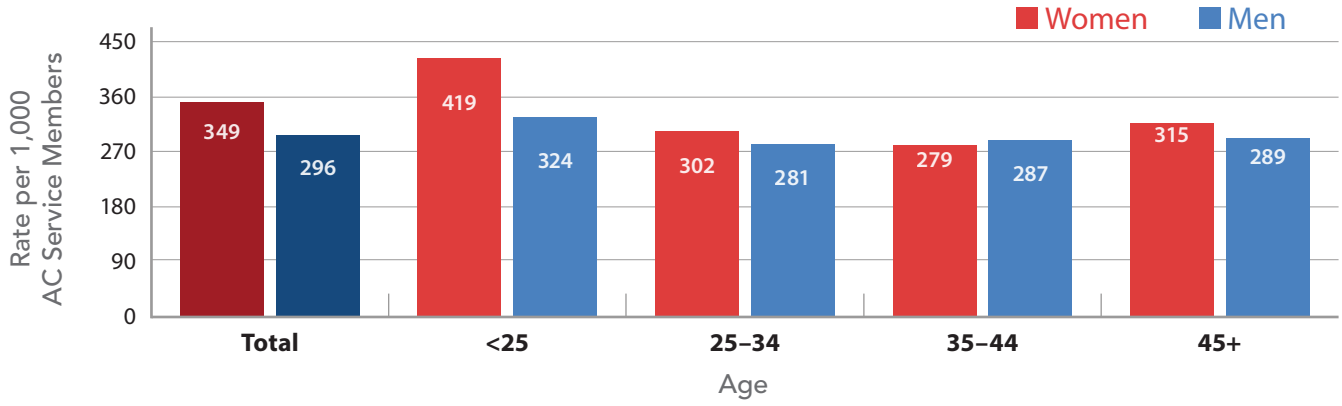
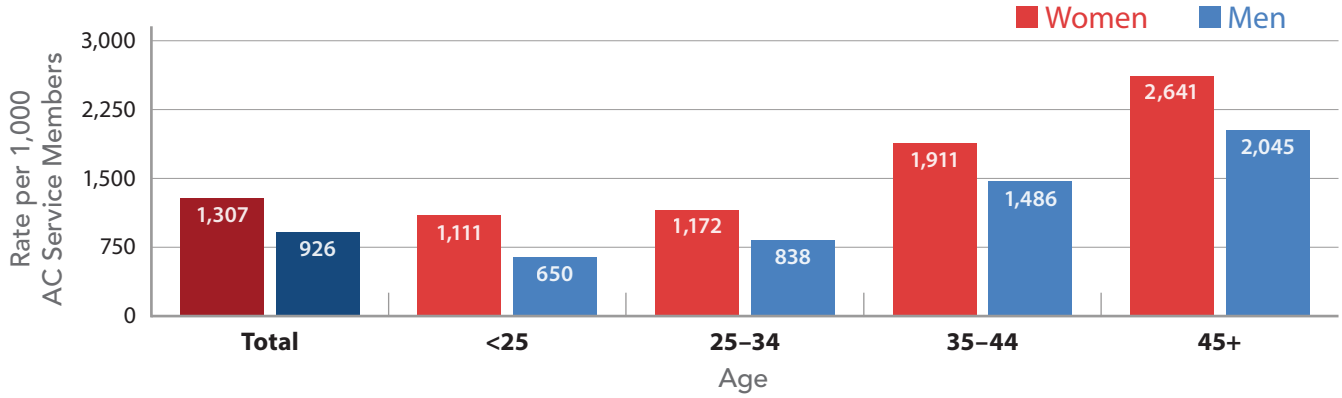
Incidence of Acute Injury by Sex and Age, AC Service Members, 2018

Overall, acute injury rates were higher for females (349 per 1,000) compared to males (296 per 1,000). Among both males and females, acute injury rates were highest in the youngest age group.



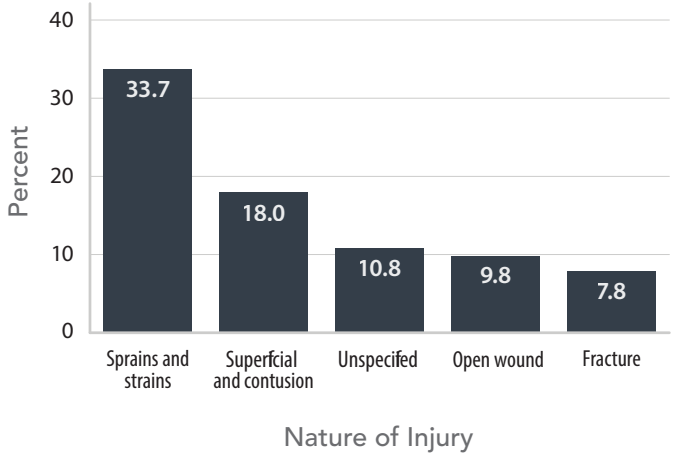
Incidence of Cumulative Traumatic Injury by Sex and Age, AC Service Members, 2018

Cumulative traumatic injury rates were higher for older compared to younger Service members and higher for females (1,307 per 1,000) compared to males (926 per 1,000).



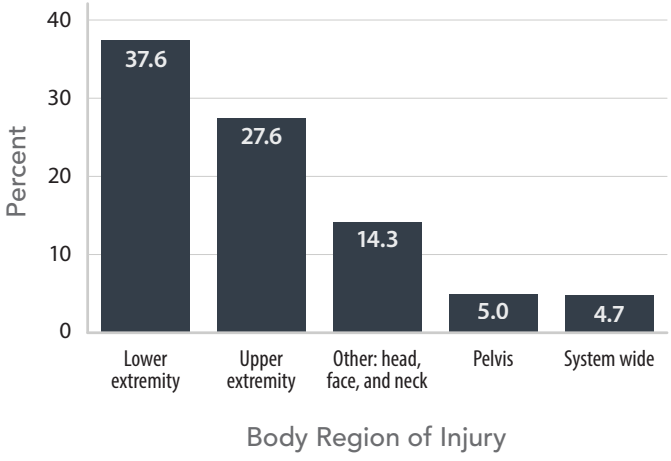
Nature of Acute Injury, Top 5 Categories, AC Service Members, 2018

Sprains and strains was the most common nature-of-injury category, accounting for 33.7% of all incident acute injuries.



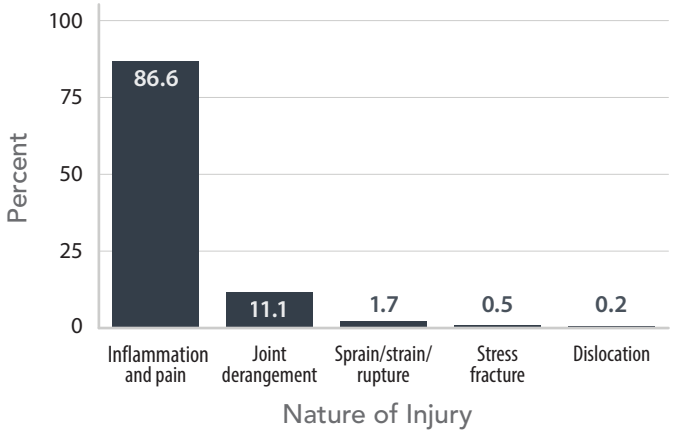
Body Region of Acute Injury, Top 5 Categories, AC Service Members, 2018

Lower extremity was the most common region affected by acute injury, accounting for 37.6% of all incident acute injuries.



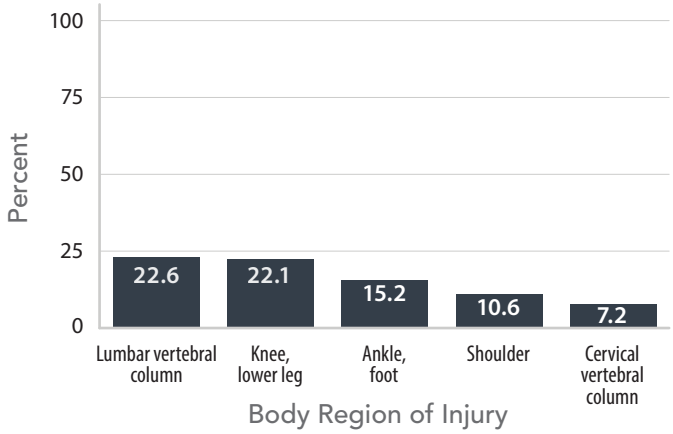
Nature of Cumulative Traumatic Injury, AC Service Members, 2018

Inflammation and pain was the most common nature-of-injury category, accounting for 86.6% of all incident cumulative traumatic injuries.



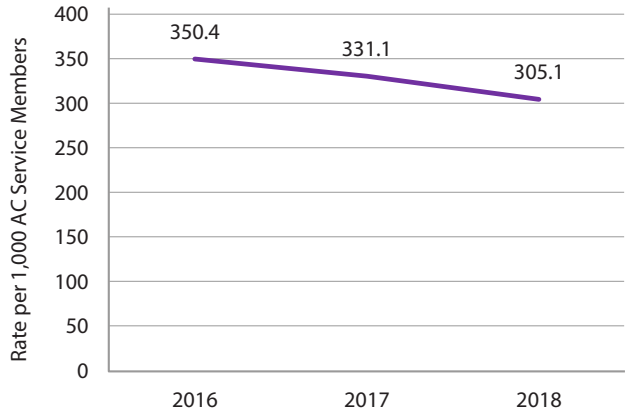
Body Region of Cumulative Traumatic Injury, Top 5 Categories, AC Service Members, 2018

Lumbar vertebral column (22.6%) and lower leg/knee (22.1%) were the most common regions affected by cumulative traumatic injury.



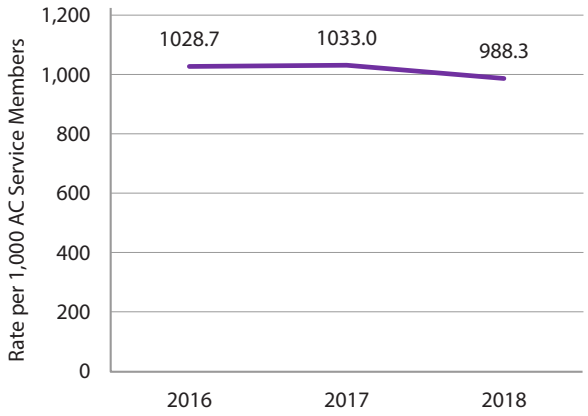
Incidence of Acute Injury, AC Service Members, 2016–2018

The rate of acute injuries decreased from 350.4 per 1,000 to 305.1 per 1,000 (12.9%) between 2016 and 2018.



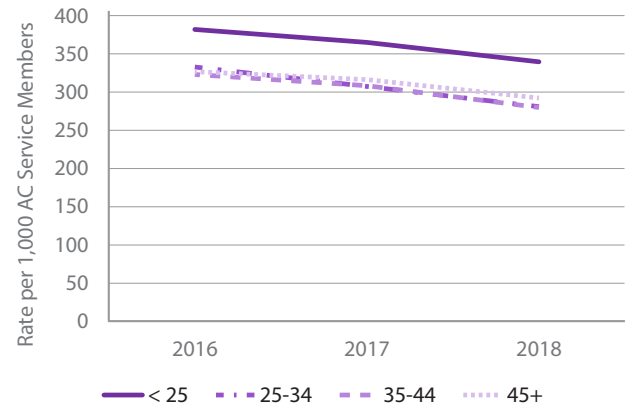
Incidence of Cumulative Traumatic Injury, AC Service Members, 2016–2018

The rate of cumulative traumatic injuries decreased from 1028.7 per 1,000 to 988.3 per 1,000 (9%) between 2016 and 2018.



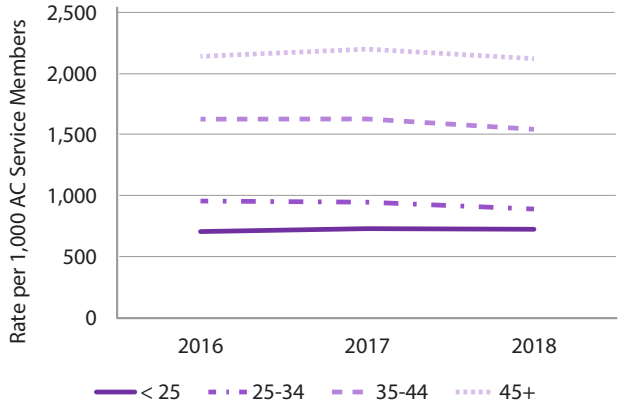
Incidence of Acute Injury by Age, AC Service Members, 2016–2018

The rate of acute injuries decreased among Service members in all age groups between 2016 and 2018.



Incidence of Cumulative Traumatic Injury by Age, AC Service Members, 2016–2018

The rate of cumulative traumatic injuries remained relatively stable among Service members in all age groups between 2016 and 2018, except for a slight increase among those in the youngest age group.



Behavioral Health

Like injury, behavioral health (BH) conditions are a leading cause of morbidity among Service members, accounting for 1.8 million (16.2%) outpatient encounters in 2018.[5]

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 period 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 the year of interest.[6]

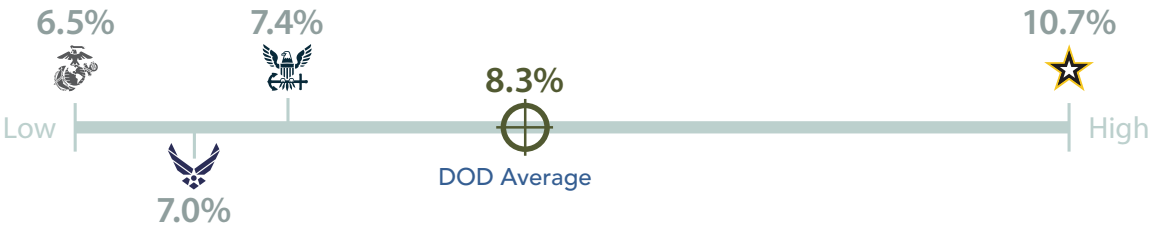
The prevalence of specific BH conditions (adjustment disorders, alcohol-related disorder, substance-related disorder, anxiety disorders, bipolar disorder, depressive disorder, psychoses, and post-traumatic stress disorder (PTSD)) during 2018 was also calculated. To be considered a case, two encounters for the same BH condition within a 365 day period were required.

To determine the proportion of 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 2018 were used for this analysis and were considered to have a lifetime history of a BH condition if they had two BH disorder diagnoses within 365 days at any time between 2002 and 2018.

Overall, 8.3% of AC Service members were diagnosed with a BH disorder in 2018. The annual prevalence of BH disorders remained relatively stable between 2014 and 2018, with a low of 8.0% in 2014 and a high of 8.8% in 2017. Women were more likely to be diagnosed with a BH disorder (12.8%) when compared to men (7.5%). Service members in the youngest age category (less than 25 years) had the highest prevalence of BH disorders among both males and females.

Among both males and females, adjustment disorder was the leading BH diagnosis in 2018 followed by anxiety disorder and depressive disorder.

Among AC Service members on active duty during December 2018, 25.2% of women and 16.2% of men (17.7% overall) had a history (lifetime prevalence) of a BH disorder. The lifetime prevalence of BH disorders ranged from 10.4% to 21.9% across the Services.



Overall, 8.3% of AC Service members had a BH disorder in 2018.

Rates ranged from 6.5% to 10.7% across Services.

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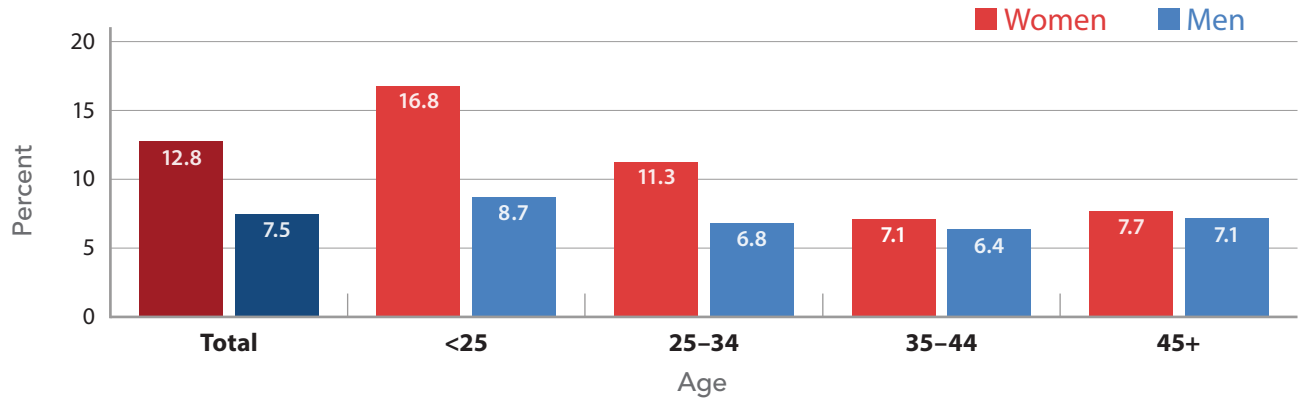
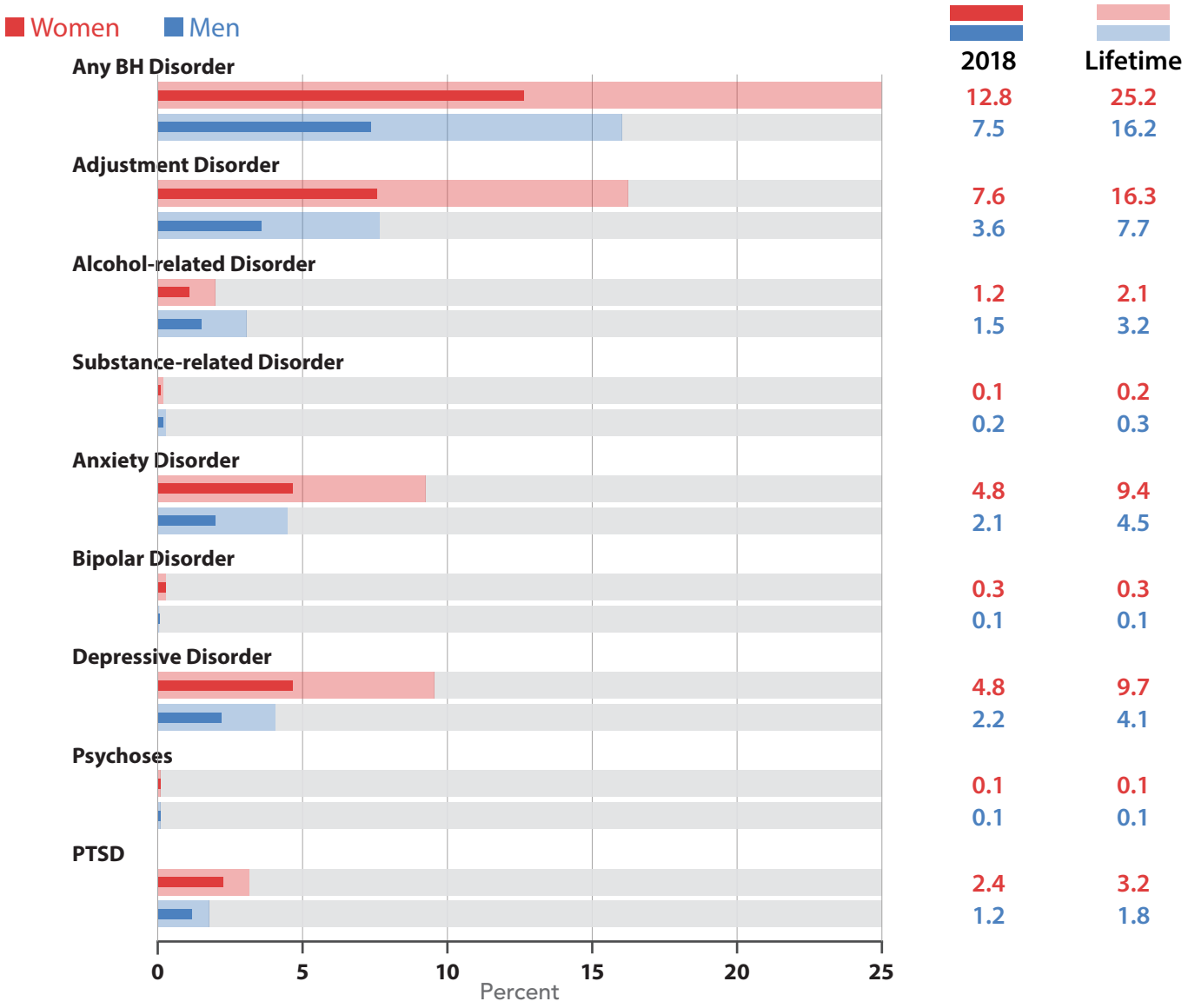
Prevalence of Behavioral Health Disorders by Sex and Age, AC Service Members, 2018

Females were more likely to be diagnosed with a behavioral health disorder compared to males, and those in the youngest age category were more likely to be diagnosed compared to older Service members.



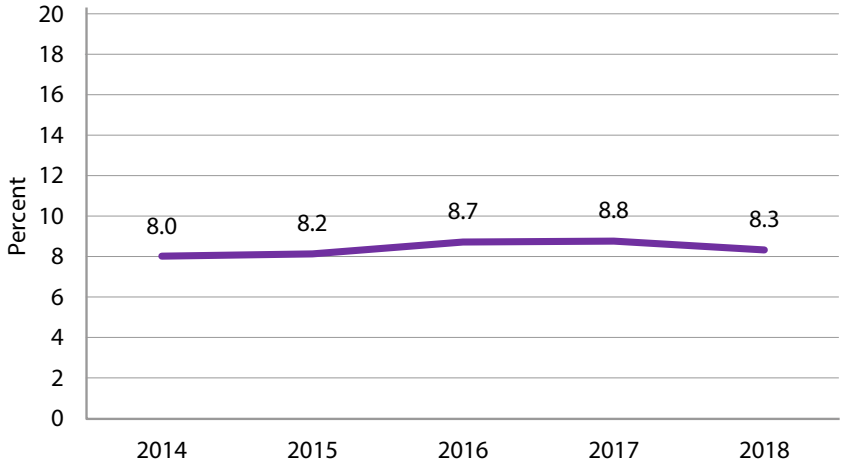
Annual and Lifetime Prevalence of Behavioral Health Disorders by Sex and Condition, 2018

Overall, 17.7% of Service members (25.2% of women and 16.2% of men) had received a diagnosis of a behavioral health disorder between 2002 and 2018. The percentage was higher for females compared to males for most behavioral health disorders.



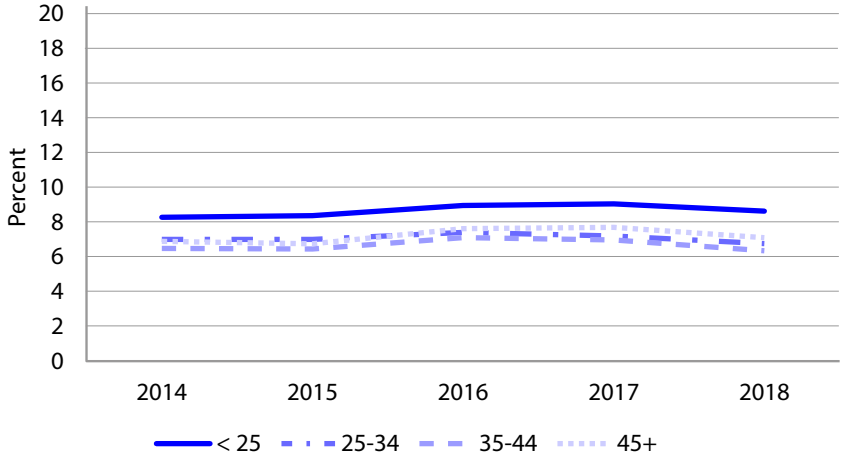
Prevalence of Behavioral Health Disorders by Year, AC Service Members, 2014–2018

The prevalence of behavioral health disorders remained relatively stable between 2014 and 2018, with fluctuation from a low of 8.0% in 2014 to a high of 8.8% in 2017.



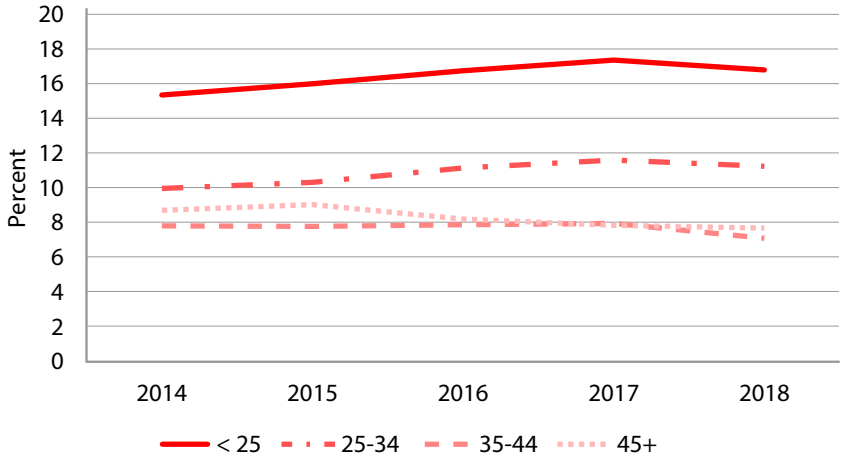
Prevalence of Behavioral Health Disorders by Age, Male AC Service Members, 2014–2018

The prevalence of behavioral health disorders remained relatively stable between 2014 and 2018 among males in all age groups.



Prevalence of Behavioral Health Disorders by Age, Female AC Service Members, 2014–2018

The prevalence of behavioral health disorders increased slightly between 2014 and 2017 among females <25 years and 25–34 years and remained relatively stable for females in other age groups.



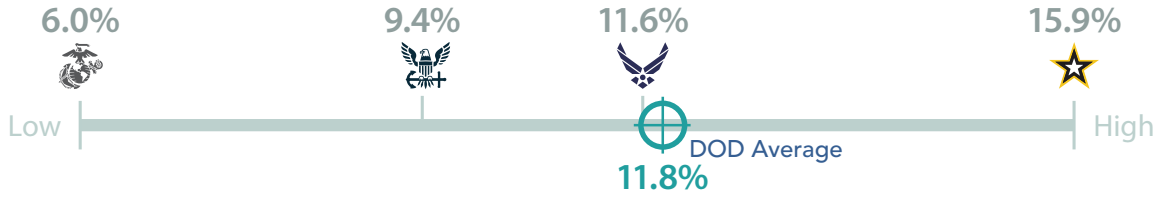
Sleep Disorders

The American Academy of Sleep Medicine recommends at least 7 hours of sleep per night for adults aged 18–60 years.[7] 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.[8]

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 2018 are reported here, along with the prevalence of the most commonly diagnosed sleep disorders.

In 2018, 11.8% of Service members were diagnosed with at least one sleep disorder. Proportions were similar for males and females (12.0% and 11.0%, respectively). **The most commonly diagnosed sleep disorders were sleep apnea and insomnia (6.5% and 4.6%, respectively).** Male Service members were far more likely to be diagnosed with sleep apnea than females (7.2% and 2.9%, respectively), while a greater percentage of female Service members were diagnosed with insomnia compared to males (6.4% and 4.3%, respectively).

The prevalence of sleep disorders remained relatively stable during the study period, with a slight decrease of 2.6% from 2014 to 2018. However, the prevalence of sleep disorders among male Service members in the 45 years and older age group increased from 39.0% in 2014 to 46.8% in 2018. 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 a Service member's career. These increases were independent of age and thought to be due in part to increased reporting during separation and retirement physicals.[9] The impact of career phase was not evaluated here and may be important to consider in the future.



Overall, 11.8% of AC Service members had a sleep disorder in 2018.

Rates ranged from 6.0% to 15.9% across Services.

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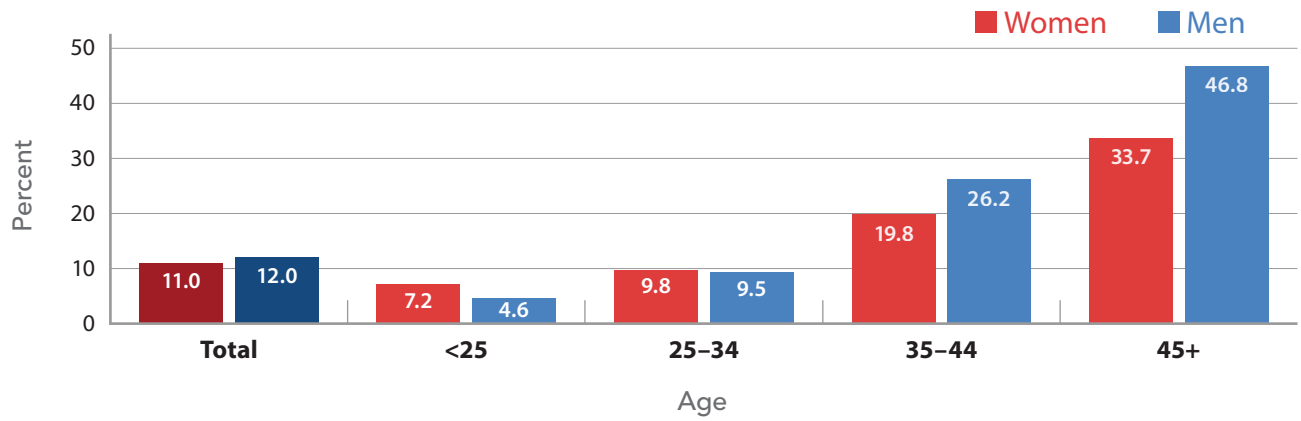
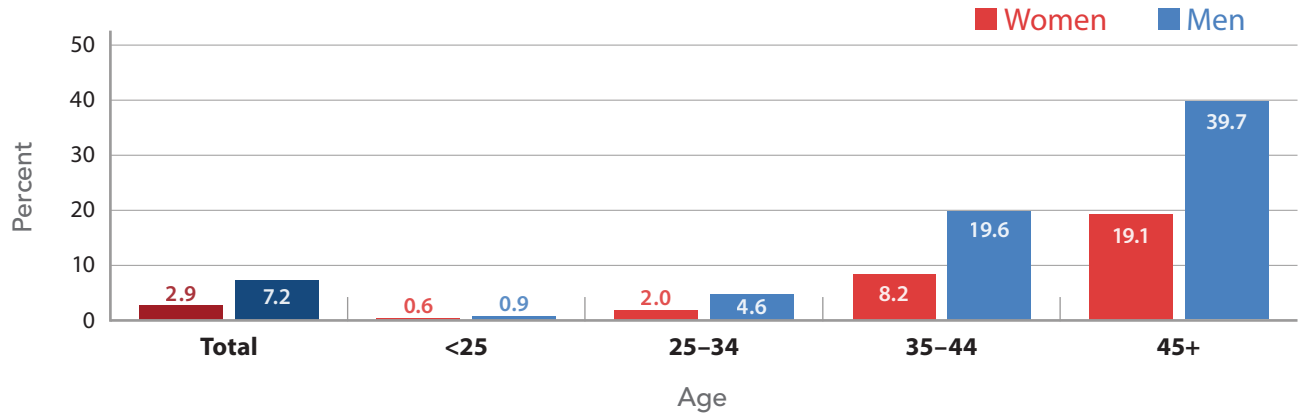
Prevalence of Sleep Disorders by Sex and Age, AC Service Members, 2018

The prevalence of sleep disorders was similar for males (12.0%) and females (11.0%) but increased with increasing age for both sexes.



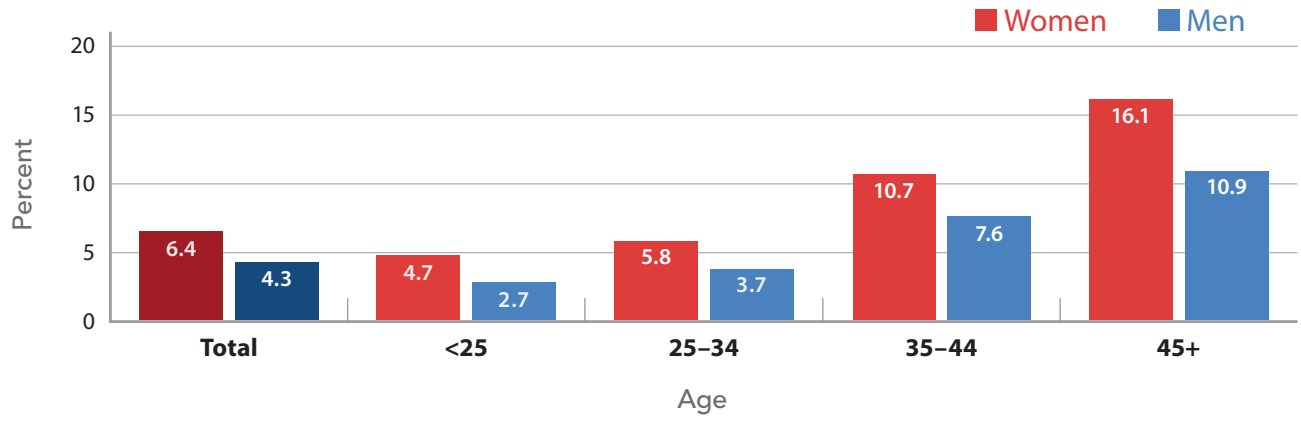
Prevalence of Sleep Apnea by Sex and Age, AC Service Members, 2018

The prevalence of sleep apnea was higher for males (7.2%) compared to females (2.9%), and prevalence increased with increasing age.



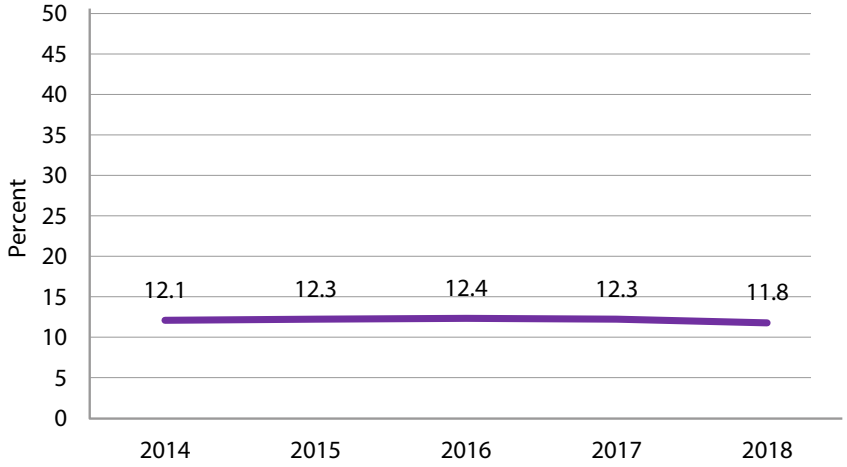
Prevalence of Insomnia by Sex and Age, AC Service Members, 2018

The prevalence of insomnia was higher for females (6.4%) compared to males (4.3%), and prevalence increased with increasing age.



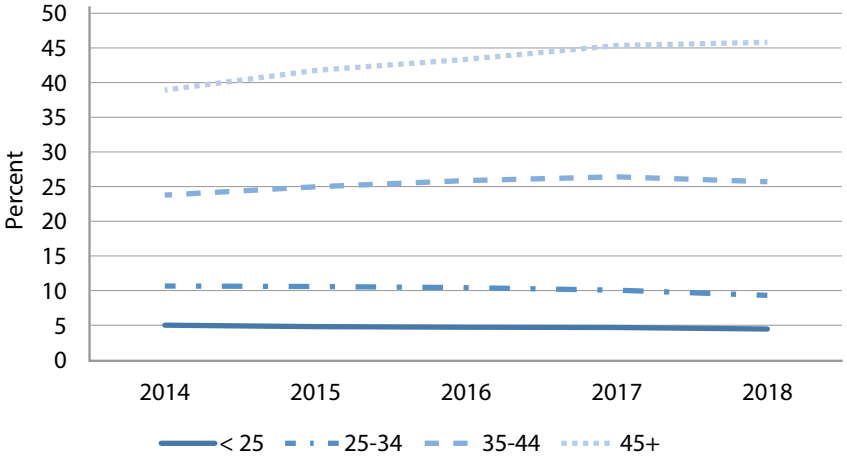
Prevalence of Sleep Disorders by Year, AC Service Members, 2014-2018

The prevalence of sleep disorders remained relatively stable between 2014 and 2018, with a slight decrease of 2.6% from 2014 to 2018.



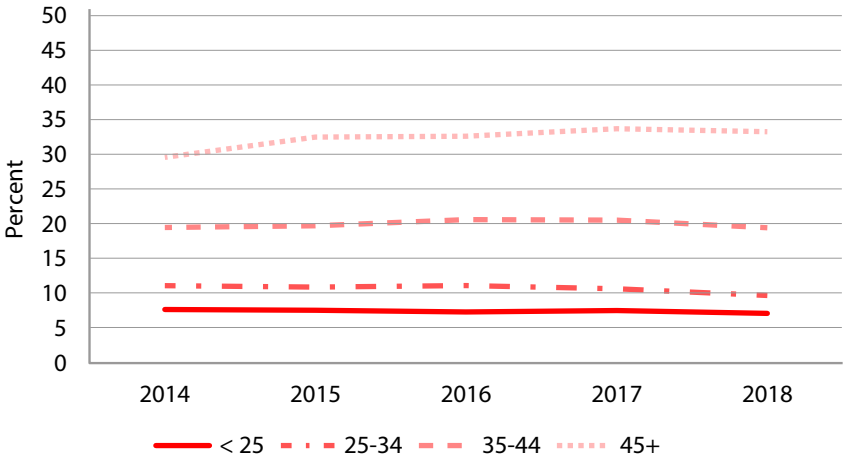
Prevalence of Sleep Disorders by Age, Male AC Service Members, 2014-2018

The prevalence of sleep disorders remained relatively stable among males ≤44 years between 2014 and 2018. The prevalence of sleep disorders among male Service members in the 45 years and older age group increased from 39.0% in 2014 to 46.8% in 2018.



Prevalence of Sleep Disorders by Age, Female AC Service Members, 2014-2018

The prevalence of sleep disorders remained relatively stable among females of all age groups between 2014 and 2018.

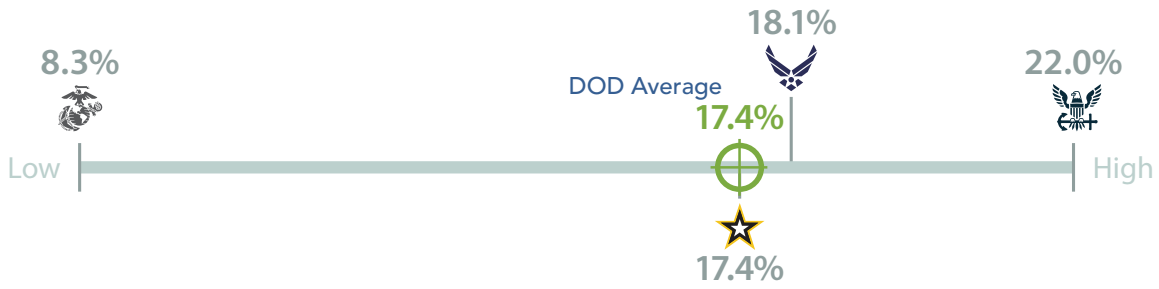


Obesity

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 healthcare utilization is higher among obese Service members than their normal-weight counterparts.[10]

The Clinical Data Repository (CDR) vital sign table within the Military Health System Data Repository (MDR) was 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. Height and weight data were then matched to the Armed Forces Health Surveillance Branch (AFHSB) Defense Medical Surveillance System (DMSS) to identify the date of birth, sex, and Service for each record. Body mass index (BMI) was calculated utilizing the latest height and weight record in a given year. BMI measurements less than 12 and greater than 45 were considered erroneous and excluded. In accordance with the Centers for Disease Control and Prevention (CDC), a BMI ≥30 was considered obese.[11]

The overall prevalence of obesity was 17.4% in 2018. Obesity rates were higher among males (18.4%) compared to females (12.6%). The lowest prevalence of obesity was found in Service members less than 25 years of age (overall prevalence: 9.7%) and the highest was found in those in the 35–44 year age group (overall prevalence: 28.2%). The overall prevalence of obesity has increased steadily since 2014.



Overall, 17.4% of AC Service members were classified as obese in 2018.

Rates ranged from 8.3% to 22.0% across Services.

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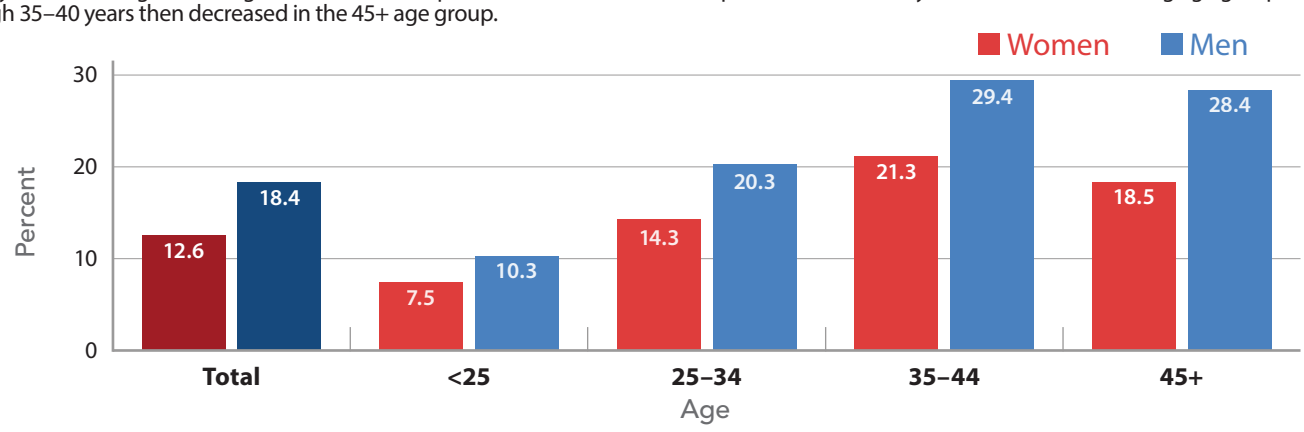
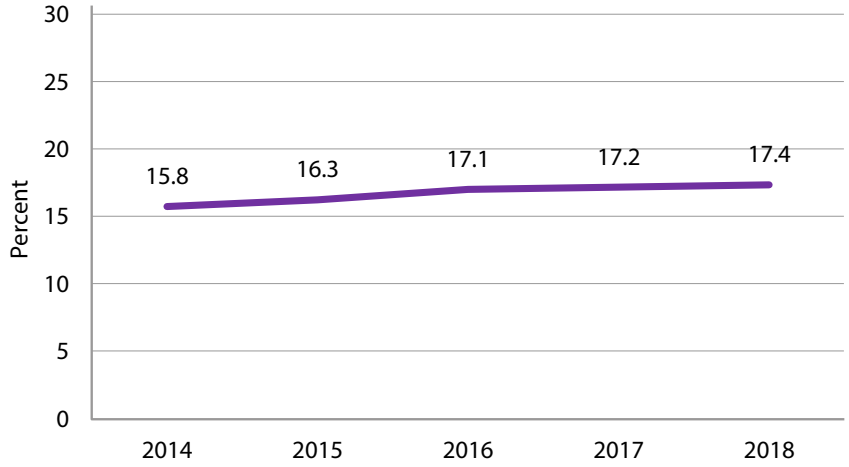
Prevalence of Obesity by Sex and Age, AC Service Members, 2018

Obesity rates were higher among males (18.4%) compared to females (12.6%). The prevalence of obesity increased with increasing age group through 35–40 years then decreased in the 45+ age group.



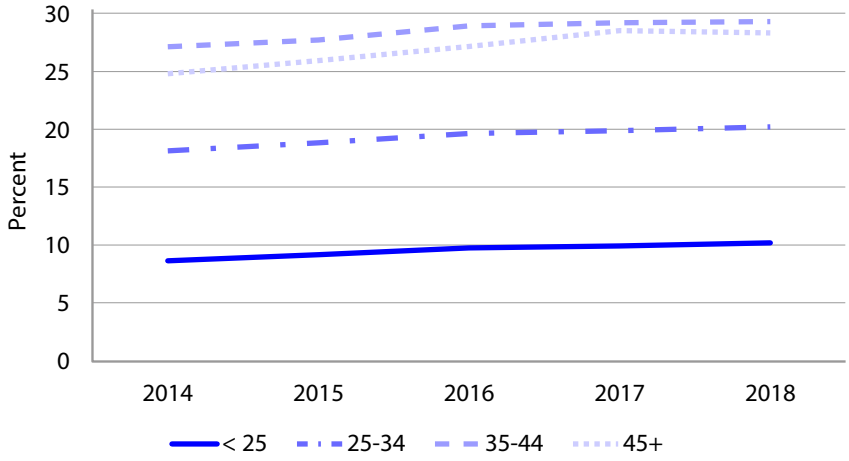
Prevalence of Obesity by Year, AC Service Members, 2014–2018

The prevalence of obesity increased slightly from 15.8% in 2014 to 17.4% in 2018.



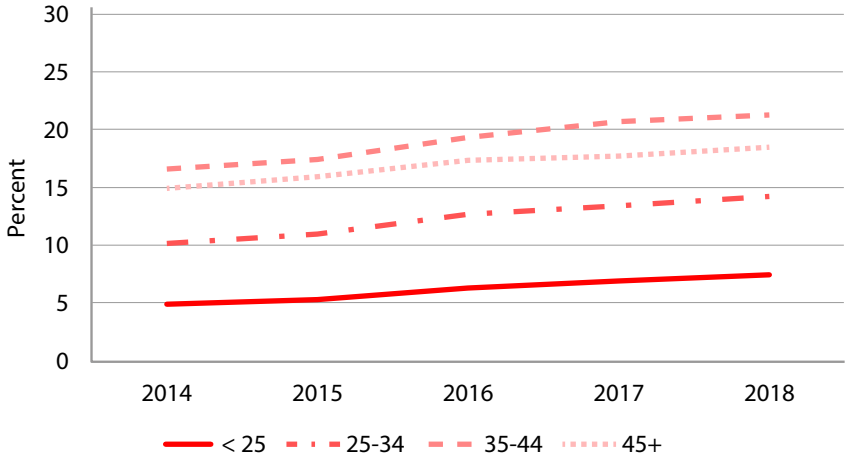
Prevalence of Obesity by Age, Male AC Service Members, 2014–2018

The prevalence of obesity increased slightly among males for all age groups between 2014 and 2018.



Prevalence of Obesity by Age, Female AC Service Members, 2014–2018

The prevalence of obesity increased slightly among females for all age groups between 2014 and 2018.



Army

Service Profile (2018):*

Population: Approximately 465,000 Army Service members
78.8% under 35 years old, 14.9% female

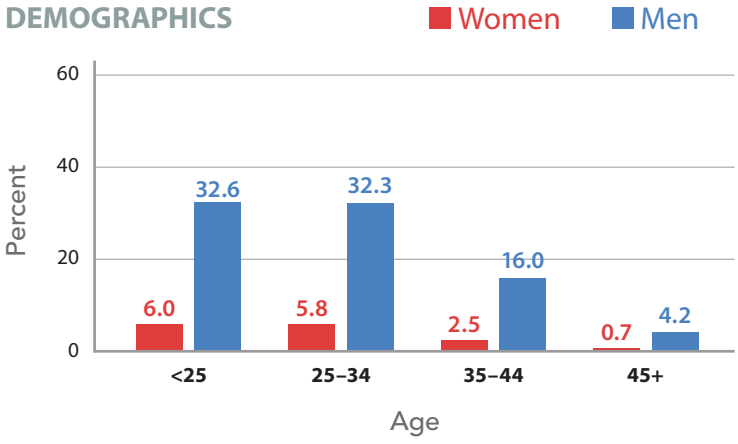
HEALTH INDEX MEASURES**

MEASURE	ARMY VALUE	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	375.7	305.1	218.9–375.7
Cumulative Traumatic Injury (rate per 1,000)	1,245.3	988.3	616.5–1,245.3
Behavioral Health 1-year (%)	10.7	8.3	6.5–10.7
Behavioral Health Lifetime (%)	21.9	17.7	10.4–21.9
Sleep Disorders (%)	15.9	11.8	6.0–15.9
Obesity (%)	17.4	17.4	8.3–22.0

ADDITIONAL INFORMATION

Injury rates in the Army were found to be higher than rates found in the Navy, Air Force, and Marine Corps. Mission-specific training and operational requirements likely contribute to the risk for injury among Soldiers. Rates of BH and sleep disorders were also higher among Soldiers than 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



* Number of AC Service members, June 2018; see Appendix for details.
** See Appendix for details regarding measure computations.

Navy

Service Profile (2018):*

Population: Approximately 324,000 Navy Service members
77.8% under 35 years old, 19.5% female

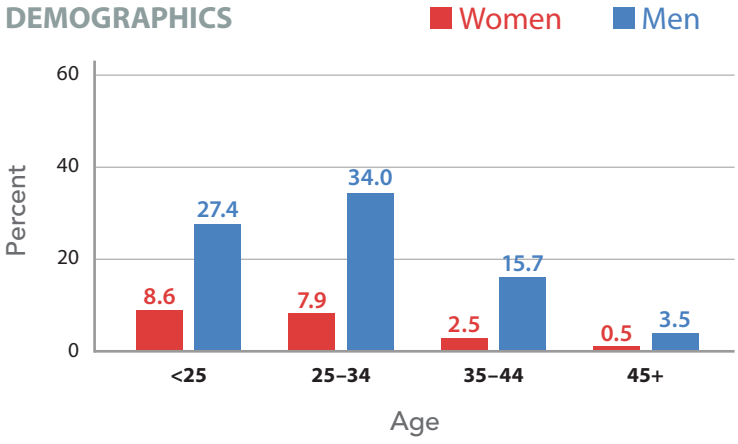
HEALTH INDEX MEASURES**

MEASURE	NAVY VALUE	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	218.9	305.1	218.9–375.7
Cumulative Traumatic Injury (rate per 1,000)	616.5	988.3	616.5–1,245.3
Behavioral Health 1-year (%)	7.4	8.3	6.5–10.7
Behavioral Health Lifetime (%)	15.8	17.7	10.4–21.9
Sleep Disorders (%)	9.4	11.8	6.0–15.9
Obesity (%)	22.0	17.4	8.3–22.0

ADDITIONAL INFORMATION

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

DEMOGRAPHICS



* Number of AC Service members, June 2018; see Appendix for details.
** See Appendix for details regarding measure computations.

Air Force

Service Profile (2018):*

Population: Approximately 321,000 Air Force Service members
77.1% under 35 years old, 20.1% female

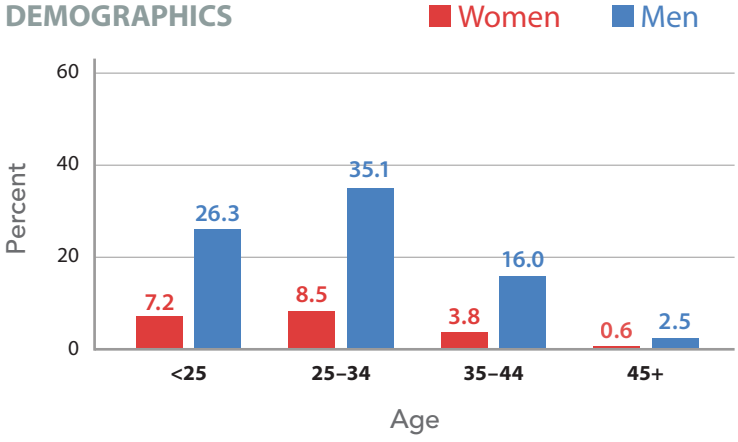
HEALTH INDEX MEASURES**

MEASURE	AIR FORCE VALUE	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	289.9	305.1	218.9–375.7
Cumulative Traumatic Injury (rate per 1,000)	1,089.1	988.3	616.5–1,245.3
Behavioral Health 1-year (%)	7.0	8.3	6.5–10.7
Behavioral Health Lifetime (%)	17.8	17.7	10.4–21.9
Sleep Disorders (%)	11.6	11.8	6.0–15.9
Obesity (%)	18.1	17.4	8.3–22.0

ADDITIONAL INFORMATION

In this analysis, cumulative traumatic injuries and obesity were found to affect Airmen at higher than average rates. Given that these conditions co-occur in the general population, it is not surprising that they were also found to co-occur among Airmen. Future efforts to address obesity and repetitive micro-trauma as separate conditions as well as efforts to better understand the interplay of these conditions have the potential to improve the readiness of Airmen.

DEMOGRAPHICS



* Number of AC Service members, June 2018; see Appendix for details.

** See Appendix for details regarding measure computations.

Marine Corps

Service Profile (2018):*

Population: Approximately 185,000 Marine Corps Service members
88.8% under 35 years old, 8.6% female

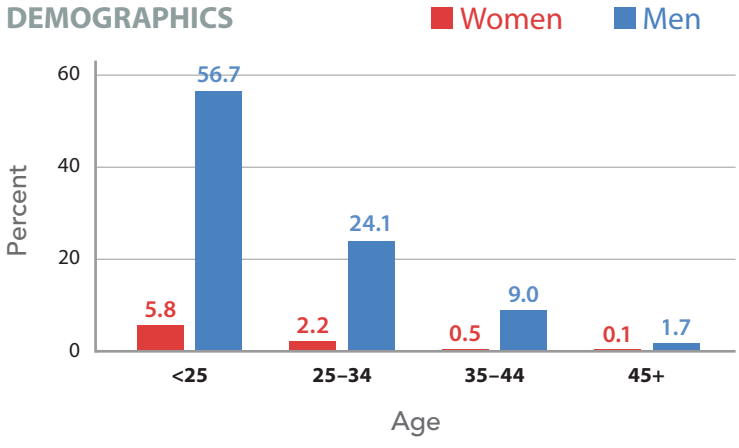
HEALTH INDEX MEASURES**

MEASURE	MARINE CORPS VALUE	DOD AVERAGE	DOD RANGE
Acute Injury (rate per 1,000)	304.6	305.1	218.9–375.7
Cumulative Traumatic Injury (rate per 1,000)	818.3	988.3	616.5–1,245.3
Behavioral Health 1-year (%)	6.5	8.3	6.5–10.7
Behavioral Health Lifetime (%)	10.4	17.7	10.4–21.9
Sleep Disorders (%)	6.0	11.8	6.0–15.9
Obesity (%)	8.3	17.4	8.3–22.0

ADDITIONAL INFORMATION

Marines have relatively low rates of BH diagnoses, sleep disorders, and obesity compared to the other Services. Injuries, especially acute injuries, however, emerge as an important area of focus for prevention efforts among Marines. Cumulative traumatic injuries such as back and knee joint disorders are the leading causes of limited duty among Marines resulting in reduced worldwide deployability and increased medical separations. Attention to reducing these injuries could increase the mission readiness among Marines.

DEMOGRAPHICS



* Number of AC Service members, June 2018; see Appendix for details.

** See Appendix for details regarding measure computations.

METHODS

Injury

Data were derived from records routinely maintained in the DMSS. These records document ambulatory encounters and hospitalizations of AC Service members in fixed military and civilian (if reimbursed through the Military Health System (MHS)) treatment facilities worldwide. Acute injuries were identified using ICD-10-CM diagnosis codes from the NCHS injury diagnosis matrix.[3] Cumulative traumatic injuries were identified using ICD-10-CM diagnosis codes from the U.S. Army Public Health Center's (APHC) cumulative trauma matrix.[4] Service members were identified as having an acute injury if they had any acute injury diagnosis in any position of an inpatient or outpatient medical encounter. Similarly, Service members were identified as having a cumulative traumatic injury if they had any cumulative traumatic 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 acute and traumatic injury matrices. 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.

For all incident injuries, the frequency and percentage of the nature of injury and body region affected were described.

Limitations:

1. The transition from 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 available in 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 non-deployment 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 injuries.
4. It is not always possible to differentiate incident injuries from re-injuries 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.

Behavioral Health

Data were derived from records routinely maintained in the DMSS. Healthcare encounters of deployed Service members 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, excluding 305.1; ICD-10-CM: F01-F99, excluding F17.200) within 365 days in any diagnostic position. 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, depressive disorders, psychoses, PTSD, and substance-related disorders), ICD-9-CM and ICD-10-CM codes from the AFHSB surveillance case definitions were used.[6] 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 history of BH disorder if they had two BH disorder diagnoses within 365 days at any time between 2002 and 2018 and were in service during December 2018 (the last month of the surveillance period). The denominator was all AC Service members during December 2018.

Limitations:

1. Service members do not always seek or receive care for a BH condition within the MHS and BH disorders may be underestimated here.
2. Some diagnoses may be miscoded or incorrectly transcribed on centrally transmitted records.
3. Some encounters may have been erroneously diagnosed or miscoded as BH disorders (e.g., screening visits).

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 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 overdiagnosis 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 within the MDR was 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 in any inpatient or outpatient encounter in the same year were excluded. Height and weight data were then matched to the AFHSB 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 ≥30, according to the CDC definition of obesity.[11]

The CDR vital sign table was 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) 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.[12]

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

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