

Hearing Health Surveillance Data Review Military Hearing Conservation Fiscal Year 2021

Defense Health Agency Hearing Center of Excellence
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Definitions

Active duty: Full-time duty in the active military service of the United States.

Audiogram: A chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.

Hearing impairment: Any tested frequency exceeding 25 decibel hearing level (dB HL) in either ear.

Permanent Threshold Shift (PTS): A Significant Threshold Shift (STS) that fails to resolve on follow-up testing is determined to be a permanent decrease in hearing. An STS that does not receive follow-up testing within the required timeframe is also identified as a PTS.

Reserve Component (RC): The term “reserve component” means, with respect to the Armed Forces (a) the Army Reserve; (b) the Navy Reserve; (c) the Marine Corps Reserve; (d) the Air Force Reserve; (e) the Space Force Reserve; (f) the Coast Guard Reserve; (g) the Army National Guard of the United States; and (h) the Air National Guard of the United States. 38 USC § 101(27)

Significant Threshold Shift (STS): Hearing thresholds changed, relative to the applicable baseline, an average of 10 dB HL or more at 2000, 3000, and 4000 Hertz (Hz) in either ear. An STS may be positive (decreased hearing) or negative (improved hearing) and requires follow-up testing to determine if it is permanent (PTS) or temporary (Temporary Threshold Shift, TTS).

STS Follow-up test compliance: An audiogram conducted after an STS is identified on a periodic exam. Used to determine if the STS is temporary or permanent. Compliance is determined by the number of members who completed required follow-up hearing tests following a positive STS on their periodic hearing test. Follow-up time period for active duty, civilians and Reserve Components (Reserve and National Guard) is determined by each service.

Temporary Threshold Shift (TTS): An STS that resolves on follow-up testing.

Department of Veterans Affairs (VA) hearing threshold disability criteria: Any reference or periodic test with a pure-tone average (PTA) of 26 dB HL or more at any three frequencies (500, 1000, 2000, 3000, or 4000 Hz), or a threshold of 40 dB HL or more at any one of those same individual frequencies per 38 CFR 3.385.

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Executive Summary

Department of Defense (DOD) policy:

- “Protects all military personnel and noise-exposed civilian personnel from hearing loss resulting from hazardous occupational and operational noise exposure through a continuing, effective, and comprehensive HCP, in accordance with Parts 1910 and 1960 of Title 29, Code of Federal Regulations (CFR).”
- “Reduces hazardous occupational and operational noise exposure to personnel to enhance mission readiness, communication, and safety.”
- “Considers hazardous noise control in military capabilities to support operational readiness and integrates noise control into the design and development of defense systems and equipment.”

(DOD Instruction 6055.12, Hearing Conservation Program [HCP], August 14, 2019, p. 3):

Annually, the DOD Hearing Conservation Working Group (HCWG); United States Air Force School of Aerospace Medicine, Public Health and Preventive Medicine Department, Epidemiology Consult Service Division; and the DOD Hearing Center of Excellence (HCE) collaborate to provide information on the effectiveness of DOD HCPs. This report covers fiscal year (FY) 2013 through 2021 and includes DOD and service-level measures of effectiveness (MOEs) on HCP metrics. It consolidates the MOEs from all uniformed service components and noise-exposed civilians and examines service-level efforts to prevent hearing loss resulting from occupational and operational illness and injury (MOEs, June 2019).^{1,2}

The MOEs include:

- MOE 1: Examines the potential hearing injuries/illnesses by calculating the percentages of tested individuals who had results of significant threshold shift (STS), permanent threshold shift (PTS), and temporary threshold shift (TTS).
- MOE 2: Examines the STS follow-up testing compliance for individuals with STS on the annual audiogram.
- MOE 3: Focuses on the measure of the proportion of individuals in the HCP population who have hearing impairment (thresholds above 25 dB HL) vs. the proportion of those with normal hearing (25 dB HL or below) in the HCP population. The MOE also includes tracking the number of enlisted personnel entering the service with hearing impairment.
- MOE 4: Calculates the percentage of service members who might qualify for Department of Veterans Affairs (VA) disability due to impaired hearing, based only on auditory threshold disability criteria per 38 CFR §3.385.

1 Service components include Active Component (referred to as active duty [AD] in this report), and Reserve Component (RC) that includes Reserve and National Guard (NG).

2 Herein, the term “civilian” will be used throughout the report when discussing noise-exposed civilians in DOD HCPs.

Each DOD component establishes, maintains, and evaluates the effectiveness of their HCPs. Because of the unique differences in mission execution, service member requirements, and expected exposure to hazardous noise, not all service members are monitored as part of an HCP. The data reported herein only represent service members and civilians enrolled in an HCP.

Figure 1 shows the percent of service members broken out by service and service component with a hearing test in FY21. The largest number of service members tested is from the AD component for all services.

Figure 1. FY21 Percent of Service Members with Hearing Tested by Service and Service Component

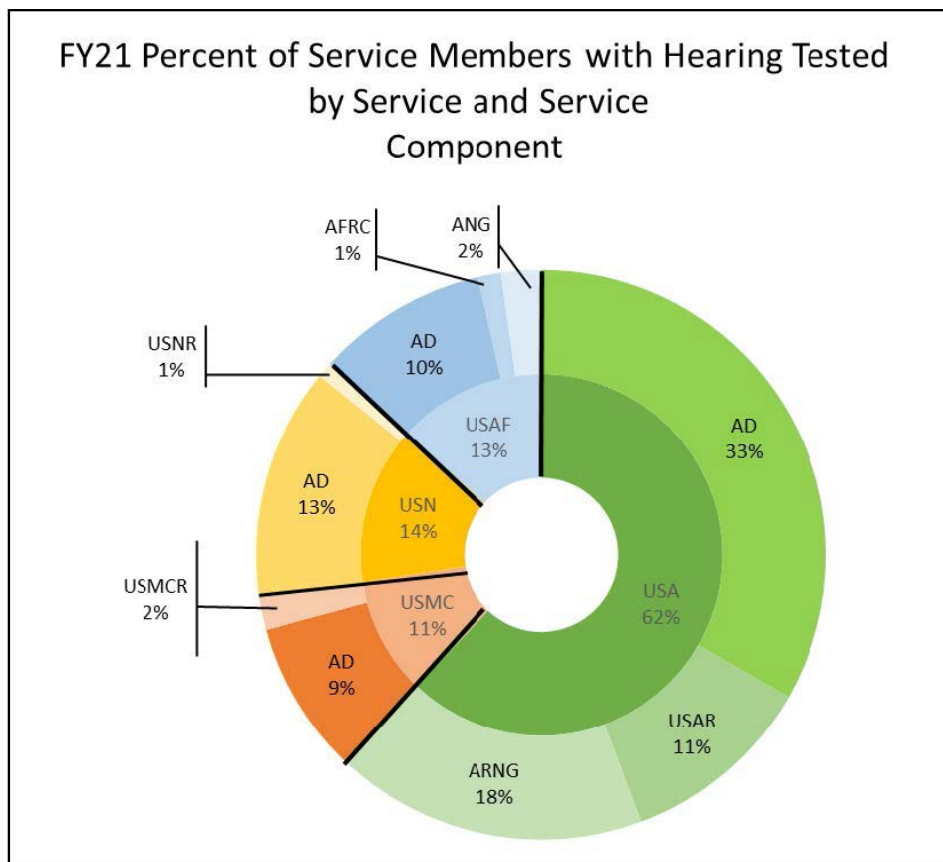


Table 1 below includes the number of unique hearing tests (audiograms) performed in FY21 for each military service component as well as DOD Civilians.

Table 1. FY21 Unique Individual Hearing Tests

Fiscal Year 2021 Unique Hearing Tests	Military	Active Duty	Reserve	National Guard	DOD Civilian
Army	831,491	445,817	147,027	238,646	20,015
Marine Corps	188,832	177,005	11,827	*	48,703
Navy	139,889	115,597	24,292	*	2,937
Air Force	177,967	130,130	17,549	30,288	23,523
Department of Defense (Military and Civilian)	1,338,178	868,529	200,695	268,934	95,178
Source: Defense Occupational and Environmental Health Readiness System- Hearing Conservation Data Repository (DOEHRS-HC DR)					
*No National Guard Component in the Marine Corps or Navy					

Summary Findings for FY21

The sections below summarize the MOE findings from the HCP hearing test data related to military and civilian personnel.

Unique Individuals by Personnel Category (FY20 and FY21)

The number of unique hearing tests completed by DOD in FY21 shows a slight decrease in negative impacts to hearing for AD and NG when compared to FY20 data; however, the Reserve and DOD civilians show an increase in FY21 compared to FY20 ([Graph 1](#)). This overall DOD decrease may be due to limited access to hearing health services because of COVID-19 pandemic restrictions. During the pandemic, DOD was limited in its use of traditional audiometry (hearing tested conducted in audiometric test booths) by new infection control measures due to social distancing, increased cleaning/sanitizing requirements, and compliance with the Centers for Disease Control and Prevention (CDC) guidance (CDC, 2003) regarding room air exchange requirements. For example, the recommended air exchange requirements within a booth increases the time interval needed between testing personnel which significantly impacts patient flow and timely access to care for clinical hearing and hearing conservation testing.

Significant Threshold Shift Rates by FY

Significant Threshold Shift (STS) rates are the number of service members or civilians who have a change in hearing defined as an average change of +/- 10dB HL or greater at 2000, 3000, and 4000 Hz in either ear on a periodic audiogram compared to the individual's applicable baseline audiogram. Follow-up testing is required to determine if the STS is a TTS that resolves upon follow-up testing or a PTS that is confirmed with follow-up testing or lack of follow-up testing completed within the required service's timeframe. STS, TTS, and PTS rates have remained stable for all service members ([Graph 2](#)), however, STS and PTS show a slight increase for civilians ([Graph 6](#)) in FY21 compared to FY20.

FY21 STS rates for DOD service members are 12.2% for STS, 2.8% for TTS and 9.3% for PTS. PTS rates for active duty (5.6%) and civilians (9.7%) are lower and may, in part, be due to their higher follow-up testing compliance which increases the accuracy of the PTS data, than for the Reserve Components which had a higher lack of follow-up testing completed within the service's required timeframes. In FY21, the National Guard and Reserve reflect PTS rates of 12.7% and 19.7%, respectively. [Graphs 3, 4, and 5](#) display the STS, TTS, and PTS rates for active duty, Reserve, and National Guard, respectively.

STS Follow-up Test Compliance

The purpose of the STS follow-up test is to determine if the hearing change was temporary or permanent. Those who complete the follow-up test and still have STS are referred for an audiological evaluation. Without follow-up testing, the hearing status is unknown. An increase in follow-up testing compliance will result in more accurate hearing status. Over the past 9 years the effect of an increase in follow-up testing compliance is best seen in decreased PTS rates in the civilian and active-duty service members. Follow-up testing compliance in the National Guard reveals an increase in STS follow-up testing associated with decreased PTS over the past 4 years. In FY21, active duty and civilians have the highest follow-up compliance rates (75% and 77.3%, respectively) while the National Guard (35.7%) and Reserve (18.3%) rates remain low. [Graphs 7 and 8](#) reflect follow-up testing compliance for service members and noise-exposed civilians, respectively.

Hearing Impairment

The percent of hearing-impaired service members show a slight increase up to 14.7% while civilians at 42.2% show a decrease in FY21 compared to FY20. Active-duty service members have the lowest rates of hearing impairment in FY21 (13.3%) compared to the Reserve (18.0%) and National Guard (17.4%). [Graphs 9 and 10](#) present the hearing impaired rates for all service members and civilians, respectively.

[Graph 11](#) provides the percent of enlisted accessions that are hearing impaired. The percent of enlisted accessions with hearing impairments increased in FY21 (11.2%) compared to FY20 (9.7%). Reserve enlisted accessions have the lowest rates (9.9%) of hearing impairment compared to the active duty (11.6%) and National Guard (10.5%).

VA Auditory Threshold Disability Criteria

[Graph 12](#) provides the percent of service members meeting the established VA auditory threshold disability criteria.³ The percent of service members who meet this established VA auditory threshold criteria for disability remains stable, with active duty service members having the lowest rates in FY21 (2.9%) and Reserve and National Guard sharing a rate of 5.1%.

Conclusions

Overall, hearing health in DOD appears to be relatively stable for service members and civilians in the HCPs between FY13 and FY21. The evidence suggests a trend of a marginal increase in hearing impairment ([Graph 9](#)) for all service members combined and for active-duty service members when FY21 data is compared to FY20. Service members meeting established VA auditory thresholds for disability criteria remained stable from FY20 to FY21 ([Graph 12](#)). Compliance for STS follow-up testing continues to show improvement in FY21 for all service components ([Graph 7](#)) when compared to FY20 data. Additionally, FY21 STS follow-up testing continues to reveal improvements for civilians ([Graph 8](#)) when compared to FY20. From FY20 to FY21, threshold shift rates for STS and TTS remained stable while PTS rates showed a slight increase for all service components except the National Guard ([Graph 4](#)). Civilian rates for STS and PTS showed a slight increase this same period. Overall, the findings indicate hearing loss trends have plateaued over the past few years with no notable reductions in hearing loss trends. It is important to note that a 1% magnitude of change for the Army compared to the other services is associated with a significant impact due to the total number of Soldiers tested ([Table 1](#)). For example, a 1% change in the Army's total number of Soldiers tested is 8,314 members versus 1,779 members for the Air Force.

3 Service components include Active Component (referred to as active duty [AD] in this report), and Reserve Component (RC) that includes Reserve and National Guard (NG).

Background

This annual report from the DOD Hearing Conservation Working Group (HCWG); the United States Air Force School of Aerospace Medicine, Public Health and Preventive Medicine Department, Epidemiology Consult Service Division; and the DOD Hearing Center of Excellence, is a collaborative effort that covers DOD hearing health for fiscal year (FY) 2013 through 2021. The report includes DOD and service-level measures of effectiveness (MOEs) for hearing conservation program (HCP) metrics. It consolidates the MOEs from all service components and civilians and examines service-level efforts to prevent hearing loss resulting from occupational and operational illness and injury (MOEs, June 2019).^{4,5}

Each service varies in how the hearing data are gathered and reported. For example, significant threshold shift (STS) and permanent threshold shift (PTS) rates are not always standardized and thus not always comparable due to different approaches to service-level Hearing Conservation Programs (HCPs, Batchelor et al., 2020). For example, the Air Force and Navy provide annual monitoring audiometry only to service members who are routinely exposed to hazardous noise (at risk approach) and the Army and Marine Corps provide annual monitoring audiometry to all service members (total force approach).

In 2018, the DOD HCWG agreed to use standard HCP MOEs to resolve the above discrepancies among the services' HCP implementation. The DOD HCWG approved MOEs to include the following: STS rates, STS follow-up compliance, hearing impairment rates, and VA auditory threshold disability criteria. One additional metric included in this report is audiogram completion rates. The metrics and data in this report are prepared and codified by the United States Air Force School of Aerospace Medicine, Public Health and Preventive Medicine Department, Epidemiology Consult Service Division and the Defense Health Agency Armed Forces Health Surveillance Branch Air Force Satellite at Wright-Patterson AFB, Ohio (Batchelor et al., 2020). This report provides a consistent method of reporting data on service HCPs using the standard MOEs described below:

- MOE 1 examines the potential hearing injuries/illnesses by calculating the percentages of tested individuals who had results of STS, PTS, and temporary threshold shift (TTS). This calculation is determined by using the number of unique individuals meeting each STS criteria on an annual audiogram per FY and dividing the total number of individuals who received an annual audiogram.
- MOE 2 examines the STS follow-up testing compliance for individuals with STS on the annual audiogram. This is calculated by dividing the number of individuals with STS who did not obtain a follow-up audiogram within each service-specific required timeframe by the total number of STS per year. The graphs within the report include the STS follow-up compliance that is based on the non-compliance metric.

4 Service components include Active Component (referred to as active duty [AD] in this report), and Reserve Component (RC) that includes Reserve and National Guard (NG).

5 Herein, the term “civilian” will be used throughout the report when discussing noise-exposed civilians in DOD HCPs.

- MOE 3 focuses on the measure of the proportion of individuals in the HCP population who have hearing impairment (thresholds above 25 dB HL) vs. the proportion of those with normal hearing (25 dB HL or below) in the HCP population. This is calculated by taking the number of individuals with results showing hearing impairment on a periodic or reference audiogram test per FY and dividing by the total number of individuals who received a periodic or reference audiogram in the same FY.
- MOE 4 calculates the percentage of service members who might qualify for Department of Veterans Affairs (VA) based only on auditory threshold disability criteria per 38 CFR §3.385, Disability due to impaired hearing. This percentage is determined by the number of individuals who met the VA hearing (auditory) threshold level criteria per FY divided by the total number of individuals obtaining an audiogram within that same FY.⁶

This report includes a graphic representation of unique hearing tests completed, by each service component, in FY20 vs. FY21. The difference in total unique tests from FY20 to FY21 was divided into the total number of unique tests completed in FY20 to determine the percent increase or decrease for FY21.

Service members tested in DOD HCPs in FY21 show the ratio of service members tested by service and service component [Table 1](#) includes the number of unique hearing tests (audiograms) performed in FY21 for each military service component.

There are two important caveats for this report that necessitate highlighting. First, the report is not intended to provide a comprehensive, descriptive epidemiological analysis of exposed versus (vs.) unexposed populations. Rather, this report is a summary of HCP participants' hearing health trends to assist HCP managers identify HCP performance gaps.

6 The award of VA service-connected disability benefits for hearing loss can be made by Veterans Benefits Administration (VBA), Department of Veterans Affairs (VA) based on many factors - not only changes in hearing (auditory) threshold levels during military service. For example, in granting service-connection for hearing loss VBA considers:

- Word Recognition Scores (testing to determine the veteran's optimum performance for word recognition under controlled and standardized conditions) of less than 94%;
- A permanent positive threshold shift worse than reference audiogram threshold "greater than normal measurement variability" at any frequency between 500 – 6000 Hz; and
- Determination of etiology affected by several facts, per court decisions and/or directed by VBA for instance:
 - Instead of conceding noise exposure for a military occupational specialty (MOS) with moderate or high probability for noise exposure, Veteran Service Representatives and Rating Veteran Service Representatives must now concede noise exposure for ALL military occupational specialties (low, moderate, and high probability of noise exposure rather than only moderate and high probability of noise exposure MOS') for the purposes of establishing an event in service;
 - When hazardous noise exposure is conceded based on the veteran engaging in combat, accept satisfactory lay or other evidence of service incurrence or aggravation of such injury or disease, if consistent with the circumstances, conditions, or hardships of such service, even if there is no official record of such incurrence or aggravation in such service. There is a requirement to resolve every reasonable doubt in favor of the veteran unless there is clear and convincing evidence to the contrary. (Reeves v. Shinseki, 682 F.3d 988, Fed.Cir. 2012)

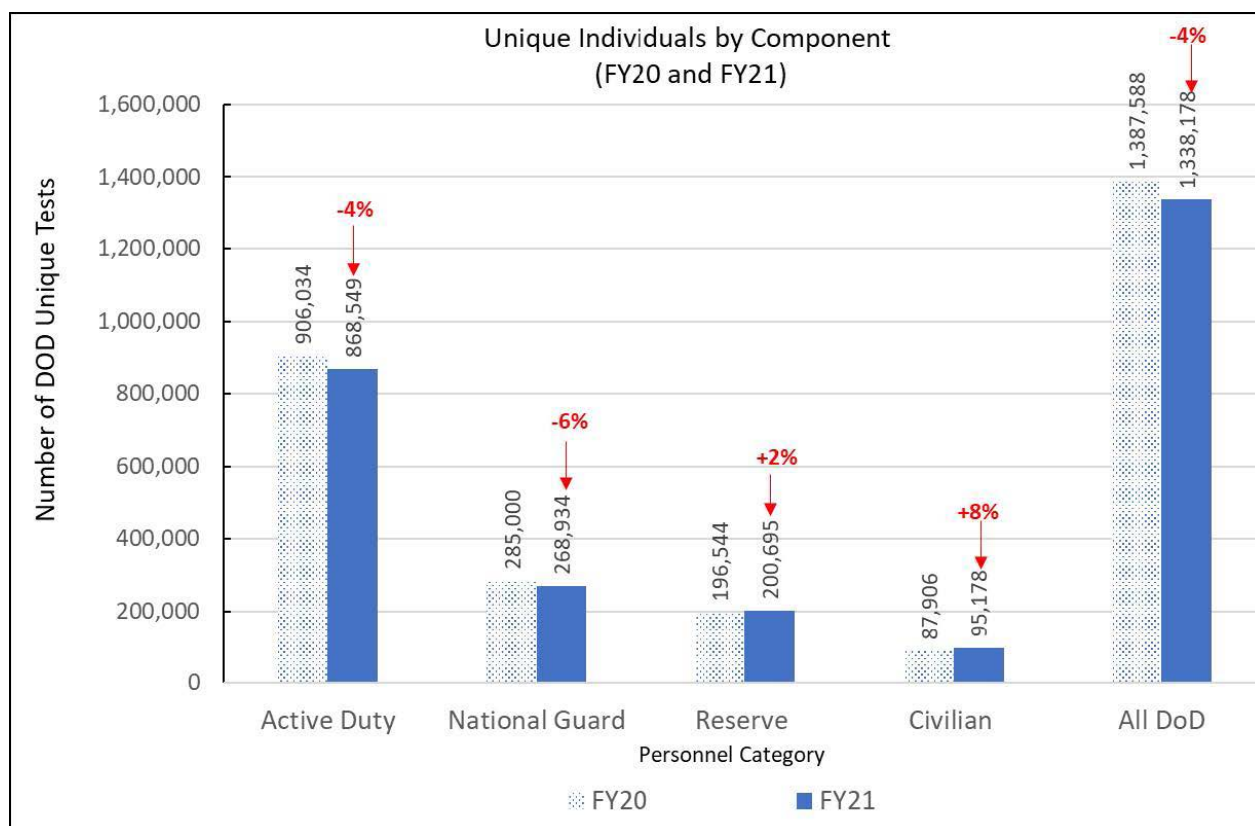
As well, it is important to note that the MOEs reports for FY2021 were constructed using a different methodology than the previous year reports. Data from the Defense Occupational Environmental Health Readiness System – Hearing Conservation Data Repository (DOEHRS-DR) used for previous MOEs reports (Calendar years 2018 and 2019 and FY2020), are no longer available as the method of retrieval changed with the server migration. Data validations were run to ensure the queries using the new methodology were within acceptable ranges when compared to the previous reports, and no significant changes in trends were noted across all measures. Data contained in the current report for years FY13-FY21 reflect the new data and methodology. Therefore, report data should not be used interchangeably with earlier versions of report prior to FY21. The leadership of each of the military services’ HCPs reviewed and approved the metrics and data in this report. For questions regarding the data presented in this report, contact the DOD Hearing Center of Excellence Prevention and Surveillance Section at: <https://hearing.health.mil/hcehome/Contact-Us>.

Hearing Health - DOD

Unique Hearing Tests by Personnel Category

The number of unique hearing tests for all service members show an overall decrease of 4% during FY21 compared to FY20. In FY21, the Reserves (all services) show a 2.0% increase in unique hearing tests compared to FY20. Of note, there was an 8.0% increase for civilian personnel in FY21 compared to FY20 (Graph 1). However, there was a 4.0% decrease for active duty and a 6.0% decrease for the National Guard in FY21 compared to FY20. The ongoing COVID-19 pandemic restrictions may have contributed to the overall 4% decrease for all service members in FY21 compared to FY20. During the pandemic, DOD's use of traditional audiometry (hearing testing conducted in an audiometric test booth) was limited by infection control measures to facilitate social distancing, increased cleaning/sanitizing requirements, and compliance with CDC guidance (CDC, 2003) regarding room air exchange. Transition of electronic health records from Armed Forces Health Longitudinal Technologies Application (AHLTA) to MHS Genesis in FY21 also may have contributed to the overall decrease in unique hearing tests compared to FY20.

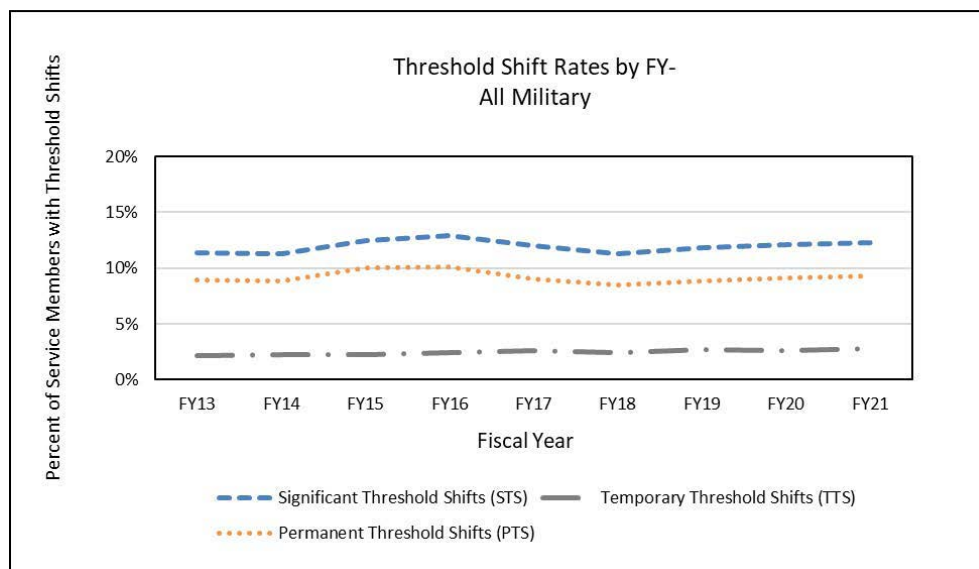
Graph 1. Unique DOD Individual Hearing Tests by Personnel Category (FY20 and FY21)



Significant Threshold Shift Rates by FY

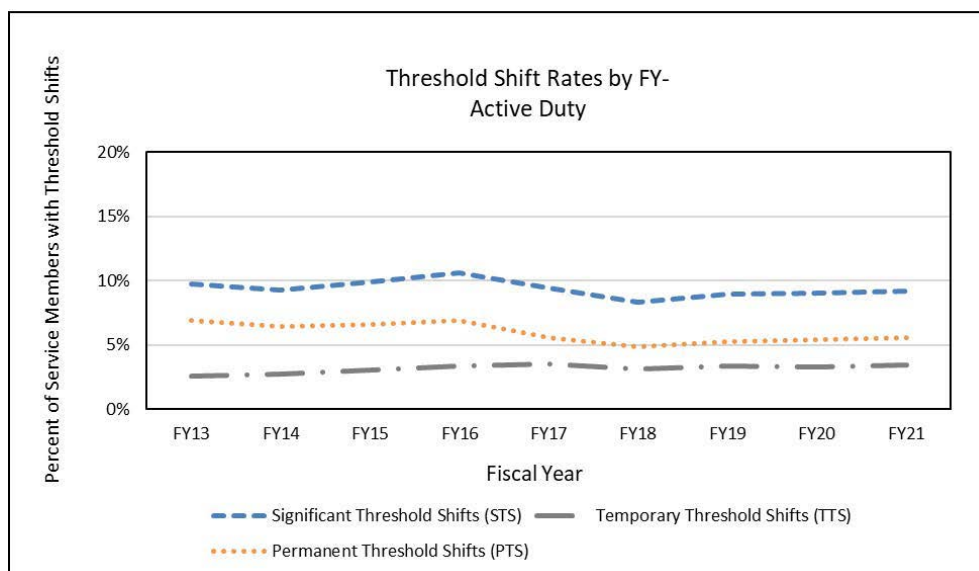
In FY21, military STS, TTS, and PTS rates remained stable when compared to FY20 STS, TTS, and PTS rates. Threshold shift rates for all service members (all components) indicate 12.2% STS, 2.8% TTS, and 9.3% PTS rates in FY21 (Graph 2).

Graph 2. Threshold Shift Rates by FY - All Service Members



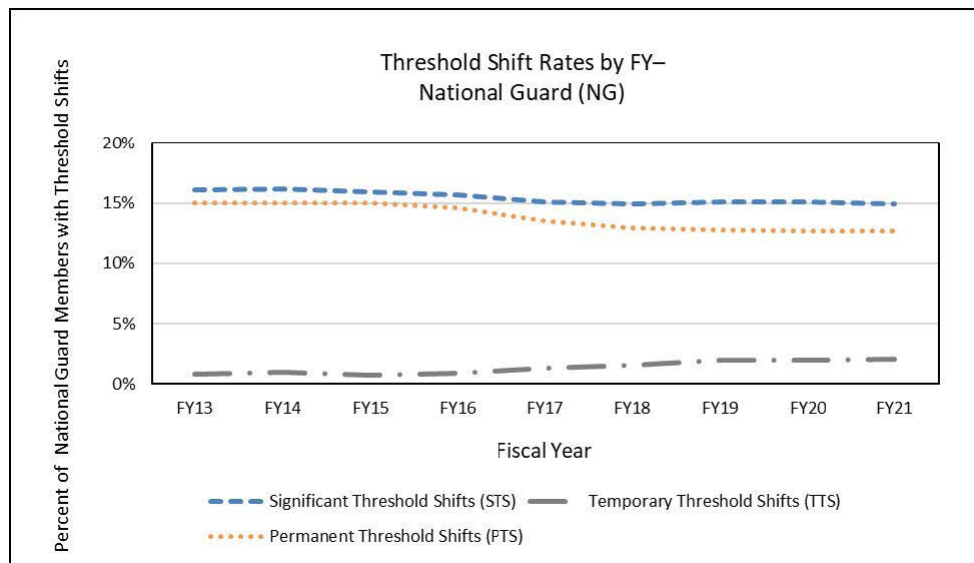
Active-duty service members have the lowest PTS rates compared to other components (i.e., Reserve and National Guard) between FY13 and FY21. Threshold shift rates for active-duty service members indicate 9.2% STS, 3.4% TTS, and 5.6% PTS rates in FY21 (Graph 3). Improved follow-up testing compliance in the active-duty population ([see Graph 7](#)) shows that about half of all the STS initially identified are found to be PTS.

Graph 3. Threshold Shift Rates by FY – AD Service Members

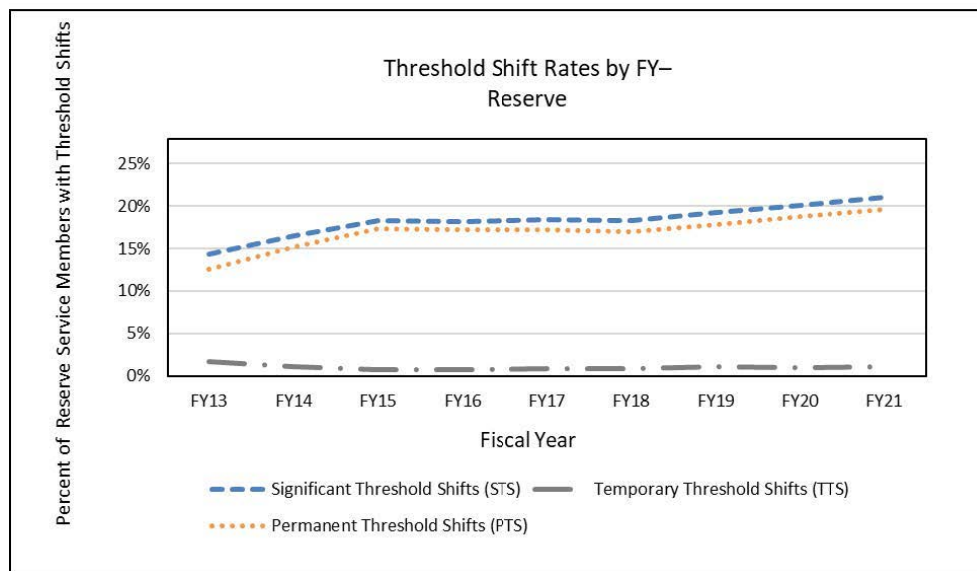


National Guard (Navy and Marine Corps do not have National Guard service members) rates for FY21 are: 15.0% STS, 2.1% TTS, and 12.7% PTS (Graph 4). Reserve rates for FY21 are: 21% STS, 1.0% TTS, and 19.7% PTS (Graph 5). Reserve and National Guard STS and PTS rates remain elevated due to a lack of STS follow-up testing. Failure to conduct STS follow-up testing prevents the accurate identification of TTS vs. PTS.

Graph 4. Threshold Shift Rates by FY - National Guard (NG) Service Members

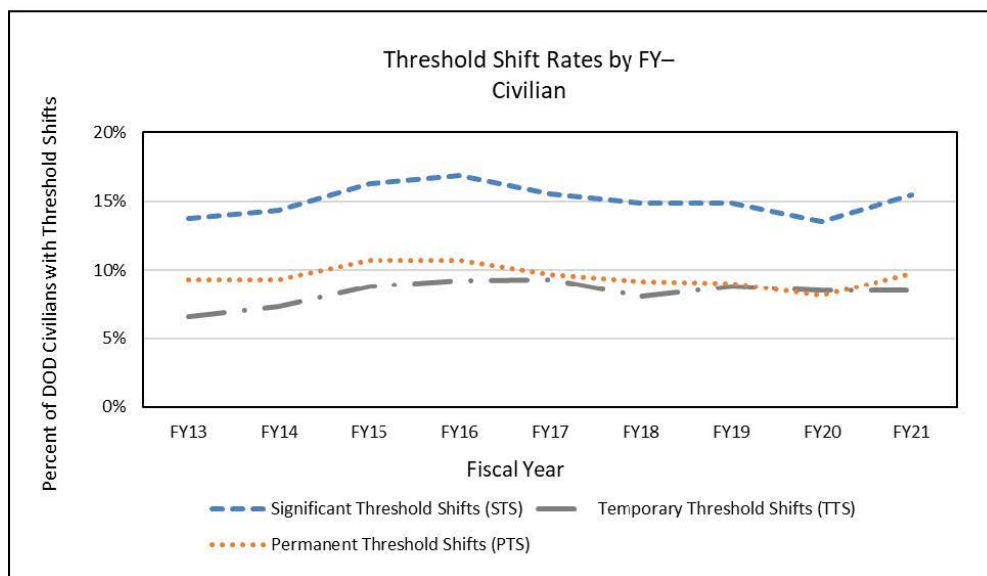


Graph 5. Threshold Shift Rates by FY - Reserves Service Members



The DOD civilian STS and PTS rates remained high compared to active-duty service members. The DOD civilian rates for FY21 are: 15.4% STS, 8.5% TTS, and 9.7% PTS (Graph 6). The data shows an increase in STS and PTS for FY21 compared to FY20.

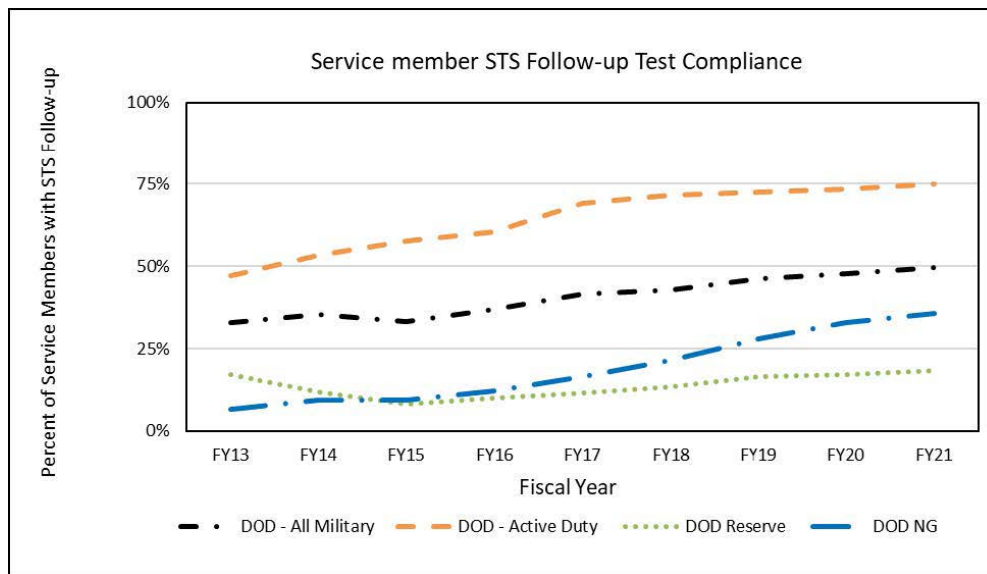
Graph 6. Threshold Shift Rates by FY – DOD Civilians



Significant Threshold Shift Follow-up Test Compliance

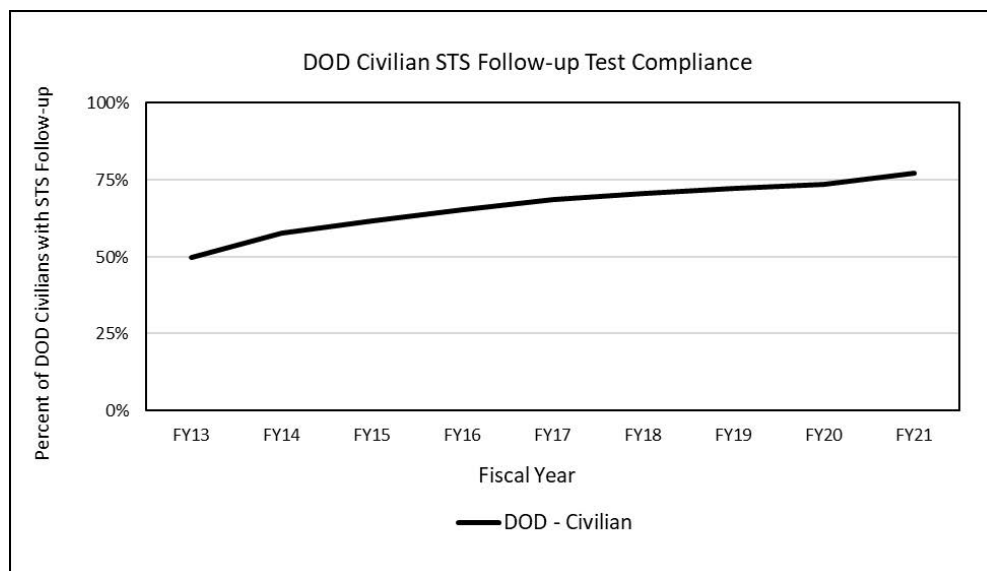
The STS follow-up testing compliance shows marginal improvement in FY21 (Graph 7). Overall compliance for military follow-up testing increases from 33% in FY13 to 49.7% in FY21. Compliance in the active duty and National Guard has improved since FY13, while compliance in the Reserve remains unchanged since FY19. Failure to conduct STS follow-up testing will: 1) elevate STS rates (i.e., the initial STS may be identified every year until follow-up testing is performed and a new baseline is established, if required) and 2) prevent accurate identification of PTS and TTS (i.e., STS with no follow-up hearing test defaults to a PTS when the service-specific follow-up test window has closed). This results in artificially high STS and PTS rates that do not reflect the true incidence of new military hearing injuries (McKenna et al., 2018).

Graph 7. Service Members STS Follow-up Test Compliance



DOD civilian STS follow-up testing compliance increased from 73.7% in FY20 to 77.3% in FY21. Overall compliance improved from 49.8% in FY13 to 77.3% in FY21 (Graph 8).

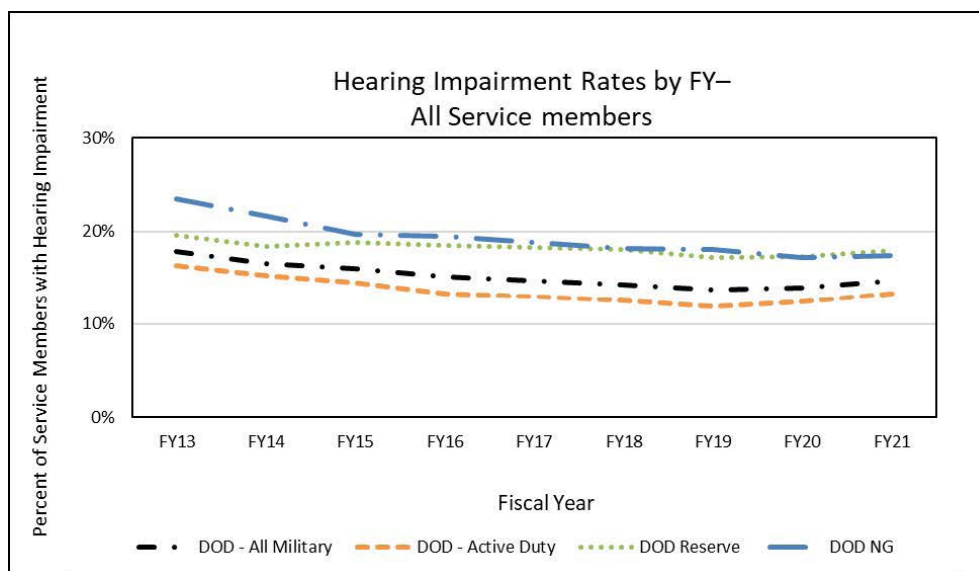
Graph 8. DOD Civilians STS Follow-up Test Compliance



Hearing Impairment

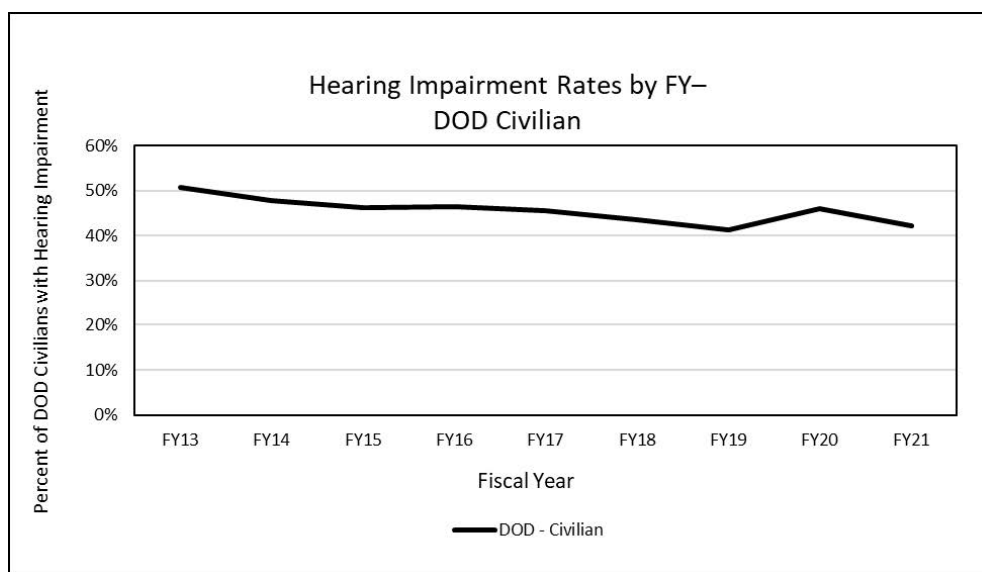
The percent of hearing impaired (hearing worse than 25 dB HL at any test frequency) service members remain essentially stable for all DOD components over the past 4 years. The percentage of DOD service members with hearing impairment decreased from 17.8% in FY13 to 14.7% in FY21. Graph 9 provides the percent of DOD service members with hearing impairment by component.

Graph 9. Hearing Impairment Rates by FY - All Service Members



The percentage of DOD civilians with hearing impairment continues to show a gradual decrease from FY13 to FY19; however, results in FY20 show an increase in hearing impairment totaling 46% compared to 42.2% in FY21. The percent of civilians with hearing impairment decreased from 50.8% in FY13 to 42.2% in FY21 (Graph 10). The high percentage of hearing impaired civilians is suspected to be, in part, reflective of differences in age and/or years of noise exposure compared to service member populations (Batchelor et al., 2020).

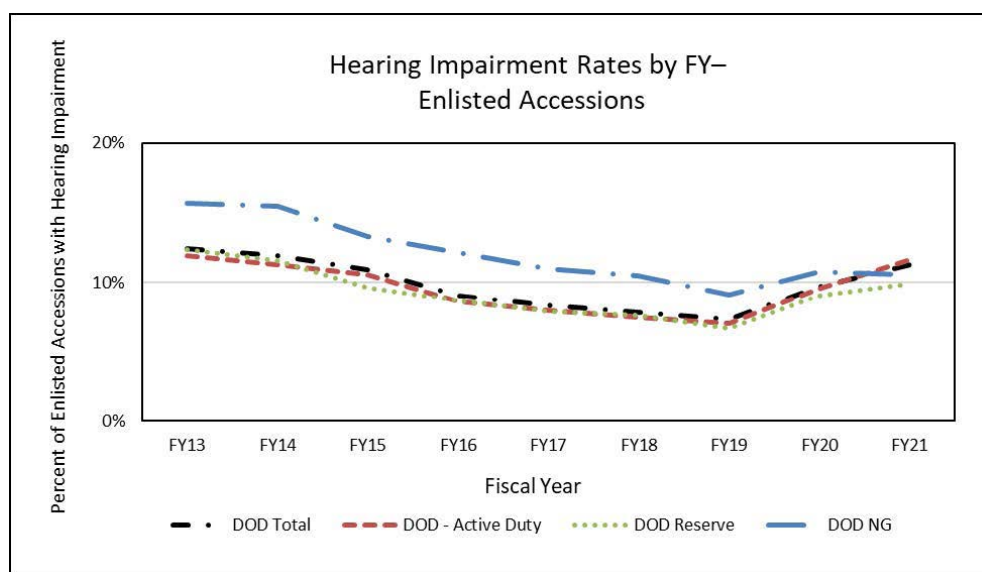
Graph 10. Hearing Impairment Rates by FY – DOD Civilian



Hearing Impairment – Enlisted Accession Data

Service members receive a hearing test as part of basic training at their entrance to military service. Those reference audiograms are used to determine the percentage of all new recruits who come into the military with hearing impairment (hearing worse than 25 dB HL at any test frequency). The percentage of enlisted accessions with hearing impairment has shown a marginal decrease for all DOD components since FY13; however, the data shows a gradual increase in enlisted hearing impairment in FY20 and FY21. Overall, the percent of DOD enlisted accessions with hearing impairment decreased from 12.5% in FY13 to 11.2% in FY21 (Graph 11) despite the slight increase in FY21 reported percentage.

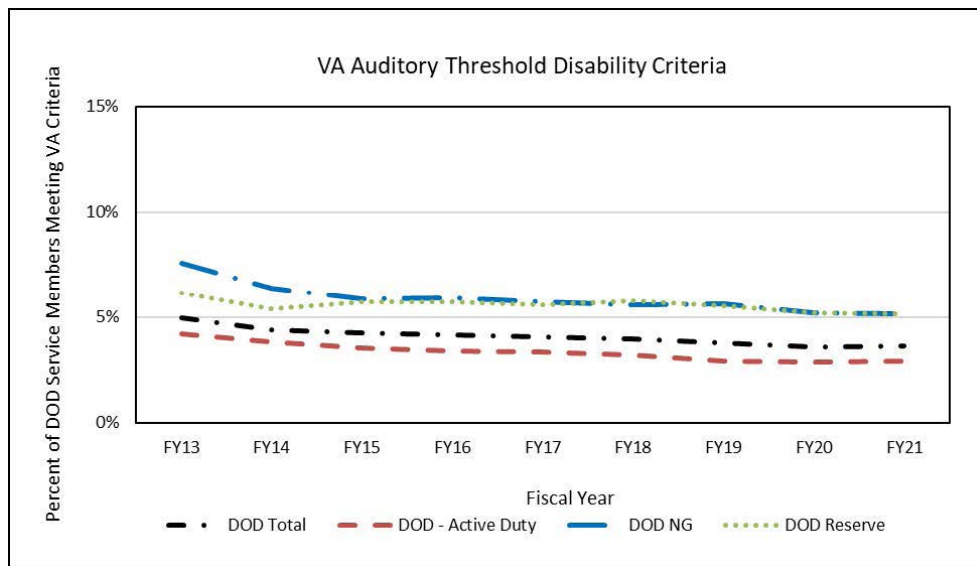
Graph 11. Hearing Impairment Rates by FY – Enlisted Service Member Accessions



VA Auditory Threshold Disability Criteria

The percentage of service members meeting established VA auditory threshold disability criteria is decreasing slightly for all DOD components. The percentage of DOD service members potentially eligible for Veterans Benefits Association (VBA) service-connected disability compensation for hearing loss decreased from 5.0% in FY13 to 3.6% in FY21 (Graph 12).

Graph 12. VA Auditory Threshold Disability Criteria – All Service Members



Summary and Conclusions

Hearing health for service members and civilians in the DOD HCP shows marginal decline. Evidence of this is seen in the increase of hearing impairment (FY20-12.1% and FY21-12.2%), increased hearing impairment in enlisted accessions (FY20-9.7% and FY21-11.2%), and unchanged rates of service members meeting VA auditory threshold eligibility criteria for hearing loss (FY20-3.6% and FY21-3.6%). The rates of VA auditory threshold eligibility criteria have decreased between FY13 and FY21 but since have plateaued in recent years. The STS rates for all military were essentially stable from FY13 to FY21. However, there was an increase in the STS rates for the Reserve in FY21 compared to FY13. All active duty and civilian populations showed a trend towards improved follow-up STS testing compliance. According to Batchelor et al. (2020), overall comparisons among these four groups should be undertaken with care because of the differences in their contributions to the dataset (active component, 65%; National Guard, 20%; and Reserve, 15%).

Table 2. Data Summary – DOD - Source: DOEHRs-HC DR

Department of Defense - Total										
Chart Title	Category	Percent								
		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Threshold Shift Rates All Service Members	STS	11.3	11.3	12.5	12.9	12.0	11.3	11.9	12.1	12.2
	TTS	2.2	2.2	2.2	2.4	2.7	2.5	2.7	2.6	2.8
	PTS	8.9	8.9	10.1	10.1	9.0	8.5	8.8	9.1	9.3
Threshold Shift Rates AD Service Members	STS	9.8	9.3	9.9	10.6	9.4	8.3	8.9	9.1	9.2
	TTS	2.6	2.7	3.1	3.4	3.5	3.1	3.4	3.3	3.4
	PTS	6.9	6.4	6.6	6.9	5.6	4.9	5.2	5.4	5.6
Threshold Shift Rates NG Service Members	STS	16.1	16.2	15.9	15.7	15.1	14.9	15.1	15.1	15.0
	TTS	0.8	0.9	0.8	0.9	1.3	1.6	1.9	2.0	2.1
	PTS	15.0	15.0	15.0	14.6	13.5	13.0	12.7	12.7	12.7
Threshold Shift Rates Reserve Service Members	STS	14.4	16.5	18.3	18.2	18.4	18.3	19.3	20.1	21.0
	TTS	1.7	1.1	0.7	0.7	0.8	0.9	1.1	0.9	1.0
	PTS	12.5	15.2	17.3	17.3	17.2	17.0	17.9	18.8	19.7
Threshold Shift Rates DOD Civilian	STS	13.8	14.4	16.3	16.8	15.6	14.9	14.8	13.5	15.4
	TTS	6.6	7.3	8.8	9.3	9.3	8.0	8.8	8.5	8.5
	PTS	9.3	9.3	10.7	10.7	9.7	9.2	9.0	8.1	9.7
STS Follow-Up Test Compliance	All	33.0	35.4	33.1	37.0	41.6	42.7	46.3	47.8	49.7
	Active Duty	47.0	53.2	57.5	60.5	69.2	71.6	72.6	73.4	75.0
	National Guard	6.7	9.2	9.3	12.2	16.6	21.3	28.1	33.0	35.7
	Reserve	17.0	12.0	8.1	9.9	11.6	13.3	16.6	17.2	18.3
	Civilian	49.8	57.8	61.7	65.5	68.7	70.7	72.4	73.7	77.3
Hearing Impairment Rates	All	17.8	16.6	16.0	15.1	14.7	14.2	13.7	13.9	14.7
	Active Duty	16.3	15.2	14.4	13.3	13.0	12.5	11.9	12.4	13.3
	National Guard	23.5	21.6	19.7	19.5	18.8	18.2	18.1	17.2	17.4
	Reserve	19.6	18.4	18.8	18.5	18.3	18.1	17.2	17.3	18.0
	Civilian	50.8	47.7	46.3	46.5	45.5	43.6	41.2	46.0	42.2
Hearing Impairment Rates - Enlisted Accessions	All	12.5	12.0	22.2	9.1	8.3	7.8	7.3	9.7	11.2
	Active Duty	11.9	11.3	10.6	8.6	8.0	7.4	7.0	9.6	11.6
	National Guard	15.7	15.5	13.3	12.2	11.0	10.5	9.1	10.8	10.5
	Reserve	12.3	11.6	9.6	8.7	7.9	7.6	6.6	9.0	9.9
VA Auditory Threshold Criteria	All	5.0	4.4	4.3	4.2	4.1	3.9	3.8	3.6	3.6
	Active Duty	4.2	3.8	3.6	3.4	3.4	3.2	2.9	2.9	2.9
	National Guard	7.6	6.4	5.9	5.9	5.7	5.6	5.6	5.2	5.1
	Reserve	6.2	5.4	5.7	5.7	5.6	5.8	5.5	5.2	5.1

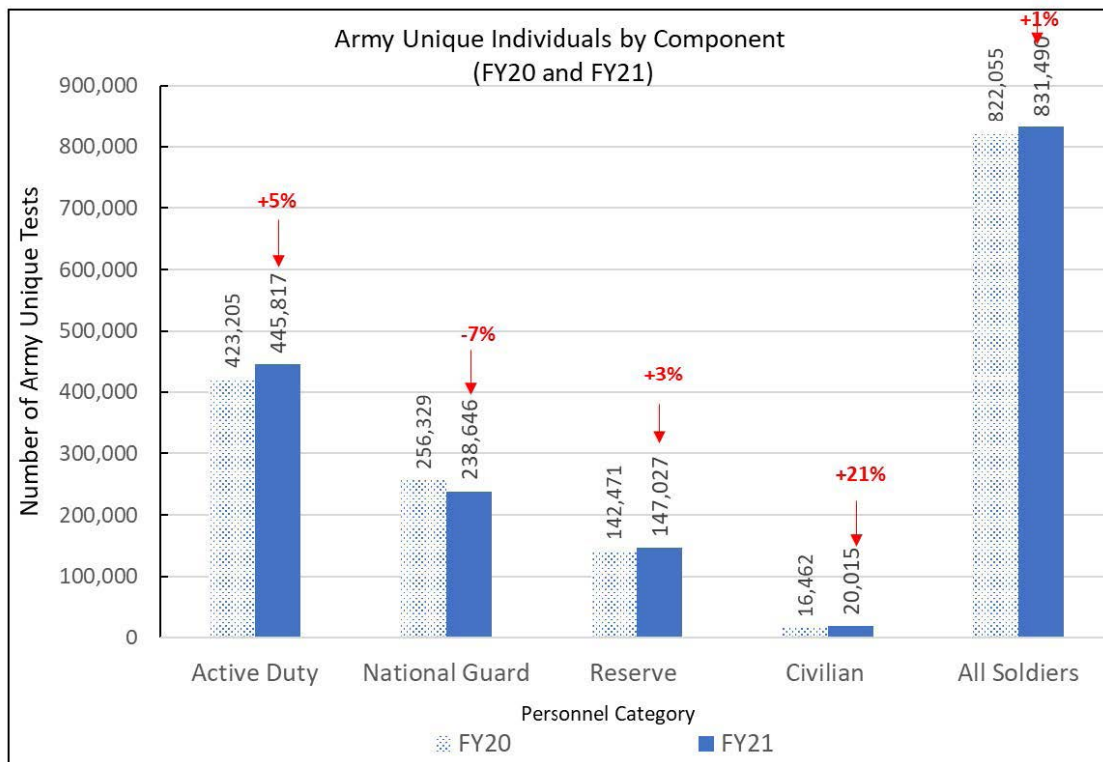
Appendix A: Hearing Health - Army

The mission of the Army Hearing Program (AHP) is to maximize Soldier and Department of the Army (DA) civilian hearing and communication abilities through implementation of the components of hearing readiness, clinical and operational hearing services, and hearing conservation, thus contributing to survivability, lethality, mission effectiveness, and quality of life. All active-duty Soldiers require an annual hearing readiness evaluation regardless of their noise-exposure risk. All Army Reserve (USAR) and Army National Guard (ARNG) Soldiers assigned to Table of Organization and Equipment (TOE) units or USAR and ARNG Soldiers, routinely exposed to hazardous noise, assigned to Table of Distribution and Allowances (TDA) units require annual DOEHRS-HC hearing tests. Soldiers experiencing a change in hearing or other hearing-related issues, regardless of exposure, are treated as if they were at risk and receive follow-up testing, counseling, and referrals as needed. The DA civilians are also enrolled in the AHP when they meet HCP noise-exposure criteria. The following data represent the test results from all Soldiers and DA civilians who received DOEHRS-HC hearing tests in FY21. Data in this review indicate that the overall hearing health for Soldiers is good and continues to improve. The data in this review indicate the overall hearing health for DA civilians is only fair although essentially stable, FY19-FY21.

Unique Hearing Tests by Personnel Category

The number of unique individual hearing tests conducted by the Army shows an increase in all Army components except for the National Guard in FY21 compared to FY20. The DA civilians also show an increase during FY21 compared to FY20. There was a 1% increase in testing for all Soldiers and a 21% increase for DA civilians in FY21 compared to FY20 (Graph 13). This increase is thought to be influenced by reduced COVID-19 pandemic restrictions resulting in easier access to hearing health services in FY21. In FY20, traditional audiometry conducted in test booths was limited by infection control measures for physical distancing, increased cleaning/sanitizing requirements, compliance with CDC guidance (CDC, 2003) regarding room air exchange, and reallocation of resources for pandemic efforts.

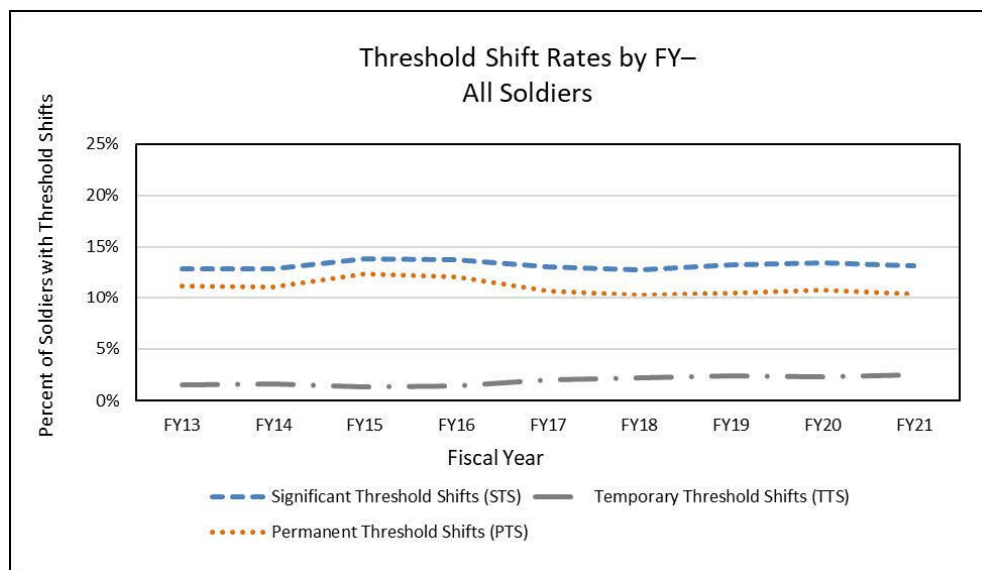
Graph 13. Army Unique Individual Hearing Tests by Personnel Category (FY20 and FY21)



Significant Threshold Shift Rates by FY

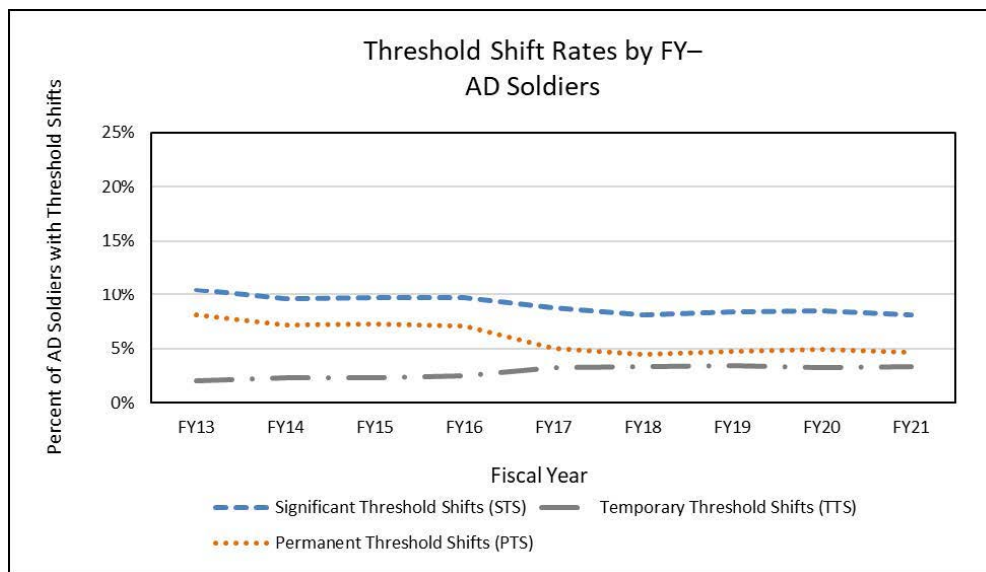
In FY21, all Soldier (all Army components combined) STS, TTS, and PTS rates remain stable compared to FY20 rates and FY13 rates (Graph 14). Threshold shift rates for all Soldiers are 13.1% STS, 2.4% TTS, and 10.5% PTS in FY21. The accuracy of PTS and TTS can be dependent upon STS follow-up testing compliance ([Graph 19](#)).

Graph 14. Threshold Shift Rates by FY - All Soldiers



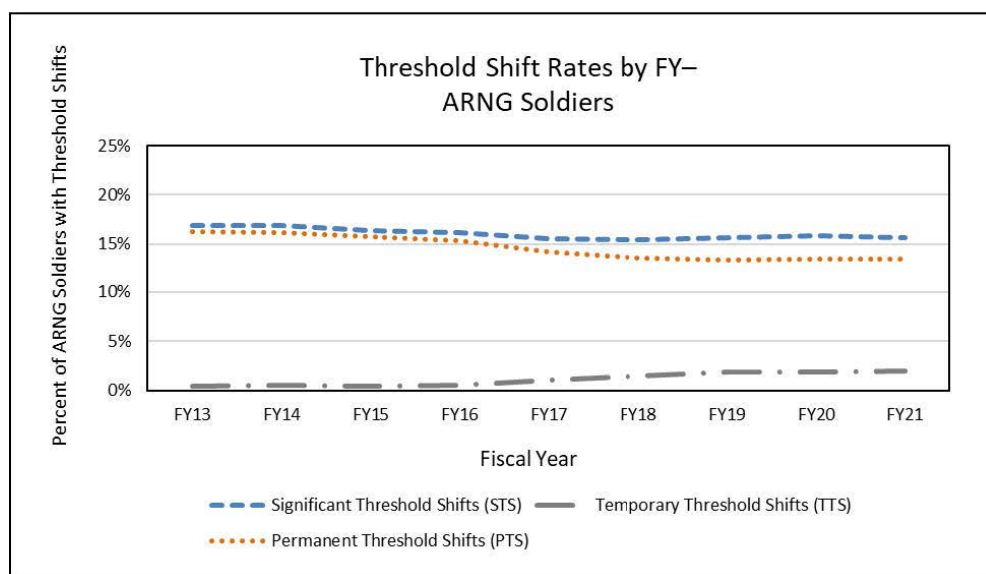
The AD Soldier rates remain stable at 8.1% STS, 3.3% TTS, and 4.6% PTS in FY21 (Graph 15) when compared to FY20 rates. Accuracy of PTS and TTS rate can be dependent upon STS follow-up testing compliance ([Graph 19](#)). Improved STS follow-up testing for AD Soldiers (compared to USAR and ARNG Soldiers) show about half of all STS identified are found to be PTS.

Graph 15. Threshold Shift Rates by FY – AD Soldiers



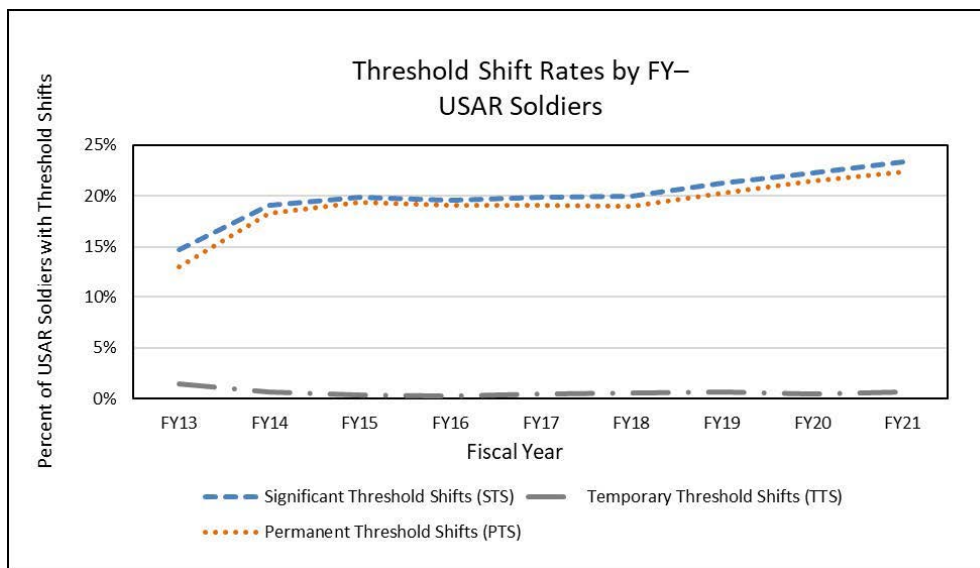
The ARNG Soldier rates remain stable at 15.7% STS, 2.0% TTS, and 13.5% PTS in FY21 when compared to FY20 (Graph 16). The STS and PTS rates remain high possibly due to a lack of STS follow-up testing compliance. Failure to conduct STS follow-up testing causes a given STS to be identified repeatedly until follow-up testing is completed and prevents the accurate identification of TTS vs. PTS.

Graph 16. Threshold Shift Rates by FY – ARNG Soldiers



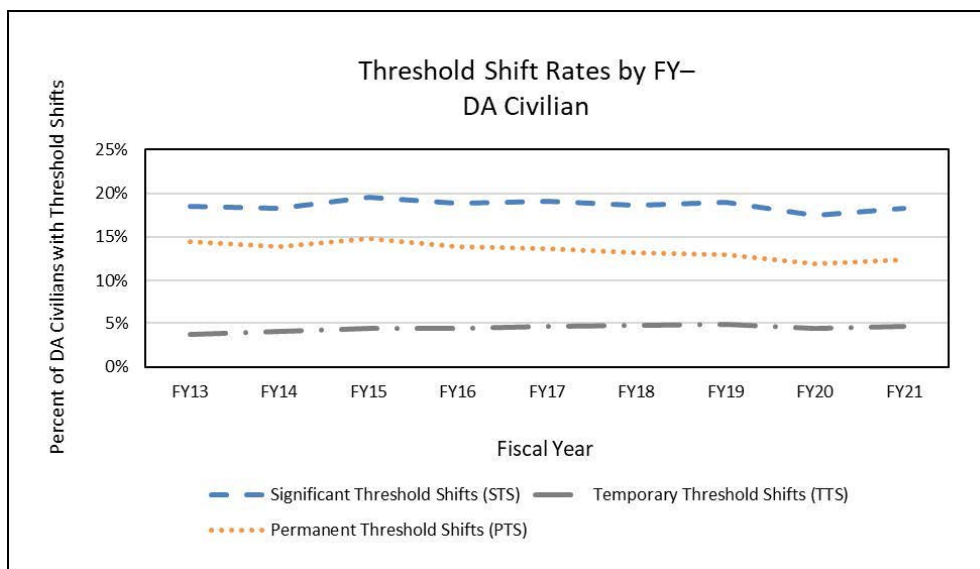
The USAR Soldier rates for FY21 are 23.3% STS, 0.7% TTS, and 21.1% PTS (Graph 17). STS show a slight increase in FY21 (23.3%) compared to FY20 (21.2%). Both STS and PTS rates remain high possibly due to a lack of STS follow-up testing from FY13-FY21. Failure to conduct STS follow-up testing prevents the accurate identification of TTS vs. PTS.

Graph 17. Threshold Shift Rates by FY - USAR Soldiers



Overall, DA civilian threshold shift rates remain high but stable from FY20 to FY21 at 18.3% STS, 4.6% TTS, and 12.4% PTS for FY21 with only negligible to marginal improvements for threshold shifts from FY13 to FY21 (Graph 18).

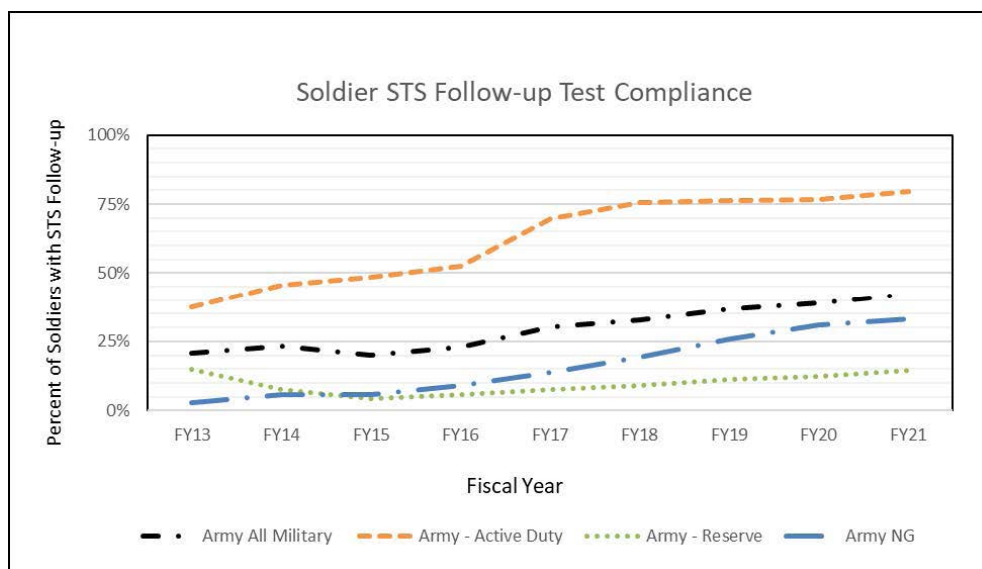
Graph 18. Threshold Shift Rates by FY – DA Civilians



Significant Threshold Shift Follow-up Test Compliance

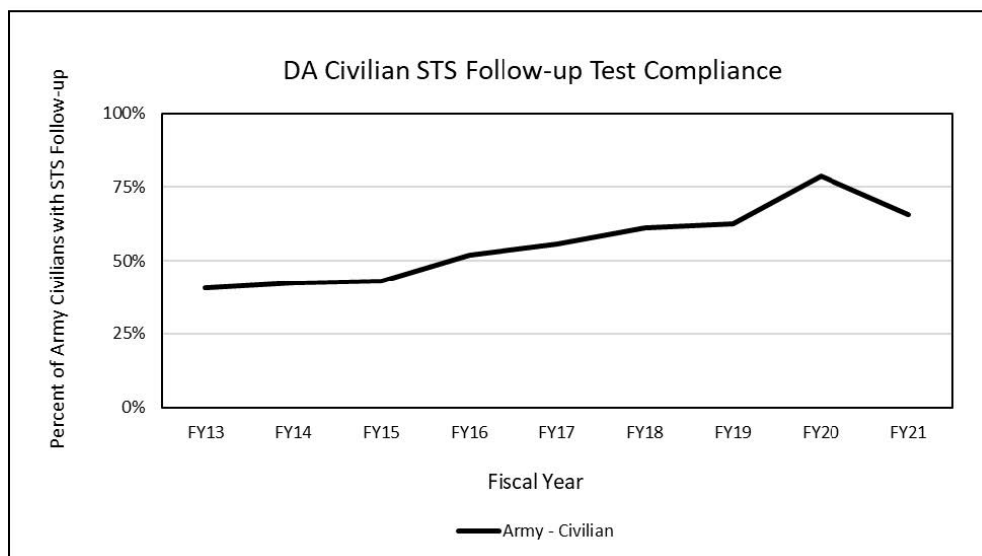
Follow-up test compliance (required for STS) shows continued improvement for all components except for the Reserve for FY13-FY21. Overall follow-up test compliance (all Soldiers) improves from 20.7% in FY13 to 42.2% in FY21 and remains essentially stable for FY20 to FY21 (Graph 19). Failure to conduct follow-up testing will: 1) Elevate STS rates as the initial STS will be identified every year until follow-up testing is performed and a new baseline is established, if required, and 2) Prevent accurate identification of PTS and TTS, i.e., increase PTS and decrease TTS rates.

Graph 19. Soldier STS Follow-up Test Compliance



The DA civilian follow-up test compliance (required for STS) continues to show increased compliance rates since FY13. Overall compliance increases from 40.6% in FY13 to 65.6% in FY21 (Graph 20). However, the DA civilian follow-up test compliance decreases from 78.6% in FY20 to 65.6% in FY21.

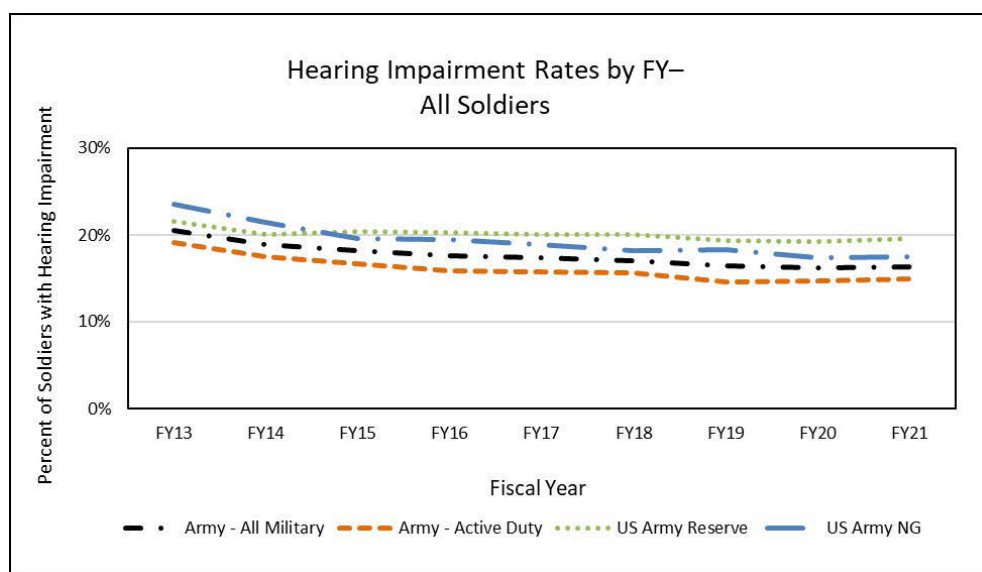
Graph 20. DA Civilians STS Follow-up Test Compliance



Hearing Impairment

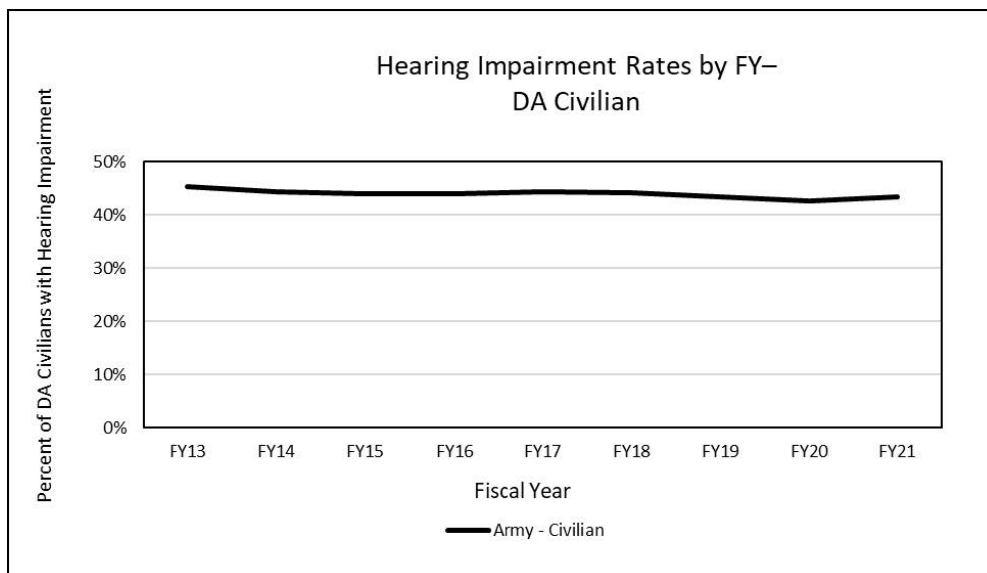
The percentage of all Soldiers with hearing impairment show a slight decrease for all Army components combined and individually since FY13. The percentage of all Soldiers with hearing impairment decreases from 20.5% in FY13 to 16.4% in FY21 for all Army components combined (Graph 21). Rates of hearing loss for Soldiers for Army components combined and individually remain stable from FY20 to FY21.

Graph 21. Hearing Impairment Rates by FY – All Soldiers



The percentage of DA civilians with hearing impairment remains high with only marginal improvement from FY13 to FY21. The percentage of DA civilians with hearing impairment decreases from 45.4% in FY13 to 43.3% in FY21 (Graph 22).

Graph 22. Hearing Impairment Rates by FY – DA Civilians

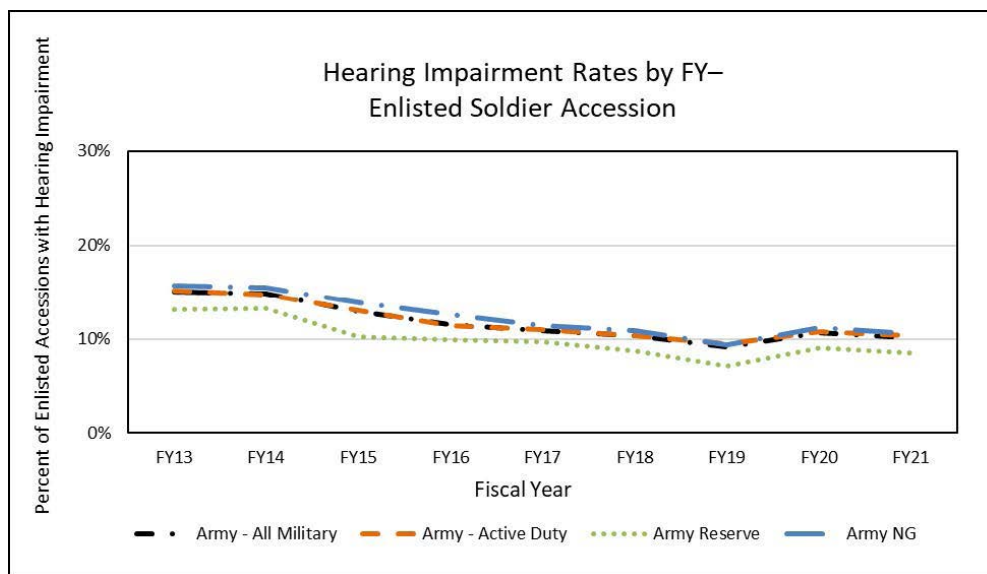


Hearing Impairment – Enlisted Soldier Accession Data

All Soldiers receive a hearing test as part of basic training at their entrance to military service.⁷ Those 'reference audiograms' are used to determine the percentage of new recruits who come into the Army with hearing impairment, i.e., hearing worse than 25 dB HL at any test frequency. The percentage of enlisted Soldier accessions with hearing impairment decreases from 15.1% in FY13 to 10.1% in FY21 for Soldiers from all Army components combined (Graph 23). There is a negligible decrease in enlisted Soldier hearing impairment (all Army components combined) in FY21 (10.1%) compared to FY20 (10.7%).

⁷ The military services refer to training at the onset of military service as Basic Combat Training (Army), Basic Training (Navy), Recruit Training (Marine Corps), and Basic Military Training (Air Force). For the purposes of this report the initial training of service members at entry to military service will be referred to as basic training.

Graph 23. Hearing Impairment Rates by FY – Enlisted Soldier Accessions



VA Auditory Threshold Disability Criteria

The percentage of Soldiers meeting established VA auditory threshold disability criteria remains stable for all Army components. The percentage of Soldiers potentially eligible for VBA service-connected disability compensation for hearing loss decreases from 6.4% in FY13 to 4.6% in FY21 for all Army components combined (Graph 24). The decrease in eligibility for VBA disability benefits for hearing loss based on auditory threshold disability criteria is consistent for all Army components (AD, USAR, ARNG) from FY13 to FY21 with a negligible decrease from FY20 (4.7%) to FY21 (4.6%).

Graph 24. VA Auditory Threshold Disability Criteria – All Soldiers

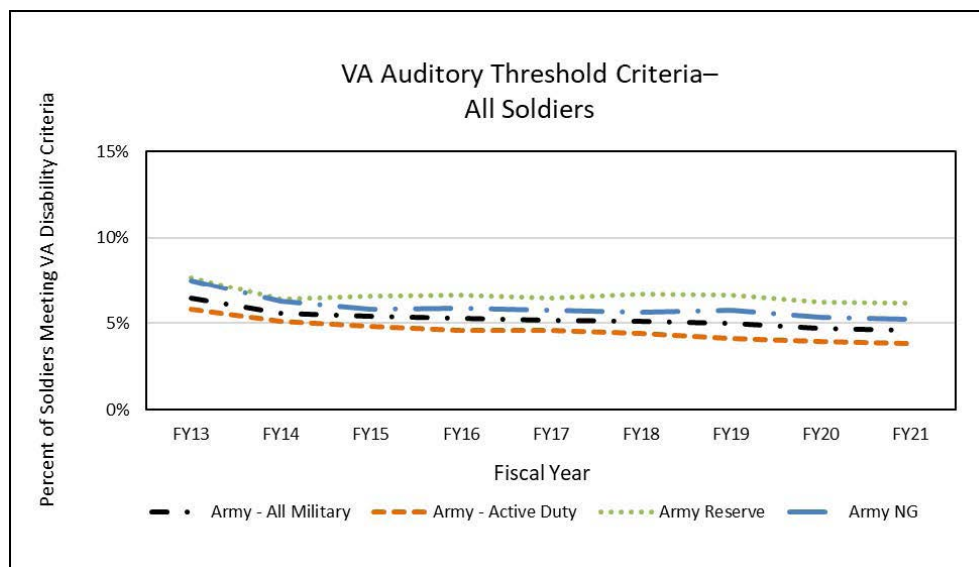


Table 3. Data Summary – Army - Source: DOEHRS-HC DR

U.S. Army										
Chart Title	Category	Percent								
		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Threshold Shift Rates - All Soldiers	STS	12.9	12.9	13.9	13.7	13.1	12.8	13.2	13.5	13.1
	TTS	1.5	1.6	1.3	1.5	2.0	2.2	2.4	2.3	2.4
	PTS	11.2	11.1	12.4	12.1	10.7	10.3	10.5	10.8	10.5
Threshold Shift Rates - AD Soldiers	STS	10.5	9.6	9.7	9.7	8.8	8.1	8.4	8.5	8.1
	TTS	2.1	2.3	2.3	2.5	3.3	3.3	3.4	3.2	3.3
	PTS	8.2	7.2	7.3	7.1	5.1	4.5	4.7	4.9	4.6
Threshold Shift Rates - ARNG Soldiers	STS	16.9	16.9	16.4	16.1	15.6	15.4	15.7	15.8	15.7
	TTS	0.4	0.5	0.4	0.5	1.0	1.5	1.8	1.9	2.0
	PTS	16.3	16.1	15.8	15.3	14.2	13.6	13.4	13.5	13.5
Threshold Shift Rates - USAR Soldiers	STS	14.8	19.1	19.9	19.6	19.9	20.0	21.3	21.2	23.3
	TTS	1.5	0.7	0.3	0.3	0.5	0.6	0.7	0.5	0.7
	PTS	13.1	18.3	19.3	19.1	19.0	20.3	21.4	22.3	21.1
Threshold Shift Rates - DA Civilians	STS	18.5	18.3	19.6	18.9	19.0	18.7	18.9	17.5	18.3
	TTS	3.7	4.1	4.4	4.4	4.7	4.8	4.8	4.4	4.6
	PTS	14.4	13.9	14.8	13.9	13.7	13.2	13.0	11.9	12.4
STS Follow-Up Test Compliance	All Soldiers	20.7	23.3	19.9	23.1	30.1	33.0	36.8	39.1	42.2
	Active Duty	37.6	45.8	48.6	52.6	69.9	75.6	76.3	76.5	79.8
	National Guard	2.9	5.6	5.9	9.0	13.7	19.3	25.9	31.0	33.2
	Reserve	14.9	7.7	4.2	5.9	7.5	9.1	11.1	12.2	14.4
	DA Civilians	40.6	42.3	43.1	51.8	55.6	61.2	62.7	78.6	65.6
Hearing Impaired	All Soldiers	20.5	18.9	18.2	17.7	17.4	17.1	16.5	16.3	16.4
	Active Duty	19.0	17.6	16.8	15.9	15.9	15.7	14.7	14.8	15.0
	National Guard	23.5	21.4	19.7	19.5	18.9	18.3	18.3	17.4	17.6
	Reserve	21.5	20.1	20.4	20.3	20.0	20.1	19.4	19.3	19.7
	DA Civilians	45.4	44.4	44.1	43.9	44.5	44.1	43.5	42.6	43.3
Hearing Impaired - Enlisted Soldier Accessions	All Soldiers	15.1	14.8	12.9	11.6	10.9	10.3	9.1	10.7	10.1
	Active Duty	15.2	14.7	13.1	11.5	10.9	10.4	9.4	10.8	10.3
	National Guard	15.7	15.5	13.9	12.6	11.4	10.9	9.4	11.2	10.6
	Reserve	13.1	13.2	10.2	9.9	9.7	8.7	7.1	9.0	8.5
VA Auditory Threshold Criteria	All Soldiers	6.4	5.6	4.4	5.3	5.2	5.1	5.0	4.7	4.6
	Active Duty	5.8	5.1	4.8	4.6	4.6	4.4	4.1	3.9	3.8
	National Guard	7.5	6.3	5.8	5.9	5.7	5.6	5.8	5.3	5.3
	Reserve	7.7	6.4	6.6	6.6	6.4	6.7	6.7	6.2	6.1

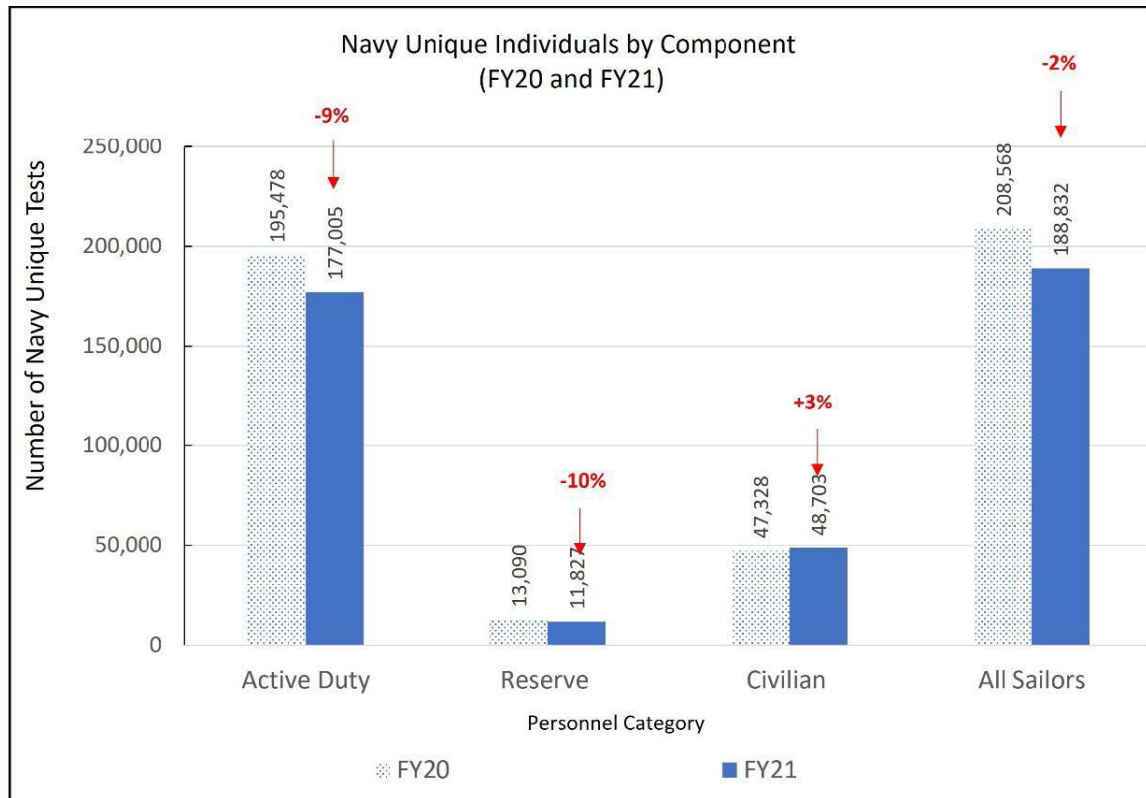
Appendix B: Hearing Health – Navy

The goal of the Department of Navy's Hearing Conservation and Noise Abatement initiative is to proactively prevent noise-induced hearing loss and ensure optimal auditory readiness. Sailors and Department of the Navy (DON) civilians are enrolled in the HCP. The following data represent the test results from all Sailors and DON civilians who received audiometric testing.

Unique Individual Hearing Tests by Personnel Category

The number of unique hearing tests by the Navy show a slight decrease in all Navy components except DON civilians show an increase during FY21 compared to FY20. Overall, there is a 2% decrease in testing for all Sailors and a 3% increase for DON civilians in FY 21 compared to FY20 (Graph 25). This decrease may be caused by limited access to hearing health services due to ongoing COVID-19 pandemic restrictions. Traditional audiometry conducted in test booths was limited by infection control measures for physical distancing, increased cleaning/sanitizing requirements, compliance with CDC guidance (CDC, 2003) regarding room air exchange, and reallocation of resources for pandemic efforts.

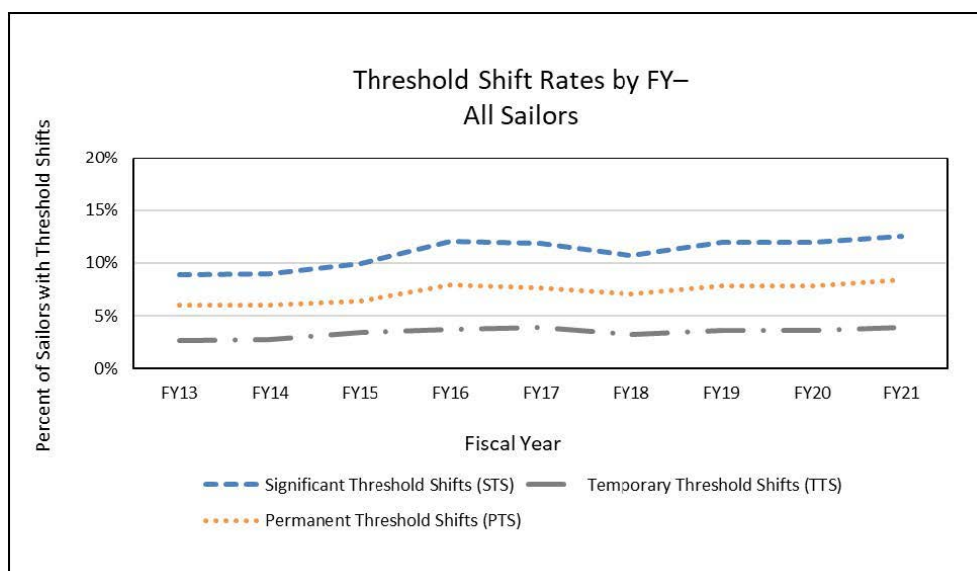
Graph 25. Navy Unique Individual Hearing Tests by Personnel Category (FY20 and FY21)



Significant Threshold Shift Rates by FY

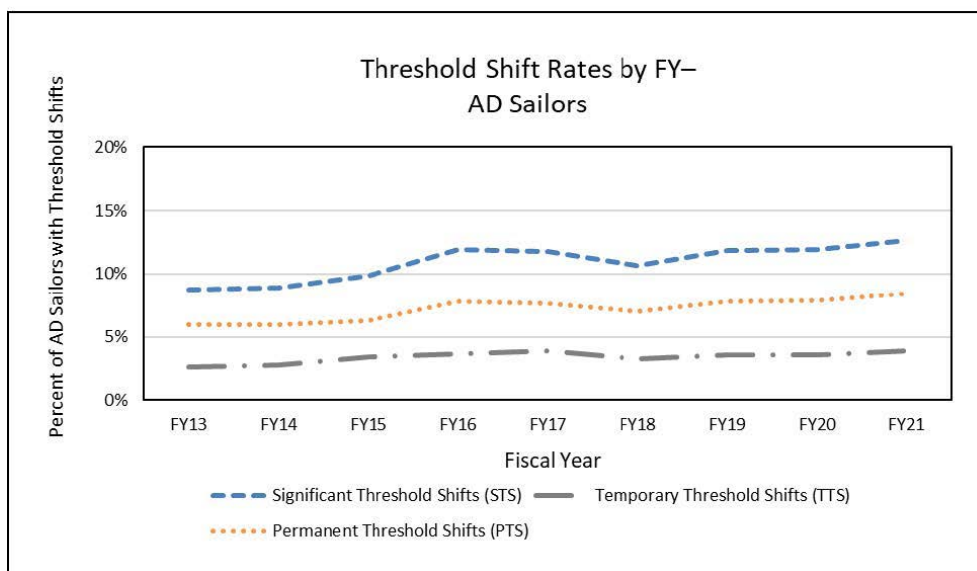
Sailor STS, TTS, and PTS rates remain essentially stable for all Navy components from FY20 to FY21. Threshold shift rates for all Sailors show 12.5% STS, 3.9% TTS, and 7.6% PTS rates in FY21 (Graph 26).

Graph 26. Threshold Shift Rates by FY – All Sailors



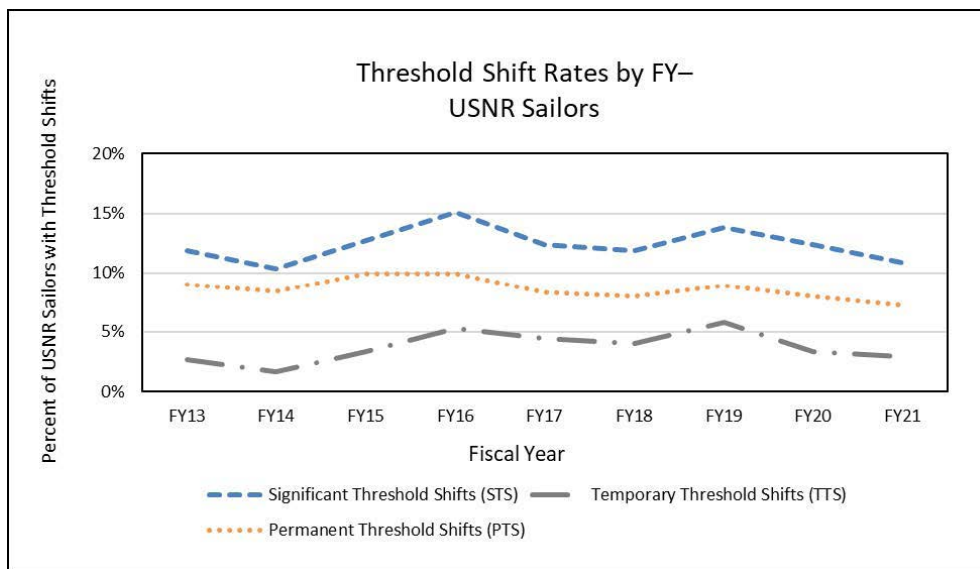
The AD Sailor threshold shift rates show a marginal increase from FY20 to FY21. Threshold shift rates for AD Sailors indicate 12.7% STS, 3.9% for TTS, and 8.4% PTS rate in FY21 (Graph 27).

Graph 27. Threshold Shift Rates by FY - AD Sailors



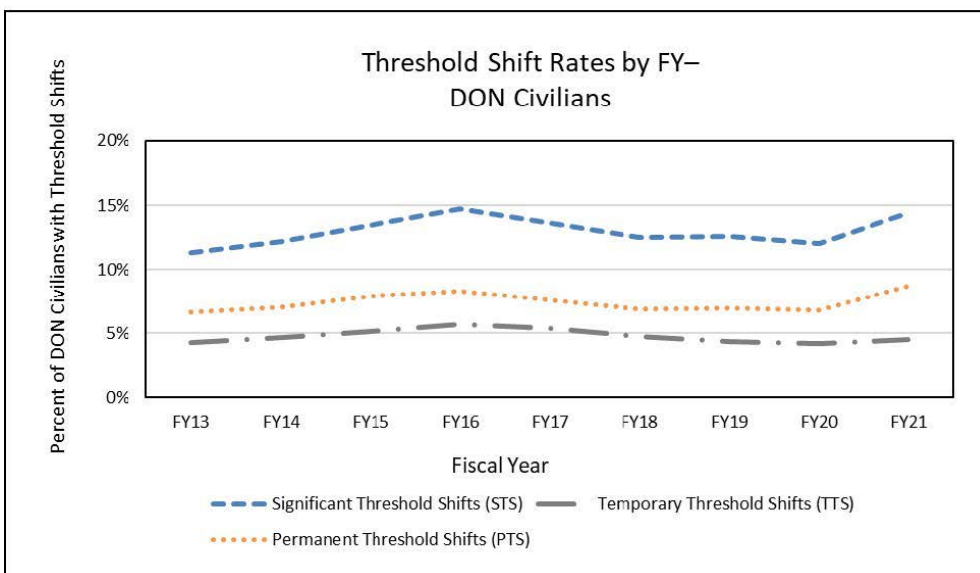
Navy Reserve (USNR) Sailor threshold shift rates decrease slightly from FY20 to FY21. Overall threshold shift rates for FY21 are: 10.9% STS, 2.9% TTS, and 7.2% PTS. The STS rates remain high possibly due to lack of STS follow-up testing. Failure to conduct STS follow-up testing prevents the accurate identification of TTS vs. PTS. It should also be noted that threshold shift rates for USNR Sailors appear to fluctuate from FY13 to FY19.

Graph 28. Threshold Shift Rates by FY - USNR Sailors



The DON civilian STS and PTS rates show an increase in FY21 compared to FY20. The DON civilian rates for FY21 are: 14.4% STS, 4.5% TTS, and 8.7% PTS (Graph 29). Improved STS follow-up testing for civilians ([Graph 31](#)) shows that about half of all STS identified are found to be PTS.

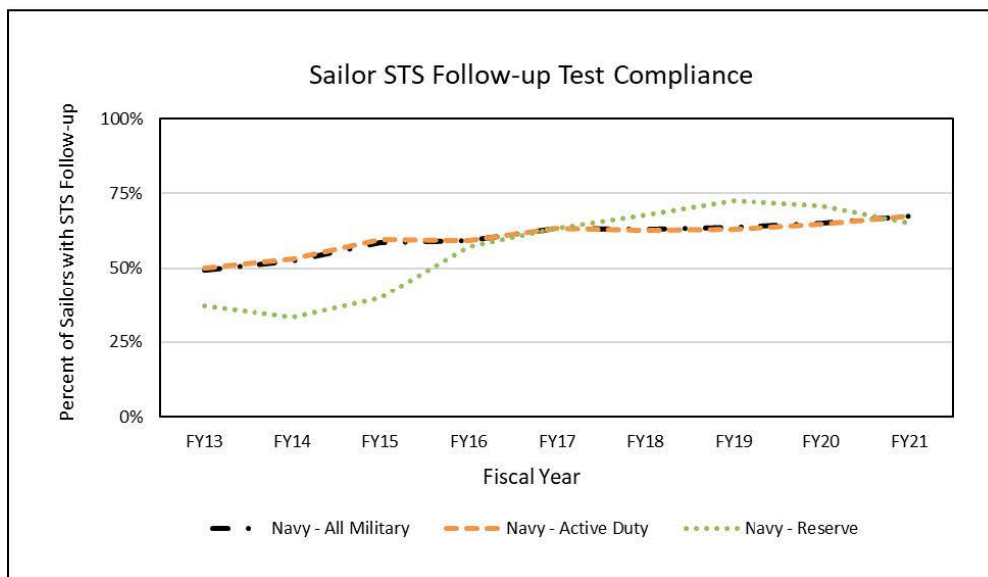
Graph 29. Threshold Shift Rates by FY - DON Civilians



Significant Threshold Shift Follow-up Test Compliance

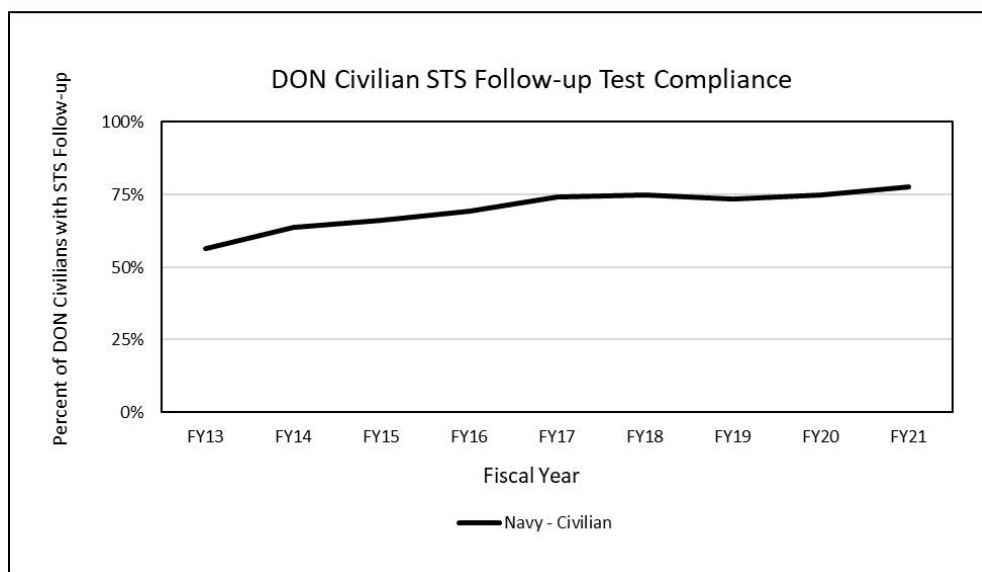
The STS follow-up testing remains stable in FY21 (Graph 30) when compared to FY20 for Sailors for all components. Overall compliance for follow-up testing (all components) increases from 49.5% in FY13 to 67.4% in FY21. The AD compliance increases to 67.5% in FY21 compared to 64.6% in FY20. The UNSR compliance increases from 37.2% in FY13 to 65.1 % in FY21; however, there is a decrease in compliance from FY20 (70.8%) to FY21 (65.1%).

Graph 30. Sailor STS Follow-up Test Compliance



The DON civilian STS follow-up test compliance shows a slight increase in FY21 compared to FY20. However, overall compliance improves from 56.3% in FY13 to 77.7% in FY21 (Graph 31).

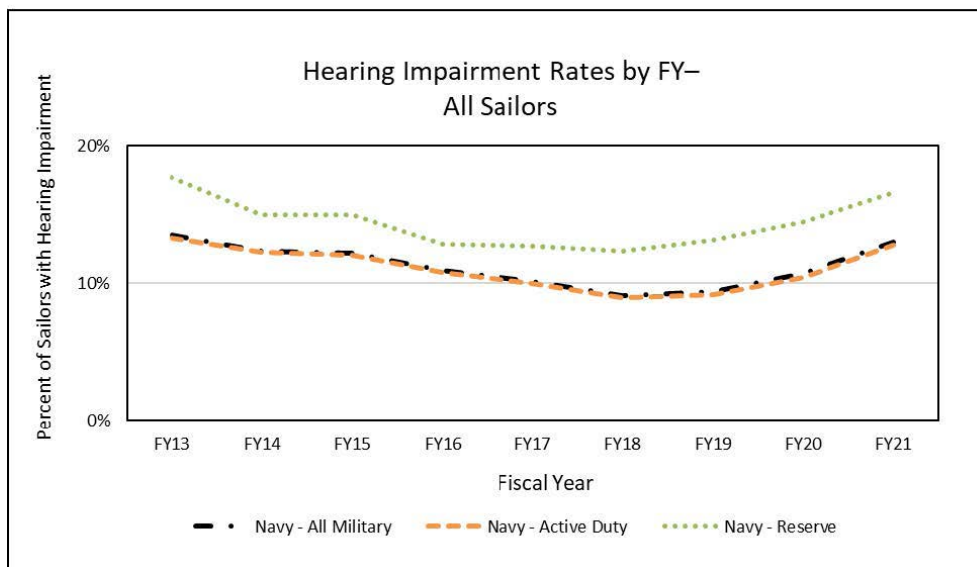
Graph 31. DON Civilian STS Follow-up Test Compliance



Hearing Impairment

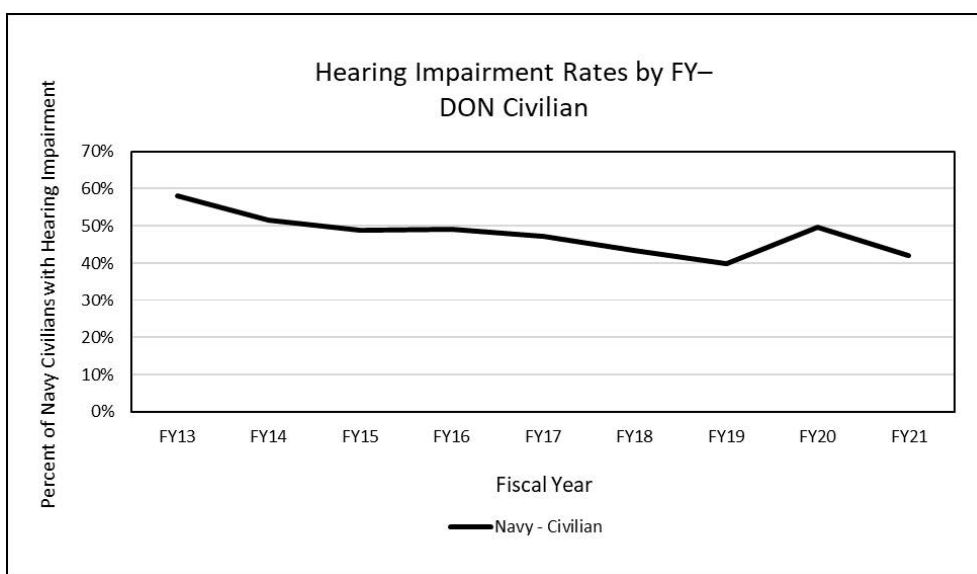
The percentage of all Sailors in FY21 with hearing impairment shows a gradual increase since FY19. Sailors with hearing impairment increases from 10.7% in FY20 to 13% in FY21. The USNR Sailors exhibit the greatest amount of hearing impairment with 17.7% in FY13 to 16.6% in FY21 with only a very marginal improvement in hearing over these years. Sailors with normal hearing thresholds in FY21 is 87%.

Graph 32. Hearing Impairment Rates by FY - All Sailors



The percentage of DON civilians with hearing impairment is high but decreases in FY21 compared to FY20. Data indicate that 58% of DON civilians have normal hearing in FY21. The percentage of DON civilians with hearing impairment decreases from 58% in FY13 to 42% in FY21.

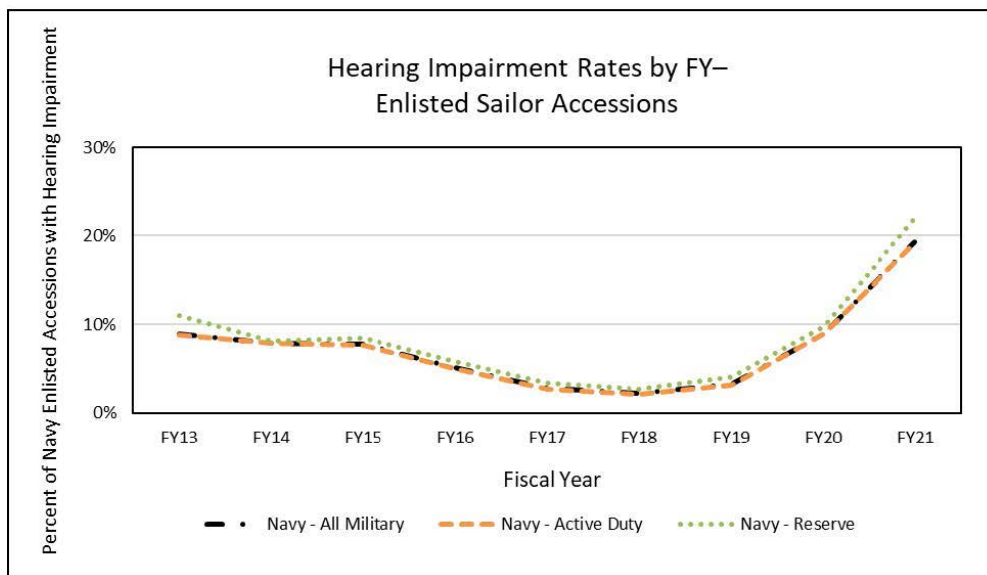
Graph 33. Hearing Impairment Rates by FY - DON Civilian



Hearing Impairment – Enlisted Accession Data

Department of the Navy (DON) accessions receive a hearing test as part of basic training when they enter military service. Those 'reference audiograms' are used to determine the percentage of all new recruits who come into the DON with hearing impairment (hearing worse than 25 dB HL at any test frequency). The percentage of enlisted sailor accessions with hearing impairment for all Navy components, show a significant increase to 19.3% in FY21 compared to 8.9% in FY20 (Graph 34). The percentage of USNR enlisted sailor accessions with hearing impairment increases from 11.0% in FY13 to 21.9% in FY21. In FY21, 80.7% of all enlisted Sailor accessions had normal hearing. The increase in hearing impairment in FY21 compared to FY19 may be due to a DON change in guidance allowing for enlistment hearing waivers.

Graph 34. Hearing Impairment Rates by FY - Enlisted Sailor Accessions



VA Auditory Threshold Disability Criteria

The percentage of Sailors meeting established VA auditory threshold disability criteria decreases only a negligible amount for all Navy components combined and separate over the past several years, FY14- FY21. The percentage of Sailors (all components combined) potentially eligible for VBA service-connected disability compensation for hearing loss shows a negligible decrease from 2.4% in FY13 to 2.0% in FY21. The highest percentage of Sailors potentially eligible for VBA service-connected disability compensation for hearing loss was in the USNR with 4.0% in FY13 to 3.3% in FY21. (Graph 35).

Graph 35. VA Auditory Threshold Disability Criteria – All Sailors

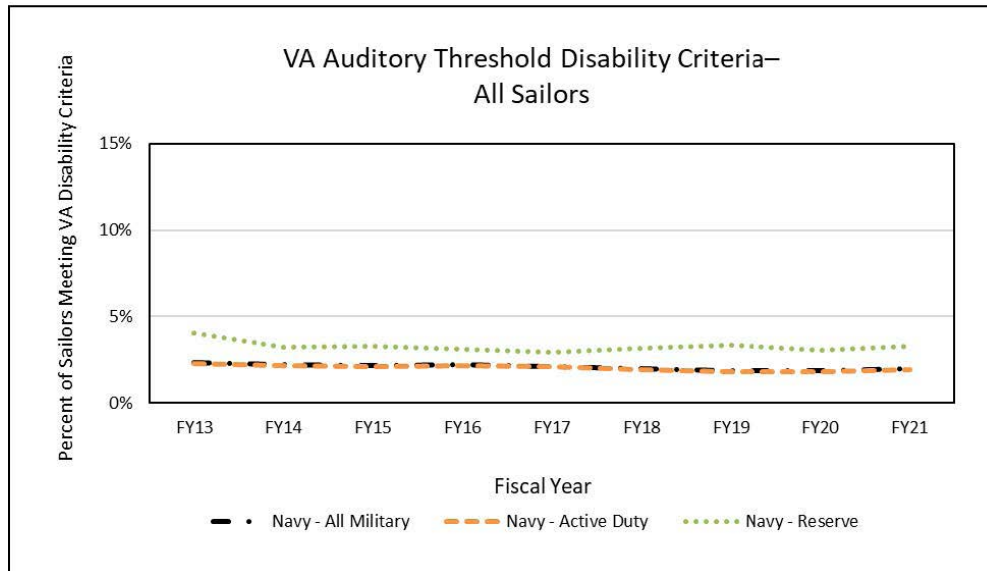


Table 4. Data Summary – Navy - Source: DOEHRS-HC DR

U.S. Navy										
Chart Title	Category	Percent								
		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Threshold Shift Rates - All Sailors	STS	13.5	12.6	13.4	15.1	12.3	9.6	10.5	11.6	13.2
	TTS	3.1	3.2	3.8	4.7	4.0	2.9	3.0	3.3	3.1
	PTS	9.9	9.0	9.2	9.9	8.1	6.4	7.1	8.0	9.9
Threshold Shift Rates - AD Sailors	STS	13.1	12.2	13.2	15.0	11.9	9.1	9.6	10.6	12.1
	TTS	3.6	3.6	4.5	5.5	4.5	3.2	3.5	3.8	3.8
	PTS	8.9	8.2	8.3	9.0	7.1	5.6	5.7	6.4	8.0
Threshold Shift Rates - USNR Sailors	STS	16.3	15.1	14.7	15.2	14.9	13.0	15.3	16.8	17.5
	TTS	0.3	0.3	0.4	0.5	0.8	0.7	0.7	0.7	0.5
	PTS	15.8	14.7	14.2	14.5	14.0	12.1	14.3	15.9	16.8
Threshold Shift Rates - USN Civilians	STS	19.2	18.5	20.2	22.1	16.8	15.6	14.5	12.8	19.4
	TTS	4.9	5.6	5.2	5.8	4.6	4.6	4.3	3.4	5.6
	PTS	13.8	12.1	14.4	14.9	11.2	9.9	9.2	8.5	12.9
STS Follow-Up Test Compliance	All Sailors	49.5	52.6	58.7	59.3	63.2	63.0	63.8	65.0	67.4
	Active Duty	50.1	53.2	59.5	59.4	63.2	67.2	63.1	64.6	67.5
	Reserve	37.2	33.3	39.9	57.4	63.2	67.8	72.5	70.8	65.1
	USN Civilians	56.3	63.9	66.1	69.2	74.1	75.0	73.6	74.8	77.7
Hearing Impaired	All Sailors	13.5	12.4	12.2	10.9	10.1	9.1	9.4	10.7	13.0
	Active Duty	13.3	12.3	12.1	10.8	10.0	9.0	9.2	10.5	12.8
	Reserve	17.7	15.0	15.0	12.8	12.7	12.4	13.2	14.5	16.6
	USN Civilians	58.0	51.4	48.9	49.1	47.2	43.6	39.8	49.6	42.0
Hearing Impaired - Enlisted Sailor Accessions	All Sailors	8.9	7.9	7.7	5.1	2.8	2.2	3.3	8.9	19.3
	Active Duty	8.8	7.8	7.7	5.0	2.7	2.2	3.2	8.9	19.2
	Reserve	11.0	8.2	8.4	5.8	3.4	2.7	4.1	9.7	21.9
A Auditory Threshold Criteria	All Sailors	2.4	2.2	2.2	2.2	2.1	2.0	1.9	1.9	2.0
	Active Duty	2.3	2.2	2.1	2.1	2.1	1.9	1.8	1.8	1.9
	Reserve	4.0	3.2	3.3	3.1	2.9	3.1	3.3	3.1	3.3

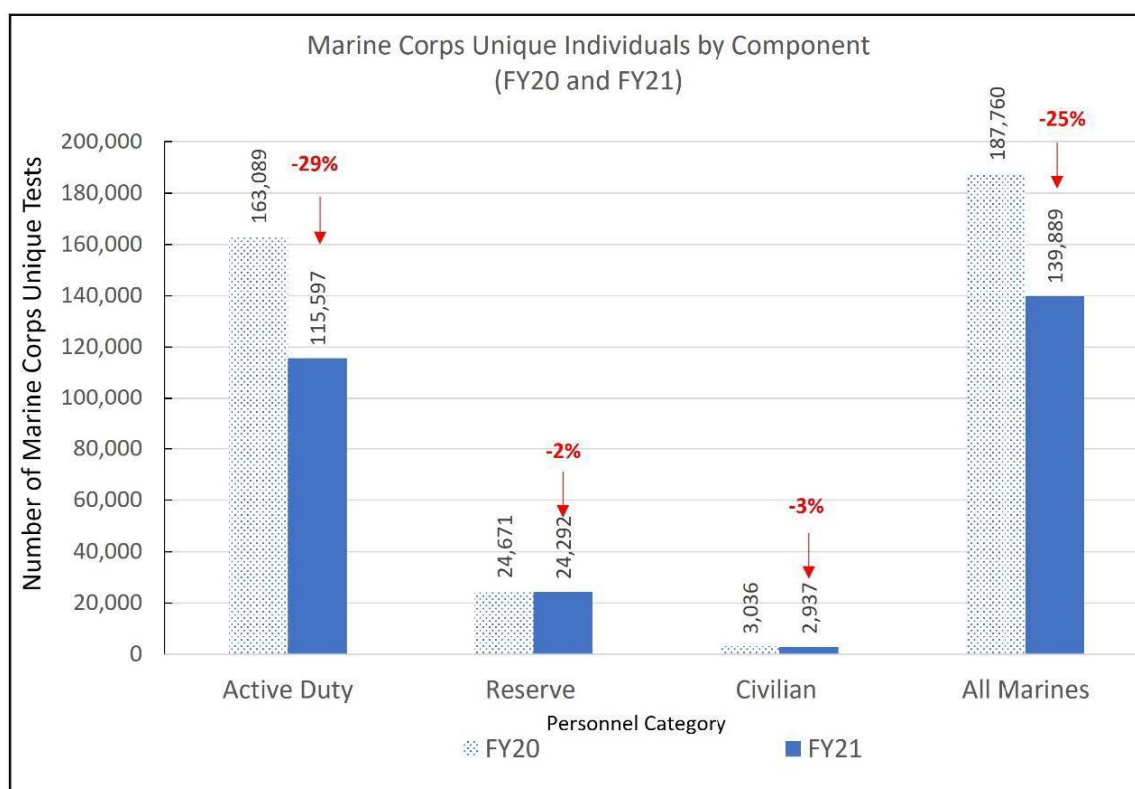
Appendix C: Hearing Health – Marine Corps

The goal of the Department of Navy's Hearing Conservation and Noise Abatement initiative is to proactively prevent noise-induced hearing loss and ensure optimal auditory readiness for Marines. The United States Marine Corps (USMC) enrolls all Marines in the HCP due to mission requirements. The USMC civilians are enrolled in the HCP based on their individual noise exposure.

Unique Hearing Tests by Personnel Category (FY20 and FY21)

The number of USMC unique hearing tests show a decrease in all components and for USMC civilians during FY21 compared to FY20. Overall, there was a 25% decrease in testing for all Marines and a 3% decrease for USMC civilian personnel in FY21 compared to FY20 (Graph 36). This decrease may be caused by limited access to hearing health services due to ongoing COVID-19 pandemic restrictions. Traditional audiometry conducted in test booths was limited by infection control measures for physical distancing, increased cleaning/sanitizing requirements, compliance with CDC guidance (CDC, 2003) regarding room air exchange, and reallocation of resources for pandemic efforts.

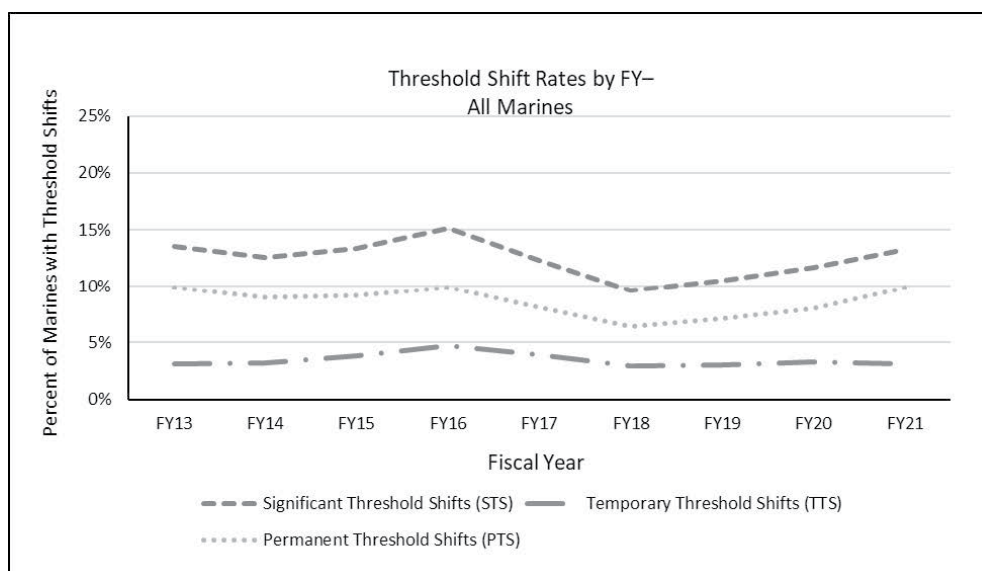
Graph 36. Marine Corps Unique Individual Tests by Personnel Category (FY20 and FY21)



Significant Threshold Shift Rates by FY

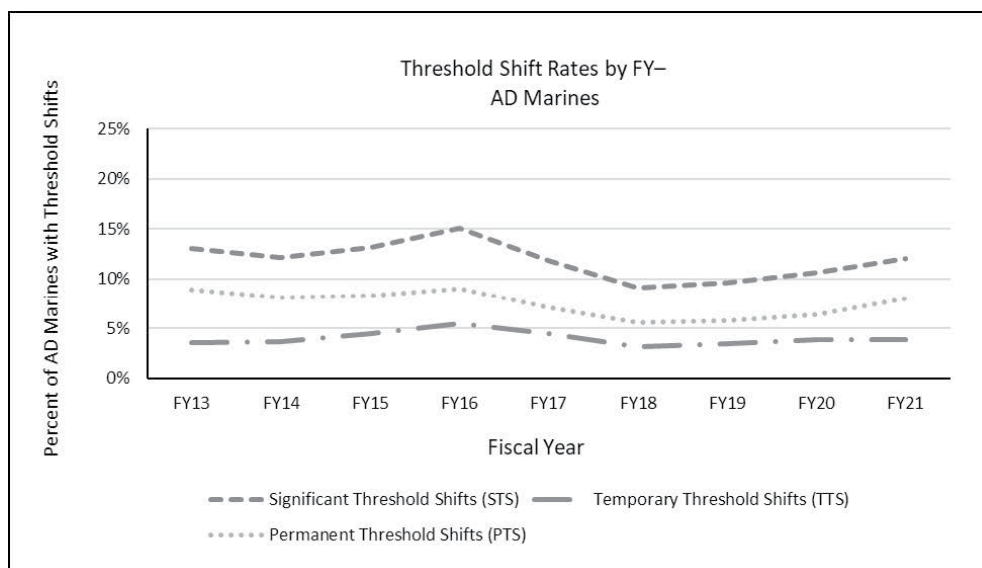
In FY21, USMC STS, TTS, and PTS show a slight increase when compared to FY20 STS, TTS, and PTS rates. Threshold shift rates for all Marines indicate 13.2% STS, 3.1% TTS, and 9.9% PTS rates in FY21 (Graph 37).

Graph 37. Threshold Shift Rates by FY - All Marines



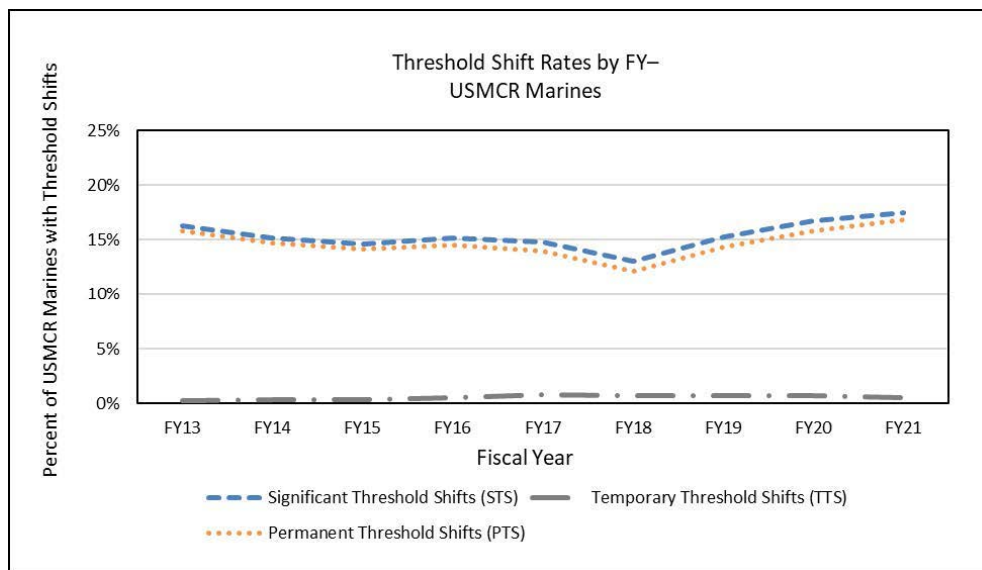
The AD Marines have the lowest PTS rates of all USMC components during FY13 - FY21. This may be due to improved follow-up testing compliance as seen in Graph 41 resulting in accurate identification of PTS and TTS. Threshold shift rates for AD Marines indicate 12.1% STS, 3.8% TTS, and 8.0% PTS rates in FY21. STS rates show a slight increase in FY21 (12.1%) compared to FY20 (10.5%). (Graph 38).

Graph 38. Threshold Shift Rates by FY - AD Marines



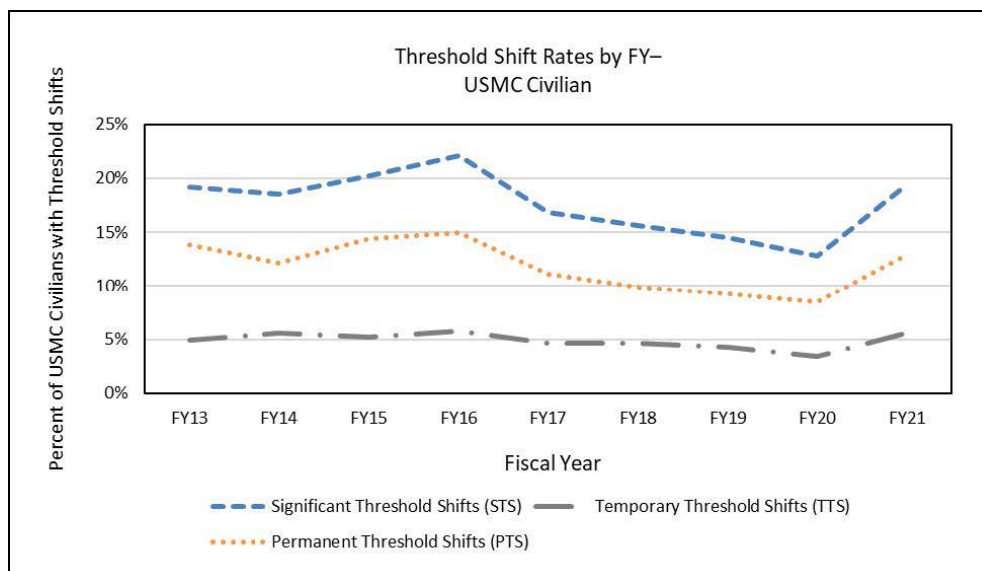
The USMC Reserve (USMCR) rates for FY21 are: 17.5% STS, 0.5% TTS, and 16.8% PTS. PTS rates show a slight increase in FY21 (16.8%) compared to FY20 (15.9%). STS and PTS rates remain high likely due to lack of STS follow-up testing shown in Graph 41. Failure to conduct STS follow-up testing prevents the accurate identification of TTS vs. PTS.

Graph 39. Threshold Shift Rates by FY – USMCR Marines



The USMC civilian STS and PTS rates show an increase in FY21 compared to FY20. The USMC civilian rates for FY21 are: 19.4% STS, 5.6% TTS, and 12.9% PTS (Graph 40).

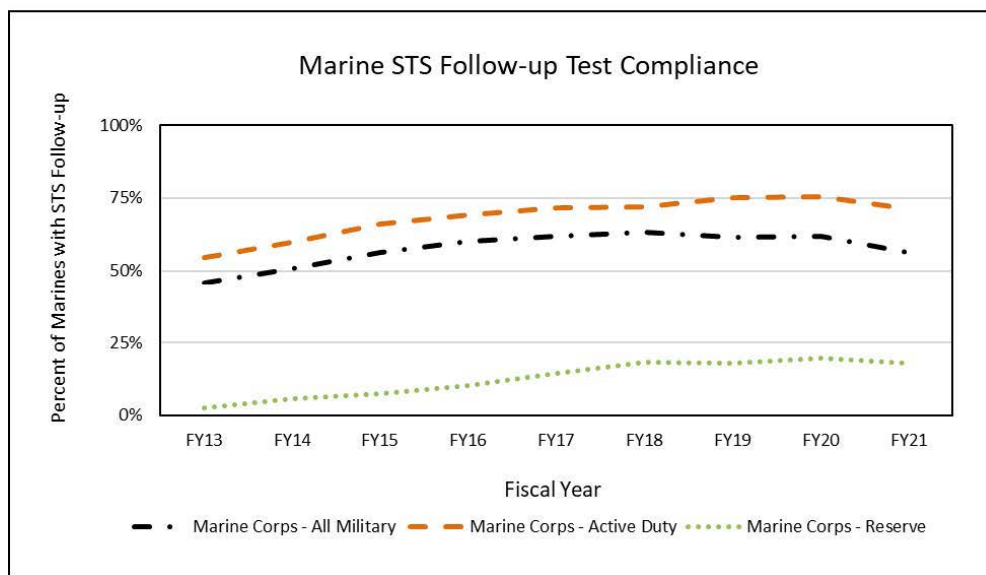
Graph 40. Threshold Shift Rates by FY – USMC Civilian



Significant Threshold Shift Follow-up Compliance

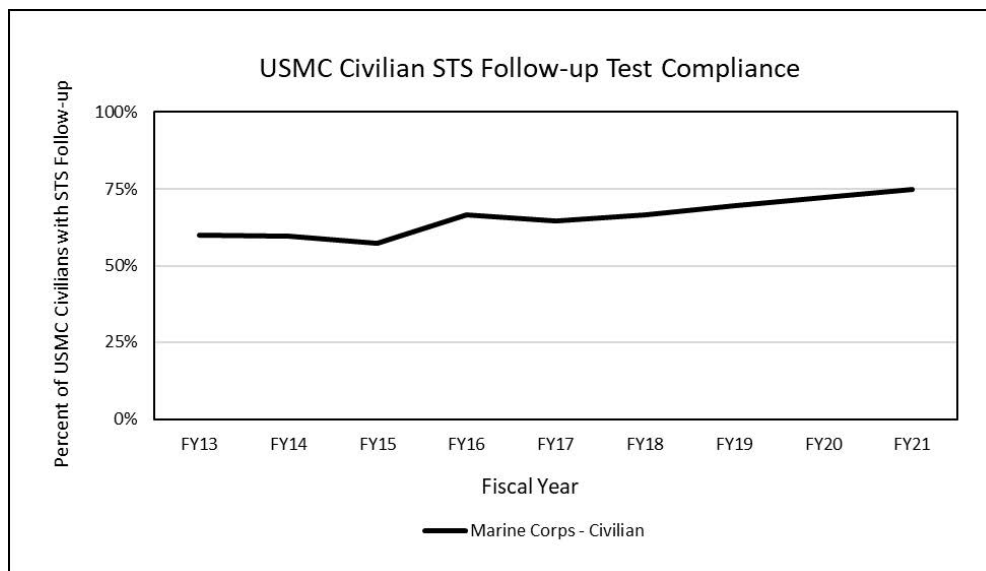
The STS follow-up testing compliance show a marginal decrease from FY20 to FY21 (Graph 41) for all individual Marine components and for all Marine components combined. Overall compliance for follow-up testing for all Marine components combined increased from 45.8% in FY13 to 56.4% in FY21. Follow-up testing compliance in the USMCR show an increase in compliance from 2.5% in FY13 to 18.0% in FY21. The AD Marine follow-up testing compliance increased from 54.5% in FY13 to 71.4% in FY21.

Graph 41. Marine STS Follow-up Test Compliance



The USMC civilian STS follow-up testing compliance continued to show improvement from 60.0% in FY13 to 74.7% in FY21 (Graph 42). There was a 2.6% increase in STS follow-up testing compliance from FY20 (72.1%) to FY21 (74.7%).

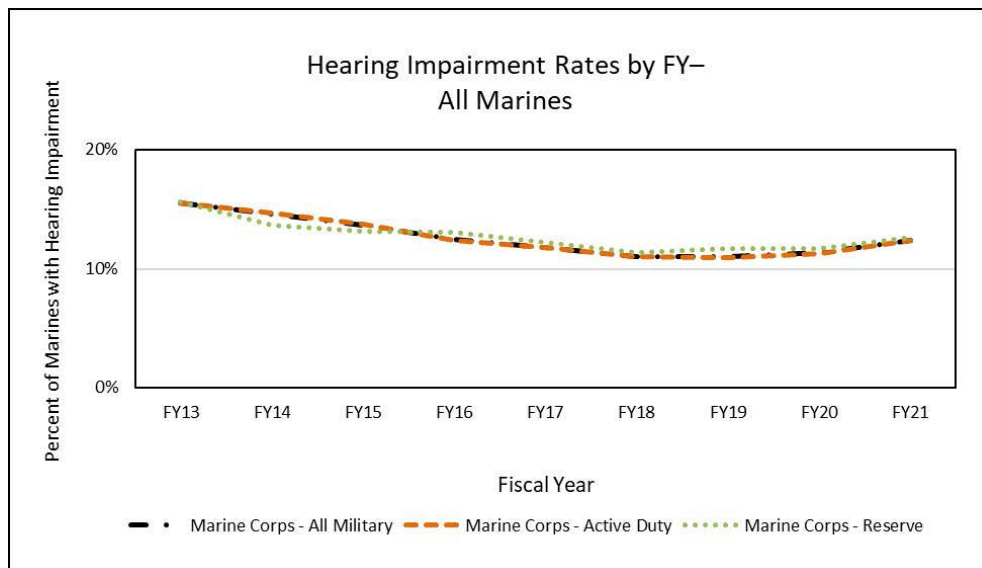
Graph 42. USMC Civilian STS Follow-up Test Compliance



Hearing Impairment

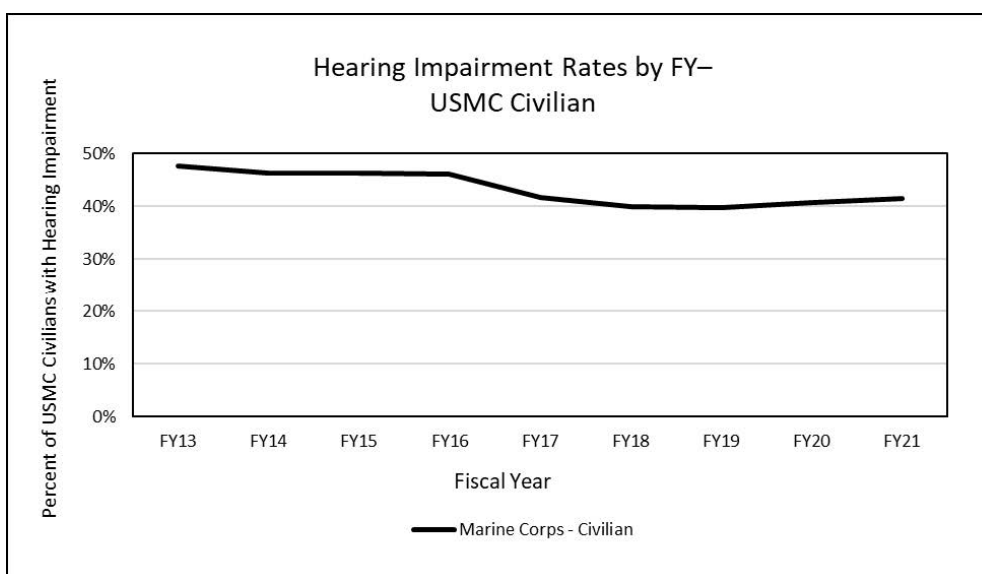
The percentage of Marines with hearing impairment (for combined and individual components) shows a marginal increase from FY20 to FY21. Marines (combined components) with hearing impairment decreased from 15.5% in FY13 to 12.4% in FY21 (Graph 43). Marines (all components combined) with normal hearing thresholds in FY21 was 87.6%.

Graph 43. Hearing Impairment Rates by FY - All Marines



The percentage of USMC civilians with hearing impairment is high but remains stable since FY17. Data indicate that 58.5% of USMC civilians have normal hearing in FY21. The percent of USMC civilians with hearing impairment decreased from 47.6% in FY13 to 41.5% in FY21 (Graph 44).

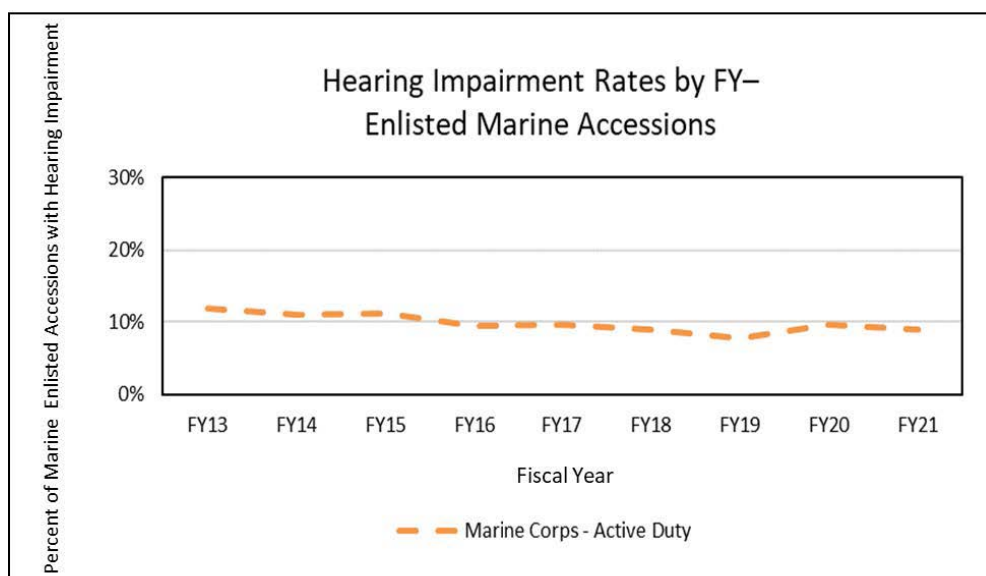
Graph 44. Hearing Impairment Rates by FY - USMC Civilian



Hearing Impairment – Enlisted Accession Data

Marines receive a hearing test as part of basic training when they enter military service. Those 'reference audiograms' are used to determine the percentage of all new recruits who enter the USMC with hearing impairment (hearing worse than 25 dB HL at any test frequency). The percentage of enlisted USMC accessions with hearing impairment for AD shows a decrease in enlisted hearing impairment of 11.8% in FY13 compared to 9.1% in FY21 (Graph 45). The percentage of USMCR enlisted accessions with hearing impairment is lacking for some years and is not reported here. In FY21, 90.9% enlisted Marine accessions had normal hearing.

Graph 45. Hearing Impairment Rates by FY - Enlisted Marine Accessions



VA Auditory Threshold Disability Criteria

The percentage of Marines meeting established VA auditory threshold disability criteria remains stable for all USMC components. The percentage of Marines (components combined) potentially eligible for VBA service-connected disability compensation for hearing loss decreases from 3.7% in FY13 to 2.4% in FY21 (Graph 46). Also, potential eligibility for VBA disability benefits for hearing loss is stable from FY20 to FY21 for Marines (combined and individual components).

Graph 46. VA Auditory Threshold Disability Criteria - All Marines

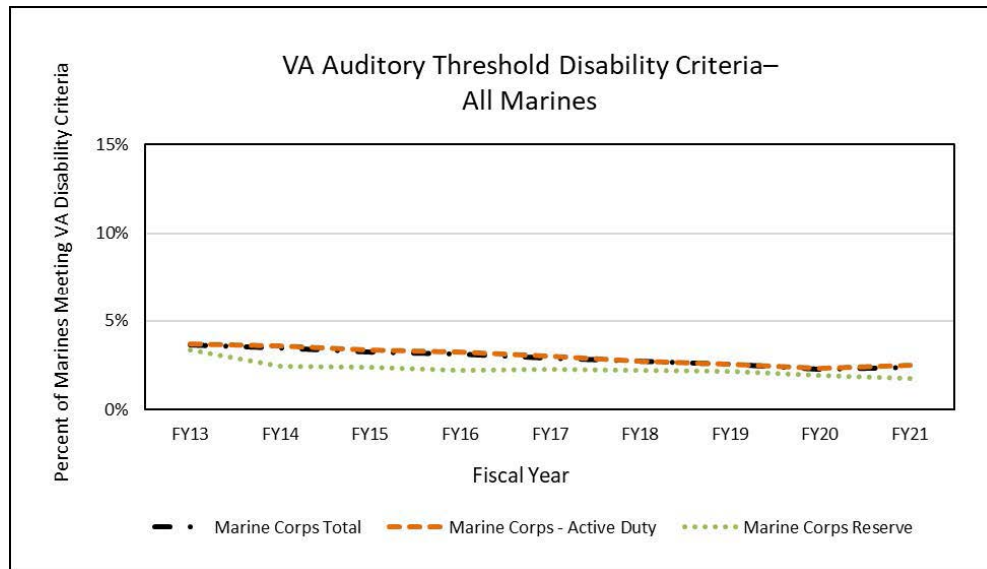


Table 5. Data Summary – Marine Corps - Source: DOEHRS-HC DR

U.S. Marine Corps										
Chart Title	Category	Percent								
		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Threshold Shift Rates - All Marines	STS	13.5	12.6	13.4	15.1	12.3	9.6	10.5	11.6	13.2
	TTS	3.1	3.2	3.8	4.7	4.0	2.9	3.0	3.3	3.1
	PTS	9.9	9.0	9.2	9.9	8.1	6.4	7.1	8.0	9.9
Threshold Shift Rates - AD Marines	STS	13.1	12.2	13.2	15.0	11.9	9.1	9.6	10.6	12.1
	TTS	3.6	3.6	4.5	5.5	4.5	3.2	3.5	3.8	3.8
	PTS	8.9	8.2	8.3	9.0	7.1	5.6	5.7	6.4	8.0
Threshold Shift Rates - USMCR Marines	STS	16.3	15.1	14.7	15.2	14.9	13.0	15.3	16.8	17.5
	TTS	0.3	0.3	0.4	0.5	0.8	0.7	0.7	0.7	0.5
	PTS	15.8	14.7	14.2	14.5	14.0	12.1	14.3	15.9	16.8
Threshold Shift Rates - USMC Civilians	STS	19.2	18.5	20.2	22.1	16.8	15.6	14.5	12.8	19.4
	TTS	4.9	5.6	5.2	5.8	4.6	4.6	4.3	3.4	5.6
	PTS	13.8	12.1	14.4	14.9	11.2	9.9	9.2	8.5	12.9
STS Follow-Up Test Compliance	All Marines	45.8	50.8	56.3	60.0	62.0	63.1	61.5	62.0	56.4
	Active Duty	54.5	59.6	66.2	69.3	71.8	71.8	75.1	75.5	71.4
	Reserve	2.5	5.5	7.4	10.1	14.5	18.3	18.0	19.7	18.0
	USMC Civilians	60.0	59.5	57.4	66.7	64.8	66.7	69.6	72.1	74.7
Hearing Impaired	All Marines	15.5	14.6	13.7	12.4	11.8	11.1	11.1	11.4	12.4
	Active Duty	15.5	14.7	13.7	12.4	11.8	11.1	11.0	11.3	12.4
	Reserve	15.6	13.7	13.2	13.1	12.2	11.4	11.7	11.8	12.7
	USMC Civilians	47.6	46.3	46.4	46.0	41.8	39.9	39.8	40.7	41.5
Hearing Impaired - Enlisted Marine Accessions	All Marines	11.8	11.0	11.2	9.3	9.6	8.9	7.8	9.7	9.1
	Active Duty	11.8	11.0	11.2	9.3	9.6	8.9	7.8	9.7	8.9
	Reserve	25.0	0.0	0.0	42.9	0.0	7.9	25.0	30.8	12.4
VA Auditory Threshold Criteria	All Marines	3.7	3.5	3.2	3.1	2.9	2.7	2.5	2.3	2.4
	Active Duty	3.7	3.6	3.3	3.3	3.0	2.7	2.6	2.3	2.5
	Reserve	3.3	2.5	2.4	2.2	2.2	2.2	2.2	1.9	1.8

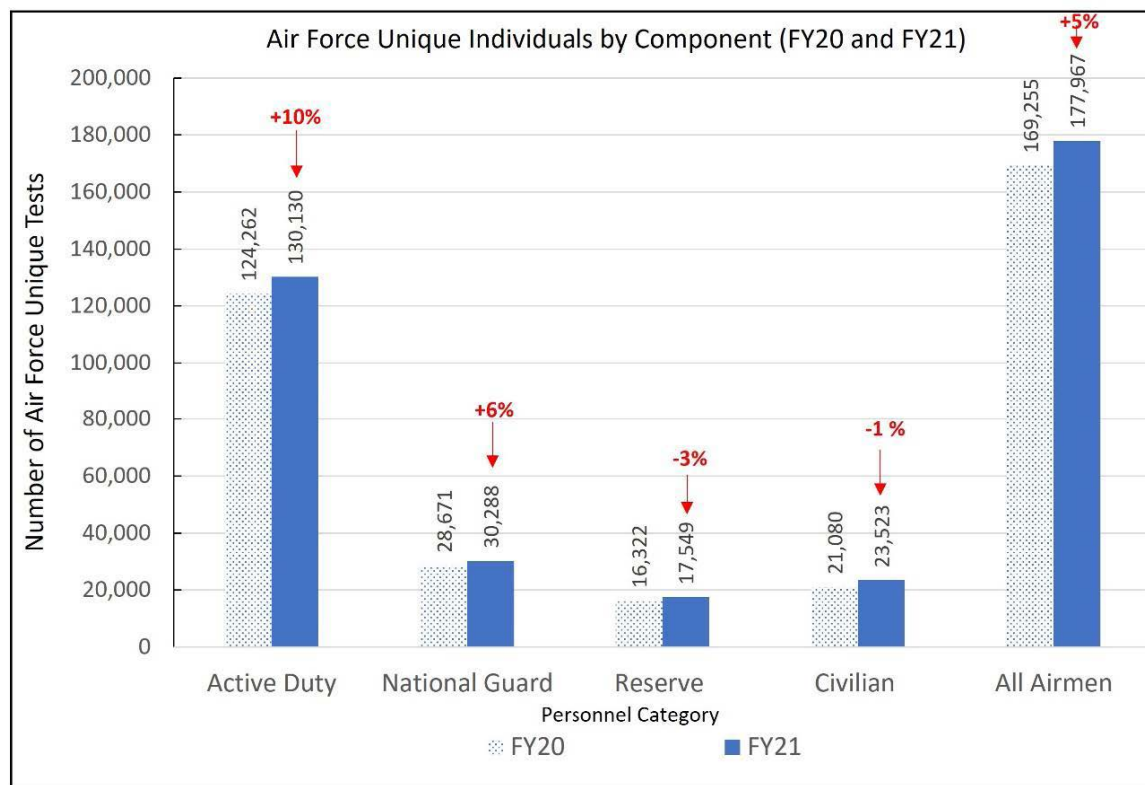
Appendix D: Hearing Health - Air Force

The Air Force (AF) HCP is a risk-based program, enrolling Airmen and civilians based on occupational exposure to hazardous noise. In 2015, the Air Force started hearing testing at basic training for all enlisted Airmen and officers, regardless of noise exposure risk. Likewise, the Air Force completes Separation Health Physical Exams (SHPE) for all Airmen, using the DOEHRS-HC system, regardless of HCP enrollment. As a result, hearing tests completed at the beginning and end of military service, regardless of HCP enrollment, shown in the graphs below, are not completely reflective of actual HCP effectiveness or hearing health of the total AF population.

Air Force Unique Hearing Tests by Personnel Category

The number of unique hearing tests by the Air Force show an increase in all components during FY21 compared to FY20. There was a 5% increase in testing for all Airmen and a 1.0% decrease for AF civilian personnel in FY21 compared to FY20 (Graph 47). This increase in testing for all Airmen is thought to be influenced by reduced COVID-19 pandemic restrictions resulting in easier access to hearing health services. Traditional audiometry conducted in test booths was limited by infection control measures for physical distancing, increased cleaning/sanitizing requirements, compliance with CDC guidance (CDC, 2003) regarding room air exchange, and reallocation of resources for pandemic efforts.

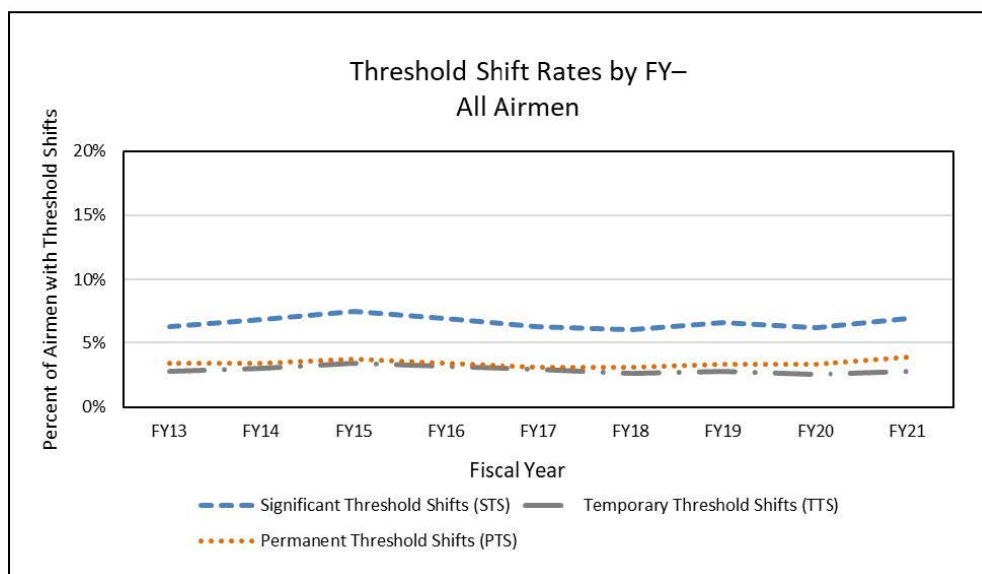
Graph 47. Air Force Unique Individual Hearing Tests by Personnel Category (FY20 and FY21)



Significant Threshold Shift Rates by FY

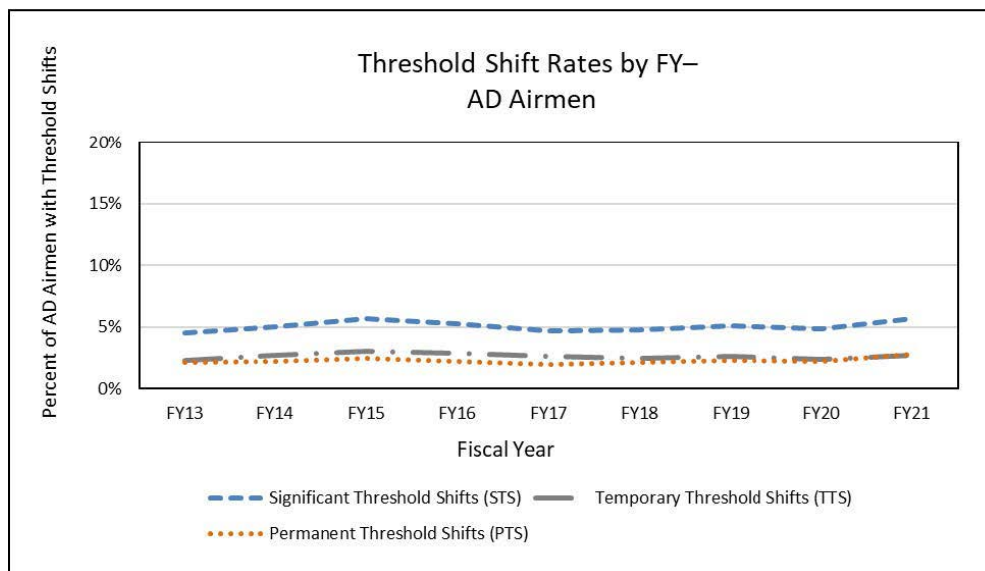
Threshold shift rates for all Airmen remain stable during FY13 - FY21. Threshold shift rates for all Airmen indicate 6.9% STS, 2.8% TTS, and 3.9% PTS rates in FY21 (Graph 48).

Graph 48. Threshold Shift Rates by FY - All Airmen



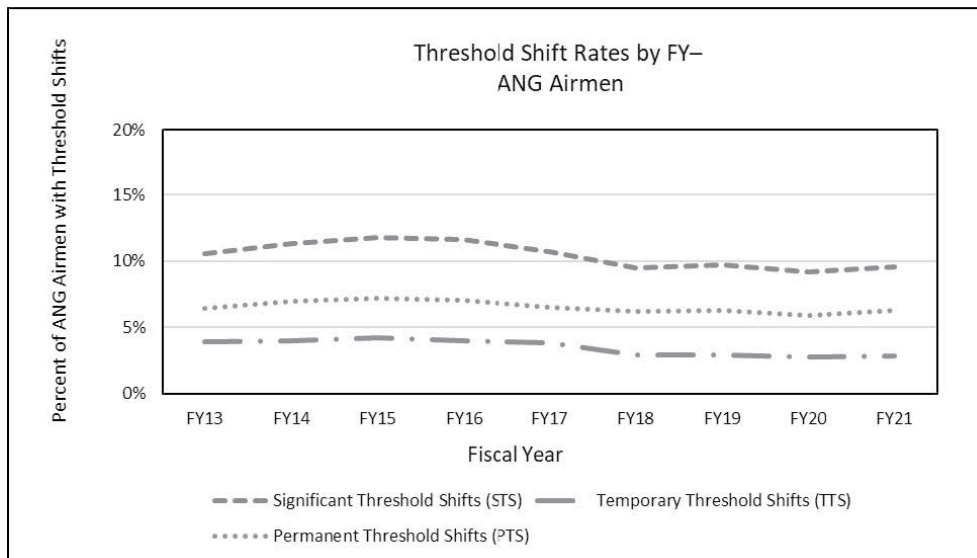
The AD Airmen have the lowest PTS rates of all Air Force components during FY13 - FY21. This may be due to improved STS follow-up testing compliance resulting in accurate identification of PTS and TTS as seen in Graph 53. Threshold shift rates for AD Airmen indicate 5.7% STS, 2.7% for TTS, and 2.8% PTS rate in FY21 (Graph 49). The STS, TTS, and PTS rates are stable from FY20 to FY21 for AD Airmen.

Graph 49. Threshold Shift Rates by FY - AD Airmen



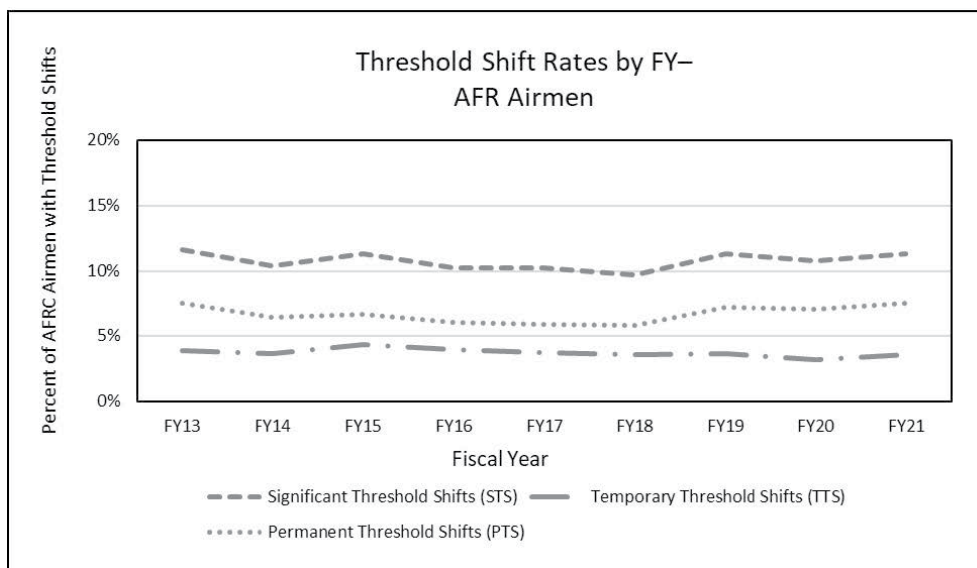
Air National Guard (ANG) threshold shift rates remain stable from FY13 to FY21. Threshold shift rates for FY21 are: 9.6% STS, 2.8% TTS, and 6.3% PTS (Graph 50). The STS, TTS, and PTS rates are stable for AD Airmen from FY20 to FY21.

Graph 50. Threshold Shift Rates by FY – ANG Airmen



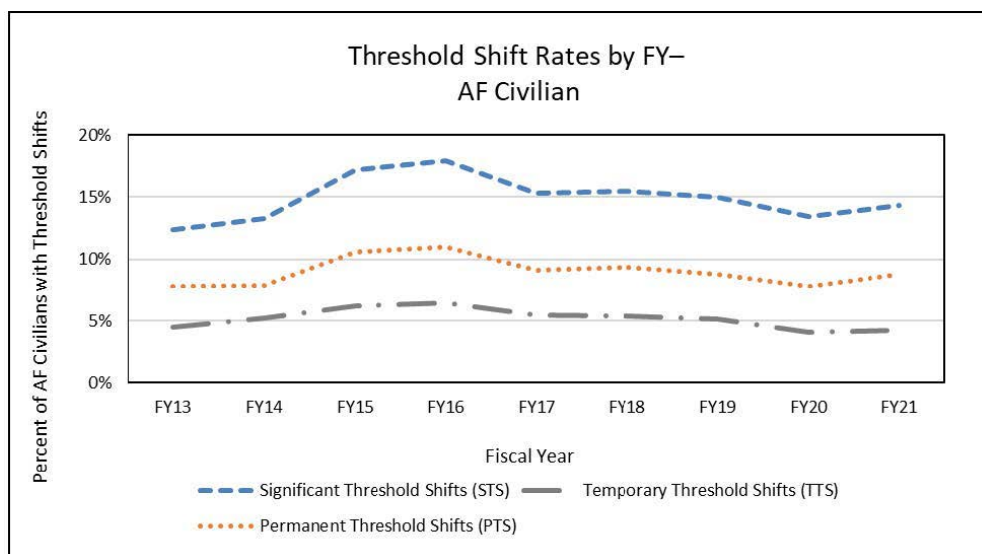
Air Force Reserve (AFR) all threshold shift rates (STS, TTS, and PTS), show a marginal increase from FY20 to FY21 (Graph 51). Threshold shift rates for FY21 are: 11.4% STS, 3.5% TTS, and 7.5% PTS. There is negligible to no improvement in STS, TTS, and PTS rates from FY13 to FY21 for AFR Airmen.

Graph 51. Threshold Shift Rates by FY - AFR Airmen



The AF civilian STS rates show increased rates from 12.4% in FY13 to 14.3% in FY21. There are negligible increases in STS, TTS, and PTS rates for these AF civilians from FY20 to FY21. The AF civilian threshold shift rates for FY21 are: 14.3% STS, 4.2% TTS, and 8.8% PTS (Graph 52). The AF civilian STS rates are higher than AF military components.

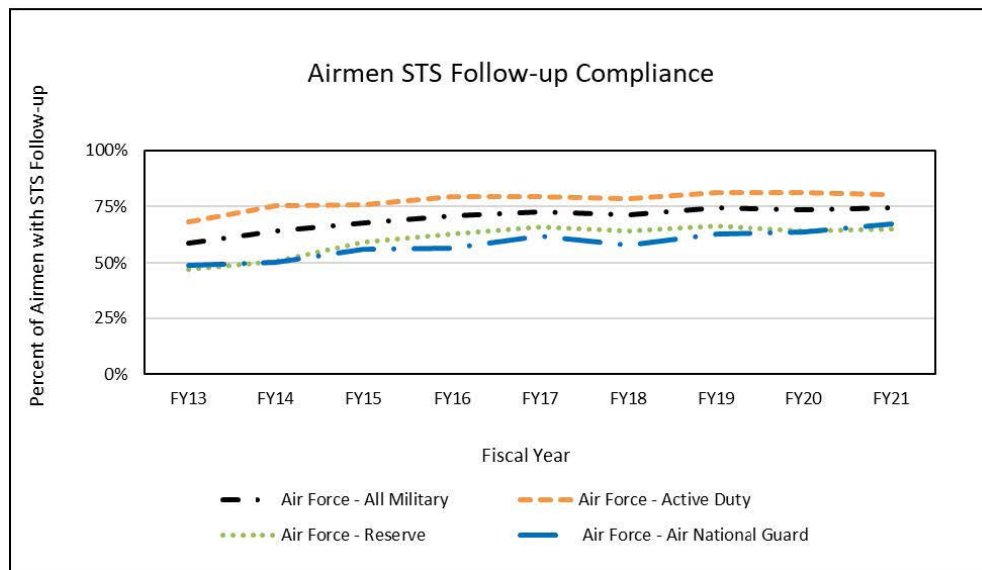
Graph 52. Threshold Shift Rates by FY – AF Civilian



Significant Threshold Shift Follow-up Compliance

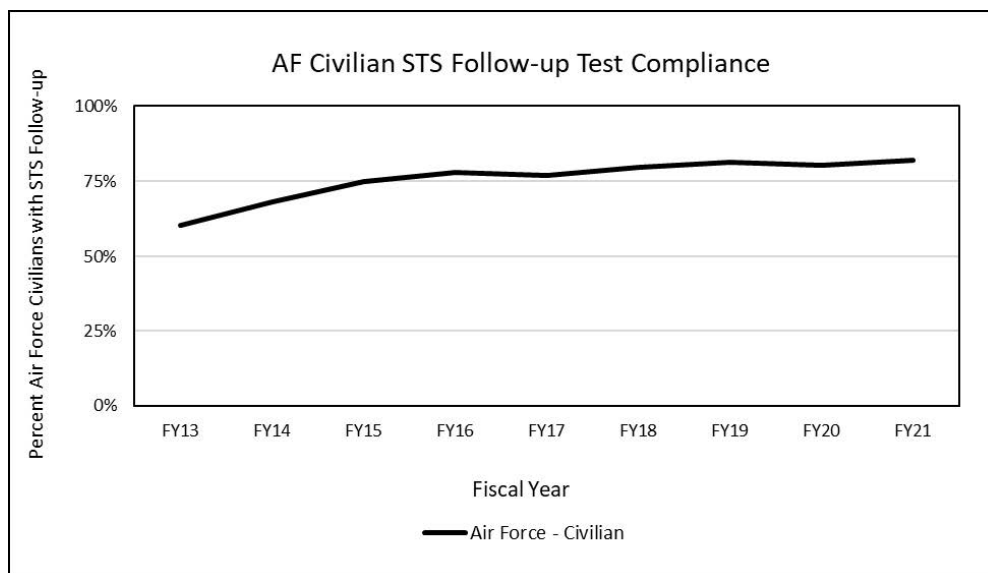
There is an increase in STS follow-up testing compliance in FY21 when compared to FY13 (Graph 53) for Airmen (combined components and individual components). Overall compliance for STS follow-up testing (all Airmen) increases from 58.8% in FY13 to 74.7% in FY21. Compliance for STS follow-up testing for AD Airmen increases from 68.2% in FY13 to 80.4% in FY21 with a marginal decrease in compliance from FY20 to FY21. Compliance in the ANG increases from 49.1% in FY13 to 67.2% in FY21. Compliance in the AFR increases from 47.0% in FY13 to 65.2% in FY21.

Graph 53. Airmen STS Follow-up Test Compliance



The AF civilian STS follow-up testing continues to show increased compliance from 60.4% in FY13 to 82.2% in FY21 (Graph 54). STS follow-up testing compliance is stable for AF civilians, FY19-FY21.

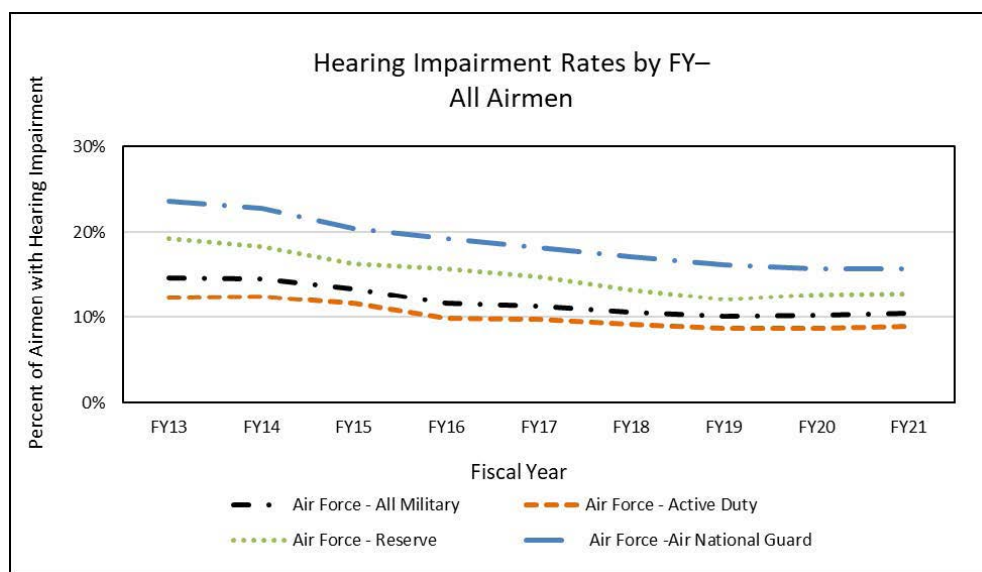
Graph 54. AF Civilian STS Follow-up Test Compliance



Hearing Impairment

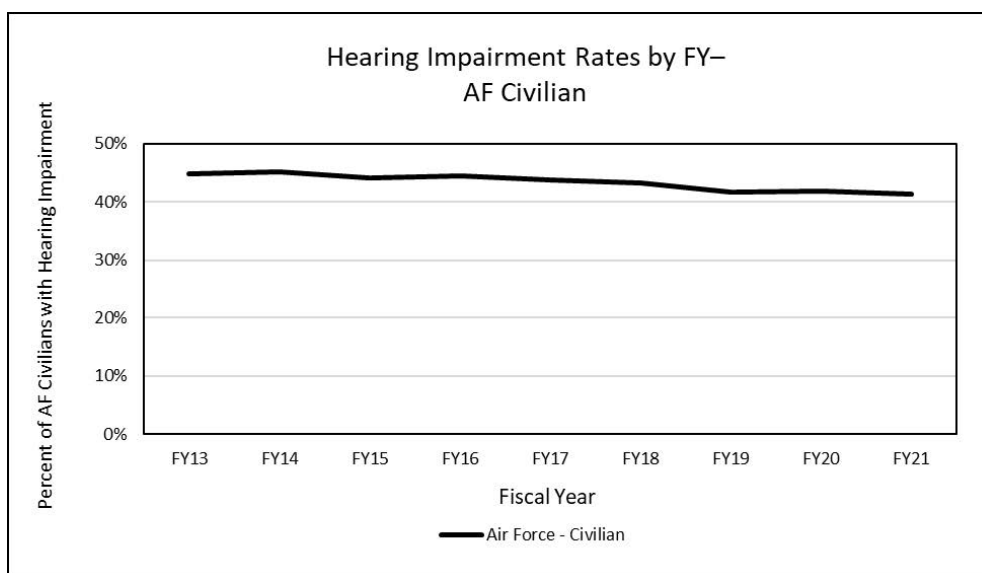
The percent of Airmen with hearing impairment is decreasing for all AF components. All Airmen with hearing impairment decreases from 14.6% in FY13 to 10.4% in FY21 (Graph 55). However, from FY20 to FY21 Airmen hearing impairment remains stable for all AF combined and individual components.

Graph 55. Hearing Impairment Rates by FY - All Airmen



The percentage of AF civilians with hearing impairment shows a marginal decrease from FY13 to FY21 and remains stable from FY20 and FY21. The percentage of AF civilians with hearing impairment decreases from 44.8% in FY13 to 41.3% in FY21. In FY21, 58.7% of civilians had normal hearing.

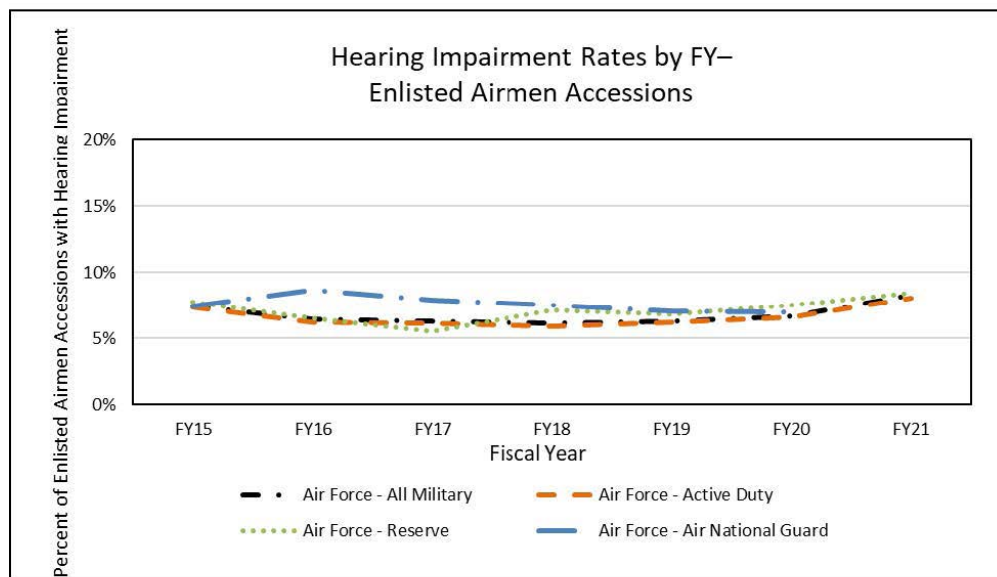
Graph 56. Hearing Impairment Rates by FY – AF Civilian



Hearing Impairment – Enlisted Accession Data

Airmen receive a hearing test as part of basic training when they enter military service. Those ‘reference audiograms’ are used to determine the percentage of all new recruits who enter the AF with hearing impairment (hearing worse than 25 dB HL at any test frequency). Enlisted airmen accessions did not receive audiometric testing prior to FY15. For all enlisted airmen accessions hearing impairment show a marginal increase from FY15 (7.4%) to FY21 (8.3%). The percentage of enlisted AD Airmen accessions with hearing impairment has a negligible increase from 7.4% in FY15 to 8.0% in FY21. The percentage of enlisted ANG airmen accessions with hearing impairment increases from 7.5% in FY15 to 9.9% in FY21. A negligible increase in hearing impairment is seen for enlisted AFR Airmen accessions from FY15 (7.7%) to FY21 (8.4%) in (Graph 57).

Graph 57. Hearing Impairment Rates by FY - Enlisted Airmen Accessions



VA Auditory Threshold Disability Criteria

The percentage of all Airmen potentially eligible for VBA service-connected disability compensation for hearing loss decreases slightly from 3.6% in FY13 to 2.2% in FY21 and remains stable from FY20 to FY21 (Graph 58). All individual AF component Airmen (AD, ANG, and AFR) had decreases in eligibility for VBA disability for hearing loss from FY13 to FY21 based on VA auditory threshold disability criteria; however, no change in eligibility is found from FY20 to FY21.

Graph 58. VA Auditory Threshold Disability Criteria – All Airmen

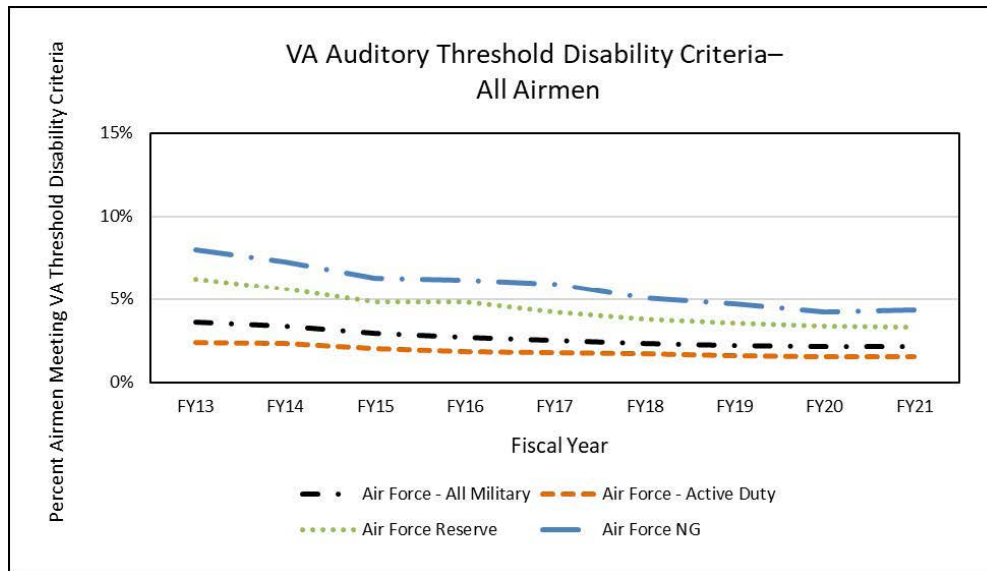


Table 6. Data Summary – Air Force - Source: DOEHS-HC DR

U.S. Air Force										
Chart Title	Category	Percent								
		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
Threshold Shift Rates - All Airmen	STS	6.3	6.8	7.5	6.9	6.3	6.0	6.6	6.2	6.9
	TTS	2.8	3.0	3.4	3.2	2.9	2.6	2.8	2.6	2.8
	PTS	3.4	3.4	3.7	3.4	3.1	3.1	3.4	3.3	3.9
Threshold Shift Rates - AD Airmen	STS	4.5	5.0	5.7	5.3	4.7	4.8	5.1	4.8	5.7
	TTS	2.3	2.7	3.1	2.9	2.6	2.5	2.6	2.4	2.7
	PTS	2.0	2.2	2.5	2.3	2.0	2.1	2.3	2.2	2.8
Threshold Shift Rates - ANG Airmen	STS	10.6	11.3	11.8	11.6	10.7	9.5	9.7	9.2	9.6
	TTS	4.0	4.0	4.2	4.0	3.9	2.9	2.9	2.8	2.8
	PTS	6.4	6.9	7.2	7.0	6.5	6.2	6.3	5.9	6.3
Threshold Shift Rates - AFR Airmen	STS	11.6	10.4	11.3	10.2	10.2	9.7	11.3	10.8	11.4
	TTS	3.9	3.6	4.3	3.9	3.7	3.5	3.6	3.1	3.5
	PTS	7.5	6.4	6.6	6.0	5.9	5.8	7.2	7.0	7.5
Threshold Shift Rates - AF Civilians	STS	12.4	13.3	17.2	17.9	15.3	15.5	15.0	13.4	14.3
	TTS	4.4	5.2	6.2	6.4	5.5	5.4	5.1	4.1	4.2
	PTS	7.8	7.9	10.6	11.0	9.1	9.3	8.8	7.8	8.8
STS Follow-Up Test Compliance	All Airmen	58.8	64.4	67.7	70.9	72.7	71.4	74.5	73.8	74.7
	Active Duty	68.2	75.4	76.0	79.7	79.5	78.5	81.5	81.2	80.4
	National Guard	49.1	50.4	56.0	56.8	61.9	57.9	62.8	63.6	67.2
	Reserve	47.0	50.6	59.5	63.0	65.9	64.2	66.6	64.0	65.2
	AF Civilians	60.4	68.0	74.8	77.9	76.8	79.7	81.2	80.4	82.2
Hearing Impaired	All Airmen	14.6	14.5	13.4	11.6	11.3	10.5	10.1	10.1	10.4
	Active Duty	12.3	12.4	11.5	9.9	9.7	9.1	8.7	8.6	8.9
	National Guard	23.6	22.8	20.4	19.3	18.2	17.1	16.2	15.7	15.8
	Reserve	19.3	18.3	16.4	15.8	14.7	13.2	12.1	12.6	12.8
	AF Civilians	44.8	45.2	44.1	44.4	43.8	43.3	41.6	41.9	41.3
Hearing Impaired - Enlisted Airmen Accessions	All Airmen	*	*	7.4	6.4	6.2	6.1	6.3	6.7	8.3
	Active Duty	*	*	7.4	6.2	6.2	5.9	6.2	6.6	8.0
	National Guard	*	*	7.5	8.7	7.9	7.5	7.1	7.0	9.9
	Reserve	*	*	7.7	6.5	5.5	7.1	6.8	7.5	8.4
VA Auditory Threshold Criteria	All Airmen	3.6	3.4	3.0	2.7	2.5	2.3	2.2	2.1	2.2
	Active Duty	2.4	2.3	2.0	1.9	1.8	1.7	1.6	1.5	1.5
	National Guard	8.0	7.3	6.3	6.2	5.9	5.1	4.7	4.2	4.4
	Reserve	6.2	5.6	4.8	4.8	4.2	3.8	3.5	3.4	3.3

*No Basic Training Hearing Test Mission

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