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**COMPARISON OF EXPERT JUDGEMENT VS. VETERAN SELF -REPORT OF
EXPOSURE AND MEDICAL CONCERNS OF US VETERANS OF CONFLICTS IN**

AFGHANISTAN AND IRAQ

By

VICTOR DE CANDIA

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ABSTRACT OF THE DISSERTATION
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Victor DeCandia

Dissertation Director

Michael Gochfeld

Background: The United States Department of Veterans Affairs - War Related Injury and Illness Study Center (WRIISC) located in East Orange, New Jersey collects data on both self-reported and expert identified exposure and medical concerns of US veterans who served in Afghanistan and Iraq. This study will compare the frequencies of self-reported and WRIISC identified concerns.

Materials and Methods: A total of 894 veterans completed a self-reported intake questionnaire developed by the WRIISC from June 2004 to January 2012. These questionnaires as well as formal medical evaluations were used by WRIISC medical personnel to assess medical and psychological function in US veterans who served in Afghanistan and Iraq. Data from the questionnaires and medical forms were abstracted into a database developed by the WRIISC.

Expected Results:

Patterns of exposure and medical concerns were analyzed using a percent agreement and sensitivity/specificity approach. It is expected that veteran

exposure and medical concerns endorsed on the WRIISC intake questionnaire would differ from the physical assessment of exposure and medical concerns identified during the WRIISC clinical evaluation.

Limitations: Recall bias of veterans while reporting exposure and medical concerns may be an issue. Information on both exposures and health were “yes”/”no” or “present” / “absent”, thus limiting quantitative interpretations.

Conclusions: There were unique exposure and medical concerns reported by US veterans who served in Afghanistan and Iraq. Overall, the largest number of exposure concerns that were identified by the WRIISC were Burning Trash (N=431, 54.1%), Sandstorms (N=365, 45.8%), and Petrochemicals (N=196, 24.6%). The largest number of medical concerns that were identified by the WRIISC were Musculoskeletal (N= 556, 6.6%), Neurological (N= 281, 22.6%) and Gastrointestinal (N=276, 33.0%).

Other key findings in this study included:

- In almost all cases the average number of exposure and medical concerns that were self-reported by veterans were more than were identified by the WRIISC
- The average number of veteran self-reported exposure concerns (mean=7.25, SD:1.92) was higher than those identified by the WRIISC (mean=4.11, SD:2.35)(t=27.84, df:1 p < .00001)

- The average number of veteran self-reported medical concerns (mean=6.79, SD:4.70) was higher than those identified by the WRIISC (mean=3.46, SD:1.69)($t=17.82$, $df:1$ $p < .00001$)
- If the WRIISC evaluation is considered the “Gold Standard”, the average difference between WRIISC identified vs. self-report medical concerns was less than for the exposure concerns
- The average difference between WRIISC identified and self-reported exposure concerns was (-43.9%). The largest difference for WRIISC evaluation vs. self-report exposure concerns was for Insects (-69.4%), The average difference between WRIISC identified and self-reported medical concerns was (-13.4%). The largest difference identified for WRIISC evaluation vs self-report medical concerns was Sleep Issues (-49.2%). Gastrointestinal (GI) concerns identified by WRIISC personnel (33.1%) were the same as the self-report percentage (33.7%)
- Veterans who had multiple deployments (three or more) self-reported a higher average number of exposure concerns (mean=8.50, SD:1.29) than those veterans who had only had one deployment (mean=6.65, SD:1.86) ($t=21.3$, $df:1$, $p < .00001$)
- The WRIISC identified a higher average number of exposure concerns in veterans with multiple deployments (three or more) (mean=8.00, SD:2.16), than those veterans with one deployment (mean=3.24, SD:1.81) ($t=41.30$, $df:1$, $p < .00001$)

- Veterans who had multiple deployments (three or more) self-reported a higher average number of medical concerns (mean=9.50, SD: 3.11) than those veterans who had only had one deployment (mean=5.78, SD:5.41) ($t=17.01$, $df:1$, $p < .00001$)
- Active duty personnel self-reported a higher average number of medical concerns (mean=7.46, SD:5.53) than Reserve military personnel (mean=4.89, SD:5.04) ($t= 8.31$, $df:1$, $p < .00001$)
- Air Force personnel self-reported the highest average number of both exposure concerns (mean=7.08, SD:1.98) and medical concerns (mean=7.54, SD:5.32)
- The WRIISC identified a higher average number of exposure concerns for veterans who served in both OEF & OIF (mean = 6.00, SD: 3.65) than those veterans who served in only OEF (mean = 3.67, SD: 1.15) ($t=6.108$, $df:1$, $p < .0001$). or OIF (mean = 3.44, SD:2.18) ($t=6.50$, $df:1$, $p < .00001$)
- Younger veterans (20-29 years old) (mean = 4.95, SD: 4.94) self-reported more medical concerns than older veterans (≥ 60 years old) (mean = 2.14, SD: 1.57) ($t= 4.12$, $df:1$ $p < .00001$)
- Females self-reported reported a higher average number (mean=7.63, SD:5.51) of medical concerns than males (mean=5.45, SD:5.27) ($t=2.45$, $df:1$, $p = .0156$)
- White veterans self-reported a higher average number of exposure concerns (mean = 7.39, SD: 1.80) than black veterans (mean = 6.53, SD:1.61) ($t= 6.0641$, $df:1$, $p < .00001$)

- White veterans self-reported a higher average number of medical concerns (mean = 7.46, SD: 6.05) than Black veterans (mean = 4.97, SD: 4.13) ($t=6.124$, $df:1$, $p<.00001$)
- Veterans who have ≤ 12 years of education self-reported a similar average number (mean = 7.31, SD: 1.48) of exposure concerns compared to veterans who have ≥ 16 years of education (mean = 6.25, 1.88) ($t=3.83$, $df:1$, $p=.0002$)
- The average number of medical concerns that were self-reported by Married veterans (mean=6.63, SD:5.85) was no different than those that were self-reported for veterans who were Never Married (mean = 6.51, SD:5.39) ($t = .29$, $dg:1$, $p = .770$)
- Those veterans who were Not Employed self-reported a similar average number of exposure concerns (mean=7.05, SD:1.79) than those who were Employed (mean=6.41, SD:1.99 ($t=4.7868$, $df:1$, $9 p<.00001$)

The value of self-reported questionnaires should continue to be evaluated as a useful tool in the treatment of those veterans who served in Afghanistan and Iraq. The use or value of the data obtained will depend on whether it is used for clinical decisions or research purposes.

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To my wife **Erin, daughter Victoria and son Nicholas**. I know that without your love and support, reaching this milestone would be meaningless.

Lastly, to the men and women who have served this country as part of the US military. I hope this research is useful to the VA and provides assistance in their continued efforts to aid all veterans, and provide the level of care that they deserve.

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PURPOSE OF STUDY

Since 2000 U.S. troops have been deployed in two major armed conflicts, *Operation Enduring Freedom (OEF-Afghanistan, 2001-2014)* and *Operation Iraqi Freedom (OIF, 2003-2011)*. The purpose of this study was to (1) describe the WRIISC program and its participants and identify areas for improvement, (2) describe exposure and medical concerns of US veterans who served in Afghanistan and Iraq (this study will examine military variables as determinants of exposure and medical concerns - number of deployments, branch of service, active duty vs. reservists, OEF/OIF and sociocultural variables - gender, age, race/ethnicity, education, marital status, employment status, and to (3) compare veteran self-reported and physician identified exposure and medical concerns.

BACKGROUND

WRIISC Evaluation

As in all war -time hazardous environments abroad, some members of the service who have served in combat will return with medical problems. Troops who have served in Iraq and Afghanistan may have been subjected to a variety of environmental hazards (See *Appendix A, Description of Exposures to US Veterans who served in wars in Afghanistan and Iraq*).

Veterans who are returning from serving in Afghanistan or Iraq were given the opportunity to have a comprehensive evaluation at the United States Department of Veterans Affairs - War Related Injury and Illness Study Center (WRIISC), East Orange, New Jersey. Upon completion of the evaluation, a summary of the key

findings were provided in patient friendly language. The first veteran who registered with the East Orange, New Jersey WRIISC was in 2001. Since that time over 1342 veterans have availed themselves of this service.

Before each veteran was evaluated they completed a questionnaire provided by the WRIISC, where they had the opportunity to self-report deployment exposure and medical concerns. These questionnaires were then evaluated by a multi-disciplinary team of WRIISC personnel. The initial self-report questionnaire required approximately 45 -60 minutes to complete, allowed a detailed assessment of self-reported exposure and medical concerns, and resulted in a high percentage of questions being answered. Upon completion of the questionnaire, veterans then were given a comprehensive evaluation by WRIISC personnel. WRIISC personnel who evaluated veterans included Physicians, Psychologists, and Nurse Practitioners. These evaluations were completed at the WRIISC, and typically took 8-16 hours to complete.

WRIISC evaluations included a (1) Medical/Physical Evaluation, (2) Psychological Evaluation, (3) Neuro- Psychological Evaluation, and an (4) Exposure Assessment. The results of these evaluations were recorded in the US Department of Veterans Affairs Computerized Patient Record System (CPRS). This study will focus on the exposure and medical assessment section, where information was collected on deployment exposure concerns and medical concerns.

United States Veterans who Served in OEF/OIF

Number of Deployments

The demographic composition of the current military force, who were deployed to OEF and OIF have some unique characteristics compared to those forces who were deployed from previous conflicts. Because the number of troops in the active component of the military was smaller than in past conflicts, the Department of Defense (DOD) had to send military personnel on repeat tours in theaters to meet the demands of extended conflicts. Approximately 263, 150 (40%) of the current military have served in two or more tours of duty. Because the pressure on troops needed for deployment has resulted in some conflict units spending longer tours. The stated policy for the active component was two years of dwell time between deployments, and as of August 1, 2008 service members were not to be deployed for more than twelve months. For the reserve component the policy was 1 year deployments and five years at home. According to a 2007 Government Accountability Office Report, the demands of conflicts made implementation of the new policy difficult.

Active vs. Reserve

Since the beginning of the wars in Afghanistan and Iraq in 2001, over 1.9 million US military personnel were deployed in 3 million tours of duty lasting more than 30 days as part of Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF). Compared to other conflicts, troops who were deployed to Afghanistan and Iraq had a larger number of National Guard and reservists. After the cold war ended in the 1990's, there was a decrease in the number of Active military personnel. Even

though the number of military personnel had decreased, the number of operational deployments increased for peacekeeping missions and humanitarian operations. Since 2003, the Army National Guard combat troops that were deployed were at a ratio of 4.3 which was higher than the stated goal of seven (7) Army National Guard units at their home station for every one deployed. The Army National Guard have been understaffed due to personnel shortages and slots they have been unable to fill, and OEF/OIF have only added to the problem. When a unit is mobilized and deployed it must be brought up to at least 100% of its authorized strength, which is accomplished by bringing personnel from other units. This directive also hurts the donor units when they are deployed.

According to the United States Department of Veterans Affairs Demographics Report published in 2007 over 40% of officers were over 35 years old compared to 15% of active enlisted personnel. Of service members who served in OEF and OIF, about 66% are white, 16% are black, and 18% are other. During the Vietnam War roughly 3.4 million service members, nearly 90%, who were deployed (one third of them through the draft) were white.

Branch of Service

According to Defense Manpower Statistics - published in 2009, the number of military personnel by Branch of Service were the Army (N=947664, 49.3%), Navy (N=354031, 18.4%), Air Force (N=372571, 19.4%), and Marines (N=246777, 12.9%) respectively.

OEF vs. OIF

Until the fiscal year 2008, there was no indicator of those veterans who served in OEF/OIF in the VA Database. Operation Enduring Freedom started in October 2001 in response to the 9/11. Operation Iraqi Freedom started in March 2003 with the invasion of Iraq. In August 2010, the last troops left Iraq. During OEF the average number of troops reached the highest level of approximately 63,500 from 2010 to 2012. This was a substantial increase from the number of troops in 2002 (5,200) and 2003 (10,400). During OIF (2003) the average number of troops were 67,700. During OIF the average number of troops reached the highest level (2007) 143,800 and (2008) 157,800. there were approximately 4,100 troops in Iraq in 2012.

Gender

In OEF/OIF there was an increased amount of female veterans deployed. During OEF and OIF most of the military was male (89%), but 11% were female. In Vietnam, most of the troops who served were men (only 7494 females served), but in OEF/OIF over compared with over 20,000 females who were deployed.

There was a significant increase in the number of female veterans, and the number of female veterans who utilize the VA has increased from 159,600 in 2000 to 292,921 in 2009. Women's involvement in combat operations is not a new phenomenon. Women have served with distinction in every U.S. conflict since the Revolutionary War (Goldstein 2001). During the Vietnam War effort (1965-1973), women primarily served as nurses and clerical. Vietnam War women's enlistment was

capped at 2% of the total forces and there were significant limits placed on female service members rank (Murdoch, et al 2006).

During the Gulf War (1990-1991), female veterans played a larger role in the military. For this combat operation women comprised about 10% of the total military forces, with less than half of women serving in administrative or medical roles (Murdoch et al 2006).

Following the Gulf War, changes in Department of Defense Policy and the new legislation enacted by Congress eased rules excluding women from combat related positions making over 90% of military occupations available to women (Donnegan, 1996). During Afghanistan and Iraq, females' roles have become greater compared to previous conflicts and though females who are women deployed were still officially barred by the Department of Defense from serving in direct combat positions)> However, this directive did not protect women from exposure to combat situations. During OEF/OIF, females served in a number of combat positions that required them to leave the military bases and have military bases and have combat exposures including enemy fire. Also, conflicts like Afghanistan and Iraq involved guerrilla fighting in urban war zones with no clear front lines.

There have been studies that suggest that women experience lower rates of combat exposure than men (Mental Health Advisory Team – IV, 2006 Rona, Fear, Hull, and Wesssly2007). Although the rates of combat exposure for women are lower for women, findings suggest that women may be experiencing significant levels of combat exposure. Among OIF soldiers deployed as part of infantry and combat support units, 12% of women were classified as having moderate levels of combat

exposure and 3% were classified as having high levels of combat exposure based on self-reports of their combat experiences (Mental Health Advisory Team- IV 2006). Comparable rates were not reported for male service members in this study. In a random sample of UK Forces deployed to Iraq, 16% of women reported they came under small arms fire, 40% reported they came under mortar and artillery fire, and 37% reported they saw seriously injured personnel. (Rona, et al 2007). Although rates of reported exposure were higher for men in this sample (26%, 54%, and 45%) respectively, these findings still represent exposure to the circumstances of combat.

Ethnicity, Race and Culture

The US military is one of the most racially desegregated forces in the world, but there have been some studies that have found that racial disparities have caused adverse health and medical effects on military personnel. A study by Sohn and Harada (2008) examined the association between perceptions of discrimination and self-reported mental health for Asian and Pacific Islander, Black, and Hispanic Veterans. Using the 2001 Veteran Identity Program Survey (VIPPS), Sohn and Harada measured use of outpatient care, discrimination, and health status in three minority veteran groups. The sample (n = 3227) was 44% Black, 44% Hispanic, and 12% Asian and Pacific Islander. Racial and ethnic discrimination during military service was significantly associated with poorer physical health but not mental health (Sohn and Harada, 2008). Data on whether there is a differential effect of race and ethnicity on military personnel ever

deployed seems to be inconsistent. A study of racial equity (assessed according to the racial distribution of US casualties in Iraq for the first 12 months of the conflict) of military service by Gifford (2005) found that blacks do not disproportionately bear the burden of US military operations, nor do other racial or ethnic minorities. Whites make up the majority of US casualties given their majority status in active duty and their high representation in US Army and Marine Corps specialties (Gifford 2005). The data suggest that the probability of any person's becoming a casualty is a function of more of representation of units most likely to make hostile contact with enemy forces than of race and ethnic discrimination in the burden of war.

Nonetheless there is some evidence that minorities can have the worst outcomes of exposure to war. Secondary data analysis of NVVRS ($n = 1195$) found that Hispanic veterans who served in Vietnam had significantly more PTSD symptoms and a higher probability of experiencing PTSD than nonminority veterans (Ortega and Rosenheck).

Several studies of Gulf War veterans have found that minority group veterans have had a greater prevalence of PTSD. In a study Kang et al (2003), nonwhite veterans had a higher prevalence of PTSD than white veterans, but the category "nonwhites" was not divided into minority subgroups, and there was no adjustment for socioeconomic factors other than age and marital status. A study of 653 Gulf war veterans from Louisiana with relatively high minority group participation (35%) found that minority group troops, particularly men, tended to report greater psychological distress and more PTSD symptoms than white men (Suker et al 1995); however, as in the Kang et al study, there was no

stratification beyond “Nonwhite status” and no adjustment for other factors that may have contributed to reporting differences. After adjusting for age, sex, race, rank, branch, and military status, Black et al. (2004) found that nonwhite veterans were at almost twice the risk of developing an anxiety disorder as white veterans, but the difference was not statistically significant.

The increasing proportion of minorities in the military highlights the need to improve the potential role of discrimination in health status. Sohn and Harada (2008) used the 2001 VIPS to assess the associations between perceptions of discrimination and self-reported mental and physical health in Latino, Asian, and Pacific Islander, Black, and White veterans. They found that racial and ethnic discrimination during military service was significantly associated with poorer physical health but not mental health. Those findings underscore the importance of developing policies that address racial and ethnic discrimination during military service while providing health care services for veterans.

Educational Status

Many studies have evaluated whether veteran and service members achieve more education than civilians, but few have evaluated whether educational attainment is affected by deployment. Two studies have examined the effects of deployment on education and have suggested that deployment has a neutral or negative effect on educational attainment. Both studies focused on Vietnam Veterans. One (Lyons et al 2006) concluded that Vietnam veterans were negatively affected by deploying and

obtained four years of schooling. It used data from the Vietnam Era Twin Study of Aging and compared 44 twin pairs in which one twin was deployed to Vietnam and the other was not. The other study using data from the National Vietnam Veteran Readjustment Study (NVVRS) concluded that combat did not affect educational obtainment.

Most previous studies have shown that veterans have benefitted from funding for education provided by the Service Readjustment Act of 1944, commonly called the GI Bill. The GI Bill provides funds for veterans to continue their education beginning at the end of World War II but was discontinued in 1955. In 1965, the bill was reinstated and covered veterans who had served in the interim. In every era, veterans have attained more education if they used military benefits (Angrist, 1993, Sampson and Laub 1996, Stanley 2003). According to one study, the GI Bill led veterans to attain 15-20% more education than their non veteran counterparts who were born in the 1920s and early 1930s (Stanley 2003). During the decade (1955-1965) when GI funds were not available, academically ambitious veterans were much less likely to attend and graduate from college than comparable nonveterans (MacLean 2005). It has been shown that economic opportunity is more strongly linked to the GI Bill than military service itself (Sampson and Laub) and veterans had higher earnings if they used their educational benefits provided by the GI Bill (Angrist 1999; Sampson and Laub 1996; Stanley 2003).

Marital Status

Marital status also differs somewhat by component and service branch. Of the active component force 55.2% are married. The Air Force had the highest proportion of married members (60.6%).

Among the reserve component veterans 49% were married. The proportion of members reporting to be married varied by service component. The Air Force reserve being the highest component (60.6%) and The Marine Corps reserve being the lowest (30.8%).

Deployments and frequent relocation are inherent in military life. The physical separation, especially when deployments are in combat zones are difficult for families. Often families have little warning of a deployment, and the deployments extend beyond the originally stated duration.

Adjusting to the different roles that each partner plays before and after deployment is one of the challenges that married couples face. Service members are expected to work long and unpredictable hours, especially in preparation for deployment, and this puts additional stresses on couples and families. Moreover, when service members return from deployment with physical injuries or cognitive defects, these problems may contribute to marital conflict. Although those effects have not been studied extensively in the military population, data on marital satisfaction in civilian populations suggest that depression, posttraumatic stress disorder, and TBI all adversely affect personal relationships and pose a higher risk of divorce (Davila et al., 2003, Kessler et al 1998, Kravetz et al 1995, Kulka et al 1990). Recent data from the Army show an overall increase in the number of divorces since the start of OEF

and OIF, especially in female soldiers. Cotton (2009) reported that in 2008, 8.5% of marriages ended in divorce in women compared with 5.7% in 2000. Similar, although the rate is lower, 2.9% of men reported marriages ending in divorce in 2008 compared to 2.2% in 2000.

The rate of domestic violence is typically higher in military couples than in civilian couples. Marshall et al. (2005) reported that wives of Army servicemen reported significantly higher husband to wife violence than demographically matched civilian wives. Although it has been reported that spousal abuse has declined over the past few years, domestic violence still affects 20% of military couples in which the service member has been deployed at least six months Booth et al. 2007).

As expected, exposure to combat appears to threaten the quality of marriage. A report by (IOM 2009) found strong evidence that those who were deployed were more likely to have marital problems when they returned including intimate partner violence, than those who were not deployed, however most of those studies were based on Vietnam veterans.

Several studies have examined the effects of deployments on marital dissolution. In the National Survey of Families and Households, 3880 Veterans of World War II and the conflicts in Korea and Vietnam reported significantly higher rates of marital dissolution if they had served in combat than if they had not (Ruger et al. 2002). A large representatives survey (n 59,631) of military members showed that deployment to Operation Desert Storm was associated with a statistically significant increase, by 4.2%, in later divorce rates of female service members (Angrist and Johnson, 2000) no association was observed in male service members.

Employment Status

There are sparse data on the effect of service in OEF and OIF on employment outcomes: however, studies that were done in Vietnam may be instructive. Several studies examined the effect of service in Vietnam and the effect of PTSD on employment and earnings. Using archival data from the NVVRS that included a cohort of 1200 male and 432 Vietnam veterans and 412 male and 304 female veterans- those veterans who had PTSD were more likely not to be working at the time of the survey than those who did not have PTSD. The study of 432 female Vietnam veterans found that those who had PTSD (8.9% of the sample) were 10 times as likely not to be working as those who did not have PTSD (OR 10.4, 95% CI 1.8 – 61.9).

Recent data from the Department of Labor Bureau of Labor Statistics found that the rate of unemployment of all veterans in the US armed forces was 4.6%, and the unemployment rate of those who have served in the US armed forces since September 2011 was 7.3%. As with non-veterans the jobless rates for veterans vary widely with age. Veterans 18-24 years old had an unemployment rate of 14.1% - nearly double the rate of those 25-34 years old (7.3%) and almost three times the rate for those 35-44 years old (4.9%).

Research has shown that from 2002 to 2004 there was an increase in the number of veterans receiving unemployment compensation and that the cost to the program had to the DOD had increased by about 75%. Loughran and Klerman noted that veterans of wars in Iraq and Afghanistan were having difficulty transitioning to the labor market. Furthermore, research suggests that the rapid increase in UCX

caseloads is attributable to the intensive use of reserves in OEF and OIF. The authors noted that the Air Force, Navy and Marine Corps reservists contributed a very small amount. The increases in veteran's claims between 2002 and 2005 were not the result of a declining job market, as the civilian job market improved during that period. Loghram and Klerman showed that the longer deployments account for more than one third of the overall increase in Army active and reserve caseloads from 2002-2005. The analyzers also demonstrated that self-reported health worsens with increasing length of deployment and that is also associated with higher UCX claims.

SIGNIFICANCE OF STUDY

In 2007, the WRIISC published a paper (Helmer, et al 2007) reporting exposure and medical concerns of the first 56 OEF/OIF veterans evaluated at the WRIISC.

Exposure concerns varied with three most common being air quality, depleted uranium, and multiple vaccinations. The findings in that preliminary paper (Helmer, et al 2007) offered insight into some of the unique needs of that population.

Veterans who reported exposure concerns were particularly concerned about long-term exposures and their effects.

This present study was unique as it: (1) allowed for a large sample of troops (N=894) that were deployed during conflicts in Afghanistan and Iraq, (2) analyzed veterans' exposure and medical concerns by military and sociocultural variables, and (3) compared veterans' self-reported exposure concerns and medical concerns to those identified by a WRIISC multi-disciplinary team.

LITERATURE REVIEW

The literature review emphasized (1) exposure and medical concerns of military personnel who served in Afghanistan and Iraq, (2) if there were any differences in exposure and medical concerns reported by multiple deployments, branch of service, active vs. reserve, Afghanistan (OEF) vs. Iraq (OIF), gender, age, ethnicity, education, marital status and employment status, and (3) the validity of self-administered exposure and medical questionnaires. The literature that have been reviewed related to reported exposures and health and the value of self-report questionnaires and their utility have varied.

Exposure and Medical Concerns of Military Personnel who have served in Afghanistan and Iraq

US veterans who have served in wars in Afghanistan and Iraq have expressed both exposure and medical concerns. As a result of this literature review, there was literature that supported findings in this study. In the original WRIISC study, Helmer, et al (2007) the authors concluded that there were unique exposure and medical concerns of US veterans who served in wars in Afghanistan and Iraq. The authors stated that “veterans reported an average of 4 medical concerns (SD 2.1, range 0-9) and 2.7 exposure concerns (SD 2.3, range 0-10). The most common exposure concerns were depleted uranium, multiple vaccinations and poor air quality. It was also noted that “greater proportions of reserve veterans reported genitourinary concerns and exposure to smoke than active duty veterans”. In this study, the average number of veteran self-reported exposure concerns (mean =

7.25, SD: 1.92) and medical concerns (mean = 6.07, SD: 4.25) were greater than the 2007 study. The difference in self-reported exposures may be because the original study included only the first 56 participants, thus limiting its statistical power. In that study, the most common exposure concerns reported were depleted uranium, multiple vaccinations and air quality. In this study, the most common self-reported exposures were Petrochemicals (84.1%), Anthrax Vaccine (83.4%) and Air Pollution (80.4%). In the original 2007 study, Depleted Uranium was a commonly reported exposure concern. In this study, Depleted Uranium was only self-reported at 23.3%. Another current study by Falvo, et al (2013) stated, “the current literature supported a clear increase in respiratory symptoms and illnesses in military personnel during and following deployment to Afghanistan and Iraq, with the predominant clinical phenotype being airway obstruction and hyper reactivity”. The findings in this study were similar to the Falvo study as the WRIISC endorsed 14.3% of veterans’ cases to have significant air pollution exposure and 19.5% to have difficulty breathing.

A study by Goldstein, (2010) reported that “about 2/3 of claims for service related disability are musculoskeletal in nature (e.g. back/neck, knee and ankles)”. In this study, not only did a large number of veterans self-report Musculoskeletal concerns(69.5%), but the WRIISC also identified Musculoskeletal issues in 66.5% of veterans who were evaluated.

Differences in exposure and medical concerns reported by multiple deployments, branch of service, active vs. reserve, Afghanistan (OEF) vs. Iraq (OIF), gender, age, ethnicity, education, marital status and employment status

Kline et al (2006) stated that nearly 25% of respondents reported at least one previous OEF or OIF deployment. Previously deployed soldiers were more than three times as likely than soldiers with no deployments to screen positive for PTSD (AOR = 3.69, 95% CI = 2.59, 5.24) and major depression (AOR = 2.20, 95% CI = 1.78, 2.72) and more than 90% more likely to score below the general population norm on physical functioning (AOR = 1.94, 95%CI = 1.51, 2.48).

A key finding in this study was that veterans with multiple deployments (Three or More) self-reported a higher average number of exposure concerns (mean = 8.50, SD:1.29) and medical concerns (mean = 9.50, SD:3.11) than those veterans who only had one deployment (mean = 6.65, SD=1.86/mean = 5.78, sd:5.41).

A Veteran's Administration study VA, (2010), reported that women tended to be younger and were more likely than men to carry a service related disability. The findings in this study were similar as Females self-reported a higher average number (mean=7.63, SD:5.51) of medical concerns than males (mean=6.35, SD:2.00) ($t=2.4554$, $p=.0156$). This is important to note because even though female veterans have not served in combat duty, they are serving near or in close proximity to combat operations, and may have been subjected to similar exposures as their male counterparts.

The findings in this study support the fact that there are differences in exposure and medical concerns that were self-reported by race/ethnicity. Hosain, et al (2013) , found compelling evidence that racial/ethnic disparities in veterans health not only persist but are, in fact, worsening. Racial differences were observed in many chronic diseases such as cardiovascular disease, cancer, diabetes, and mental health. The findings in this study were different from the Hosain study as White veterans self-reported a higher average number of exposure concerns (mean = 7.39, SD: 1.80) than Black veterans (mean = 6.53, SD:1.61) ($t = 6.0641$, $p, .0001$) and medical concerns (mean = 7.46, SD: 6.05/mean = 4.97, SD: 4.13) ($t = 6.124$, $p < .0001$).

Validity of Self-Report Questionnaires

Results of studies conducted on the value of veteran self-reported exposure and medical data have varied. The findings in this study identified that the difference between self-reported exposure and medical concerns and those concerns identified by the WRIISC were weak. However, this literature review, identified several studies that concluded that the use of self-report questionnaires for exposure and medical concerns were useful.

A 1998 study published on US troops returning home from the Persian Gulf War concluded that Veterans deployed to the Persian Gulf have higher self-reported prevalence of health symptoms compared to PGW veterans who were deployed only as far as Germany. Gulf-service environmental exposures are associated with increased health symptoms reporting involving predicted body-symptoms, after adjusting for war-zone stressor exposures and PTSD.

Ahlborg and, Gunnar (1990) compared data from self-reported questionnaires with independent information on occupational exposures in two studies of reproductive outcome. They found relatively good agreement. It is important to note that the objective measures may not represent the exact truth, but may be used to indicate the direction and magnitude of the misclassification bias.

Elbogen, et al (2013.) found that “The results identify a subset of Iraq and Afghanistan veterans at higher risk for post deployment adjustment and indicate that the veteran’s self-report of violence was useful in prediction future aggression. Under reporting of violence was not evidenced by most veterans but could be improved upon by obtaining collateral information.” This would confirm that self-report data obtained from a veteran self-report might be useful in the diagnosis of aggression of military personnel.

A recent study examined the association of military exposures and illness symptoms reported by veterans who had served in the Gulf War. Boyd, et al (2003) the stated that “There are important differences between the high- and low-symptom groups that suggest that the belief of being exposed to chemical/biological weapons is an important concomitant, and perhaps contributor to the symptoms known as Gulf War illness. More essential is that, regardless of the cause of their symptoms, ill veterans reported experiencing from more negative life events in the years immediately after the war.”

A study by Cherry, et al (2001), found that there was only a weak association between self-reported exposures and health reported by the United Kingdom troops in the Gulf War. However, there was a consistent relation between adverse health

and a number of inoculations and days handling pesticides. The findings in this study were similar to this study as the average difference for WRIISC identified exposures and veteran self-reported exposure concerns was (--43.9%)

Betthausen, et al (2012) found that “There is a gap in investigations of the combined use of Neuropsychological and neuroimaging and self-report measures among Veterans with mTBI and/or PTSD. Integrated neuro-psychological evaluation should include a thorough assessment of self-reported symptoms, including onset, frequency, duration, severity, and report of changes over time (Groth-Marnat 2009)”. The findings in this study were similar as the gap between WRIISC identified medical concerns and those medical concerns that were self-reported by veterans was (-13.4%).

Several studies have concluded that veterans who were deployed reported more exposure and medical concerns than those who had no deployment. A study by Hallman, et al (2003) found that compelling evidence indicates “The results of the factor and cluster analysis are consistent with other studies that have found a core group of musculoskeletal, mood, memory, and fatigue problems reported by ill Gulf War veterans, problems that are reported with lower frequency and severity by non-deployed controls from the same era of military service. Very similar factors have been identified in an Australian primary care population and in a sample of the US general population. Although these core complaints do not appear to be unique to ill Gulf War veterans, their association with deployment in Operations Desert Shield and Desert Storm suggest that service in the Gulf War is a risk factor for such

complaints". The findings in this study confirm that veterans will self – report environmental and medical concerns associated with their deployment.

A recent study by Osinubi also questioned the et al (2014) et al stated, "It is common for individuals to report an exposure and have little or no concern related to such exposure, especially if it is an exposure with which they are familiar or that was anticipated. On the contrary, many veterans report little or no actual exposure, yet they have a very high level of concern regarding potential exposure".

Literature reviewed also noted that the use of data obtained from questionnaires will depend on whether it is used for clinical decisions or research purposes.

Ferrante et al (2008) stated that "the preferred source for data will depend on the outcome of interest, the purpose, the resources available, and whether it is preferable to tolerate more false positives or false negatives".

OBJECTIVES

These are several research questions that were formulated and evaluated in this paper:

(1) To describe demographics of WRIISC participants and compare them to the overall composition of deployed forces to Afghanistan (OEF) and Iraq (OIF);

There will be unique demographic differences among US veterans of wars in Afghanistan and Iraq who chose to visit the WRIISC compared with all veterans deployed. This study will describe both military (number of deployments, branch of service, active vs. reserve, OEF vs. OIF) as well as sociocultural (gender, age, race/ethnicity, education, marital status, employment status) variables and

compare them to the overall military forces deployed to OEF/OIF using a chi-square goodness of fit calculation.

(2) To describe and compare exposure and medical concerns of WRIISC participants who were deployed to Afghanistan (OEF) and Iraq (OIF):

This study involved 894 veterans that were evaluated at the WRIISC from June 2004 – January 2012. In the original WRIISC study “Health and Exposure Concerns of Veterans Deployed to Iraq and Afghanistan” (Helmer, D. et al) the authors stated that “veterans reported an average of 4 physical health concerns (SD 2.1, range 0-9) and exposure concerns (SD 2.3, range 0-10). The most common exposure concerns were depleted uranium, multiple vaccinations and poor air quality. Greater proportions of reserve veterans reported genitourinary concerns and exposure to smoke than active duty veterans.”

This study evaluated both veteran self-reported and WRIISC identified exposure and medical concerns vs. variables to include multiple deployments, active vs. reserve, branch of service, OEF vs. OIF, gender, age, race/ethnicity, education, marital status, and employment status

(3) To evaluate if there is a difference between self-reported exposure concerns and WRIISC identified exposure concerns, and if there is a difference between self-reported medical concerns and WRIISC identified medical concerns:

Each veteran completed a self-report questionnaire that detailed exposure and medical concerns, before they were evaluated by a WRIISC multi-disciplinary team.

Data was abstracted from patient self-reported questionnaires as well as the Department of Veterans Affairs Computerized Registry System (CPRS) and evaluated to identify if any correlation exists.

METHODOLOGY

The study was conducted using a retrospective chart review to summarize exposure and medical information of 894 veterans who were evaluated at the WRIISC from June 2004 – January 2012. Data were collected by using patient self-reporting questionnaires as well as the United States Department of Veterans Affairs Computerized Patient Registry System (CPRS) which contained exposure and medical evaluations conducted by the WRIISC. Data were then abstracted into a secondary database developed by the WRIISC without any identifiers to protect veteran's confidentiality. This dissertation research was reviewed and approved by the Institutional Review Board at Rutgers University – Biomedical and Health Sciences, Piscataway, New Jersey and the United States Department of Veterans Affairs – East Orange, New Jersey

POPULATION AND SAMPLE

Those veterans whom were eligible to be evaluated at the WRIISC included (1) All combat veterans who had some exposure concerns or chronic medical symptoms, (2) Veterans who participated in military Atmospheric Nuclear Weapons test and (3) Veterans who participated in Project 112 or SHAD (Shipboard Hazard and Defense). The population that was used for this study were US veterans who served in OEF or OIF who voluntarily chose to be evaluated at the WRIISC. As of August

2016, the number of veterans who have sought health care at the WRIISC was 1324. Data were obtained on veterans who sought health care from the WRIISC during the period June 2004 - January 2012. The extraction of data began in 2012, thus limiting the total number of veterans used in the study to N = 894. The smallest number of veterans who were evaluated at the WRIISC was in 2012 (N=3, 0.4%, this only included the month of January) - while the largest number was in 2009 (N=187, 22.2%) see Table 1.

Table 1, Number of US Veterans Evaluated at the WRIISC, East Orange, NJ (06/04-1/12)

Veterans Evaluated at WRIISC	2004	2005	2006	2007	2008	2009	2010	2011	2012*
Number	5	43	113	152	173	187	112	55	3
Percent of Total	0.6	5.1	13.4	18.0	20.5	22.2	13.3	6.5	0.4

**** Only includes veterans evaluated during January 2012***

DATA COLLECTION

The questionnaires, medical histories and examination details were collected by the WRIISC. Participation in the WRIISC evaluation included permission to analyze this data collectively. Initially, data for this study was abstracted from the veteran's self-reported questionnaires without individual identifiers. Data included, age, gender, race/ethnicity, active vs. reserve, general medical, physical symptoms, branch of military service, and military and civilian exposure concerns.

Data was then abstracted from the clinical notes in the VA Computerized Patient Record System (CPRS). In the original WRIISC evaluation Medical, Psychological, Neurological-Psychological, and Exposure notes were created for each veteran.

Exposure concerns were defined as those documented in the final impression section of the clinical notes. The clinician's initials were captured upon abstraction of data.

WRIISC personnel then abstracted information including age, gender, physical data, and deployment and civilian exposure data. For each patient, a log was kept in the event of a discrepancy over classification of medical or exposure data. This log book was then reviewed by select WRIISC personnel, and controversies were resolved and the abstraction completed.

Before beginning the abstraction, WRIISC personnel were trained by those who developed the software. Quality control measures included a random verification of approximately 10% of the sample population, to ensure that exposure and medical data were captured appropriately.

Evaluator Heterogeneity

During the study period, there were several WRIISC medical personnel who evaluated veterans exposure and medical concerns. WRIISC medical personnel may have evaluated a veteran for *both* exposure and medical concerns, while most providers only evaluated a veteran for only their exposure *or* medical concerns. Two evaluators completed 62.2% of the exposure assessments, but there was little variability in the number of exposures endorsed (see Table 2). One evaluator completed 65.2% of the medical evaluations, and since this evaluator had the lowest number of endorsements, their subsample was analyzed as well (see Table 3).

Table 2, Number of Exposure Concern Evaluations Completed by WRIISC Provider

Provider	Frequency	Percent	Mean Number of Exposure Concerns Identified
Provider 1	291	34.9	3.45
Provider 2	228	27.3	3.39
Provider 3	130	15.6	3.29
Provider 4	112	13.4	2.94
Provider 5	49	5.8	4.33
Provider 6	17	2.0	3.86
Provider 7	8	1.0	2.33
Total	835	100.0	3.28

Table 3, Number of Medical Concern Evaluations Completed by WRIISC Provider

Provider	Frequency	Percent	Mean Number of Medical Concerns Identified
Provider 1	536	65.2	2.65
Provider 2	98	11.9	4.19
Provider 3	85	10.3	3.16
Provider 4	34	4.1	3.43
Provider 5	27	3.3	3.93
Provider 6	17	2.1	4.35
Provider 7	13	1.7	3.61
Provider 8	6	0.7	3.20
Provider 9	6	0.7	3.74
Total	822	100	3.64

In Table 4, WRIISC providers identified zero exposure concerns in (2.2%) of veterans who were evaluated. The largest percentage (31.0%) of veterans had three exposure concerns that were identified by WRIISC providers. In (4.0%) of veterans who were evaluated, five or more exposure concerns were identified.

Table 4, Number of Exposure Concerns Identified by WRIISC Provider Evaluation

Provider	Zero Exposures N (% of Zero Exposures)	One Exposures N (% of One Exposures)	Two Exposures N (% of Two Exposures)	Three Exposures N (% of Three Exposures)	Four Exposures N (% of Four Exposures)	Five Exposures N (% of Five Exposures)	More than Five Exposures N (% of Five or more Exposures)
1	7 (2.4)	6 (2.1)	83 (28.5)	68 (23.3)	64(21.9)	44 (15.1)	19(6.7)
2	0 (0.0)	8 (3.5)	42 (18.4)	76(33.3)	69 (29.4)	28(12.3)	5 (3.1)
3	2 (1.5)	15 (11.5)	10 (7.6)	58 (44.6)	40 (30.8)	3(2.3)	2 (1.7)
4	5 (4.5)	14 (12.5)	11 (9.8)	31(27.7)	43 (38.4)	4 (3.6)	5 (3.5)
5	1 (2.0)	4 (8.0)	10 (20.4)	17(34.7)	12 (24.5)	3(6.1)	2(4.3)
6	3(17.6)	0 (0.0%)	3 (17.6)	5 (29.4)	0 (0.0)	5 (29.4)	1 (6.0)
7	0 (0.0)	1(12.5)	2 (25.0)	4 (50.0)	1 (12.5)	0 (0.0)	0 (0.0)
Total	18	48	161	259	229	87	34
% of Total Evaluations	2.2	5.7	19.3	31.0	27.4	10.4	4.0

In Table 5, WRIISC providers identified zero medical concerns in (6.2%) of veterans who were evaluated. The largest percentage of veterans (18.9%) had three medical concerns that were identified by WRIISC providers. In (13.5%) of evaluations, five or more medical concerns were identified.

Table 5, Number of Medical Concerns Identified by WRIISC Provider Evaluation

<u>Provider</u>	<u>Zero Medical Concerns</u> N (% of Zero Medical Concern)	<u>One Medical Concern</u> N (% of One Medical Concern)	<u>Two Medical Concerns</u> N (% of Two Medical Concerns)	<u>Three Medical Concerns</u> N (% of Three Medical Concerns)	<u>Four Medical Concerns</u> N (% of Four Medical Concerns)	<u>Five Medical Concerns</u> N (% of Five Medical Concerns)	<u>More than Five Medical Concerns Identified</u> N (% of More than Five Medical Concerns)
1	18 (3.3)	79 (14.7)	99(18.5)	108 (20.5)	103(19.2)	48(8.9)	81 (14.9)
2	2 (2.0)	13 (13.3)	15 (15.3)	18 (18.4)	22 (22.4)	20 (20.4)	8 (8.2)
3	17 (20.0)	1 (1.2)	15 (17.6)	9 (10.6)	14 (16.5)	23 (27.1)	6 (7.0)
4	2 (5.9)	4 (11.8)	1(2.9)	10 (29.4)	5 (14.7)	10 (29.4)	2 (5.9)
5	1 (3.7)	2(7.4)	5 (18.5)	4 (14.8)	6(22.2)	4(14.8)	5 (18.6)
6	0 (0.0)	0 (0.0)	1 (5.6)	5(29.4)	3 (17.6)	3 (17.6)	5(29.4)
7	6(46.2)	2(15.4)	2 (15.4)	1 (7.7)	2 (15.4)	0 (0.0)	0 (0.0)
8	3 (50.0)	1 (16.7)	1 (16.7)	1 (16.6)	0 (0.0)	0 (0.0)	0 (0.0)
9	2(33.3)	2 (33.3)	2 (33.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	51	104	141	156	155	108	107
% of Total Evaluations	6.2	12.7	17.2	18.9	18.8	13.1	13.1

Table 6, lists exposure concerns identified by provider. Among all providers, the most frequent exposure concern identified by WRIISC provider was Burning Trash (N=431, 51.2%). The least frequent exposure concern identified was Animals (N=8, 0.9%).

Table 6, Exposure Concerns Identified vs. WRIISC Provider

Exposure Concern	Provider 1 N=291	Provider 2 N=228	Provider 3 N=130	Provider 4 N=112	Provider 5 N=49	Provider 6 N=17	Provider 7 N=8	Total N=835	Test Statistic
Burning Trash	169 (58.1)	107 (46.9)	55 (42.3)	57 (50.8)	31 (63.3)	6 (35.3)	6 (75.0)	431 (51.2)	χ^2 : 22.40, p:002
Sandstorms	108 (37.1)	99 (43.4)	49 (37.7)	68 (60.7)	33 (67.3)	5 (29.4)	3 (37.5)	365 (43.7)	χ^2 : 29.88, p:000
Chemical Alarms	73 (25.1)	74 (32.4)	41 (31.5)	34 (30.4)	7 (14.3)	8 (47.1)	4 (50.0)	241 (28.9)	χ^2 : 18.21, p:011
Contaminated Food & Water	73 (25.1)	74 (32.4)	41 (31.5)	34 (30.4)	7 (14.3)	8 (47.1)	4 (50.0)	241 (28.9)	χ^2 : 13.94, p:052
Petrochemicals	49 (16.8)	70 (30.7)	27 (20.8)	28 (25.0)	16 (32.7)	4 (23.5)	2 (25.0)	196 (23.5)	χ^2 : 14.39, p:045
Depleted Uranium	39 (13.4)	44 (19.3)	39 (30.0)	16 (14.3)	5 (10.2)	5 (29.4)	1 (12.5)	149 (17.8)	χ^2 : 22.47, p:002
Oil Well Fire	31 (10.7)	31 (13.9)	32 (24.6)	15 (13.4)	4 (8.2)	3 (17.6)	1 (12.5)	117 (14.0)	χ^2 : 16.62, p:020
Anthrax Vaccine	29 (9.9)	39 (17.5)	21 (16.2)	21 (18.8)	0 (0.0)	4 (23.5)	1 (12.5)	115 (13.8)	χ^2 : 17.39, p:015
Air Pollution	10 (1.2)	60 (26.9)	18 (13.8)	10 (8.9)	5 (10.2)	7 (41.2)	4 (50.0)	114 (13.7)	χ^2 : 77.77, p:000
Noise	32 (3.8)	25 (10.9)	6 (4.6)	13 (11.6)	31 (63.3)	2 (11.8)	1 (12.5)	110 (13.2)	χ^2 : 114.99, p:000
Vehicular Exhaust	44 (15.1)	26 (11.4)	10 (7.7)	13 (11.6)	15 (30.6)	1 (5.9)	0 (0.0)	109 (13.1)	χ^2 : 20.60, p:004
Multiple Vaccinations	25 (8.6)	21 (9.2)	35 (26.9)	11 (10.0)	3 (6.1)	1 (5.9)	2 (25.0)	98 (11.7)	χ^2 : 37.04, p:000
Asbestos	24 (8.2)	24 (10.5)	14 (10.8)	8 (7.1)	4 (8.2)	0 (0.0)	1 (12.5)	75 (9.0)	χ^2 : 3.43, p:842
Insects	12 (4.5)	17 (7.6)	11 (8.5)	13 (11.6)	7 (14.3)	1 (5.9)	1 (12.5)	62 (7.4)	χ^2 : 10.41, p:166

Table 6,(continued) Exposure Concerns Identified vs. WRIISC Provider

Exposure Concern	Provider 1 N=291	Provider 2 N=228	Provider 3 N=130	Provider 4 N=112	Provider 5 N=49	Provider 6 N=17	Provider 7 N=8	Total N=835	Test Statistic
Pesticides	16 (5.9)	17 (7.6)	17 (13.1)	5 (4.6)	2 (4.1)	2 (11.8)	1 (12.5)	60 (7.2)	χ^2 : 10.99, p:.139
Enemy Fire	16 (5.9)	11 (4.9)	5 (3.8)	6 (5.4)	9 (18.4)	2 (11.8)	1 (12.5)	50 (6.0)	χ^2 : 16.47, p:.021
Burning Hardware	24 (8.2)	7 (3.1)	5 (3.8)	4 (3.7)	7 (14.3)	2 (11.8)	0 (0.0)	49 (5.9)	χ^2 : 17.06, p:.017
Human Corpses	14 (4.8)	7 (3.1)	9 (6.9)	3 (2.8)	6 (12.5)	2 (11.8)	0 (0.0)	41 (4.9)	χ^2 : 12.22, P.097
Non-Ionizing Radiation	13 (4.5)	16 (7.2)	3 (2.3)	4 (3.7)	2 (4.1)	2 (11.8)	1 (12.5)	41 (4.9)	χ^2 : 7.41, p:.388
Mefloquine	8 (2.7)	11 (4.9)	8 (6.2)	5 (4.6)	0 (0.0)	2 (11.8)	0 (0.0)	34 (4.1)	χ^2 : 8.38, p:.300
Biological Weapons	7 (2.4)	8 (3.6)	5 (3.8)	1 (0.9)	2 (4.1)	0 (0.0)	1 (12.5)	24 (2.9)	χ^2 : 5.69, p:.579
Pyroditigimine	4 (1.5)	3 (2.2)	5 (3.8)	2 (1.8)	0 (0.0)	1 (5.9)	0 (0.0)	17 (2.0)	χ^2 : 5.46, p:.604
Body Fluids	7 (2.4)	2 (0.9)	2 (1.5)	0 (0.0)	1 (2.1)	0 (0.0)	0 (0.0)	12 (1.4)	χ^2 : 4.89, p:.613
Lead	3 (1.0)	1 (0.4)	3 (2.4)	3 (2.8)	0 (0.0)	0 (0.0)	1 (12.5)	11 (1.3)	χ^2 : 12.22, P:.094
Ionizing Radiation	4 (1.5)	2 (0.9)	2 (1.5)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	9 (1.1)	χ^2 : 1.54, p:.981
Animals	3 (1.0)	2 (0.9)	2 (1.5)	0 (0.0)	1 (2.1)	0 (0.0)	0 (0.0)	8 (0.9)	χ^2 : 2.43, p:.932

Table 7, lists medical concerns identified by provider. Among all providers, the most frequent medical concern identified by WRIISC provider was Musculoskeletal (N=556, 67.6%). The least frequent medical concern identified was Autoimmune (N=12, 1.4%).

Table 7. Medical Concerns Identified vs. WRIISC Provider

Medical Concern	Provider 1 N=536	Provider 2 N=98	Provider 3 N=85	Provider 4 N=34	Provider 5 N=27	Provider 6 N=17	Provider 7 N=13	Provider 8 N=6	Provider 9 N=6	Total N=822	Test Statistic
Musculoskeletal	362 (67.5)	74 (75.5)	55 (64.7)	25 (73.5)	18 (66.7)	10 (58.8)	8 (61.5)	1 (16.7)	5 (83.3)	556 (67.6)	χ^2 : 44.63, p:000
Neurological	180 (33.5)	37 (37.8)	32 (37.6)	14 (41.2)	4 (14.8)	7 (41.2)	5 (38.5)	0 (0.0)	2 (33.3)	281 (34.1)	χ^2 : 17.46, p:065
Gastrointestinal	180 (33.5)	23 (23.5)	42 (49.4)	12 (35.3)	10 (37.0)	4 (23.5)	2 (15.4)	1 (16.7)	2 (33.3)	276 (33.6)	χ^2 : 25.12, p:005
Sleep	157 (29.4)	32 (32.7)	36 (42.4)	17 (50.0)	5 (18.5)	2 (11.8)	3 (23.1)	2 (33.3)	0 (0.0)	254 (30.9)	χ^2 : 26.96, p:003
ENT	119 (22.3)	38 (38.8)	25 (29.4)	19 (55.9)	11 (40.7)	1 (5.9)	2 (15.4)	0 (0.0)	0 (0.0)	215 (26.2)	χ^2 : 49.95, p:000
Cardiac	1 (2.4)	31 (31.6)	24 (28.2)	8 (23.5)	5 (18.5)	4 (23.5)	2 (15.4)	4 (66.7)	2 (33.3)	208 (25.3)	χ^2 : 15.66 p:110
Respiratory	106 (19.8)	10 (10.2)	16 (8.8)	12 (35.3)	6 (22.2)	5 (29.4)	3 (23.1)	2 (33.3)	2 (33.3)	162 (19.7)	χ^2 : 18.247, p:051
Allergies	107 (19.9)	6 (6.1)	28 (32.9)	9 (26.5)	1 (3.7)	1 (5.9)	0 (0.0)	0 (0.0)	3 (50.0)	155 (18.9)	χ^2 : 42.19, p:000
Skin	83 (15.5)	22 (22.4)	13 (15.3)	14 (41.2)	6 (22.2)	4 (23.5)	0 (0.0)	1 (16.7)	0 (0.0)	143 (17.4)	χ^2 : 26.55, p:003
Genitourinary	51 (9.5)	10 (10.2)	2 (2.4)	3 (8.8)	6 (22.2)	0 (0.0)	0 (0.0)	1 (16.7)	1 (16.7)	74 (9.0)	χ^2 : 16.35, p:090
Vision	5 (0.9)	4 (4.1)	1 (1.2)	1 (2.9)	1 (3.7)	0 (0.0)	1 (7.7)	1 (16.7)	0 (0.0)	64 (7.7)	χ^2 : 17.69, p:060
Infectious	14 (2.6)	3 (3.9)	2 (2.4)	0 (0.0)	1 (3.7)	9 (0.0)	0 (0.0)	0 (0.0)	1 (16.7)	59 (7.1)	χ^2 : 7.44, p:684
MUS	16 (2.9)	13 (13.3)	14 (6.5)	2 (5.9)	6 (0.0)	6 (35.3)	3 (23.1)	4 (66.7)	1 (16.7)	59 (7.1)	χ^2 : 93., p:000
Hematologic	35 (6.5)	9 (9.2)	4 (4.7)	3 (8.8)	1 (3.7)	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	53 (6.3)	χ^2 : 5.51, p:854
Endocrine	29 (5.4)	5 (5.1)	3 (3.5)	5 (14.7)	3 (11.1)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	46 (5.5)	χ^2 : 10.24, p:420
Physical, No	16 (2.9)	1 (1.0)	6 (7.1)	0 (0.0)	1 (7.7)	0 (0.0)	1 (7.7)	0 (0.0)	3 (50.0)	27 (3.2)	χ^2 : 51.09, p:000
Reproductive	10 (1.9)	4 (4.1)	0 (0.0)	1 (2.9)	0 (0.0)	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	16 (1.9)	χ^2 : 8.03, p:626
Autoimmune	4 (0.7)	3 (3.1)	3 (3.5)	0 (0.0)	1 (3.7)	1 (5.9)	0 (0.0)	0 (0.0)	0 (0.0)	12 (1.4)	χ^2 : 10.69, p:382
Physical, Other	524 (97.8)	95 (96.9)	85 (97.6)	31 (91.2)	26 (96.3)	16 (94.1)	12 (92.3)	5 (83.3)	6 (100.0)	824 (97.2)	χ^2 : 403.99, p:000

DATA ANALYSIS

For each military variable, (number of deployments, branch of service, active vs. reserve, OEF vs. OIF) as well as sociocultural variable (gender, age, race/ethnicity, education, marital status, employment status) the mean and standard deviation were calculated. Number of percent of cases for each combination of self-report (Yes/No) and chart documentation (Yes/No) were calculated along with the overall percent of cases in which the two sources totally agreed (percent agreement on positives plus negatives). Because no recognized, "gold standard" exists for these variables, sensitivities (percent true positives detected) and specificities (percent true negatives detected) were calculated in two ways: (a) assuming the WRIISC record as the gold standard and (b) assuming the veteran self-report record as the gold standard.

RESULTS

DEMOGRAPHIC COMPARISON

In this study population demographic data are shown in Table 8. Demographic variables that were evaluated included Age (Mean, SD), Number of Deployments: One/Two/Three or More, Branch of Service: Army/Navy/Air Force/Marines, Conflict: OEF/OIF/Both, Gender: Male/Female, Race: White/Black/Other Ethnicity: Non-Hispanic/Hispanic/Other, Education Level: ≤ 12 Years/ ≥ 12 Years/ ≥ 16 Years), Marital Status: Married/Divorced/Separated/Widowed/Living as Married/Never Married, and Employment Status: Employed/Unemployed.

The average age of all US veterans used in this study was 32.8 years, SD: 9.75. The average age for Active veterans was younger (29.1, SD: 7.68) compared to those veterans who were Reserve/Guard (35.6, 10.21). Multiple deployments were classified by One Deployment (N=624, 73.6%), Two Deployments (N=189, 22.4%), and Three or More Deployments (N=34, 4.0%). Branch of Service included the Army (N= 555, 65.6%), Air Force (N=165, 19.5%), Marines (N=78, 9.3%) and Navy (N= 47, 5.6%). The number of veterans in this study who served in OIF (Iraq) were substantially greater (N=782, 84.4%) than those who served in OEF (Afghanistan) (N=144, 15.6%).

Almost 10 percent (N=79, 8.5%) of veterans in this study served in both Afghanistan (OEF) and Iraq (OIF). Most veterans in this study were Male (N=733, 86.5%) compared to Female (N=114, 13.5%). The number of veterans identified by race were White (N= 422, 49.8%), Black (N = 208, 24.6%), and Other (N=217, 25.6%). Ethnicity was categorized as Non-Hispanic (N=512, 66.6%), Hispanic/Latino

(N=233, 30.3%), and other (N= 24, 3.1%). Years of education were < 12 Years (N =38, 4.7%), ≥ 12 Years (N=584, 72.1%), and ≥ 16 Years (N=188, 23.2%). Marital status was combined into three categories: Married/Living as Married (N=332, 41.8%), Divorced/Separated/Widowed (N=141, 17.8%), and Never Married (N=321, 40.4%). Employment, Status, which were almost identical, was either Employed (N=400, 49.9%) or Unemployed (N=402, 50.1%).

Table 8, Study Population Demographics (Active/Reserve/Guard, Total)

Characteristic	Active n=367 n (% of Active)	Reserve/Guard n=486 n (% of Reserve/Guard)	Total n=894 n (% of total)	Test Statistic*
Average Age, Mean, SD	29.1, 7.68	35.6, 10.21	32.8, 9.75	t: 10.13, p: 0.000
Number of Deployments				χ^2 : 27.3, 2 df, p <.001
One	234 (64.8)	390 (80.2)	624 (73.7)	
Two	104 (28.8)	85 (17.5)	189 (22.3)	
Three or More	23 (6.4)	11 (2.3)	34 (4.0)	
Branch of Service				χ^2 : 153.2, 4 df, p, .001
Army	155 (43.2)	400 (82.3)	555 (65.7)	
Navy	26 (7.2)	21 (4.3)	47 (5.6)	
Air Force	130 (36.2)	35 (7.2)	165 (19.5)	
Marines	48 (13.4)	30 (6.2)	78 (9.2)	
Conflict				χ^2 : 19.2, 1 df
OEF (Afghanistan)	80 (21.9)	64 (14.5)	144 (17.9)	
OIF (Iraq)	333 (63.8)	449 (79.3)	782 (72.3)	
Both	52 (14.3)	27 (6.2)	79 (9.8)	
Gender				χ^2 : 15.9, 1 df
Male	332 (91.9)	401 (82.5)	733 (86.5)	
Female	29 (8.1)	85 (17.5)	114 (13.5)	
Race				χ^2 : 0.52, 2 df
White	177 (49.0)	245 (50.4)	422 (49.8)	
Black	87 (24.1)	121 (24.9)	208 (24.6)	
Other	97 (26.9)	120 (24.7)	217 (25.6)	
Ethnicity				χ^2 : 0.64, 1 df

Table 8, (continued) Study Population Demographics (Active/Reserve/Guard, Total)

Characteristic	Active n=367 n (% of Active)	Reserve/Guard n=486 n (% of Reserve/Guard)	Total n=894 n (% of total)	Test Statistic*
Non-Hispanic	220 (6.9)	292 (66.4)	512 (66.6)	
Hispanic/Latino,	97 (29.5)	136 (30.9)	233 (30.3)	
Other	12 (3.6)	12 (2.7)	24 (3.1)	
Education Level				χ^2 : 29.6, 2 df, p < .001
< 12 Years	19 (5.5)	19 (4.1)	38 (4.7)	
≥ 12 Years	279 (80.6)	305 (65.7)	584 (72.1)	
≥ 16 Years	48 (13.9)	140 (30.2)	188 (23.2)	
Marital Status				χ^2 : 11.40, 5 df
Married/Living as Married	124 (36.9)	204 (44.9)	332 (41.8)	
Divorced/Separated/Widowed	56 (16.7)	85 (18.7)	141 (17.8)	
Never Married	156 (46.4)	165 (36.4)	321 (40.4)	
Employment Status				χ^2 : 33.68, 1 df
Working	128 (37.9)	272 (58.6)	400 (49.9)	
Unemployed	210 (62.1)	192 (41.4)	402 (50.1)	

Chi Square- Goodness of Fit Calculation

The Chi-Square - Goodness of Fit statistic (χ^2) was computed for demographic variables (see Table 9) to determine if the sample population was representative of the US military population that had served in wars in Iraq and Afghanistan. As a rule of thumb if the calculated $\chi^2 > 1$ the model is a poor fit and indicates that the fit has not fully captured the data.

In this study, the best fit by demographic was for Gender ($\chi^2 = 2.6$) while the worst fit was Race/Ethnicity ($\chi^2 = 351.3$) Though this population may not have represented a good fit for the general military population in all demographic variables, the results obtained from this study will be useful to the WRIISC.

Table 9, Study Population Demographics – Chi Square Goodness of Fit Calculation

Demographic	Active Era Military (N, %)	Observed (WRIISC) Study Population (N, %)	Expected (N)	Goodness of Fit Chi- Square Calculation
Age				
Average Age, Mean	33.4 (4.63)	32.8 (9.75)	-	t = 1.83, df=2, p = 0.662
20-30 Years	1000276 (44.5)	323 (45.2)	317	$\chi^2 = 0.11$
30-40 Years	69316 (32.3)	144 (20.2)	230	$\chi^2 = 32.2$
40-50 Years	291518 (17.8)	188 (26.3)	127	$\chi^2 = 29.3$
> 50 Years	112175 (5.2)	59 (8.3)	37	$\chi^2 = 13.1$
Total				$\chi^2 = 74.7$
Number of Deployments				
One, N (% of Total)	1222971 (57.0)	624 (73.6)	483	$\chi^2 = 41.2$
Two or More, N (% of Total)	579302 (27.0)	189 (22.4)	229	$\chi^2 = 6.9$
Three or More, N % of Total	343291 (16.0)	34 (4.0)	136	$\chi^2 = 76.5$
Total				$\chi^2 = 124.6$
Active vs. Reserve				
Active	1381308 (71.9)	367 (43.0)	613	$\chi^2 = 6.2$
Reserve	538905 (28.1)	486 (57.0)	240	$\chi^2 = 15.9$
Total				$\chi^2 = 22.1$
Branch of Service				
Army, N (% of Total)	1081137 (50.3)	527 (6.2)	401	$\chi^2 = 39.6$
Navy, N (% of Total)	382362 (17.8)	47 (5.6)	142	$\chi^2 = 63.6$
Air Force, N (% of Total)	414591 (19.3)	151 (19.0)	154	$\chi^2 = 0.6$
Marines, N (% of Total)	261651 (12.2)	73 (9.2)	97	$\chi^2 = 5.9$
Total				$\chi^2 = 109.7$

Table 9 (Continued), Study Population Demographics – Chi Square Goodness of Fit Calculation

Characteristic	Active Era Military (N, %)	Observed (WRIISC) Study Population (N, %)	Expected (N)	Goodness of Fit Chi- Square Calculation
Gender				
Male, N (% of Total)	1894533 (88.3)	733 (86.5)	748	$\chi^2 = 0.3$
Female, N (% of Total)	251031 (11.7)	114 (13.5)	99	$\chi^2 = 2.3$
Total				$\chi^2 = 2.6$
Race				
White, N (% of Total)	1416072 (66.0)	422 (49.8)	559	$\chi^2 = 33.6$
Black, N, (% of Total)	343290 (16.0)	208 (24.6)	136	$\chi^2 = 38.1$
Other, N, (% of Total)	386202 (18.0)	217 (18.0)	153	$\chi^2 = 26.8$
Total				$\chi^2 = 98.5$
Ethnicity				
Non-Hispanic, N (% of Total)	661 (86.0)	512 (66.6)	661	$\chi^2 = 33.6$
Hispanic/Latino, N (% of Total)	76.9 (10.0)	233 (30.3)	77	$\chi^2 = 316.1$
Other, N (% of Total)	30.8 (4.0)	24 (3.1)	31	$\chi^2 = 1.6$
Total				$\chi^2 = 351.3$
Educational Status				
< 12 Years, N (% of Total)	17755 (0.8)	38 (4.7)	65	$\chi^2 = 11.2$
≥ 12 Years, N (% of Total)	1439077 (67.1)	584 (72.1)	544	$\chi^2 = 2.9$
≥ 16 Years, N (% of Total)	650407 (30.1)	188 (23.2)	244	$\chi^2 = 12.9$
Total				$\chi^2 = 27.0$
Marital Status				
Married	166,061 (69.5)	124 (36.9)	200	$\chi^2 = 5.4$
Never Married	72800 (30.5)	165 (35.8)	89	$\chi^2 = 8.1$
Total				$\chi^2 = 13.5$

Table 9 (Continued), Study Population Demographics – Chi Square Goodness of Fit Calculation

Characteristic	Active Era Military (N, %)	Observed (WRIISC) Study Population (N, %)	Expected (N)	Goodness of Fit Chi- Square Calculation
Employment Status				
Employed	1953410 (92.7)	400 (49.9)	743	12.6
Not Employed	153828 (7.3)	402 (50.1)	59	44.6
Total				$\chi^2 = 57.2$

EXPOSURE AND HEALTH CONCERNS

MILITARY VARIABLES

Multiple Deployments

The average number self-reported exposure concerns by number of deployments were One Deployment: mean=6.65, sd:1.86/Two Deployments: mean=6.79, SD:2.08/Three or More Deployments mean=8.50, SD:1.29. The greatest difference between self-reported veteran exposures (one deployment/ two deployments/ three or more deployments) were Anthrax Vaccine (61.4%/18.2%/3.7%), Petrochemicals (62.7% /17.7% /3.7%) and Air Pollution (60.2%/17.0%/3.2%).

The average number of self-reported medical concerns were One Deployment: mean=5.78, SD:5.41/Two Deployments: mean =5.79, SD:5.60/Three or More Deployments: mean=9.50, SD:3.11. The largest variation of veteran self-reported medical concerns included Constipation/Loose Bowel (76.7%/20.8%/2.5%), Gastrointestinal (72.5%/19.8%/3.3%) and Musculoskeletal (45.9%/13.8%/2.6%).

The average number of military exposure concerns identified by the WRIISC by Number of Deployments were One Deployment: mean=3.24,, SD:1.81/ Two Deployments: mean=3.07, SD: 2.24/Three Deployments: mean=8.00, SD:2.16. As a result of the WRIISC multi – disciplinary evaluation several military exposure concerns identified increased to include Sandstorms (44.7%/47.8%/54.5%), Vehicular Exhaust (12.1%/16.3%/27.3%), and Oil Well Fires (12.6%/18.0%/33.3%).

The average number of medical concerns identified by the WRIISC for multiple deployments were One Deployment : mean=3.60, SD:1.7/Two Deployments:

mean=3.71, SD:1.94/Three or More Deployments: mean=3.75, SD:.95. The average number of WRIISC identified medical concerns remained similar with increasing number of military deployments. For instance, respiratory issues identified were similar (20.1%/17.3%/18.2%) as the number of military deployments increased. There may be several reasons why the number of self-report exposures and medical concerns increased with the number of deployments increased to include the cumulative effect of repeated combat duty on military health.

Active vs. Reserve

The military population who were observed at the WRIISC were different from the military population statistics that were published by the Defense Manpower Data Center, 2009 (see Table 10). The largest percentage of veterans were observed in this study were Reserve/Guard members (N=486, 54.3%). In comparison the percentage of WRIISC Reserve/Guard veterans in this study were greater compared to all Reserve/Guard Members who were deployed in OEF/OIF (N= 538,905, 28.5%). Though Active service military personnel represented a large percentage of the sample (N=367, 45.7%), the percentage of Active service component members used in this study were significantly less than the general population that served in Afghanistan and Iraq (N=1,381,308, 71.9%).

were Musculoskeletal (N=160, 38.6%), Weakness (N=86, 35.7%) and Gastrointestinal (N=79, 30.4%). The largest number of medical concerns which were self-reported by Reserve/Guard personnel included Musculoskeletal (N=255, 63.4%), Weakness (N=155, 64.3%) and Gastrointestinal (N=141, 35.9%). In Active service personnel the average number of military exposures that were identified by WRIISC personnel were 26% greater (mean=4.11, SD:2.35) compared to those veterans who served in the Reserve/Guard (mean= 3.25, SD: 1.99). Among Active duty personnel the largest military exposure concerns that were identified included Burning Trash (N=152, 46.1%), Sandstorms (N=142, 43.2%), and Petrochemicals (N=82, 24.9%). Among Reserve/Guard personnel the largest number of military exposure concerns that were identified by WRIISC personnel included Burning Trash (N=279, 59.7%), Sandstorms (N=223, 47.8%) and Petrochemicals (N=114, 24.4%).

The average number of medical concerns that were identified by the WRIISC multi-disciplinary team among Active service personnel (mean=4.00, SD:1.68) were greater than those identified in Reserve/Guard personnel (mean= 3.41, SD:1.78). The largest number of medical concerns that were identified in Active duty military personnel were Sinusitis (N=56, 32.2%), Musculoskeletal (N=244, 29.2%) and Gastrointestinal (N=125, 15.0%). The largest number of WRIISC identified medical concerns among Reserve/Guard military personnel included Allergies-Sinusitis (N=86, 49.4%), Musculoskeletal (N=311, 36.2%), and Neurological (N=169, 20.2%).

Table 10, Service Members Deployed by Component as of April 30, 2009

	Army N (% of Army)	Navy N (% of Navy)	Air Force N (% of Air Force)	Marine Corps N (% of Marine Corps)	Total N (% of Total)
Active	582773 (61.5%)	320140 (90.4%)	269220 (72.3%)	209175 (84.8%)	1381308 (71.9%)
National Guard	239336 (25.3%)	N/A	65295 (17.5%)	N/A	304661 (15.9%)
Reserves	125595 (13.2%)	33891 (9.6%)	38056 (10.2%)	36702 (15.2%)	234244 (12.2%)
Total	947664 (100.0%)	354031 (100.0%)	372571 (100.0%)	246777 (100.0%)	1921043 (100.0%)

*** In contrast with the Army and Air Force, the Navy and Marine Corps do not have a National Guard Component**

Though the average number of self-reported military exposure concerns reported by Active service personnel (mean=7.25, SD:1.92), were similar to the average number exposure concerns that were reported by those personnel who served in the Reserve/Guard (mean = 6.29, SD:1.83). The largest number of exposure concerns self-reported by Active service personnel included Anthrax Vaccine (N=219, 34.1%), Petrochemicals (N=216, 33.6%) and Multiple Vaccinations (N=196, 30.6%)/Air Pollution (N=198, 30.6%). The largest number of self-reported exposure concerns among Reserve/Guard military personnel included Petrochemicals (N=325, 50.5%), Air Pollution (N=323, 49.8%), and Anthrax Vaccine (N=317, 49.3%).

The average number of medical concerns that were self-reported by Active service military personnel (mean=7.46, SD:5.53) were greater than the number that were reported by personnel who served in the Reserve/Guard (mean=5.04, SD:4.89). The largest number of medical concerns that were reported by Active service personnel

Branch of Service

The number of Army veterans who were used in this study represented a larger percentage (66.2% vs. 49.3%) compared to the overall number of Army personnel who served in OEF/OIF. The most dramatic difference between OEF/OIF veterans and those used in this study by branch were those veterans who served in the Navy. The percentage of Navy personnel who were evaluated at the WRIISC between 2004-2012 compared to the total number of Navy personnel who served in OEF/OIF was 5.6% vs. 18.4% respectively.

The highest average number of exposure concerns that were self-reported by veterans were the Air Force (mean=7.08, SD:1.98), followed by Army (mean=6.73, SD:1.69), Navy (mean=6.67, SD:4.04) and the Marines (mean=6.40, SD:3.05). Among Air Force personnel the highest number of exposures that were self-reported included Petrochemicals (N=101, 86.3%), Multiple Vaccinations (N=98, 83.1%) and Air Pollution (N=98, 82.4%). In Army personnel the highest number of self-reported exposures included Petrochemicals (N=366, 84.5%), Air Pollution (N=362, 82.8%), and Anthrax Vaccine (N=356, 82.4%). Navy personnel were most concerned with Multiple Vaccines (N=26, 83.9%), Petrochemicals (N=26, 81.3%), and Anthrax Vaccine (N=25, 80.1%). Marine personnel were most concerned with Anthrax Vaccine (N=48, 80.0%), Petrochemicals (N=47, 78.3%), and Air Pollution (N=36, 61.0%). Air Force personnel reported the highest average number of medical concerns (mean=7.54, SD: 5.32). The average number of self-reported medical concerns among Navy (mean=6.67, SD:2.14) and Marine (N=6.40, SD:4.72) veterans were similar, but the average number of self-reported medical concerns for Army

veterans were less than the average number reported by the Air Force. The highest number of self-reported medical concerns among Air Force personnel were Musculoskeletal (N=79, 64.2%), Weakness (N=40, 32.8%) and Gastrointestinal (N=37, 30.8%). The highest number of self-reported medical symptoms among Navy military personnel were Musculoskeletal (N=21, 63.6%), Weakness (N=14, 45.2%), and Gastrointestinal. Marine veterans were most concerned with Musculoskeletal (N=31, 50.8%), Weakness (N= 18, 30.0%) and Gastrointestinal (N=20, 33.9%). The highest number of medical concerns that were self-reported by Army personnel included Musculoskeletal (N=283, 63.2%), Weakness (N=168, 37.9%) and Gastrointestinal (N=151, 34.2%).

The Marines represented the highest average number of military exposure concerns identified by WRIISC personnel (mean=4.40, SD:4.34), followed by the Air Force (mean = 3.77, SD:2.42) and Army (mean=3.33, SD:1.87). The lowest average number of exposure concerns were the Navy (mean =2.67, SD:2.08). Among Marine personnel, the WRIISC multi-disciplinary team identified Sandstorms (N=20, 27.4%), Burning Trash (N=19, 26.0%) and Air Pollution (N=12, 16.4%) as the top three exposure concerns. Among Air Force personnel, Burning Trash (N=72, 47.7%), Sandstorms (N=64, 42.4%), and Petrochemicals (N= 42, 27.8%) were the greatest concern. Among Army personnel WRIISC personnel identified Burning Trash (N=317, 60.2%), Sandstorms (N=266, 50.5%), and Petrochemicals (N = 114, 20.6%) as the most concerning. Among Navy personnel Burning Trash (N=23, 51.1%), Petrochemicals (N=16, 35.6%) and Noise (N=13, 28.9%) were the top exposure concerns identified. The highest average number of medical concerns

identified by WRIISC personnel were among Air Force personnel (mean= 4.00, SD:1.87). The average number of medical concerns identified for other branches of service were similar (Army, mean=3.62, SD:1.69/Navy, mean=3.33, SD:1.15/Marines, mean=3.000, SD: 2.35) respectively.

The highest number of medical concerns identified in Air Force personnel were Allergies-Sinusitis (N=22, 91.7%), Musculoskeletal (N=116, 71.1%), and Gastrointestinal (N=49, 30.1%) The top medical concerns that were identified by the WRIISC in Army personnel included Allergies-Sinusitis (N=97, 78.2%), Musculoskeletal (N=364, 66.2%) and Sleep (N=180, 48.6%). The top medical concerns that were identified in Navy personnel included Allergies-Sinusitis (N=10, 90.1%), Musculoskeletal (N=25, 55.6%), and Neurological (N=23, 51.1%). WRIISC personnel identified Allergies-Sinusitis (N=13, 86.6%), Musculoskeletal (N=49, 64.5%) and Gastrointestinal (N=29, 38.2%) as the most concerning in Marine personnel.

OEF vs. OIF

In this study the total number of veterans who served in Iraq (N=782, 92.3%) was greater than those veterans who served in Afghanistan (N = 144, 18.1%). Veterans who were observed at the WRIISC who served in both Iraq and Afghanistan represented a smaller percentage (N=79, 9.3%). The greatest number of veterans who were evaluated were Reserve/National Guard veterans who served in Iraq (N=449, 53.0%) though Active veterans who served in Iraq (N=333, 39.3%)

also represented a large percentage of the population. Reserve/National Guard veterans who served in both OIF/OEF were the smallest number (N=27, 3.2%). The average number of self-reported exposure concerns for OEF veterans was mean=6.00, SD:1.00. OEF veterans self-reported Petrochemicals (N=31, 75.6%), Insects (N=32, 74.4%) and Multiple Vaccinations. (N=30, 73.2%) as their greatest exposure concerns. The average number of self-reported exposure concerns for OIF veterans was mean= 6.79, SD:1.92. OIF veterans self-reported Anthrax Vaccine (N=510, 85.0%), Petrochemicals (N=510, 84.7%) and Air Pollution (N=494, 81.5%) as their top exposure concerns. The average number of self-reported exposure concerns for veterans who served in Both OEF and OIF was mean= 6.75, sd:3.20. For veterans who served in both OEF and OIF, Biological Weapons (N =12, 15.6%), Depleted Uranium (N=18, 12.2%) and Petrochemicals (N=56, 10.4%) were the greatest concern.

The average number of medical concerns that were self-reported by OEF veterans was mean=6.00, SD: 5.57. Veterans who served in OEF self-reported Musculoskeletal (N=26, 57.8%), Extremities (N=18, 40.9%) and Weakness (N=13, 30.2%) as their top medical concerns.

The average number of medical concerns self-reported by OIF veterans was mean=5.97, SD:5.39. Veterans who served in OIF reported that Musculoskeletal (N=389, 62.6%), Weakness (N=228, 37.1%) and Gastrointestinal (N=210, 34.5%) were their greatest concerns. The average number of medical concerns that were self-reported by veterans who served in Both OEF and OIF were mean= 9.50, SD:5.74. Veterans who served in both OEF and OIF self-reported Musculoskeletal

(N=41, 65.1%), Gastrointestinal (N=29, 46.0%) and Weakness (N=26, 40.6%) as their greatest concerns.

The average number of military exposures identified by the WRIISC in OEF veterans was mean= 3.67, SD 1.15. Among OEF veterans The WRIISC identified Burning Trash (N=412, 73.3%), Sand Storms (N=340, 46.1) and Petrochemicals (N=180, 24.4%) as the top concerns.

The average number of military exposures identified by the WRIISC in OIF veterans was mean=3.44, SD 2.18. Among OIF veterans who were evaluated at the WRIISC the top exposures included Sandstorms (N=25, 41.7%), Burning Trash (N=24, 40.0%), and Petrochemicals (N=16, 26.7%). The average number of exposures identified by veterans who served in both OEF and OIF was mean=6.00, SD:3.65. Among veterans who served in both OEF and OIF Sandstorms (N=40, 53.3%), Burning Trash (N=36, 48.0%) and Contaminated Food and Water (N=32, 42.7%) were identified by the WRIISC as the top exposure concerns.

The average number of medical concerns identified by the WRIISC for OEF veterans was mean=2.33, SD:1.53. Among OEF veterans who were evaluated at the WRIISC, the top medical concerns were Allergies-Sinusitis, (N=24, 92.3%), Musculoskeletal (N=90, 62.9%) and Neurological (N=43, 34.3%) concerns. The average number of medical concerns identified by the WRIISC in OIF veterans was mean=3.68, SD:1.73. The top medical concerns that were identified by the WRIISC for OIF veterans included %), Allergies-Sinusitis (N=131, 80.9%), Musculoskeletal (N=517, 67.1%) and Gastrointestinal (N=258, 33.5%). The average number of medical concerns that were identified by the WRIISC in veterans who served in both OEF and OIF was

mean= 3.75, SD: .96. The top medical concerns identified by the WRIISC for veterans who served in OEF and OIF were Allergies-Sinusitis (N=13, 92.9%), Musculoskeletal (N=51, 65.4%), and Gastrointestinal (N=32, 41.0%).

SOCIOCULTURAL VARIABLES

Gender Differences

Self-reported exposures reported by veterans varied by gender. The average number of self-reported exposure concerns in males were greater (mean=6.90, SD:1.86) compared to females (mean=6.35, SD:2.00). The highest percentage of exposures that were reported by male veterans were Petrochemicals (N=471, 85.0%), Anthrax Vaccine (N=453, 82.2%) and Air Pollution (N=452, 81.4%) respectively. Among those exposures self-reported by females the highest number included Anthrax Vaccine (N=83, 90.2%), Multiple Vaccinations (N=77, 83.7%) and Insects (N=76, 81.7%).

The average number of self-reported medical concerns in females (mean=7.63, SD:5.51) were greater than those reported by males (mean=5.42, SD:5.27). The largest number of medical concerns reported by male veterans included Chest Pain (N=121, 84.6%), Cough (N=96, 80.0%), and Back (N=351, 61.4%). Female veterans reported that Back (N=64, 68.1%), Elevated Temperature (N=46, 49.5%) and Change in Menstruation (N=29, 46.8%) as their greatest concerns.

The average number of exposure concerns identified by WRIISC personnel for males was higher mean=3.66, SD:2.29 compared to females mean = 2.68, SD:1.44.

Exposures that were identified by the WRIISC multi – disciplinary team were among

males were Burning Trash (N=380, 55.3%), Sandstorms (N=310, 45.1%) and Petrochemicals (N=170, 24.7%). Those female exposures identified by the WRISSC were very similar to males but at slightly lower percentages. They included Sandstorms (N=55, 50.0%), Burning Trash (N=51, 46.4%) and Petrochemicals (N=26, 23.6%).

The average number of WRIISC identified medical concerns for males was mean=3.69, SD:1.88 compared to females mean= 3.42, SD:1.17. Among males the top medical concerns that were identified included Allergies-Sinusitis (N=121, 82.3%), Musculoskeletal (N=474, 65.6%), and High Blood Pressure (N=86, 43.0%). Among females the top three medical concerns identified were Allergies- Sinusitis (N=21, 77.8%), Musculoskeletal (N=248, 71.9%), and Gastrointestinal (N=42, 36.8%).

Age

The average number of self-reported exposure concerns among 20-29 year old veterans was mean=6.50, SD:1.98. For this category the top concerns reported was Petrochemicals (N=284, 84.0%), Anthrax Vaccine (N=284, 83.5%), and Air Pollution (N=276, 81.7%). For veterans who were categorized as 30-39 year olds the average number of self-reported exposures was mean= 6.61, SD: 2.17). Top concerns in this category included Air Pollution (N=118, 82.5%), Petrochemicals (N=116, 82.3%) and Anthrax Vaccine (N=117, 81.8%). The average number of self-reported exposure concerns for 40-49 year old was mean=6.29, SD:2.07. Top exposure concerns were Air Pollution (N=90, 95.0%), Petrochemicals (N=103, 87.3%), and Anthrax Vaccine (N=97, 82.9%). The average number of exposure concerns self-

reported by 50-59 year olds was mean=6.65, SD:2.39. Top exposure concerns for this category included Anthrax Vaccine (N=33, 89.2%), Petrochemicals (N=34, 87.2%), and Insects (N=32, 80.0%). The average number of exposure concerns that were reported for ≥ 60 year old veterans was mean=6.33, SD:2.33). Top exposure concerns among these veterans included Air Pollution (N=6, 85.7%), Multiple Vaccinations (N=6, 85.7%), and Anthrax Vaccine (N=5, 83.3%) and Human Corpses (N=5, 83.3%).

For 20-29 year old veterans, the average number of exposures that were identified by the WRIISC were mean=3.31, SD:1.90. In 20-29 year old veterans the WRIISC identified Burning Trash (N=221, 54.0%), Sandstorms (N=185, 24.2%) and Contaminated Food And Water (N=126, 30.8%) as the top concerns. In 30-39 Year old veterans, the average number of exposures that were identified by the WRIISC were mean=3.64, SD:2.26. The top exposure concerns identified in this group were Burning Trash (N=100, 55.6%), Sandstorms (N=86, 47.8%), and Contaminated Food and Water (N=54, 30.0%). The average number of exposure concerns identified by the WRIISC in 40-49 year olds were mean=3.75, SD:2.38. The top three exposure concerns included Burning Trash (N=81, 54.4%), Sandstorms (N=68, 45.6%), and Contaminated Food and Water (N=48, 32.2%). The average number of exposure concerns that were identified by the WRIISC for 50-59 year old veterans were mean=3.30, SD:2.32. The top three exposure concerns were Burning Trash (N=25, 50%), Sandstorms (N=22, 44.0%), and Petrochemicals (N=16, 32.0%). For veterans who were classified as ≥ 60 years old, the average number of WRIISC identified exposure concerns were mean=2.89, SD:1.96. The top three

exposure concerns in this category were Burning Trash (N=4, 44.4%), Sandstorms (N=4, 44.4%), and Contaminated Food and Water (N=3, 33.3%).

For veterans who were classified as 20-29 years old, the average number of medical concerns that were identified by the WRIISC was mean=3.11, SD:1.75. For this category, the top three medical concerns were Allergies- Sinusitis (N=71, 81.6%), Musculoskeletal (N=299, 68.4%), and Gastrointestinal (N=141, 32.3%). For veterans who were classified as 30-39 years old, the average number of medical concerns that were identified by the WRIISC were mean=3.76, SD:1.20. The top three medical concerns identified included Allergies- Sinusitis (N=31, 79.5%), Musculoskeletal (N=122, 64.9%), and Neurological (N=79, 42.0%). In veterans who were classified as 40-49 years old, the average number of medical concerns identified by the WRIISC were mean=3.39, SD:2.20. Of greatest concern were Allergies- Sinusitis (N=28, 84.8%), Musculoskeletal (N=94, 62.7%), and High Blood Pressure (N=26, 46.4%). The average number of medical concerns identified by the WRIISC in 50-59 year old veterans was mean=3.56, SD:1.85. The top three medical concerns were Musculoskeletal (N=37, 71.2%), High Blood Pressure (N=10, 50.0%), and High Cholesterol (N=10, 50.0%). The average number of WRIISC identified exposure concerns for veterans who were classified as ≥ 60 years old was mean=2.00, SD:1.73. The top three concerns identified were High Blood Pressure (N=3, 75.0%), Musculoskeletal (N=4, 44.4%), and Sleep (N=4, 44.4%).

Ethnicity, Race and Culture

The average number of self-reported exposure concerns were highest in white veterans (mean=7.39, SD:1.80). The lowest average number was black veterans

(mean= 6.53, sd:1.61). The largest number of self-reported exposure concerns reported among white veterans were Petrochemicals (N=266, 85.8%), Anthrax Vaccine (N=260, 84.1%), and Air Pollution (N= 255, 81.7%). Black veterans were most concerned with Anthrax Vaccine (N=139, 86.3%), Air Pollution (N=132, 80.5%), and Multiple Vaccinations (N=120, 75.5%). Among Asian or Pacific Islander veterans self-reported exposures which were the greatest concern were Petrochemicals (N=18, 90.0%), Air Pollution (90.0%), and Insects (90.0%). American Indian/Alaskan Native veterans were concerned with Insects (N=7, 100%), Anthrax Vaccine (N=6, 85.7%), and Multiple Vaccinations (N=6, 85.7%). A number of veterans were classified as Other (N=81). The highest prevalence of self-reported exposures among this group included Petrochemicals (N=65, 85.5%), Air Pollution (N=65, 85.5%) and Anthrax Vaccine (N=61, 78.2%).

The highest average number of medical concerns that were self-reported were for white veterans (mean=7.46, SD:6.05), black veterans (mean=4.97, sd:4.13), followed by other veterans (mean=3.00, SD:2.24). Self-reported medical concerns that were reported by White veterans included Musculoskeletal (N=202, 62.9%), Gastrointestinal (N=116, 60.1%) and Trouble Breathing N=85, 55.2%). Black veterans were most concerned with High Blood Pressure (N=21, 100.0%), Constipation/Loose Bowel (N=100, 60.9%), and Musculoskeletal (N=93, 55.4%). Latino veterans were most concerned with Musculoskeletal N=121, 62.3%), Weakness (N=64, 33.3%) and Gastrointestinal (N=60, 30.9%). The highest number of self-reported medical concerns among Asian American veterans in this group were Musculoskeletal (N=13, 65.0%), Gastrointestinal (N=8, 40.0%) and Difficulty

Breathing (N=5, 25.0%). American Indian/Alaskan Native reported Musculoskeletal (N=6, 85.7%), and Coughing (N=2, 40.0%) most concerning.

Among veterans who were evaluated at the WRIISC the average number of exposure concerns identified were higher for white veterans (mean=4.02, SD:2.48) compared to black veterans (mean=3.26, SD:1.52). The average number of exposure concerns for all other veterans was mean=2.71, Sd:1.12).

Among veterans who were evaluated at the WRIISC the average number of exposure concerns identified were higher for White veterans (mean=4.02, SD:2.48) compared to Black veterans (mean=3.26, SD:1.52). The average number of exposure concerns for all other veterans was mean=2.71, SD;1.13. The highest number of exposures identified by the WRIISC multi-disciplinary team among white veterans were Burning Trash (N=229, 70.2%), Sandstorms (N=182, 46.0%) and Petrochemicals (N=100, 25.3%). Among Black veterans the greatest exposure concerns identified were Burning Trash (N=98, 49.0%) and Sandstorms (N=98, 49.0%) followed by Petrochemicals (N=49, 24.5%). Those exposure concerns identified in Asian American veterans included Burning Trash (N=7, 35.0%), Petrochemicals (N=6, 30.0%), and Sandstorms and Vehicular Exhaust (N=5, 25.0%). Among veterans classified as American Indian/Other, Sandstorms (N=6, 60.0%), Air Pollution (N=5, 50.0%) and Depleted Uranium (N=4, 40.0%) were the highest prevalence. Veterans who were classified as other had Burning Trash (N=45, 52.3%), Petrochemicals (N=21, 24.4%), and Sandstorms (N=33, 38.4%) as their greatest concern.

The ethnic group used in this study were categorized as White (N=312), Hispanic Latino (N=194), Black (N=164), Other (N=81), Asian or Pacific Islander (N=20), or American Indian/Alaskan Native (N=7).

The average number of WRIISC identified medical concerns for white veterans was the same (mean=3.88 SD:2.00) as black Veterans (mean=3.76, SD:1.33) and veterans who were classified as other (mean=3.00, SD:0.89). Medical concerns that were identified by the WRIISC in white veterans included Allergies – Sinusitis (N=83, 85.6%), Musculoskeletal (N=268, 64.7%), and Gastrointestinal (N=140, 33.8%). Those medical concerns identified in Black veterans included Allergies-Sinusitis (N=28, 73.7%), Musculoskeletal (N=131, 62.9%) and Neurological (N=72, 34.6%). Those medical concerns identified most in Asian American veterans included Musculoskeletal (N=14, 70.0%), Allergies-Sinusitis (N=2, 6.6%), and ENT (N=10, 50.0%), Among veterans who were classified as Other the top concerns identified included Allergies-Sinusitis (N=17, 85.0%), and Musculoskeletal (N=70, 73.7%) and Cardiac, HBP (N=10, 43.5%).

Education

In this study veterans' education were categorized by <12 Years, ≥12 Years, or ≥ 16 Years. The largest group of veterans were ≥ 12 Years, (N = 458, 41.3%), ≥ 16 Years (N=149, 23.2%), those classified as attaining less than 12 Years of education (N=35, 5.5%). The authors believed that ≤12 Years were representative of those veterans who did not obtain a High School diploma, ≥ 12 Years represented veterans who had fulfilled the requirements for a High School diploma and ≥ 16 Years was equivalent to a College degree.

The largest average number of self-reported exposures were for < 12 Years of education (mean = 7.32, SD: 1.48), ≥ 12 Years of Education (mean = 6.77, SD:2.47) and ≥ 16 Years of Education (mean = 6.25, SD: 2.88). Those top exposures that were self-reported by veterans with < 12 Years of Education were Petrochemicals (N=407, 84.9%), Anthrax Vaccine (N= 405, 84.6%) and Air Pollution (N=389, 80.5%). Those veterans with ≥ 12 Years of Education reported similar concerns with Air Pollution (N=118, 81.9%), Petrochemicals (N=81, 80.2%) and Anthrax Vaccine (N=248, 86.7%). Veterans who had ≥ 16 Years of Education reported Air Pollution (N=31, 79.5%), Petrochemicals (N=81, 80.2%) and Multiple Vaccinations (N=35, 87.5) as their top exposure concerns.

The largest average number of self-reported medical concerns were ≥ 12 Years of Education (mean = 6.78, SD:3.11), ≥ 16 Years of Education (mean = 6.24, SD:2.90) and < 12 Years of Education (mean = 5.24, SD:1.31). In this study those veterans who were classified as < 12 Years of education, the largest number of medical concerns that were self-reported were Musculoskeletal (N=22, 62.9%), Difficulty Breathing (N=11, 32.4%) and -Gastrointestinal (N=10, 29.4%). Veterans with ≥ 12 Years of Education reported Palpitations (N= 69, 73.4%) Musculoskeletal (N=284, 62.0%), and Difficulty Breathing (N= 115, 25.2%) as their top concerns. In veterans who were categorized as ≥ 16 Years of Education the top medical concerns that were self-reported included Musculoskeletal (N=92, 61.7%), Gastrointestinal (N=57, 39.0%), and Weakness (N=57, 39.0%).

The WRIISC identified the largest average number of exposure concerns in veterans < 12 Years of Education (mean = 4.22, SD:1.53), ≥ 12 Years of Education (mean =

3.51, SD:1.62, ≥ 16 Years of Education (mean = 2.74, SD: 1.36). Among military exposures that were identified by the WRIISC personnel for veterans with ≤ 12 Years of Education the greatest were Burning Trash (N=136, 60.7%), Sandstorms (N=99, 44.2%) and Petrochemicals (N=38, 30.4%). For veterans with ≥ 12 Years of Education the highest prevalence of military exposures that were highlighted included Burning Trash (N=189, 52.8%), Sandstorms (N=235, 48.0%), and Contaminated Food and Water (N=108, 30.2%). For those veterans with ≥ 16 Years of Education Sandstorms (N=84, 53.2%), Burning Trash (N=68, 51.5%) and Contaminated Food and Water (N=45, 34.1%) were of greatest concern.

The WRIISC identified the highest number of medical concerns in veterans with ≥ 12 Years of Education (mean = 3.29, SD:2.59), < 12 Years of Education (mean = 3.22, SD:1.42), and ≥ 16 Years of Education (mean = 3.11, SD:1.66) For veterans with ≤ 12 Years of Education the highest prevalence of medical concerns included Sinusitis (N=107, 81.7%), Musculoskeletal (N=165, 66.8%), and High Blood Pressure (N=69, 43.4%). For Veterans with ≥ 12 years of Education the WRIISC identified Musculoskeletal (N=239, 65.1%), Sinusitis (N=80, 79.2%) and Gastrointestinal (N=129, 35.1%) issues as those of greatest concern. Veterans who were classified as having ≥ 16 Years of education, the top three medical concerns identified by the WRIISC included Sinusitis (N=30, 78.9%) Musculoskeletal (N=99, 72.8%) and Gastrointestinal (N=46, 33.8%).

Marital Status

Veterans who were part of this study were categorized as Married/Living as Married, Divorced/Separated/Widowing, or Never Married, or Living as Married.

The largest number of veterans were Married (N=332, 41.8%), Divorced/Separated/Widowed (N=147, 17.8%), and Never Married (N = 321, 40.4%).

The average number of exposure concerns that were self-reported by Divorced/Separated/Widowed veterans was slightly higher (mean = 7.56, SD: 3.41) than married veterans (mean=7.06, SD:1.46) and for those veterans who were never married (mean= 6.93, SD:5.25). Married/Living as Married veterans reported their top exposure concerns as Petrochemicals (N=200, 90.2 %), Anthrax Vaccine (N=198, 86.2%) and Air Pollution (N=202, 84.1%), and Multiple as their top concerns. The greatest number of self-reported exposure concerns among Divorced /Separated/Widowing veterans were Multiple Vaccinations (N=60, 85.7%), Petrochemicals (N=89, 81.4%) and Anthrax Vaccine (N=84, 81.2%). Those veterans who were classified as Never Married felt that Anthrax Vaccine (N=226, 84.3%), Petrochemicals (N=200, 81.1%) and Air Pollution (N=208, 78.2%) were the greatest concern.

The average number of medical concerns that were self-reported by married veterans was higher (mean=6.63 SD:5.85) than those that were self-reported for veterans who were Never Married and Divorced/Separated/Widowing (N= 6.30, SD:4.66). The top medical concerns which were self-reported by Married veterans included Musculoskeletal (N=172, 70.6%), Weakness (N=106, 40.6%) and

Gastrointestinal (N=95, 39.5%). Among veterans who were classified as Divorced/Separated/Widowing top medical concerns that were self-reported included Musculoskeletal (N=62, 49.3%), Weakness (N=44, 35.1%), and Gastrointestinal (N=34, 30.1%). The top medical concerns reported by veterans categorized as Never married included Musculoskeletal (N=153, 56.5%), Gastrointestinal (N=75, 28.4%) and Weakness (N=73, 27.8%).

The average number of exposures identified by the WRIISC for veterans who were Married/Living as Married (mean=3.06, SD:1.36) were less than for those veterans who were not married (mean=3.83, sd:2.62) and Divorced/Separated/Widowing (mean = 4.21, SD: 2.83). Among Married/Living as Married veterans the largest number of exposures identified by the WRIISC included Burning Trash (N=163, 54.2%), Sandstorms (N=142, 47.2%), and Depleted Uranium (N=54, 17.9%). Among Divorced/Separated/Widowing veterans the exposures most identified by the WRIISC included Burning Trash (N=67, 50%), Sandstorms (N=37, 45.0%) and Petrochemicals (N=32, 32.5%).

The largest number of exposures that were identified by WRIISC personnel among veterans who were Never Married included Burning Trash (N=168, 56.0%), Sandstorms (N=137, 45.7%), and Petrochemicals (N=72, 24.0%).

The average number of medical concerns identified by the WRIISC for Married/Living as Married (mean=3.63, SD: 2.30) was less than those veterans who were never married (mean=3.984, SD: 1.456) and Divorced/Separated/Widowing (mean = 4.23, SD: 3.91). In Married/Living as Married veterans the WRIISC identified Musculoskeletal (N=226, 70.2%), Sleep (N=116, 36.8%) and Neurological

(N=110, 33.6%) were the largest medical concerns identified. The WRIISC identified Musculoskeletal (N=87, 66.7%), Gastrointestinal (N=37, 41.1%) and Neurological (N=52, 38.8%) as the major medical concerns of those veterans who were classified as Divorced/Separated/Widowing. Never Married veterans had Musculoskeletal (N=210, 65.6%), Neurological (N=101, 31.6%) and Gastrointestinal (N=97, 30.3%) as the most concerning.

Employment Status

In this study there was a similar percentage of veterans who were Unemployed (N=372, 49.3%) compared to those veterans who were Employed (N= 382, 50.3%). In most all cases the number of exposures that were identified by the WRIISC multi-disciplinary team were not substantially different for those who were employed as compared to those who were unemployed.

The average number of self-reported exposures for employed veterans was mean=6.41, SD:1.99. Unemployed veterans reported more exposure concerns (mean=7.05, SD:1.79) than those who were employed. The top three self-reported exposures among employed veterans were Petrochemicals (N=283, 54.1%), Multiple Vaccinations (41.3%) and Anthrax Vaccine (N=265, 42.4%). The top three exposures that were reported by unemployed veterans included Anthrax Vaccine (N=255, 40.8%), Air Pollution (N=248, 39.4%) and Petrochemicals (N=240, 38.5%). For those veterans who are employed, the average number of self-reported medical concerns (mean = 5.19, SD:4.79) were less than those who were unemployed (mean=6.97, sd:5.96).

Among employed veterans self-reported medical concerns Constipation/Loose Bowel (N=65, 55.1%), High Blood Pressure (N=29, 52.7%), and Gastrointestinal (N = 189, 18.5%) were the highest percentage. In almost all cases, both exposure and medical symptoms reported by unemployed veterans were greater than those who were employed. The highest number of self-reported medical concerns of unemployed veterans included Palpitations (N=49, 51.0%), Nausea (N=275, 42.6%), and Musculoskeletal (N=196, 30.4%).

The average number of exposures identified by the WRIISC among those veterans who were employed (mean=3.02, SD:2.03) were less than those who were unemployed (mean=3.95, SD:2.12). The top three exposures that were identified by the WRIISC for those veterans who were employed were Burning Trash (N=269, 56.2%), Sandstorms (170, 45.7%), and Petrochemicals (N=95, 25.5%). Among those unemployed veterans exposures that were identified by the WRIISC, the top three (Burning Trash N =201, 52.6%, Sandstorms N=178, 45.6%, Petrochemicals N=94, 24.3%) did not differ dramatically from those veterans who were employed. The average number of medical concerns among veterans who were employed were less (mean=3.53, SD:1.82) compared to veterans who were unemployed (mean= 3.76, SD:1.69). The top three medical exposures that were identified by the WRIISC for employed veterans included Allergies- Sinusitis (N=66, 76.7%) Musculoskeletal (N=263, 66.2%), and High Blood Pressure. (N=48, 45.7%). Those identified for unemployed veterans were Allergies-Sinusitis (N=70, 86.4%), Musculoskeletal (N=266, 67.1%) and Sleep (N=121, 30.6%).

WRIISC MEDICAL VS. EXPOSURE CONCERNS

At the conclusion of their evaluation, veterans evaluated at the WRIISC may have been identified with unique military exposure as well as medical concerns (see table 12). The number of veterans who were identified by the WRIISC to have an exposure concern were compared with medical concerns. The top three identified exposure concerns identified by WRIISC personnel were Burning Trash, Sandstorms, and Petrochemicals respectively. The WRIISC identified a large number of medical concerns among veterans who were exposed to Burning Trash to include Respiratory (N=103, 65.6) and Cardiac (N=108, 51.2%). Veterans who were identified by the WRIISC to have exposures to Sandstorms also had high levels of medical concerns identified to include Respiratory (N=91, 58.0%), Gastrointestinal (N=134, 51.0%) and Cardiac (N=83, 43.0%). Veterans who the WRIISC identified to have exposure to Petrochemicals had Skin (N=32, 23.5%), Hematology (N=13, 26.0%) and ENT (N=46, 22.0%) as their top medical concerns.

Table 12, WRIISC Identified Medical Concerns vs. Military Exposure Concerns
(N, % within Medical Concern)

Exposure	Musculoskeletal	Gastrointestinal	Genitourinary	Respiratory	Cardiac	ENT	Vision	Skin
Burning Trash	282 (53.6)	140 (53.2)	40 (55.6)	103 (65.6)	108 (56.0)	107 (51.2)	33 (54.1)	81 (59.6)
Sandstorms	249 (47.3)	134 (51.0)	40 (55.6)	91 (58.0)	83 (43.0)	95 (45.5)	29 (47.5)	69 (50.7)
Petrochemicals	89 (16.9)	43 (16.3)	14 (19.4)	24 (15.3)	39 (20.2)	46 (22.0)	11 (18.0)	32 (23.5)
Depleted Uranium	97 (18.4)	53 (20.2)	13 (18.1)	25 (15.9)	39 (20.2)	36 (17.2)	11 (18.0)	29 (21.3)
Oil Well Fires	78 (14.7)	43 (16.3)	10 (13.9)	30 (19.1)	31 (16.1)	32 (15.3)	7 (11.5)	19 (14.0)
Anthrax Vaccine	74 (14.1)	39 (14.8)	14 (19.4)	14 (8.9)	28 (14.5)	31 (14.8)	10 (16.4)	28 (20.6)
Air Pollution	74 (14.1)	41 (15.6)	14 (19.4)	26 (16.6)	22 (11.4)	40 (19.1)	5 (8.2)	15 (11.0)
Noise	75 (14.3)	37 (14.1)	11 (15.3)	23 (14.6)	27 (14.0)	51 (24.4)	9 (14.8)	25 (18.4)
Vehicular Exhaust	77 (14.6)	32 (12.2)	10 (13.9)	31 (19.7)	22 (11.4)	36 (17.2)	12 (19.7)	24 (17.6)
Contaminated Food & Water	163 (31.0)	101 (38.4)	21 (29.2)	47 (29.9)	60 (31.1)	75 (35.9)	31 (50.8)	53 (39.0)
Multiple Vaccinations	61 (11.6)	34 (12.9)	8 (11.1)	17 (10.8)	24 (12.4)	17 (8.1)	6 (9.8)	16 (11.8)
Asbestos	49 (9.3)	24 (9.1)	8 (11.1)	12 (7.6)	16 (8.3)	16 (7.7)	8 (13.1)	11 (8.1)
Insects	47 (8.9)	29 (11.0)	7 (9.7)	19 (12.1)	20 (10.4)	15 (7.2)	6 (9.8)	15 (11.0)
Pesticides	39 (7.4)	18 (6.8)	7 (9.7)	9 (5.7)	17 (8.8)	21 (10.0)	2 (3.3)	13 (9.6)
Burning Hardware	35 (6.7)	19 (7.2)	3 (4.2)	18 (11.5)	13 (6.7)	12 (5.7)	4 (6.6)	8 (5.9)
Ionizing Radiation	7 (1.3)	6 (2.3)	2 (2.8)	2 (1.3)	5 (2.6)	3 (1.4)	0 (0.0)	1 (0.7)
Non-Ionizing Radiation	27 (5.1)	17 (6.5)	5 (6.9)	6 (3.8)	8 (4.1)	12 (5.7)	2 (3.3)	5 (3.7)
Mefloquine	19 (3.6)	13 (4.9)	1 (1.4)	3 (1.9)	11 (5.7)	9 (4.3)	3 (4.9)	5 (3.7)
Biological Weapons	17 (3.2)	13 (4.9)	4 (5.6)	1 (0.6)	5 (2.6)	10 (4.8)	0 (0.0)	5 (3.7)
Animals	6 (1.1)	2 (0.8)	1 (1.4)	1 (0.6)	3 (1.6)	2 (1.0)	0 (0.0)	0 (0.0)
Lead	6 (1.1)	3 (1.1)	0 (0.0)	1 (0.6)	2 (1.0)	5 (2.4)	0 (0.0)	2 (1.5)
Small Pox Vaccine	8 (1.5)	6 (2.3)	2 (2.8)	1 (0.6)	2 (1.0)	4 (1.9)	0 (0.0)	3 (2.2)

Table 12, (Continued), WRIISC Identified Medical Concerns vs. Military Exposures
(N, % within Medical Concern)

Exposure	Neurological	Hematology	Infectious	Endocrine	Reproductive	Sleep	Autoimmune	Other
Burning Trash	141 (52.4)	27 (54.0)	13 (61.9)	26 (59.1)	7 (46.7)	142 (58.2)	3 (30.0)	431 (54.1)
Sandstorms	119 (44.2)	22 (44.0)	12 (57.1)	20 (45.5)	10 (66.7)	106 (43.4)	2 (20.0)	365 (45.8)
Petrochemicals	43 (16.0)	13 (26.0)	4 (19.0)	6 (13.6)	3 (20.0)	37 (15.2)	0 (0.0)	134 (16.8)
Depleted Uranium	48 (17.8)	11 (22.0)	6 (28.6)	11 (25.0)	1 (6.7)	48 (19.7)	4 (40.0)	149 (18.7)
Oil Well Fires	47 (17.5)	5 (10.0)	3 (14.3)	10 (22.7)	2 (13.3)	39 (16.0)	1 (10.0)	117 (14.7)
Anthrax Vaccine	38 (14.1)	10 (20.0)	2 (9.5)	7 (15.9)	5 (33.3)	41 (16.8)	3 (30.0)	115 (14.4)
Air Pollution	43 (16.0)	5 (10.0)	5 (23.8)	7 (15.9)	4 (26.7)	38 (15.6)	2 (20.0)	114 (14.3)
Noise	33 (12.3)	10 (20.0)	2 (9.5)	8 (18.2)	5 (33.3)	44 (18.0)	1 (10.0)	110 (13.8)
Vehicular Exhaust	37 (13.8)	6 (12.0)	1 (4.8)	4 (9.1)	3 (20.0)	35 (14.3)	2 (20.0)	109 (13.7)
Contaminated Food & Water	97 (36.1)	13 (26.0)	8 (38.1)	11 (25.0)	7 (46.7)	79 (32.4)	4 (40.0)	241 (30.2)
Multiple Vaccinations	25 (9.3)	5 (10.0)	2 (9.5)	3 (6.8)	5 (33.3)	23 (9.4)	2 (20.0)	98 (12.3)
Asbestos	29 (10.8)	3 (6.0)	1 (4.8)	1 (2.3)	1 (6.7)	21 (8.6)	0 (0.0)	75 (9.4)
Insects	19 (7.1)	6 (12.0)	6 (28.6)	6 (13.6)	0 (0.0)	20 (8.2)	1 (10.0)	62 (7.8)
Pesticides	22 (8.2)	3 (6.0)	0 (0.0)	3 (6.8)	1 (6.7)	13 (5.3)	1 (10.0)	60 (7.5)
Burning Hardware	20 (7.4)	3 (6.0)	0 (0.0)	2 (4.5)	2 (13.3)	19 (7.8)	1 (10.0)	49 (6.1)
Ionizing Radiation	3 (1.1)	2 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.2)	0 (0.0)	9 (1.1)
Non-Ionizing Radiation	11 (4.1)	3 (6.0)	0 (0.0)	2 (4.5)	1 (6.7)	11 (4.5)	0 (0.0)	41 (5.1)
Mefloquine	13 (4.8)	1 (2.0)	1 (4.8)	2 (4.5)	2 (13.3)	12 (4.9)	0 (0.0)	34 (4.3)
Biological Weapons	11 (4.1)	2 (4.0)	0 (0.0)	4 (9.1)	1 (6.7)	12 (4.9)	0 (0.0)	24 (3.0)
Animals	3 (1.1)	0 (0.0)	1 (4.8)	1 (2.3)	0 (0.0)	3 (1.2)	0 (0.0)	8 (1.0)
Lead	2 (0.7)	0 (0.0)	0 (0.0)	1 (2.3)	0 (0.0)	1 (0.4)	0 (0.0)	11 (1.4)
Small Pox Vaccine	7 (2.6)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.6)	1 (10.0)	11 (1.4)

SELF-REPORT VS. WRIISC IDENTIFIED EXPOSURE AND MEDICAL CONCERNS

There have been many studies on the value of information obtained from self-report questionnaires in the treatment of veterans. In Health Status of Persian Gulf War Veterans (Proctor) reported that “self –reported symptoms due to several environmental exposures and the effect of stress are associated with increased health symptoms predicted body systems after adjusting for war zone stressors and PTSD.” In almost all cases the number of exposure and medical concerns that were self-reported by veterans were less than those concerns that were identified by the WRIISC multi –disciplinary team. The WRIISC identified an average of $N=4.11$, $SD:2.35$ exposure concerns compared to mean= 7.25 , $SD:1.92$ veteran self-reported exposure concerns ($t=27.84$, $df: 1$, $p < .00001$) (See Table 13). The WRIISC identified an average of $N=3.46$, $SD: 1.69$ medical concerns compared to mean= 6.79 , $SD:4.70$ ($t=17.82$, $df: 1$, $p < .00001$) veteran self-reported exposure concerns. (See Table 14).

Table 13, Average Number of Self-Reported vs. WRIISC Identified Exposure Concerns

Demographic	Self - Reported Exposure Concern Mean (SD)	WRIISC Identified Exposure Concern Mean (SD)	Test Statistic
Overall	7.25 (1.92)	4.11 (2.35)	t =27.84, df: 1, p < .00001
One Deployment	6.65 (1.86)	3.24 (1.81)	t =35.86, df: 1, p < .00001
Two Deployments	6.79 (2.08)	3.07 (2.23)	t =34.54, df: 1, p < .00001
Three or More Deployments	8.50 (1.29)	8.00 (2.16)	t = 5.76, df: 1, p < .0001
Active	7.25 (1.92)	4.11 (2.35)	t =28.82, df: 1, p < .00001
Reserve	6.29 (1.83)	3.25 (1.99)	t =30.96, df: 1, p < .00001
Army	6.73 (1.69)	3.33 (1.87)	t = 37.48, df: 1 p < .0001
Air Force	7.08 (1.98)	3.77 (2.42)	t =29.50, df: 1, p < .00001
Marines	6.40 (3.05)	4.40 (4.34)	t =30.96, df: 1, p < .00001
Navy	6.67 (4.04)	2.67 (2.08)	t = 25.32, df: 1, p < .0001
OEF	6.00 (1.00)	3.67 (1.15)	t =41.25, df: 1, p < .00001
OIF	6.79 (1.92)	3.44 (2.18)	t =31.21, df: 1, p < .00001
Both OEF & OIF	6.75 (3.20)	6.00 (3.65)	t = 4.25, df: 1 p < .0001
Male	6.90 (1.86)	3.66 (2.29)	t =31.19, df: 1, p < .00001
Female	6.35 (2.00)	2.68 (1.45)	t =41.21, df: 1, p < .00001
20 -29 (Years)	6.50 (1.98)	3.31 (1.90)	t =31.90, df: 1 p < .00001
30-39 (Years)	6.61 (2.17)	3.64 (2.26)	t =25.84, df: 1, p < .00001
40-49 (Years)	6.29 (2.07)	3.75 (2.38)	t = 21.78, df: 1, p < .0001
50-59 (Years)	6.65 (2.39)	3.30 (2.32)	t =27.57, df: 1 p < .00001
≥ 60 Years	6.33 (2.33)	2.89 (1.96)	t =32.14, df: 1 p < .00001
White	7.39 (1.80)	4.02 (2.48)	t = 26.79, df: 1, p < .0001
Black	6.53 (1.61)	3.26 (1.52)	t =40.99, df: 1, p < .00001
Other	6.86 (1.68)	2.71 (1.13)	t =53.19, df: 1, p < .00001
< 12 Years of Education	7.31 (1.48)	4.22 (1.53)	t =39.81, df: 1, p < .00001
≥ 12 Years of Education	6.77 (2.47)	3.51 (1.62)	t =31.21, df: 1, p < .00001
≥ 16 Years of Education	6.25 (2.88)	2.74 (1.36)	t =31.84, df: 1, p < .00001
Married	7.06 (1.46)	3.05 (1.36)	t = 50.25, df: 1 p < .0001
Divorced/Separated/Widowing	7.56 (3.41)	4.21 (3.83)	t = 7.91, df: 1 p < .0001
Not Married	6.93 (1.84)	3.83 (2.62)	t =25.62, df: 1, p < .00001
Employed	6.41 (1.99)	3.02 (2.03)	t = 29.88, df: 1, p < .00001
Not - Employed	7.05 (1.79)	3.95 (2.12)	t = 30.16, df: 1, p < .0001

Table 14, Average Number of Self-Reported Concerns vs. WRIISC Identified Medical Concerns

Demographic	Self - Reported Medical Concern Mean (SD)	WRIISC Identified Medical Concern Mean (SD)	Test Statistic
Overall	6.79 (4.70)	3.46 (1.69)	t =17.82, df: 1, p < .00001
One Deployment	5.78(5.41)	3.60 (1.75)	t =10.07, df: 1, p < .00001
Two Deployments	5.79(5.60)	3.71 (1.94)	t =21.72 df: 1, p < .00001
Three Deployments	9.50 (3.11)	3.75 (.96)	t = 52.11, df: 1, p < .0001
Active	7.46 (5.53)	4.00 (1.68)	t =17.61, df: 1, p < .00001
Reserve	5.04 (4.89)	3.41 (1.78)	t =9.14, df: 1, p < .00001
Army	5.50 (5.38)	3.62 (1.69)	t =9.79, df: 1, p < .00001
Air Force	7.54 (5.32)	4.00 (1.87)	t =14.53, df: 1, p < .00001
Marines	6.40 (4.72)	3.00 (2.35)	t =18.57, df: 1, p < .00001
Navy	6.67 (2.14)	3.33 (1.15)	t = 28.47, df: 1, p < .0001
OEF	6.00 (5.57)	2.33 (1.53)	t =18.74, df: 1, p < .00001
OIF	5.97 (5.39)	3.68 (1.73)	t =11.82, df: 1, p < .00001
Both OEF & OIF	9.50 (5.74)	3.75 (.96)	t = 19.06, df: 1 p < .0001
Male	5.45 (5.27)	3.69 (1.88)	t =9.20, df: 1, p < .00001
Female	7.63 (5.51)	3.42 (1.17)	t =19.07, df: 1, p < .00001
20 -29 (Years)	4.95 (4.94)	3.11 (1.75)	t =9.04, df: 1 p < .00001
30-39 (Years)	6.18 (5.46)	3.76 (2.00)	t =12.16, df: 1, p < .00001
40-49 (Years)	5.39 (4.77)	3.39 (2.20)	t = 4.06, df: 1, p < .0001
50-59 (Years)	5.76 (4.67)	3.56 (1.85)	t =7.10, df: 1 p < .00001
≥ 60 Years	2.14 (1.57)	2.00 (1.73)	t =1.65, df: 1 p = .098
White	7.46 (6.05)	3.88 (2.00)	t = 14.86, df: 1, p < .0001
Black	4.97 (4.13)	3.76 (1.33)	t =7.16, df: 1, p < .00001
Other	3.14 (2.24)	3.00 (.89)	t =1.50 df: 1, p = .133
< 12 Years of Education	5.24 (1.31)	3.22 (1.42)	t =28.77, df: 1, p > .99
≥ 12 Years of Education	6.78 (3.11)	3.29 (2.59)	t =23.23, df: 1, p < .00001
≥ 16 Years of Education	6.24 (2.90)	3.11 (1.66)	t =24.78, df: 1, p < .00001
Married	6.64 (5.85)	3.63 (2.30)	t =13.94, df: 1, p < .00001
Divorced/Separated/Widowing	6.30 (4.66)	4.23 (3.91)	t =4.12, df: 1, p < .00001
Never Married	6.51 (5.39)	3.98 (1.45)	t =11.97, df: 1, p = .133
Employed	5.19 (4.79)	3.53 (1.82)	t =8.36, df: 1, p < .00001
Employed	5.19 (4.79)	3.53 (1.82)	t =8.36, df: 1, p < .00001

Among exposures that were self-reported by veterans who were used in this study *Table 15*, the highest frequency were Petrochemicals (N=541, 84.1%), Anthrax Vaccine (N=536, 83.4%) and Air Pollution (N=521, 80.4%). The lowest percentage of military exposures that were self-reported by veterans were Pyrodostigmine (N = 21, 9.1%), Depleted Uranium (N=148, 23.3%) and Radiation (N = 55, 24.0%).

Table 15, Frequency of Military Exposures by Data Source among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Exposure	Total, N*	Patient Self-Report N (%)	Total, N	WRIISC Identified N (%)
Anthrax Vaccine	643	536 (83.4%)	796	115 (14.4%)
Biological Weapons	641	77 (12.0%)	796	24 (3.1%)
Contaminated Food and Water	645	226 (35.0%)	796	103 (12.9%)
Human Corpses	644	425 (66.0%)	796	41 (5.2%)
Depleted Uranium	636	148 (23.3%)	796	149 (18.7%)
Petrochemicals	643	541 (84.1%)	796	196 (24.1%)
Pesticides	646	457 (70.7%)	796	60 (7.5%)
Insects	650	502 (77.2%)	796	62 (7.8%)
Multiple Vaccinations	641	505 (78.8%)	796	98 (12.3%)
Air Pollution	648	521 (80.4%)	796	114 (14.3%)
Chemical Protective Gear	239	111 (46.4%)	796	1 (0.1%)
Pyridostigmine	231	21 (9.1%)	796	16 (2.0%)
Blood or Body Fluids	238	110 (46.2%)	796	12 (1.5%)
Chemical Alarms	237	66 (27.8%)	796	15 (1.9%)
Radiation	229	55 (24.0%)	796	9 (1.1%)
Smoke from Oil Well Fires	236	136 (57.6%)	796	117 (14.7%)
Enemy Fire	240	172 (71.7%)	796	50 (6.3%)

* During the study period the self-report questionnaire was modified so the sample size varies for different variables

The highest frequency of exposures identified by the WRIISC included Petrochemicals (N = 196, 24.6%), Depleted Uranium (N = 149, 18.7%) and Anthrax Vaccine (14.4%). The lowest percentage WRIISC identified exposures were Chemical Protective Gear (N = 1, 0.1%), Radiation (1.1%) and Blood or Body Fluids (1.5%).

There was a large decrease in the number of exposures that were identified by the WRIISC in almost all military exposures (see Table 16). For almost the WRIISC identified exposure was less than the self-identified exposure. The average difference for exposures was -43.9%.

The difference ranged from Insects (-69.4%) to Depleted Uranium (-4.6%). Eight (53.3%) of the military exposures that were highlighted had a difference that was \geq 60%.

Table 16, Frequency Comparison, Military Exposures by Data Source (Self-Report vs. WRIISC) among US Veterans Evaluated at the WRIISC (2004-2012)

Exposure	Self- Report Prevalence (%)	WRIISC Identified Prevalence (%)	Difference (Self-Report vs. WRIISC) (+/- %)
Anthrax Vaccine	83.4	14.4	-69.0
Biological Weapons	12.0	3.1	-8.9
Contaminated Food and Water	35.0	12.9	-22.1
Human Corpses	66.0	5.2	-60.8
Depleted Uranium	23.3	18.7	-4.6
Petrochemicals	84.1	24.1	-60.0
Pesticides	70.7	7.5	-63.2
Insects	77.2	7.8	-69.4
Multiple Vaccinations	78.8	12.3	-66.5
Air Pollution	80.4	14.3	-66.1
Chemical Protective Gear	46.4	0.1	-46.1
Pyridostigimine	9.1	2.0	-7.1
Blood or Body Fluids	46.2	1.5	-44.7
Chemical Alarms	27.8	1.9	-25.9
Radiation	24.0	1.1	-22.9
Smoke from Oil Well Fires	57.6	14.7	-42.9
Enemy Fire	71.7	6.3	-65.4

The highest frequency of Self-Reported Medical Concerns in this study (see *Table 17*) were Sleep Related Issues (N=331, 79.4%), Musculoskeletal (N = 447, 69.5%), and Vision (40.3%). The lowest frequency of medical concerns were Reproductive (N = 61, 13.2%), Cardiac (Palpitations) (N=97, 15.4%) and Hay Fever/Allergies

(N=38, 17.9%). The highest frequency of Medical Concerns that were identified by the WRIISC were Musculoskeletal (N = 555, 66.5%), Blood Pressure (N=91, 42.1%) and Gastrointestinal (N=276, 33.1%). The lowest frequency of medical concerns that were identified by the WRIISC were Reproductive (N=16, 1.9%), Vision (N=43, 5.1%) and Hay Fever/Allergies (N=11, 6.3%).

Table 17, Frequency of Military Medical Concerns by Data Source among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Medical Concern	Total, N	Patient Self-Report N (%)	Total, N	WRIISC Identified N (%)
Musculoskeletal	663	447 (69.5%)	835	555 (66.5%)
Gastrointestinal	653	220 (33.7%)	835	276 (33.1%)
Skin	413	162 (39.2%)	835	142 (17.0%)
Vision	417	168 (40.3%)	847	43 (5.1%)
Sleep	417	331 (79.4%)	835	253 (30.3%)
Blood Pressure	56	17 (30.4%)	216	91 (42.1%)
Hay Fever/Allergies	212	38 (17.9%)	174	11 (6.3%)
Chest Pain	651	143 (22.0%)	216	19 (8.8%)
Reproductive	462	61 (13.2%)	835	16 (1.9%)
Cardiac (Palpitations)	628	97 (15.4%)	216	19 (8.8%)
Difficulty Breathing	662	171 (25.8%)	835	162 (19.4%)

Though dramatically less compared to the military exposure difference (see Table 18), almost all of the medical concerns that were identified by the WRIISC were than those medical concerns that were self reported. The average difference for all medical concern categories was (-13.4%). The largest difference was for Sleep issues (-49.2%). Most medical concerns were $\leq 15.0\%$. Musculoskeletal and Gastrointestinal concerns showed good agreement between WRIISC identified and self-reported. For other categories, WRIISC identified were lower, however the WRIISC identified more hypertension than was self-reported.

Table 18, Frequency Comparison, Medical Concerns by Data Source (Self-Report vs. WRIISC) among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Medical Concern	Self-Report Frequency (%)	<u>WRIISC Identified Frequency (%)</u>	<u>Difference (Self-Report vs. WRIISC) (+/- %)</u>
Musculoskeletal	69.5	66.5	-3.0
Gastrointestinal	33.7	33.1	-0.6
Skin	39.2	17.0	-22.2
Vision	40.3	5.1	-35.2
Sleep	79.4	30.3	-49.1
Blood Pressure	30.4	42.1	11.7
Hay Fever/Allergies	17.9	6.3	-11.6
Chest Pain	22.0	8.8	-13.2
Reproductive	13.2	1.9	-11.3
Cardiac (Palpitations)	15.4	8.8	-6.6
Difficulty Breathing	25.8	19.4	-6.4

Concordance, Sensitivity, and Specificity

Exposure Concerns

Table 20 shows the measures of agreement for each outcome as well as the sensitivity and specificity taking the self-report or exposure record as the gold standard after adjustment for clustering with practices. With regard to exposures rates for agreement were the highest for Biological Weapons (87.6%), Depleted Uranium (83.9%), and Contaminated Food and Water (68.5%). The lowest percentage of agreement among military exposures were Multiple Vaccinations (20.9%)

**Table 19, Measures of Agreement, Military Exposure Concerns among US Veterans
Evaluated at the WRIISC, East Orange NJ (2004-2012)**

Exposure	WRIISC Self Report Total	Yes Yes N	Yes No N	No Yes N	No No N	Agreement % (95% CI)
Anthrax Vaccine	613	94	1	422	96	30.9 (27.2-34.6)
Biological Weapons	612	6	69	7	530	87.6 (84.9-90.2)
Contaminated Food & Water	615	55	166	2	366	68.5 (64.8-72.2)
Human Corpses	614	21	5	393	195	35.1 (31.3-38.9)
Depleted Uranium	606	81	32	65	428	83.9 (80.9-86.8)
Petrochemicals	616	85	10	438	83	27.3 (23.8-30.8)
Pesticides	616	42	4	399	171	34.6 (30.8-38.4)
Insects	620	21	5	393	195	34.8 (31.1-38.6)
Multiple Vaccinations	612	16	63	421	112	20.9 (17.7-24.1)
Air Pollution	618	79	13	423	103	29.4 (25.8-32.9)
Chemical Protective Gear	226	0	106	0	119	52.7 (46.2-59.2)
Pyridostigimine	218	1	0	20	180	83.0 (78.0-87.9)
Blood or Body Fluids	225	3	1	104	115	52.4 (45.9-58.9)
Chemical Alarms	490	11	0	268	211	45.1 (40.7-49.5)
Radiation	217	8	2	45	140	68.2 (62.0-74.4)
Smoke From Oil Well Fires	404	10	3	68	323	82.4 (78.7-86.1)
Enemy Fire	227	6	2	158	56	27.3 (21.5-33.1)

Table 20, Measures of Agreement, Sensitivity and Specificity, Military Exposure Concerns among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Exposure	WRIISC MR as Gold Standard	WRIISC MR as Gold Standard	Self-Report as Gold Standard	Self-Report as Gold Standard
	Sensitivity	Specificity	Sensitivity	Specificity
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Anthrax Vaccine	99 (98.2-99.8)	19 (15.9 – 22.1)	18 (14.9 – 21.0)	99 (98.2 – 99.8)
Biological Weapons	8 (6.2 – 9.8)	99 (98.3 – 99.7)	46 (42.1 – 49.9)	88 (85.4 – 90.1)
Contaminated Food & Water	25 (22.1- 27.9)	93 (91.3 – 94.7)	66 (62.3 – 69.7)	69 (65.3 – 72.7)
Human Corpses	81 (78.4-83.7)	33 (29.8 – 36.2)	5 (3.3 – 6.7)	98 (96.9 – 99.1)
Depleted Uranium	72 (68.9 – 75.0)	87 (84.7 – 89.2)	55 (51.0 – 58.9)	93 (90.9 – 95.0)
Petrochemicals	89 (86.9 – 91.1)	16 (13.5 – 18.5)	16 (13.1 – 18.9)	89 (86.6 – 91.5)
Pesticides	91 (89.9 – 92.1)	30 (26.9 – 33.1)	10 (7.6 – 12.4)	97 (95.7 – 98.3)
Insects	81 (78.4 – 83.7)	33 (29.8 – 36.2)	5 (3.3 – 6.7)	98 (96.9 – 99.1)
Multiple Vaccinations	20 (17.3 – 22.7)	21 (18.3 – 23.8)	4 (2.5 – 5.6)	64 (60.2 -67.8)
Air Pollution	86 (83.7 – 88.3)	20 (17.3 – 22.7)	16 (13.1 – 18.9)	89 (86.5 – 91.5)
Pyridostigmine	100 (100)	82 (79.4 – 84.6)	5 (2.1 – 7.9)	100 (100)
Blood or Body Fluids	75 (72.1 – 77.9)	53 (49.6 – 59.4)	3 (.77 – 5.2)	98 (96.1- 99.8)
Chemical Alarms	100 (100)	45 (41.6 – 48.4)	4 (2.3 – 5.7)	95 (93.1 – 96.9)
Radiation	80 (77.3 – 80.7)	76 (73.1 – 78.9)	16 (11.1 – 20.9)	76 (70.3 – 81.7)
Smoke From Oil Well Fires	77 (74.2 – 79.8)	83 (80.5 – 85.2)	4 (2.1 – 5.9)	99 (98.0 – 99.9)
Enemy Fire	75 (72.1 – 77.9)	27 (24.0 – 30.0)	4 (1.5 – 6.5)	97 (94.8 – 99.2)

Medical Concerns

Table 21, shows the measures of agreement for each outcome. In Table 22, the calculated sensitivities/specificities are listed using the self-report or exposure record as the gold standard after adjustment for clustering with practices. With regard to medical concern rates for agreement were the highest for Cardiac-Palpitations (93), Reproductive (86%), and Difficulty-Breathing (77%). The lowest percentage of agreement among exposure concerns were Sleep (44%).

Table 21, Measures of Agreement, Medical Concerns among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Medical Concern	WRIISC	Yes	Yes	No	No	Agreement
	Self Report	Yes	No	Yes	No	
	Total	N	N	N	N	
Musculoskeletal	663	317	95	130	121	66 (62.4 – 69.6)
Gastrointestinal	651	125	98	93	335	71 (67.5 – 74.5)
Skin	413	45	14	117	237	68 (63.6 – 72.4)
Vision	417	29	9	139	240	65 (60.5 – 69.6)
Sleep	417	106	10	225	76	44 (39.2 – 48.8)
Blood Pressure	30	17	13	0	0	57 (40.8 – 73.2)
Hay Fever/Allergies	212	5	29	33	145	71 (64.9 – 77.1)
Chest Pain	649	38	125	103	383	65 (61.3 – 68.7)
Reproductive	462	6	5	58	393	86 (82.8 – 89.2)
Cardiac (Palpitations)	59	2	3	1	53	93 (86.5 – 99.5)
Difficulty Breathing	662	72	55	99	436	77 (73.8 – 80.2)

Table 22, Measures of Agreement, Sensitivity and Specificity, Medical Concerns among US Veterans Evaluated at the WRIISC, East Orange NJ (2004-2012)

Medical Concern	WRIISC MR as Gold Standard	WRIISC MR as Gold Standard	Self-Report as Gold Standard	Self-Report as Gold Standard
	Sensitivity	Specificity	Sensitivity	Specificity
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Musculoskeletal	77 (73.8 – 80.0)	48 (44.4- 51.6)	71 (67.8 – 74.5)	56 (52.2 – 59.8)
Gastrointestinal	56 (52.7 - 59.4)	78 (74.6 -81.4)	57 (53.2 – 60.8)	77 (73.8 – 80.2)
Skin	76 (73.1 – 78.9)	67 (63.8 – 70.2)	27 (22.7 – 31.3)	94 (91.7 – 96.3)
Vision	76 (73.1 – 78.9)	63 (59.7 – 66.3)	17 (13.4 – 20.6)	96 (94.1 – 97.9)
Sleep	91 (89.1 – 92.9)	34 (30.8 – 37.2)	32 (27.5 – 36.5)	88 (84.9 -91.2)
Blood Pressure	57 (53.7 – 60.3)	0 (0)	100 (100)	0 (0)
Hay Fever/Allergies	15 (12.6 – 17.4)	81 (78.4 – 83.6)	13 (8.5 – 17.5)	83 (77.9 – 88.1)
Chest Pain	23 (20.2 – 25.8)	78 (75.2 – 80.8)	27 (23.6 – 30.4)	75 (71.7 – 78.3)
Reproductive	55 (51.6 – 58.4)	87 (84.7 – 89.3)	9 (6.4 – 11.6)	99 (98.1 – 99.9)
Cardiac (Palpitations)	40 (36.7 – 43.3)	98 (97.1 – 98.9)	66 (53.9 – 78.1)	95 (89.4 – 100.0)
Difficulty Breathing	57 (53.7 – 60.3)	79 (76.3 – 81.8)	42 (36.2 – 45.8)	89 (86.6 – 91.4)

CONCLUSIONS

As a result of this study, there were unique observations made related to both self-reported and WRIISC identified exposure and medical concerns. Though this study population was larger than the original study conducted by the WRIISC in 2007 (N=894 vs 56), the results from this study may not be generalized to the US military population who served in Afghanistan and Iraq. However, this study may be useful to the WRIISC to: (1)) assist in the redesign of current self-report questionnaires to provide useful information to be used in research and clinical observation and (2) to allocate current resources to diagnose and treat recurring exposure and medical concerns of US veterans.

Exposure and Medical Concerns

Overall, the largest number of exposure concerns that were identified by the WRIISC were Burning Trash (n= 431, 54.1%), Sandstorms (n= 365, 45.8%), and Petrochemicals (n= 196, 24.6%). The largest number of medical concerns that were identified by the WRIISC were Musculoskeletal (n=556, 6.6%), Neurological (n=281, 22.6%) and Gastrointestinal (n=276,33.0%).

Self-Reported vs. WRIISC Identified Exposure and Medical Concerns

The have been numerous studies done on the veterans self-report of both exposure and medical concerns. While this study confirmed published findings, there were some findings that differed from previous studies.

Active duty personnel self-reported a dramatically higher number of medical concerns than Reserve military personnel (mean=7.46, sd:5.53 vs (mean=4.89, sd: 5.04, $p < .00001$). This is not an expected finding, as active duty personnel would be considered as “professionals” compared to Reserve/Guard personnel.

Compared to other branches of service, Air Force personnel self-reported the highest number of both exposure (mean=7.08, sd: 1.98) and medical concerns (mean=7.54, sd:5.32). This was not an expected finding, as even though operation OEF/OIF required a great deal of air support, those military personnel who were charged with front line activities could have been exposed to a greater number of exposures,

Veterans who had multiple deployments (three or more) reported a much higher number of exposure (mean=8.50, sd:1.29) ($t = 7.923$, $p < .00001$) and medical concerns (mean=9.50, sd:3.11) than those veterans who were only deployed once (mean=6.65, sd:1.86/mean=5.78, sd:5.41) respectively ($t = 5.8409$, $p < .00001$).

In a previous paper Kline et al (2006) found that previously deployed soldiers were more than three times as likely as soldiers with one deployment to screen positive for PTSD.

A study by the Ronna et al, (2006) found that even though rates of combat exposure for women were lower than men, they may still experience moderate rates based on self-reports of their experiences. In this study, females reported a higher number (mean=7.63, sd:5.51) of medical concerns than males (mean=6.35, sd:2.00) ($t = 2.4554$, $p = .0156$).

A study by Loughran and Kierman (2004) found that veterans of wars in Iraq and Afghanistan were having trouble transitioning into the labor market, and demonstrated that self-reported health increases with the length of deployment and is associated with UCX claims. In line with that study, those veterans who were not employed reported a higher number of exposure concerns (mean=7.05, sd:1.79) than those who were employed (mean=6.41, sd:1.99). ($t=4.7868$, $p<.00001$).

A study by Kang et al (2003) found that minority groups had a greater prevalence of PTSD. this study found White veterans reported a higher number of exposure (mean = 7.39, sd: 1.80) than black veterans (mean = 6.53, sd:1.6) ($t=6.0641$, $p=.0001$) and medical concerns (mean = 7.46, sd: 6.05/mean = 4.97, sd: 4.13)($t= 6.124$, $p<.0001$). Even though a larger number may of veterans may have been called into combat operations during both OEF and OIF due to limited military resources, in most instances military personnel who were involved in front line combat operations were younger. In this study, younger veterans (20-29 years old) (mean = 4.95, sd: 4.94) reported more medical concerns than those older veterans (mean = 2.14, sd: 3.10) ($t= 4.116$, $p<.00001$).

The WRIISC identified a higher number of exposure and medical concerns in veterans with three or more deployments (mean=8.00, sd:2.16, mean=9.50, sd:3.11) than those with one deployment (mean=6.65, sd:1.86, mean=5.78, sd:5.41). ($t=3.5733$, $p=.001$), ($t=6.4167$, $p<.0001$).

The WRIISC identified a greater number of exposure concerns for veterans who served in both OEF & OIF (mean = 6.00, sd: 3.65) than those veterans who served in only OEF (mean = 3.67, sd: 1.15) or OIF (mean = 3.44, sd: 2.18) ($t=6.108$, $p<.0001$).

If the WRIISC evaluation is considered the “Gold Standard”- the data that was obtained for medical concerns which be more predictive of the actual outcome. For instance, the largest variation in self-report vs. WRIISC evaluation for exposure concerns was for Insects (-69.4%), while the largest variation identified for medical concerns was Sleep Issues (-49.1%). For Gastrointestinal issues the variation between Self-Report prevalence (33.7%) was only slightly higher than GI issues identified by WRIISC personnel (33.1%).

The value of self-reported questionnaires should continue to be evaluated as a useful tool in the treatment of those veterans who served in Afghanistan and Iraq. The use of value of the data obtained will depend on whether it is used for clinical decisions or research purposes.

STRENGTHS/WEAKNESSES OF STUDY

- Recall bias may be an issue with the veteran's self-reported questionnaire.
The questionnaire may not fully capture exposure and medical concerns.
- Some exposure as well as medical concern misclassification during the data abstraction from the CPRS into the WRIISC data base software may be incorrect.
- Due to the self-report questionnaire format changing several times during the study period, including both the existence and depth of question that was asked, and some data was not readily available. This required the authors to recode variables to align with the WRIISC database, which may have resulted in classification error.
- Data was not readily available on actual military exposures limiting quantitative interpretations.

APPENDIX A

Description of Military Exposures of US Veterans who Served in Afghanistan and Iraq (Taken from Gulf War Illness and the Health of Gulf War Veterans, Scientific Findings and Recommendations, Research Advisory Committee on Gulf War Veterans Illnesses)

Burn Pits

During military operations in Afghanistan and Iraq, open burn pits were used for disposal of chemicals, medical and human waste, spent and virgin munitions, petrochemical products, plastics/Styrofoam®, rubber, and wood. Many OEF/OIF veterans have expressed concerns over their exposures to burn pits, and the long-term health effects as a consequence. The issue with determining a veteran's personal exposure to a burn pit is that the quantity of waste in a burn pit may vary, burn pit composition may vary from military installation (externally and internally), and site specific geologic and environmental conditions may not be consistently the same.

Some possible health effects to veterans who were exposed to burn pits could include toxic effects to the skin, respiratory system, eyes, liver, kidneys, central nervous system, cardiovascular system, reproductive system, peripheral nervous system, and gastrointestinal tract.

Chemical Agent Resistant Coating Paint (CARC)

Beginning in 1970's the military painted vehicles with Chemical Agent Resistant Coating (CARC). Several compounds in CARC formulations, if taken into the body in

sufficiently high concentrations may cause short and long term health effects. The most common of these compounds is Hexamethylene Disisocyanate (HDI), which is used to harden the paint. Solvents used in CARC and paint thinners, as well as solvents used in other coating activities can be hazardous via dermal contact and inhalation. Health effects of exposure to CARC could include dizziness, rashes, and nausea.

Biological/Chemical Agents

Enemy Biological/Chemical agents may have been stockpiled at munitions depots. When these munitions depots were found and destroyed, veterans may have been exposed to low levels of these agents. Possible health effects to Biological/Chemical Agents could include dizziness, rashes, nausea, and neurological damage.

Depleted Uranium (DU)

Due to the high density of depleted uranium, which is about twice as heavy as lead, it was used in munitions designed to penetrate armour plate. It was also used as a reinforcement material for combat vehicles such as tanks.

Inhalation is the most likely route of intake during or following the use of depleted uranium munitions in conflict or when depleted uranium in the environment is re-suspended in the atmosphere by winds or other forms of disturbance. Accidental inhalation may also occur as a consequence of fire in a depleted uranium storage facility, an aircraft crash, or the decontamination of vehicles from within or near conflict areas. Dermal contact is considered a relatively unimportant type of

exposure since little of the depleted uranium will pass across the skin into the blood. Depleted uranium could enter systemic circulation through open wounds or imbedded depleted uranium fragments.

Potentially depleted uranium has both chemical and radiological toxicity with the two important target organs being the kidneys and the lungs. Health consequences are determined by the physical and chemical nature of the depleted uranium to which the individual is exposed, and to the level and duration of exposure. Insoluble uranium particles, 1-10 μm in size, tend to be retained in the lung and may lead to irradiation of the lung and even lung cancer if a high enough radiation dose results over a period of time.

JP -5 and JP8 Fuel

JP-5 and JP-8 are substances used as aircraft fuels by the military. JP-5 is the US Navy's primary jet fuel, and JP-8 is one of the jet fuels used by the U.S. Air Force. JP5 and JP8 represent a common chemical exposure for flight and ground personnel during flight and ground operations. Personal exposure typically happens through incidental exposure, most notably inhalation of vapors.

Both of these substances are colorless liquids that may change into gas vapor. They both smell like kerosene, since kerosene is a primary component of both JP-5 and JP-8. They are both made by refining crude petroleum oil deposits found underground or shale oil found in rock. Inhalation of JP=5 or JP-8 for a short period of time may cause headaches, difficulty in concentrating, coordination problems and

fatigue. Breathing lower levels of JP-5 and JP-8 for a longer period could result in lack of initiative, sleep disturbance, and dizziness.

Pesticides and Insect Repellants

Chemical pesticides and insect repellants have been in use for many years by the military. Many pesticides are neurotoxic by design, meaning they are designed to kill insects by attacking their nervous system. Pesticides and Insect repellants used by military personnel in Iraq and Afghanistan included:

Organophosphate Pesticides (OPs)

Organophosphate Pesticides (OPs) constitute a large portion of pesticides that were used. OPs are a large and diverse family of chemicals that include hundreds of pesticides. Acute effects of excess exposure to OP pesticides include effects on the central nervous system and muscles. Symptoms that result from acute OP poisoning usually develop within minutes to hours and resolve in hours to days.

Carbamate Pesticides

Carbamate Pesticides are chemically distinct from OPs, but also exert neurotoxic effects. Effects of overexposure to carbamate pesticides are similar to OPs. Reported cases of carbamate poisoning in humans involve ingestion of poisoned food or water.

N,N-Diethyl-meta-toluamide (DEET)Insect Repellent

N, N-Diethyl-meta-toluamide (DEET) which was used as an insect repellent by the military. Personnel typically applied DEET by use of creams or sticks. Though DEET was intended to be used on areas of exposed skin, military personnel also applied DEET to their uniforms. DEET is used as an insect repellent and discourages insects

from landing on the skin. DEET is a neurotoxicant and has other side effects such as hypersalivation, tremors, and seizures.

Pyrethroid Insecticides

The US military has been using Pyrethroid Pesticides (primarily Permethrin) for over 20 years to treat clothing, shoes, bed nets to kill or repel insects such as mosquitoes and ticks. Permethrin is a particularly effective long term repellent for fabrics because it retains its potency for a long time. Although highly toxic to insects, pyrethroids are relatively safe for humans. In humans who have been exposed to occupationally or by accident to high doses of pyrethroids, symptoms include nausea, facial tingling, dizziness, headache, fatigue, burning, itching of the skin, eye irritation, and respiratory symptoms. At extremely high doses, convulsions and loss of consciousness can occur.

Organochlorine Insecticides

Organochlorines are a diverse class of insecticides that include DDT, chlordane, and dieldrin. The military used a pesticide powder called Lindane as a delousing agent. It was primarily used by military police and others involved in the processing of Iraqi prisoners of war. Lindane was also issued to military personnel for their own use. Human over exposure to Lindane is associated with tremors, ataxia, seizures, and in rare circumstances possibly death.

Sand Storms

Many OEF/OIF veterans reported exposure to high levels of particulates due to high levels of fine sand blowing in the wind during their duty. It is difficult to determine exactly what their exposure was, because exposure would vary dramatically due to

environmental and geologic conditions. A number of health concerns relate particularly to smaller size particulates. Those between 2.5 and 10 microns in diameter can be inhaled and accumulate in the lungs; those between 0.1 and 2.5 microns can lodge more deeply in the alveoli; those smaller than 0.1 microns, also known as ultrafine particulates, can cross the pulmonary epithelium and enter general circulation. The sand in Afghanistan and Iraq is extremely fine and is almost the consistency of dust. Prolonged exposures to high levels of particulates have been associated with acute and chronic respiratory and cardiovascular effects, including exacerbations of pre-existing conditions. Those synergistic effects of exposure to fine and ultrafine particulates with other toxicants is not well known.

Multiple Vaccinations

Multiple vaccinations (including anthrax) are common to most overseas deployments. US troops typically received a standard series of inoculations against infectious diseases to include yellow fever, typhoid, cholera, hepatitis B, meningitis, whooping cough, polio, tetanus. There are currently no significant findings related to any health outcomes, but negative effects related to receipt of a large number of vaccines cannot be ruled out.

Anthrax Vaccine

The Anthrax Vaccine Immunization Program (AVIP) is the name of the policy set forth by the United States to immunize its military and specific civilian personnel with the Anthrax vaccine known as Anthrax Vaccine Adsorbed (AVA) and by the trade name Biothrax®. Over 8 million doses of Biothrax® were administered to over 2 million military personnel as part of the program between March 1998 and

June 2008. Reported health effects related to anthrax vaccine include tenderness, redness, itching, lumps, bruises, muscle aches, headaches, fatigue, and in rare cases a severe allergic reaction. Anthrax vaccine has received criticism in scientific circles due to lack of potency and allegations that the vaccine has been linked to Gulf War Syndrome.

Infectious Diseases

Veterans who were deployed to Iraq or Afghanistan may have experienced symptoms of exposure to infectious diseases while they were on active duty or later develop symptoms of infectious diseases that were contracted overseas. Some of the infectious diseases that veterans may have contracted could include:

Malaria

Malaria is an infectious disease caused by a parasite transmitted by mosquitoes. Symptoms in humans include chills, fever, and sweats. Very few cases of malaria have been reported in US veterans who served in Iraq or Afghanistan. That is not surprising because between 1990-1991 malaria had been eliminated from Saudi Arabia where troops were serving. As of May 2005, 52 cases of malaria had been reported in US troops who served exclusively in Afghanistan or in both Afghanistan and Iraq. It is believed that all 52 infections were contracted in Afghanistan.

Brucellosis

Brucellosis is a highly contagious disease caused by ingestion of unsterilized milk or meat from infected animals or close contact with their secretions. Transmission from human to human through sexual contact or from mother to child is rare.

Symptoms in humans include fevers, profuse sweating and joint and muscle pain.

The duration of the disease can last from a few weeks or persist for years.

Campylobacter jejuni

Campylobacter jejuni is a species of bacteria found in animal feces and is one of the most common causes of human gastroenteritis in humans. Contaminated food is the major source of infections, with incorrectly prepared meat and poultry as the primary source. Symptoms in humans include abdominal pain, diarrhea, fever, and malaise.

Coxiella burnetti (Q Fever)

“Q Fever” is a disease caused by infection with Coxiella burnetti, a bacterium that affects both animals and humans. The infection results from inhalation of spore like small cell variant from contact with milk, urine, feces, vaginal mucus, or semen of infected animals. Symptoms in humans include such fever, severe headache, and gastrointestinal problems such as nausea and diarrhea. In chronic cases there may be inflammation of the heart.

(TB) Mycobacterium Tuberculosis

Tuberculosis (TB) is caused by bacterium called Mycobacterium Tuberculosis. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidneys, spine and brain. Symptoms of TB include a bad cough that lasts three weeks or longer, pain in the chest, coughing up blood or sputum, weakness or fatigue, weight loss, loss of appetite, chills, fever and sweating at night

Nontyphoidal Salmonella

Salmonellosis is an infection with Salmonella bacteria. Most people infected with salmonella develop diarrhea, fever, vomiting, and abdominal cramps 12 to 72 hours after infection. In most cases the illness lasts four to seven days, and most people recover without treatment. The type of salmonella associated with infections in humans is nontyphoidal salmonella, and is usually contracted from sources such as poultry, pork, and beef, infected eggs or egg products, reptiles such as turtles, lizards, and snakes, and tainted fruits and vegetables.

Leishmaniasis

Leishmaniasis is a parasitic disease that is caused by infection with Leishmania parasites which are caused by the bite of infected sand flies. There are several forms of Leishmaniasis that are found in humans. The most common forms are cutaneous leishmaniasis, which causes skin sores and visceral leishmaniasis which affects internal organs such as the spleen, liver, and bone marrow.

Some of those who develop cutaneous leishmaniasis display no symptoms or signs. Military personnel who develop clinical indication of infection have one or more sores on their skin. The sores may start out as papules (bumps) or nodules (lumps) and end up like ulcers.

Those military personnel who have evidence of visceral leishmaniasis may also have symptoms or signs. Clinical evidence of infection could include fever, weight loss, enlargement (swelling) of the spleen and liver and low blood counts, including a low red blood cell count (anemia).

Published reports and public presentations indicate that more than 1000 troops had a diagnoses of leishmaniasis contracted during a tour of duty in Iraq or Afghanistan. As of May 2005, military personnel had diagnosed and confirmed cutaneous leishmaniasis in more than 1000 military personnel who served in OEF or OIF and were deployed to Afghanistan, Kuwait or Iraq. “

West Nile Virus (WNV)

The main mode of WNV is via various species of mosquitoes which are the prime vector, with birds being the most commonly affected animal and serving as the prime reservoir host. Symptoms in humans are characterized by fever, headache, muscle pain or weakness, malaise, nausea and vomiting. Less than 1% of the cases are severe and result in neurological disease when the central nervous system is affected.

Oil Well Fires

Oil well fires were caused by Iraqi military forces setting fire while reiterating after being driven out by coalition forces. The resulting fires burned out of control because of the dangers of fighting the fires, including land mines being placed in areas around the wells. An estimated 6 million barrels of oil were lost each day. Byproducts of these fires could nausea, headache, difficulty breathing.

Pyridostigmine Bromide (PB)

Pyridostigmine Bromide was used by the military during combat situations as an agent to be given prior to exposure to the nerve agent Soman in order to increase survival. Common side effects of

PB use include sweating, diarrhea, nausea, vomiting, abdominal cramps, increased salivation, tearing, facial flushing and joint pain, sleep disorder, memory loss, and fatigue.

TABLES

***Table 23.1, Veterans Self-Reported Exposure Concerns
Active, Reserve/Guard, Total Number (%)***

Exposure Concern	Active N (% within Active)	Reserve/Guard N (% within Reserve/Guard)	Total N (% within Total)	Test Statistic
Petrochemicals	216 (33.6%)	325 (50.5%)	541 (84.1%)	$X^2: .48, p: .489$
Anthrax Vaccine	219 (34.1%)	317 (49.3%)	536 (83.4%)	$X^2: 1.06, p: .303$
Air Pollution	198 (30.6%)	323 (49.8%)	521 (80.4%)	$X: 3.64, p: .056$
Multiple Vaccinations	196 (30.6%)	309 (48.2%)	505 (78.8%)	$X^2: .66, p: .417$
Insects	191 (29.4%)	311 (47.8%)	502 (77.2%)	$X^2: 2.49, p: .115$
Pesticides	174 (26.9%)	283 (43.8%)	457 (70.7%)	$X^2: 1.90, p: .168$
Human Corpses	180 (28.0%)	245 (38.0%)	425 (66.0%)	$X^2: 3.12, p: .077$
Contaminated Food & Water	89 (13.8%)	137 (21.2%)	226 (35.0%)	$X^2: .09, p: .766$
Depleted Uranium	61 (9.6%)	87 (13.7%)	148 (23.3%)	$X^2: 1.32, p: .717$
Biological Weapons	32 (50.0%)	45 (7.0%)	77 (12.0%)	$X^2: .14, p: .712$

Table 23.2, Veterans Self- Reported Medical Concerns
Active, Reserve /Guard, Total Number (%)

Medical Concern	Active N (% within Active)	Reserve/Guard N (% within Reserve/Guard)	Total N (% within Total)	Test Statistic
Back	160 (38.6%)	255 (63.4%)	415 (62.3%)	$\chi^2: .54, p: .462$
Weakness	86 (35.7%)	155 (64.3%)	241 (36.7%)	$\chi^2: 2.79, p: .095$
Nausea	40 (15.0%)	78 (19.5%)	118 (17.7%)	$\chi^2: 2.18, p: .140$
Gastrointestinal	79 (30.4%)	141 (35.9%)	220 (33.7%)	$\chi^2: 2.11, p: .146$
High Temperature	68 (26.0%)	128 (31.8%)	196 (29.5%)	$\chi^2: 2.64, p: .104$
Extremities	76 (28.6%)	106 (27.1%)	182 (27.8%)	$\chi^2: .86, p: .342$
Difficulty Breathing	58 (22.1%)	115 (28.5%)	173 (26.0%)	$\chi^2: 3.38, p: .066$
Shakiness	72 (27.3%)	85 (21.5%)	157 (23.8%)	$\chi^2: 2.89, p: .089$
Night Urination	45 (19.2%)	81 (24.2%)	126 (22.1%)	$\chi^2: 1.96, p: .162$
Dizziness	54 (20.6%)	91 (23.0%)	145 (22.1%)	$\chi^2: .54, p: .463$
Chest Pain	54 (20.9%)	89 (22.6%)	143 (22.0%)	$\chi^2: .27, p: .605$
Weight Loss	51 (19.6%)	83 (21.5%)	134 (20.7%)	$\chi^2: .34, p: .562$
Increased Perspiration	56 (21.1%)	78 (19.9%)	134 (20.4%)	$\chi^2: .13, p: .718$
Cough	45 (17.5%)	75 (20.2%)	120 (19.1%)	$\chi^2: .72, p: .396$
Constipation/Loose Bowel	42 (16.2%)	78 (19.9%)	120 (18.2%)	$\chi^2: 1.95, p: .134$
Swelling	33 (12.6%)	85 (21.4%)	118 (17.9%)	$\chi^2: 8.14, p: .004$
Sensitivity to Temperature	31 (33.7%)	61 (17.0%)	92 (15.3%)	$\chi^2: 1.99, p: .158$
Palpitations	36 (13.5%)	61 (15.4%)	97 (14.6%)	$\chi^2: 1.61, p: .078$
Change in Smell/Taste	31 (11.7%)	60 (15.0%)	91 (13.7%)	$\chi^2: 1.43, p: .232$
Change in Menstruation	10 (11.6%)	20 (14.5%)	30 (13.4%)	$\chi^2: .38, p: .540$
Dental Issues	19 (10.1%)	36 (12.5%)	55 (11.6%)	$\chi^2: .69, p: .406$
HBP	25 (9.3%)	31 (7.9%)	56 (8.5%)	$\chi^2: 1.21, p: .059$
Difficulty Swallowing	19 (7.2%)	35 (8.8%)	54 (8.1%)	$\chi^2: .56, p: .454$
Frequent Urination	18 (6.8%)	26 (6.5%)	44 (6.6%)	$\chi^2: .03, p: .875$
Fainting	14 (5.3%)	15 (3.7%)	29 (4.4%)	$\chi^2: .97, p: .324$
Paralysis	12 (4.6%)	15 (3.8%)	27 (4.1%)	$\chi^2: .28, p: .600$
Seizures	5 (1.9%)	5 (1.3%)	10 (1.5%)	$\chi^2: .41, p: .523$

Table 23.3, Exposures Identified by the WRIISC Assessment**Active, Reserve/Guard, Total Number (%)**

Exposure Concern	Active N (% within Active)	Reserve/Guard N (% within Reserve/Guard)	Total N (% within Total)	Test Statistic
Burning Trash	152 (46.2%)	279 (59.7%)	431 (54.1%)	χ^2 :14.23, p:.000
Sandstorms	142 (43.2%)	223 (47.8%)	365 (45.9%)	χ^2 :1.64, p:.201
Petrochemicals	82 (24.9%)	114 (24.4%)	196 (24.6%)	χ^2 :.03, p:.969
Depleted Uranium	65 (19.8%)	84 (56.4%)	149 (18.7%)	χ^2 :.397, p:.528
Oil Well Fires	36 (10.9%)	81 (17.3%)	117 (14.7%)	χ^2 :6.31, p:.012
Anthrax Vaccine	56 (17.0%)	59 (12.6%)	115 (14.4%)	χ^2 : 3.00, p:.083
Air Pollution	45 (13.7%)	69 (14.8%)	114 (14.3%)	χ^2 :.19, p:.663
Noise	54 (16.4%)	56 (12.0%)	110 (13.8%)	χ^2 : 3.17, P:.075
Contaminated Food & Water	45 (13.7%)	58 (12.4%)	103 (12.9%)	χ^2 : 782, p:.368
Multiple Vaccinations	49 (14.9%)	49 (10.5%)	98 (12.3%)	χ^2 : 3.46, p:.063
Asbestos	46 (14.0%)	29 (6.2%)	75 (9.4%)	χ^2 :13.36, p:.000
Insects	24 (7.3%)	38 (8.1%)	62 (7.8%)	χ^2 :.19, p:.662
Pesticides	20 (6.1%)	40 (8.6%)	60 (7.5%)	χ^2 :1.71, p:.191
Enemy Fire	17 (5.2%)	33 (7.1%)	50 (6.3%)	χ^2 :1.18, p:.277
Burning Hardware	23 (7.0%)	26 (5.6%)	49 (6.2%)	χ^2 :.68, p:.411
Non-Ionizing Radiation	26 (7.9%)	15 (3.2%)	41 (5.2%)	χ^2 :8.69, p:.003
Human Corpses	15 (4.6%)	26 (5.6%)	41 (5.2%)	χ^2 :.40, p:.526
Mefloquine	24 (7.3%)	9 (1.9%)	33 (4.1%)	χ^2 :13.99, p:.000
Biological Weapons	9 (2.7%)	15 (3.2%)	24 (3.0%)	χ^2 :.15, p:.669
Pyridostigimine	5 (1.5%)	12 (2.6%)	17 (2.1%)	χ^2 :1.11, p:.313
Chemical Alarms	9 (2.7%)	6 (1.3%)	15 (1.9%)	χ^2 :.220, p:.138
Lead	7 (2.1%)	4 (0.9%)	11 (1.4%)	χ^2 : 2.29, p:.130
Ionizing Radiation	5 (1.5%)	4 (0.9%)	9 (1.1%)	χ^2 :.76, p:.383
Animals	3 (0.9%)	5 (1.1%)	8 (1.0%)	χ^2 :.05, p:.825

Table 23.4, Medical Concerns Identified by WRIISC Assessment
Active, Reserve/Guard, Total Number (%)

Medical Concern	Active N (% within Active)	Reserve/Guard N (% within Reserve/Guard)	Total N (% within Total)	Statistical Measure
Allergies-Sinusitis	56 (32.2%)	86 (49.4%)	142 (81.6%)	χ^2 :.74, p:389
MSD/Pains	244 (29.2%)	311 (36.2%)	555 (66.5%)	χ^2 : 2.22, p:136
Cardiac -BP	38 (17.6%)	53 (24.5%)	91 (42.1%)	χ^2 :.55, p:460
Cardiac, Cholesterol	23 (10.6%)	63 (29.2%)	86 (39.8%)	χ^2 :8.87, p:003
Neurological	111 (13.3%)	169 (20.2%)	280 (33.5%)	χ^2 :1.09, p:296
Gastrointestinal/Digestive	125 (15.0%)	151 (18.1%)	276 (33.1%)	χ^2 :1.66, p:197
Sleep	107 (12.8%)	146 (17.5%)	253 (30.5%)	χ^2 :.003, p:958
ENT	96 (11.5%)	119 (14.3%)	215 (25.7%)	χ^2 :.74, p:390
Cardiac	80 (9.6%)	128 (15.3%)	208 (24.9%)	χ^2 :1.55, p:213
Respiratory	65 (7.8%)	97 (11.6%)	162 (19.4%)	χ^2 :.34, p:560
Allergies	62 (7.4%)	93 (11.1%)	155 (18.6%)	χ^2 :.36, p:547
Cardiac, Triglycerides	16 (7.4%)	22 (10.2%)	38 (17.6%)	χ :.21, p:654
Autoimmune-RA	2 (6.9%)	3 (10.3%)	5 (17.2%)	χ^2 :.33, p:564
Skin	58 (6.9%)	84 (10.1%)	142 (17.0%)	χ^2 :12, p:728
Genitourinary	26 (3.1%)	48 (5.7%)	74 (8.9%)	χ^2 :1.64, p:200
Cardiac, Palpitations	12 (5.6%)	7 (3.2%)	19 (8.8%)	χ^2 :5.16, p:023
Vision	26 (3.1%)	37 (4.4%)	63 (7.5%)	χ^2 :.02, p:882
MUS	26 (3.1%)	33 (4.0%)	59 (7.1%)	χ^2 :.09, p:758
Hematology	23 (2.8%)	30 (3.6%)	53 (6.3%)	χ :.04, p:850
Allergies-Hayfever	4 (2.3%)	7 (4.0%)	11 (6.3%)	χ^2 :.01, p:912
Endocrine	14 (1.7%)	32 (3.8%)	46 (5.5%)	χ^2 :2.742, p:098
Vision, Other	18 (2.1%)	25 (3.0%)	43 (5.1%)	χ^2 :37.59, p:534
Autoimmune –Raynaud’s	0 (0.0%)	1(3.4%)	1 (3.4%)	χ^2 :1.11, p:292
Autoimmune-Lupus	0 (0.0%)	1(3.4%)	1 (3.4%)	χ^2 :1.11, p:292

Table 23.4 (Continued), Medical Concerns Identified by, WRIISC Assessment
Active, Reserve/Guard, Total Number (%)

Medical Concern	Active N (% within Active)	Reserve/Guard N (% within Reserve/Guard)	Total N (% within Total)	Test Statistic
Physical - Other	12 (1.4%)	12 (1.4%)	24 (2.8%)	χ^2 :25.08, p:.401
Infectious	10 (1.2%)	11 (1.3%)	21 (2.5%)	χ^2 :.26, p:.608
Allergies - Food	2 (1.1%)	2 (1.1%)	4 (2.3%)	χ^2 :.25, p:.615
Allergies-Urticaria	2 (1.1%)	2 (1.1%)	4 (2.3%)	χ^2 :.25, p:.615
Cardiac, Other	5 (0.6%)	12 (1.4%)	17 (2.0%)	χ^2 : 11.93, p:.451
Reproductive	11 (1.3%)	5 (0.6%)	16 (1.9%)	χ :4.73, p:.030
Autoimmune	5 (0.6%)	7 (0.8%)	12 (1.4%)	χ^2 :.001, p:.972
Cardiac, Vascular	0 (0.0%)	3 (1.4%)	3 (0.4%)	χ^2 :1.94, p:.164
Autoimmune-Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune-Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune -Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune-Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune-MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 24.1, Veterans Self-Reported Exposure Concerns**Branch of Service Number (%)**

Exposure Concern	Army N (% within Army)	Air Force N (% within Air Force)	Marines N (% within Marines)	Navy N (% within Navy)	Total N (% within Total)	Test Statistic
Petrochemicals	366 (84.5%)	101(86.3%)	47 (78.3%)	26 (81.3%)	540 (84.4%)	X^2 :2.37, p:.668
Air Pollution	362 (82.8%)	98 (82.3%)	36 (61.0%)	24 (75.0%)	520 (80.4%)	X^2 :16.84, p:.002
Multiple Vaccinations	337 (78.2%)	98 (83.1%)	43 (71.2%)	26 (83.9%)	504 (78.8%)	X :3.94, p:.414
Insects	352 (80.5%)	94 (78.3%)	32 (53.3%)	23 (71.9%)	501 (77.2%)	X^2 :23.12, p:.000
Pesticides	314 (72.4%)	94 (78.3%)	25 (41.7%)	23 (74.2%)	456 (70.7%)	X^2 :28.98, p:.000
Human Corpses	288 (66.2%)	91 (77.1%)	27 (45.8%)	19 (61.3%)	425 (66.1%)	X^2 :19.52, p:.001
Anthrax Vaccine	159 (36.7%)	41 (34.1%)	16 (27.1%)	9 (28.1%)	225 (34.9%)	X^2 :4.73, p:.316
Contaminated Food & Water	159 (36.7%)	41 (34.2%)	16 (27.1%)	9 (28.1%)	225 (34.9%)	X^2 :4.73, p:.316
Depleted Uranium	96 (22.6%)	31 (26.3%)	12 (20.3%)	8 (24.2%)	147 (23.1%)	X^2 :4.31, p:.366
Biological Weapons	47 (10.9%)	13 (11.2%)	9 (15.3%)	8 (25.0%)	77 (12.0%)	X^2 :6.45, p:.168

Table 24.2, Veterans Self-Reported Medical Concerns**Branch of Service Number (%)**

Medical Concern	Army N % Within Army	Air Force N (% within Air Force)	Marines N (% within Marines)	Navy N (Within Marines)	Total N (% within Total)	Test Statistic
Back	283 (63.2%)	79 (64.2%)	31 (50.8%)	21 (63.6%)	414 (62.3%)	$X^2:4.39, p:.355$
Constipation/Loose Bowel	234 (42.5%)	75 (45.7%)	34 (45.3%)	19 (76.0%)	362 (56.2%)	$X^2:10.66, p:.326$
Weakness	168 (37.9%)	40 (32.8%)	18 (30.0%)	14 (45.2%)	240 (36.6%)	$X^2:4.93, p:.295$
Gastrointestinal	151 (34.2%)	37 (30.8%)	20 (33.9%)	12 (37.5%)	220 (33.7%)	$X^2:1.22, p:.876$
High Temperature	137 (30.6%)	30 (24.4%)	16 (26.7%)	12 (36.4%)	195 (29.5%)	$X^2:5.19, p:.268$
HBP	146 (26.5%)	51 (31.0%)	20(26.6%)	13(40.0%)	230 (27.1%)	$X^2:12.22, p:.006$
Difficulty Breathing	126 (28.1%)	26 (21.1%)	11 (18.3%)	9 (27.3%)	172 (25.9%)	$X^2:7.27, p:.122$
Shakiness	108 (24.4%)	33 (27.0%)	8 (13.3%)	8 (24.2%)	108 (24.4%)	$X^2:4.28, p:.316$
Night Urination	90 (23.9%)	22 (19.8%)	8 (15.7%)	6 (20.7%)	126 (22.1%)	$X^2:2.56, p:.635$
Chest Pain	98 (22.3%)	27 (22.9%)	11 (18.3%)	7 (21.9%)	143 (22.0%)	$X^2:.83, p:.935$
Dizziness	101 (23.0%)	24 (19.7%)	12 (19.7%)	7 (21.2%)	144 (21.9%)	$X^2:4.36, p:.360$
Extremities	129 (23.5%)	31 (18.9%)	11 (14.8%)	11 (44.5%)	182 (21.5%)	$X^2:5.08, P:.180$
Weight Loss	101 (23.1%)	21 (17.6%)	6 (10.3%)	6 (19.4%)	134 (20.7%)	$X^2:6.29, p:.178$
Increased Perspiration	93 (21.0%)	26 (21.3%)	7 (11.7%)	7 (21.2%)	133 (20.2%)	$X^2:6.92, p:.140$
Cough	86 (20.5%)	19 (16.1%)	10 (16.9%)	5 (16.1%)	120 (19.1%)	$X^2:1.83, p:.768$
Swelling	88 (19.8%)	10 (8.3%)	10 (16.4%)	9 (28.1%)	117 (17.8%)	$X^2:15.71, p:.003$
Nausea	80 (17.9%)	18 (14.6%)	10 (16.4%)	10 (30.3%)	118 (17.7%)	$X^2:4.68, p:.321$
Sensitivity to Temperature	67 (16.6%)	14 (12.6%)	6 (10.5%)	5 (17.9%)	92 (15.3%)	$X^2:2.48, p:.647$
Change in Smell/Taste	59 (13.2%)	16 (13.0%)	11 (18.0%)	5 (15.6%)	91 (13.7%)	$X^2:1.37, p:.849$
Change in Menstruation	21 (13.8%)	4 (10.5%)	5 (23.8%)	0 (0.0%)	30 (13.4%)	$X^2:4.27, p:.234$

Table 24.2 (Continued), Veterans Self-Reported Medical Concerns**Branch of Service Number (%)**

Medical Concern	Army N (% within Army)	Air Force N (% within Air Force)	Marines N (% within Marines)	Navy N (% within Navy)	Total N (% within Total)	Test Statistic
Dental Issues	40 (12.7%)	6 (6.5%)	5 (11.6%)	4 (16.0%)	55 (11.6%)	$X^2:3.14, p:.370$
Palpitations	70 (72.2%)	12 (12.4%)	6 (6.2%)	8 (8.2%)	96 (11.3%)	$X^2:4.12, p:.009$
Difficulty Swallowing	40 (9.0%)	5 (4.1%)	2 (3.3%)	7 (21.2%)	54 (8.1%)	$X^2:12.63, p:.013$
Frequent Urination	30 (6.7%)	5 (4.1%)	5 (8.2%)	4 (12.1%)	44 (6.6%)	$X^2:3.24, p:.518$
Fainting	21 (4.7%)	3 (2.4%)	1 (1.7%)	4 (12.1%)	29 (4.4%)	$X^2:7.05, p:.133$
Paralysis	18 (4.1%)	4 (3.3%)	1 (1.7%)	4 (12.55)	27 (4.1%)	$X^2:6.91, p:.141$
Seizures	8 (1.8%)	2 (1.7%)	0 (0.0%)	0 (0.0%)	10 (1.5%)	$X^2:1.69, p:.791$

Table 24.3, Exposure Concerns Identified by WRIISC Assessment**Branch of Service Number (%)**

Exposure Concern	Army N (%) within Army	Air Force N (%) within Air Force)	Marines N (%) within Marines)	Navy N (%) within Navy)	Total N (%) within Total)	Test Statistic
Burning Trash	317 (60.2%)	72 (42.7%)	19 (26.0%)	23 (51.1%)	431 (54.1%)	X^2 :34.78, p:000
Sandstorms	266 (50.5%)	64 (42.4%)	20 (27.4%)	15 (33.3%)	365 (45.9%)	X^2 :18.97, p:001
Petrochemicals	114 (26.1%)	42 (27.8%)	24 (3.3%)	16 (35.6%)	196 (24.6%)	X^2 :9.28, p:054
Depleted Uranium	95 (18.0%)	37 (24.5%)	13 (17.8%)	4 (8.8%)	149 (18.7%)	X^2 :6.62, p:157
Oil Well Fires	77 (14.6%)	20 (13.2%)	8 (11.0%)	12 (26.7%)	117 (14.7%)	X^2 :6.39, p:172
Anthrax Vaccine	65 (12.3%)	25 (16.6%)	13 (17.8%)	12 (26.7%)	115 (14.5%)	X^2 :8.73, p:068
Air Pollution	74 (14.0%)	25 (16.6%)	12 (16.4%)	3 (6.7%)	114 (14.3%)	X^2 ; 3.24, p:519
Noise	63 (12.0%)	19 (12.6%)	15 (20.5%)	13 (28.9%)	110 (13.8%)	X^2 :13.26, p:010
Vehicular Exhaust	65 (12.3%)	27 (17.9%)	9 (12.3%)	7 (15.6%)	109 (13.7%)	X^2 :9.62, p:047
Contaminated Food & Water	71 (15.5%)	24 (15.9%)	5 (6.8%)	3 (6.7%)	103 (12.9%)	X^2 :6.11, p:191
Multiple Vaccinations	59 (11.2%)	24 (15.9%)	11 (15.1%)	4 (8.9%)	98 (12.3%)	X^2 :3.56, p:470
Asbestos	35 (6.6%)	20 (13.2%)	14 (19.2%)	6 (13.3%)	75 (9.4%)	X^2 :16.43, p:002
Insects	49 (9.3%)	7 (4.6%)	4 (5.5%)	1 (2.2%)	62 (7.8%)	X^2 :18.10, p:001
Pesticides	44 (8.3%)	8 (5.3%)	6 (8.2%)	2 (4.4%)	60 (7.5%)	X^2 :2.34, p:674
Enemy Fire	42 (8.0%)	6 (3.9%)	1 (1.4%)	1 (2.2%)	50 (6.3%)	X^2 :8.25, p:083
Burning Hardware	37 (7.0%)	10 (6.6%)	0 (0.0%)	2 (4.4%)	49 (6.1%)	X^2 :5.83, p:212
Human Corpses	25 (4.7%)	9 (5.9%)	5 (6.8%)	2 (4.4%)	41 (5.2%)	X^2 :.91, p:923
Non-Ionizing Radiation	18 (3.4%)	13 (8.6%)	7 (9.5%)	3 (6.7%)	41 (5.2%)	X^2 :10.17, p:038
Mefloquine	15 (2.8%)	14 (9.3%)	2 (2.7%)	3 (6.7%)	34 (4.3%)	X^2 :12.96, p:011
Biological Weapons	17 (3.2%)	4 (2.6%)	2 (2.7%)	1 (2.2%)	24 (3.0%)	X^2 :.30, p:990
Pyridostigmine	12 (2.3%)	3 (2.0%)	0 (0.0%)	2 (4.4%)	17 (2.1%)	X^2 :2.83, p:586
Chemical Alarms	9 (1.7%)	2 (1.3%)	3 (4.1%)	1 (2.2%)	15 (1.9%)	X^2 :2.35, p:672
Body Fluids	7 (1.3%)	4 (2.6%)	0 (0.0%)	1 (2.2%)	12 (1.5%)	X^2 :2.73, p:604
Lead	5 (0.9%)	4 (2.6%)	1 (1.4%)	0 (0.0%)	11 (1.4%)	X^2 :74.59, p:000
Ionizing Radiation	6 (1.1%)	1 (0.7%)	1 (1.4%)	1 (2.2%)	9 (1.1%)	X^2 :.83, p:935
Animals	5 (0.9%)	1 (0.7%)	2 (2.7%)	0 (0.0%)	8 (1.0%)	X^2 :2.97, p:579

Table 24.4, Medical Concerns Identified by WRIISC Assessment**Branch of Service Number (%)**

Medical Concern	Army N (% within Army)	Air Force N (% within Air Force)	Marines N (% within Marines)	Navy N (% within Navy)	Total N (% within Total)	Test Statistic
Allergies - Sinusitis	97 (78.2%)	22 (91.7%)	13 (86.6%)	10(90.1%)	142 (81.6%)	χ^2 :2.87, p:.581
Musculoskeletal	364 (66.2%)	116 (71.2%)	49 (64.5%)	25 (55.6%)	555 (66.5%)	χ^2 :2.17, p:.705
Gastrointestinal	184 (33.5%)	49 (30.1%)	29 (38.2%)	14 (31.1%)	276 (33.1%)	χ^2 :2.17, p:.705
Cardiac- Cholesterol	65 (42.5%)	8 (26.7%)	11 (47.8%)	2 (20.0%)	86 (39.8%)	χ^2 :4.87, p:.181
Neurological	191 (34.7%)	43 (26.4%)	24 (31.6%)	23 (51.1%)	281 (33.7%)	χ^2 :10.94, p:.027
Sleep	180 (32.7%)	32 (19.6%)	26 (34.2%)	16 (35.6%)	254 (30.5%)	χ :11.86, p:.018
Allergies - Urticaria	2 (1.6%)	1 (4.2%)	1(6.7%)	0 (0.0%)	4 (28.6%)	χ^2 :2.17, p:.539
Allergies - Food	2 (1.6%)	2 (8.3%)	0 (0.0%)	0 (0.0%)	4 (28.6%)	χ^2 :4.76, p:.190
ENT	138 (25.1%)	47 (28.8%)	18 (23.7%)	11(24.4%)	214 (25.7%)	χ^2 :4.03, p:.402
Cardiac	146 (26.5%)	29 (17.8%)	23 (30.3%)	10(22.2%)	208 (24.9%)	χ^2 :6.87, p:.143
Respiratory	119 (21.6%)	24 (14.7%)	23 (30.3%)	6 (13.3%)	162 (19.2%)	χ^2 :5.59, p:.232
Allergies	107 (19.5%)	23 (14.1%)	14 (18.4%)	11 (24.4%)	155 (18.6%)	χ^2 :3.69, p:.450
Cardiac Triglycerides	26 (17.0%)	6 (20.0%)	3 (13.0%)	3 (30.0%)	38 (17.6%)	χ^2 :1.54, P:.671
Autoimmune - RA	4 (22.2%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	5 (17.2%)	χ^2 :2.52, p:.471
Skin	103 (18.7%)	24 (14.7%)	12 (15.8%)	4 (8.8%)	143 (17.1%)	χ^2 :4.11, p:.391
Autoimmune - Psoriasis	18 (14.5%)	7 (29.1%)	1 (4.2%)	3 (27.2%)	29 (16.7%)	χ^2 :3.21, p:.690
Genitourinary	56 (10.2%)	11 (6.7%)	7 (9.2%)	0 (0.0%)	74 (8.8%)	χ^2 :6.57, p:.160
Cardiac - Palpitations	7 (4.6%)	5 (16.7%)	4 (17.4%)	3 (30.0%)	19(8.8%)	χ^2 :13.35, p:.004
Vision	44 (8.0%)	11 (6.7%)	5 (6.5%)	4 (8.8%)	64 (7.7%)	χ^2 :.59, p:.965
Vision, Other	43 (7.7%)	11 (6.7%)	5 (6.5%)	4 (8.8%)	63(7.6%)	χ^2 :69.76, p:1.000
MUS	36 (6.5%)	15 (9.2%)	3 (3.9%)	5 (11.1%)	59 (7.1%)	χ^2 :3.68, p:.451

Table 24.4, Medical Concerns Identified by WRIISC Assessment**Branch of Service Number (%)**

Medical Concern	Army N (% within Army)	Air Force N (% within Air Force)	Marines N (% within Marines)	Navy N (% within Navy)	Total N (% within Total)	Test Statistic
Hematology	32 (5.8%)	9 (5.5%)	8 (10.5%)	4 (8.8%)	53 (6.4%)	$X^2:3.24$, p:.519
Allergies - Hayfever	10 (8.1%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	11 (6.3%)	$X^2:3.41$, p:.333
Endocrine	31 (5.6%)	9 (5.5%)	4 (5.2%)	2 (4.4%)	46 (5.5%)	$X^2:1.18$, p:.996
Infectious	16 (2.9%)	4 (2.5%)	0 (0.0%)	1 (2.2%)	21 (2.5%)	$X^2:2.35$, p:.671
Reproductive	10 (1.8%)	4 (2.5%)	1 (1.3%)	1 (2.2%)	16 (1.9%)	$X^2:1.47$, p:.977
Physical, Other	11 (2.0%)	0 (0.0%)	4 (5.2%)	0 (0.0%)	15 (1.7%)	$X^2:873.50$, p:.000
Cardiac Vascular	3 (1.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (1.4%)	$X^2:1.25$, p:.740
Cardiac, Other	10 (1.8%)	2 (1.2%)	0 (0.0%)	0 (0.0%)	12 (1.4%)	$X^2:13.50$, P:1.000
Autoimmune	8 (1.5%)	2 (1.2%)	0 (0.0%)	2 (4.4%)	12 (1.4%)	$X^2:4.05$, p:.400
Autoimmune - Lupus	1 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)	$X^2:1.63$, p:.889
Autoimmune - Raynaud's	1 (3.4%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)	$X:1.63$, p:.889
Autoimmune, Other	2 (0.4%)	2 (1.2%)	0 (0.0%)	1 (2.1%)	5 (0.6%)	$X^2:26.30$, p:.156
Autoimmune - MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune - Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac-Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 25.1, Veterans Self-Reported Exposure Concerns**OEF/OIF/Both OEF & OIF Number (%)**

Exposure Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF N (% within Both OEF & OIF)	Total N (% within Total)	Test Statistic
Petrochemicals	31 (75.6%)	510 (84.7%)	56 (10.4%)	597 (75.2%)	$X^2:1.97, p:161$
Anthrax Vaccine	26 (60.5%)	510 (85.0%)	56 (10.4%)	592 (74.5%)	$X^2:2.39, p:121$
Air Pollution	27 (64.3%)	494 (81.5%)	47 (9.0%)	568 (71.5%)	$X^2:.919, p:338$
Insects	32 (74.4%)	470 (77.4%)	52 (9.7%)	554 (69.8%)	$X^2:1.118, p:290$
Multiple Vaccinations	30 (73.2%)	475 (79.2%)	46 (9.1%)	551 (69.4%)	$X^2:1.590, p:238$
Pesticides	28 (65.1%)	429 (71.1%)	44 (9.6%)	501 (63.1%)	$X^2:.092, p:967$
Human Corpses	29(67.4%)	396 (65.8%)	45 (10.6%)	470 (59.2%)	$X^2:2.391, p:122$
Contaminated Food & Water	15 (36.5%)	211(34.9%)	8 (9.1%)	234 (29.5%)	$X^2:.032, p:858$
Depleted Uranium	8 (19.5%)	140 (23.5%)	18 (12.2%)	166 (20.9%)	$X^2:1.680, p:195$
Biological Weapons	3 (7.1%)	140 (23.5%)	12 (15.6%)	155 (19.4%)	$X^2:3.742, p:053$

Table 25.2, Veterans Self-Reported Medical Concerns**OEF/OIF/Both OEF & OIF Number (%)**

Medical Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF (% within Both OEF & OIF)	Total N (% within Total	Test Statistic
Back	26 (57.8%)	389 (62.6%)	41 (65.1%)	456 (62.3%)	$X^2:423, p:516$
Extremities	18 (40.9%)	164 (37.1%)	26 (14.3%)	208 (37.5%)	$X^2:2.095, p:.543$
Weakness	13 (30.2%)	228 (37.1%)	26 (40.6%)	267 (36.7%)	$X^2:824, p:364$
Gastrointestinal	10 (22.7%)	210 (34.5%)	29 (46.0%)	249 (33.7%)	$X^2:2.583, p:111$
High Temperature	12 (26.7%)	184 (29.7%)	26 (40.6%)	222 (29.5%)	$X^2:189, p:664$
Difficulty Breathing	11 (25.0%)	162 (26.1%)	17 (27.6%)	190 (26.0%)	$X^2:025, p:874$
Shakiness	12 (26.1%)	145 (23.7%)	19 (29.7%)	176 (23.8%)	$X^2:140, p:709$
Night Urination	10 (23.8%)	116 (22.0%)	15 (28.3%)	141 (22.1%)	$X^2:.073, p:787$
Dizziness	7 (15.2%)	138 (22.6%)	18 (28.6%)	163 (22.1%)	$X^2:1.350, p:245$
Chest Pain	8 (18.2%)	135 (22.2%)	19 (30.2%)	162 (22.0%)	$X^2:394, p:530$
Weight Loss	10 (22.7%)	124 (20.6%)	15 (24.6%)	149 (20.7%)	$X^2:113, p:737$
Increased Perspiration	6 (13.3%)	128 (20.9%)	15 (23.8%)	149 (20.4%)	$X^2:1.473, p:225$
Cough	7 (15.6%)	113 (19.4%)	14 (23.7%)	134 (19.1%)	$X^2:396, p:529$
Constipation/Loose Bowel	8 (18.2%)	112 (18.4%)	29 (8.0%)	149 (18.2%)	$X^2;1.673, p:.009$
Swelling	7 (15.2%)	111 (18.1%)	11 (17.2%)	129 (17.9%)	$X^2:243, p:622$
Nausea	5 (10.9%)	113 (18.2%)	17 (27.6%)	135 (17.7%)	$X^2:1.590, p:207$
Sensitivity to Temperature	4 (10.0%)	88 (15.7%)	8 (14.5%)	100 (15.3%)	$X^2;939, p:333$
Palpitations	5 (5.2%)	92 (15.0%)	14 (14.4%)	111 (14.4%)	$X^2:.902, p:653$
Change in Smell/Taste	2 (4.4%)	89 (14.4%)	11 (17.5%)	102 (13.7%)	$X^2:3.500, p:061$

Table 25.2, Veterans Self-Reported Medical Concerns**OEF/OIF/Both OEF & OIF Number (%)**

Medical Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF N (% within Both OEF & OIF)	Total N (% within Total)	Test Statistic
Change in Menstruation	3 (15.8%)	27 (13.2%)	2 (8.0%)	32 (13.4%)	$X^2:103, p:748$
Difficulty Swallowing	50 (8.1%)	4 (8.7%)	7 (10.9%)	61(8.1%)	$X^2:.020, p:887$
HBP	1 (2.2%)	55 (9.0%)	20 (8.7%)	76 (7.8%)	$X^2:1.081, p:.006$
Frequent Urination	2 (4.4%)	42 (6.8%)	6 (9.4%)	50(6.6%)	$X^2:366, p:545$
Fainting	3 (6.5%)	26 (4.2%)	4 (6.3%)	33 (4.4%)	$X^2:545, p:460$
Paralysis	5 (4.6%)	1 (2.2%)	4 (6.3%)	10 (4.2%)	$X^2:432, p:511$
Seizures	0 (0.0%)	10 (1.7%)	2 (3.2%)	12 (1.5%)	$X^2:741, p:389$
Dental Issues	7 (20.0%)	48 (10.9%)	5 (10.4%)	60 (11.6%)	$X^2:2.637, p:104$

**Table 25.3, Exposure Concerns, Identified by WRIISC Assessment,
OEF/OIF/Both OEF & OIF Number (%)**

Exposure Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF N (% within Both OEF & OIF)	Total N (% within Total)	Test Statistic
Burning Trash	407 (55.2%)	24 (40.0%)	36 (48.0%)	467 (58.6%)	X ² :5.18, p:023
Sandstorms	340 (46.1%)	25 (41.7%)	40 (53.3%)	405 (50.8%)	X ² :45, p:504
Petrochemicals	180 (24.4%)	16 (26.7%)	2 (2.7%)	198 (24.8%)	X ² :.001, p:975
Depleted Uranium	137 (18.9%)	12 (20.0%)	15 (20.0%)	164 (20.5%)	X ² :07, p:787
Contaminated Food & Water	96 (13.0%)	7 (11.7%)	32 (42.7%)	135 (16.9%)	X ² :09, p:.763
Oil Well Fires	114 (15.5%)	3 (5.0%)	15 (20.0%)	132 (16.6%)	X ² :4.85, p:028
Noise	99 (13.4%)	11 (18.3%)	16 (21.3%)	126 (15.8%)	X ² :1.12, p:290
Anthrax Vaccine	109 (14.8%)	6 (10.0%)	10 (13.3%)	125 (15.7%)	X ² :1.03, p:310
Vehicular Exhaust	99 (13.6%)	10 (16.7%)	15 (20.0%)	124 (15.6%)	X ² :.49, p:483
Air Pollution	105 (14.2%)	9 (15.0%)	8 (10.7%)	122 (15.3%)	X ² :.03, p:873
Insects	59 (8.0%)	3 (5.0%)	58 (8.0%)	120 (15.1%)	X ² :.70, p:403
Multiple Vaccinations	86 (11.7%)	12 (20.0%)	1 (0.1%)	99 (12.4%)	X ² :3.57, p:059
Asbestos	70 (9.5%)	5 (8.3%)	13 (17.3%)	88 (11.0%)	X ² :.09, p:766
Pesticides	58 (7.9%)	2 (3.3%)	5 (6.7%)	65 (8.1%)	X ² :1.64, p:200
Burning Hardware	45 (6.1%)	4 (6.7%)	3 (4.0%)	52 (6.5%)	X ² :.03, p:862
Enemy Fire	44 (6.0%)	6 (10.0%)	2 (2.7%)	52 (6.5%)	X ² :1.53, p:216
Burning Hardware	45 (6.1%)	4 (6.7%)	3 (4.0%)	52 (6.5%)	X ² :.03, p:862
Non-Ionizing Radiation	40 (5.4%)	1 (1.7%)	5 (6.7%)	46 (5.8%)	X ² :1.61, p:205
Human Corpses	37 (5.0%)	4 (6.7%)	4 (5.3%)	45 (5.6%)	X ² :.31, p:579
Mefloquine	29 (3.9%)	5 (8.3%)	7 (9.3%)	41 (5.1%)	X ² :2.63, p:105
Biological Weapons	21 (2.6%)	3 (5.0%)	0 (0.0%)	24 (3.0%)	X ² :.88, p:349
Chemical Alarms	15 (1.9%)	1 (1.7%)	2 (2.7%)	18 (2.2%)	X ² :.02, p:898
Pyrdostigimine	16 (2.2%)	1 (1.7%)	0 (0.0%)	17 (2.1%)	X ² :.07, p:795
Body Fluids	12 (1.6%)	0 (0.0%)	2 (2.7%)	14 (1.8%)	X ² :.99, p:319
Lead	10 (1.4%)	1 (1.7%)	1 (1.3%)	12 (1.5%)	X ² :.04, p:843
Ionizing Radiation	9 (1.2%)	0 (0.0%)	1 (1.3%)	10 (1.3%)	X ² :.74, p:389
Animals	7 (1.0%)	1 (1.7%)	2 (2.7%)	10 (1.3%)	X ² :.28, p:592
MOPP	1 (0.1%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	X ² :3.57, p:059

Table 25.4, Medical Concerns Identified by WRIISC Assessment
OEF/OIF/Both OEF & OIF Number (%)

Medical Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF N (% within Both OEF & OIF)	Total N (% within Total)	Test Statistic
Musculoskeletal	90 (62.9%)	517 (67.1%)	51 (65.4%)	658 (78.8%)	χ^2 :.05, p:.825
Gastrointestinal	50 (34.9%)	258 (33.5%)	32 (41.0%)	340 (40.7%)	χ^2 :.05, p:.825
Neurological	49(34.3%)	260 (33.7%)	28 (35.9%)	337 (40.3%)	χ^2 :20, p:.654
Sleep	42 (29.3%)	233 (30.2%)	21 (26.9%)	296 (36.1%)	χ^2 :49, p:.485
Cardiac	30 (20.9%)	194 (25.2%)	16 (20.5%)	240 (28.7%)	χ^2 :2.16, p:.142
Respiratory	32 (22.3%)	150 (19.5%)	20 (25.6%)	202 (24.6%)	χ^2 :2.16, p:.142
Allergies, Sinusitis	24 (92.3%)	131 (80.9%)	13 (92.9%)	168 (20.5%)	χ^2 :1.28, p:.257
Skin	17 (11.8%)	133 (17.3%)	7 (9.0%)	157 (19.4%)	χ^2 :4.01, p:.045
Endocrine	5 (3.4%)	150 (19.5%)	4 (5.1%)	159 (19.0%)	χ^2 :.02, p:.879
Allergies	24 (16.9%)	144 (18.7%)	13 (16.7%)	181 (16.8%)	χ^2 :20, p:.655
Cardiac, HBP	15 (46.8%)	86 (43.0%)	10 (62.5%)	111 (13.5%)	χ^2 :2.94, p:.086
Physical, Other	5 (7.6%)	21 (2.7%)	79 (9.3%)	105 (12.8%)	χ^2 :12.12, p:.979
Cardiac, Cholesterol	12 (37.5%)	82 (41.0%)	8 (50.0%)	102 (12.4%)	χ^2 :75, p:.387
Cardiac, Other	4 (2.7%)	3 (4.5%)	79 (9.3%)	86 (10.5%)	χ^2 :10.86, p:.541
ENT	43 (30.6%)	19 (29.2%)	24 (30.8%)	86 (10.3%)	χ^2 :1.15, p:.284
Vision	17 (11.8%)	58 (7.5%)	11 (14.1%)	86 (10.3%)	χ^2 :5.06, p:.025
Vision, Other	17 (11.7%)	57 (7.9%)	11 (9.3%)	85 (10.2%)	χ^2 :65.99, p:.005
Autoimmune, Other	0 (0.0%)	5 (3.1%)	79 (9.4%)	84 (10.2%)	χ^2 :.52, p:.991
Genitourinary	12 (8.4%)	66 (8.6%)	4 (5.1%)	82 (9.8%)	χ^2 :1.48, p:.224
MUS	12 (8.4%)	53 (6.9%)	6 (7.7%)	71 (8.4%)	χ^2 :.05, p:.818
Hematology	12 (8.4%)	47 (6.1%)	6 (7.7%)	65 (7.8%)	χ^2 :.27, p:.607
Cardiac, Triglycerides	6 (18.8%)	35 (17.5%)	3 (18.8%)	44 (5.4%)	χ^2 :.02, p:.899
Physical, No Concerns	4 (2.8%)	26 (3.4%)	3 (3.8%)	33 (4.0%)	χ^2 :1.28, p:.257
Cardiac, Palpitations	5 (15.6%)	18 (9.0%)	4 (25.0%)	27 (3.3%)	χ^2 :5.66, p:.017
Infectious	7 (4.8%)	17 (2.2%)	3 (3.8%)	27 (3.3%)	χ^2 :.63, p:.429
Reproductive	4 (2.7%)	14 (1.8%)	2 (2.6%)	18 (2.1%)	χ^2 :.19, p:.660
Allergies, Hayfever	2 (7.7%)	10 (6.2%)	1 (7.1%)	13 (1.6%)	χ^2 :.02, p:.895
Autoimmune	2 (1.4%)	10 (1.3%)	0 (0.0%)	12 (1.5%)	χ^2 :1.25, p:.263
Allergies, Food	1 (3.8%)	4 (2.5%)	1 (7.1%)	6 (0.7%)	χ^2 :1.59, p:.207
Autoimmune, RA	2 (33.3%)	3 (11.1%)	0 (0.0%)	5 (0.6%)	χ^2 :.97, p:.326
Allergies, Urticaria	0 (0.0%)	4 (2.5%)	0 (0.0%)	4 (0.4%)	χ^2 :.36, p:.549
Cardiac, Vascular	2 (6.2%)	1 (0.5%)	0 (0.0%)	3 (0.4%)	χ^2 :.24, p:.622
Autoimmune, Lupus	0 (0.0%)	1 (3.7%)	0 (0.0%)	1 (0.1%)	χ^2 :.17, p:.684
Autoimmune, Raynaud's	0 (0.0%)	1 (3.7%)	0 (0.0%)	1 (0.1%)	χ^2 :.17, p:.684
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 25.4 (Continued), Medical Concerns Identified by WRIISC Assessment**OEF/OIF/Both OEF & OIF Number (%)**

Medical Concern	OEF N (% within OEF)	OIF N (% within OIF)	Both OEF & OIF N (% within Both OEF & OIF)	Total N (% within Total)	Test Statistic
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 26.1, Veterans Self-Reported Exposure Concerns**Number of Deployments Number (%)**

Exposure	One Deployment N (% within One Deployment)	Two Deployments N (% within Two Deployments)	Three Deployments N (% within Three or More Deployments)	Total N (% within Total)	Test Statistic
Petrochemicals	403 (62.7%)	114 (17.7%)	24 (3.7%)	541 (84.1%)	χ^2 :5.72, p:.057
Anthrax Vaccine	395 (61.4%)	117 (18.2%)	24 (3.7%)	536 (83.4%)	χ^2 :9.22, p:.010
Air Pollution	390 (60.2%)	110 (17.0%)	21 (3.2%)	521 (80.4%)	χ^2 :.38, p:.828
Multiple Vaccinations	382 (59.6%)	106 (16.5%)	17 (2.7%)	505 (78.8%)	χ^2 :.52, p:.772
Insects	366 (56.3%)	112 (17.2%)	24 (3.7%)	502 (77.2%)	χ^2 :9.32, p:.009
Pesticides	336 (52.0%)	100 (15.5%)	21 (3.3%)	457 (70.7%)	χ^2 :3.82, p:.148
Human Corpses	305 (47.4%)	99 (15.4%)	21 (3.3%)	425 (66.0%)	χ^2 :12.37, p:.002
Contaminated Food & Water	163 (25.3%)	84 (13.0%)	15 (2.3%)	226 (35.0%)	χ^2 :7.52, p:.023
Depleted Uranium	104 (16.4%)	33 (5.2%)	11 (1.7%)	148 (23.3%)	χ^2 :7.94, p:.019
Biological Weapons	54 (8.4%)	18 (2.8%)	5 (0.8%)	77 (12.0%)	χ^2 :2.45, p:.294

Table 26.2, Veterans Self-Reported Medical Concerns**Number of Deployments Number (%)**

Medical Concern	One Deployment N (% within One Deployment)	Two Deployments N (% within Two Deployments)	Three Deployments N (% within Three or More Deployments)	Total N (% within Total)	Test Statistic
Back	306 (61.1%)	92 (65.7%)	17 (68.0%)	415 (62.3%)	χ^2 :1.359, p:.507
Weakness	171 (34.7%)	59 (42.4%)	11 (44.0%)	241 (36.7%)	χ^2 :3.411, p:.182
Gastrointestinal	160 (32.5%)	49 (36.0%)	11 (45.8%)	220 (33.7%)	χ^2 :2.254, p:.324
High Temperature	143 (28.7%)	46 (32.6%)	7 (19.2%)	196 (29.5%)	χ^2 :.833, p:.659
Difficulty Breathing	134 (26.7%)	31 (22.1%)	8 (33.3%)	173 (26.0%)	χ^2 :1.898, p:.387
Shakiness	112 (22.6%)	37 (27.6%)	8 (32.0%)	157 (23.8%)	χ^2 :1.910, p:.385
Extremities	135 (27.0%)	41 (30.4%)	6 (25.0%)	152 (23.3%)	χ^2 :1.653, p:.091
Night Urination	94 (21.8%)	27 (22.5%)	5 (29.4%)	126 (22.1%)	χ^2 :.567, p:.753
Dizziness	102 (20.6%)	35 (25.2%)	8 (33.3%)	145 (22.1%)	χ^2 :3.133, p:.209
Chest Pain	101 (20.5%)	36 (26.7%)	6 (25.0%)	143 (22.0%)	χ^2 :2.462, p:.292
Weight Loss	102 (20.9%)	27 (20.0%)	5 (20.8%)	134 (20.7%)	χ^2 :.057, p:.972
Increased Perspiration	94 (19.0%)	33 (23.7%)	7 (28.0%)	134 (20.4%)	χ^2 :2.420, p:.298
Cough	87 (18.3%)	27 (20.9%)	6 (26.1%)	120 (19.1%)	χ^2 :1.214, p:.545
Constipation/Loose Bowel	92 (18.4%)	25 (18.5%)	3 (12.5%)	120 (18.4%)	χ :.980, p:.559
Swelling	90 (18.2%)	23 (16.4%)	5 (20.0%)	118 (17.9%)	χ^2 :.315, p:.854
Nausea	89 (17.8%)	25 (17.9%)	4 (17.4%)	118 (17.7%)	χ^2 :.435, p:.933
Palpitations	68 (13.6%)	24 (17.3%)	5 (20.8%)	97 (15.4%)	χ^2 :1.459, p:.089
Sensitivity to Temperature	70 (15.4%)	19 (15.6%)	3 (13.0%)	92 (15.3%)	χ^2 :.099, p:.952
Change in Smell/Taste	63 (12.6%)	22 (15.6%)	6 (25.0%)	91 (13.7%)	χ^2 :3.510, p:.173

Table 26.2, (Continued), Veterans Self-Reported Medical Concerns**Number of Deployments Number (%)**

Medical Concern	One Deployment N (% within One Deployment)	Two Deployments N (% of Two Deployments)	Three Deployments N (% of Three or More Deployments)	Total N (% of Total)	Test Statistic
Change in Menstruation	26 (14.4%)	4 (10.0%)	0 (0.0%)	30 (13.4%)	$X^2: 1.187, p: .552$
Dental Issues	46 (12.6%)	8 (8.2%)	1 (7.1%)	55 (11.6%)	$X^2: 1.697, p: .428$
HBP	38 (7.6%)	13 (9.6%)	5 (20.8%)	56 (8.6%)	$X^2: 1.987, p: .357$
Difficulty Swallowing	40 (8.0%)	9 (6.5%)	5 (20.0%)	54 (8.1%)	$X^2: 5.226, p: .073$
Frequent Urination	32 (6.4%)	9 (6.4%)	3 (12.0%)	44 (6.6%)	$X^2: 1.225, p: .542$
Fainting	19 (3.8%)	8 (5.8%)	2 (8.3%)	29 (4.4%)	$X^2: 1.927, p: .381$
Paralysis	19 (3.8%)	6 (4.3%)	2 (8.3%)	27 (4.1%)	$X^2: 1.213, p: .545$
Seizures	8 (1.6%)	2 (1.5%)	0 (0.0%)	10 (1.5%)	$X^2: .409, p: .815$

Table 26.3, Exposure Concerns Identified by WRIISC Assessment**Multiple Deployments Number (%)**

Exposure Concern	One Deployment N (% within One Deployment)	Two Deployments N (% within Two Deployments)	Three or More Deployments N (% within Three or more Deployments)	Total N (% within Total)	Test Statistic
Burning Trash	324 (55.3%)	91 (51.1%)	16 (48.5%)	431 (54.1%)	χ^2 :1.79, p:.407
Sandstorms	262 (44.7%)	85 (47.8%)	18 (54.5%)	365 (45.8%)	χ^2 :1.57, p:.456
Deployment, Other	189 (32.3%)	107 (60.1%)	14 (42.4%)	310 (39.9%)	χ^2 :.39, p:.001
Petrochemicals	149 (25.4%)	40 (22.5%)	7 (21.2%)	196 (24.2%)	χ^2 :.86, p:.652
Depleted Uranium	105 (17.9%)	33 (18.5%)	11 (33.3%)	149 (18.7%)	χ^2 :4.89, p:.087
Oil Well Fires	74 (12.6%)	32 (18.0%)	11 (33.3%)	117 (14.7%)	χ^2 :12.68, p:.002
Anthrax Vaccine	83 (14.2%)	28 (15.7%)	4 (12.1%)	115 (14.4%)	χ^2 :.42, p:.811
Air Pollution	86 (14.7%)	24 (13.5%)	4 (12.1%)	114 (14.3%)	χ^2 :.29, p:.864
Vehicular Exhaust	71 (12.1%)	29 (16.3%)	9 (27.3%)	109 (13.7%)	χ^2 :7.41, p:.025
Contaminated Food & Water	79 (13.5%)	21 (11.8%)	3 (9.1%)	103 (12.9%)	χ^2 :1.29, p:.523
Multiple Vaccinations	73 (12.5%)	21 (11.8%)	4 (12.1%)	98 (12.3%)	χ^2 :.06, p:.972
Asbestos	46 (7.8%)	23 (12.9%)	6 (18.2%)	75 (9.4%)	χ^2 :7.266, p:.027
Insects	46 (7.8%)	15 (8.4%)	1 (3.0%)	62 (7.8%)	χ^2 :1.15, p:.564
Pesticides	44 (7.5%)	13 (7.3%)	3 (9.1%)	60 (7.5%)	χ^2 :.13, p:.938
Body Fluids	8 (1.4%)	2 (1.1%)	2 (6.1%)	12 (1.5%)	χ^2 :4.87, p:.088
Enemy Fire	34 (5.8%)	13 (7.3%)	3 (9.1%)	50 (6.3%)	χ^2 :.99, p:.610
Burning Hardware	38 (6.5%)	9 (5.1%)	2 (6.1%)	49 (6.1%)	χ^2 :.48, p:.785
Non-Ionizing Radiation	29 (4.9%)	8 (4.5%)	4 (12.1%)	41 (5.1%)	χ^2 :3.49, p:.174
Human Corpses	28 (4.8%)	10 (5.6%)	3 (9.1%)	41 (5.1%)	χ^2 :1.21, p:.654
Mefloquine	19 (3.2%)	12 (6.7%)	3 (9.1%)	34 (4.3%)	χ^2 :6.06, p:.048
8-Biological Weapons	18 (3.1%)	5 (2.8%)	1 (3.0%)	24 (3.0%)	χ^2 :.03, p:.984
Pyridostigimine	7 (1.2%)	8 (4.5%)	2 (6.1%)	17 (2.1%)	χ^2 :9.67, p:.008
Chemical Alarms	8 (1.4%)	4 (2.2%)	3 (9.1%)	15 (1.9%)	χ^2 :10.26, p:.006
Lead	8 (1.4%)	1 (0.6%)	2 (6.1%)	11 (1.4%)	χ^2 :6.19, p:.045
Noise	76 (13.0%)	31 (17.4%)	3 (9.1%)	110 (1.3%)	χ^2 :2.91, p:.233
Ionizing Radiation	8 (1.4%)	1 (0.6%)	0 (0.0%)	9 (1.1%)	χ^2 :1.18, p:.554
Animals	3 (0.5%)	3 (16.7%)	2 (6.1%)	8 (1.0%)	χ^2 :10.75, p:.005
MOPP	1 (0.2%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	χ^2 :6.19, p:.045

Table 26.4 , Medical Concerns Identified by WRIISC Assessment**Number of Deployments Number (%)**

Medical Concern	One Deployment N (% within One Deployment)	Two Deployments N (% within Two Deployments)	Three Deployments N (% within Three or more Deployments)	Total N (% within Total)	Test Statistic
Allergies, Sinusitis	106 (80.3%)	29 (82.9%)	7 (100.0%)	142 (81.6%)	χ^2 :1.76, p:414
Musculoskeletal	411 (66.5%)	123 (66.5%)	22 (66.6%)	555 (66.5%)	χ^2 :.00, p:1.000
Cardiac, BP	62 (39.7%)	25 (46.3%)	4 (66.7%)	91 (42.1%)	χ^2 :2.23, p:328
Neurological	203 (32.8%)	70 (37.8%)	8 (24.2%)	281 (33.6%)	χ^2 :2.94, p:.230
Cardiac, Cholesterol	66 (42.3%)	20 (37.0%)	0 (0.0%)	86 (39.8%)	χ^2 :4.55, p:103
Gastrointestinal	202 (32.7%)	61 (32.9%)	13 (39.4%)	276 (33.0%)	χ^2 :.64, p:.727
Sleep	191 (30.9%)	53 (28.6%)	10 (30.3%)	254 (30.4%)	χ^2 :.34, p:.842
ENT	151 (24.4%)	57 (30.8%)	7 (21.2%)	215 (25.7%)	χ^2 :3.39, p:.183
Cardiac	152 (24.6%)	51 (27.6%)	5 (15.2%)	208 (24.9%)	χ^2 :2.41, p:299
Respiratory	124 (20.1%)	32 (17.3%)	6 (18.2%)	162 (19.4%)	χ^2 :.73, p:694
Allergies	116 (18.8%)	32 (17.3%)	7 (21.2%)	155 (18.5%)	χ^2 :.37, p:832
Cardiac, Triglycerides	25 (16.0%)	13 (24.1%)	0 (0.0%)	38 (17.6%)	χ^2 :3.110, p:.211
Autoimmune, RA	3 (16.7%)	2 (18.2%)	0 (0.0%)	5 (17.2%)	χ^2 :.01, p:.917
Skin	113 (18.3%)	24 (13.0%)	6 (18.2%)	143 (16.9%)	χ^2 :2.86, p:239
Genitourinary	61 (9.9%)	10 (5.4%)	3 (9.1%)	74 (8.9%)	χ^2 :3.52, p:.172
Cardiac, Palpitations	12 (7.7%)	7 (13.0%)	0 (0.0%)	19 (8.8%)	χ^2 :1.98, p:.371
Vision	47 (7.6%)	14 (7.6%)	3 (9.1%)	64 (7.7%)	χ^2 :.10, p:.951
Vision, Other	46 (7.4%)	14 (7.4%)	3 (8.8%)	63 (7.4%)	χ :10.74, p:.043
MUS	44 (7.1%)	13 (7.0%)	2 (6.1%)	59 (7.1%)	χ^2 :.05, p:.973

Table 26.4 (Continued) , Medical Concerns Identified by WRIISC Assessment**Number of Deployments Number (%)**

Medical Concern	One Deployment N (% within One Deployment)	Two Deployments N (% within Two Deployments)	Three Deployments N (% within Three or more Deployments)	Total N (% within Total)	Test Statistic
Hematology	38 (6.1%)	15 (8.1%)	0 (0.0%)	53 (6.3%)	$X^2:3.25, p:.197$
Allergies, Hayfever	8 (6.1%)	3 (8.6%)	0 (0.0%)	11 (6.3%)	$X^2:79, p:.675$
Endocrine	31 (5.0%)	13 (7.0%)	2 (6.1%)	46 (5.5%)	$X^2:1.13, p:.569$
Autoimmune, Raynaud's	1 (5.6%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	$X^2:.63, p:.426$
Physical, No Concerns	21 (3.4%)	5 (2.7%)	1 (2.9%)	27 (3.2%)	$X^2:.23, p:.894$
Infectious	16 (2.6%)	3 (1.6%)	2 (6.1%)	21 (2.5%)	$X^2:2.31, p:.315$
Autoimmune, Lupus	1 (5.6%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	$X^2:.63, p:.426$
Physical, Other	20 (3.2%)	3 (1.6%)	1 (2.9%)	24 (2.8%)	$X^2:41.76, p:.732$
Allergies, Food	3 (2.3%)	0 (0.0%)	1 (14.3%)	4 (2.3%)	$X^2:5.30, p:.071$
Allergies, Urticaria	3 (2.3%)	1 (2.9%)	0 (0.0%)	4 (2.3%)	$X^2:.21, p:.842$
Reproductive	14 (2.3%)	2 (1.1%)	0 (0.0%)	16 (1.9%)	$X^2:1.73, p:.420$
Cardiac, Other	8 (1.3%)	3 (1.6%)	1 (2.9%)	12 (1.4%)	$X^2:37.27, p:.041$
Autoimmune	8 (1.3%)	4 (2.2%)	0 (0.0%)	12 (1.4%)	$X^2:1.26, p:.533$
Cardiac, Vascular	3 (1.9%)	0 (0.0%)	0 (0.0%)	3 (1.4%)	$X^2:1.17, p:.557$
Autoimmune, Other	3 (0.5%)	3 (1.6%)	0 (0.0%)	6 (0.6%)	$X^2:8.05, p:.624$
Autoimmune, Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 27.1, Veterans Self-Reported Exposure Concerns**Gender Number (%)**

Exposure Concern	Male N (% within Male)	Female N (% within Female)	Total N (% within Total)	Test Statistic
Petrochemicals	471 (85.0%)	70 (78.7%)	541 (84.1%)	X^2 :2.33, p:127
Anthrax Vaccine	453 (82.2%)	83 (90.2%)	536 (83.4%)	X^2 :3.64, p:056
Air Pollution	452 (81.4%)	69 (74.2%)	521 (80.4%)	X^2 :2.66, p:103
Multiple Vaccinations	428 (78.0%)	77 (83.7%)	505 (78.8%)	X^2 :1.55, p:213
Insects	426 (76.5%)	76 (81.7%)	502 (77.2%)	X^2 :1.24, p:265
Pesticides	388 (70.2%)	69 (74.2%)	457 (70.7%)	X^2 :.63, p:429
Human Corpses	376 (68.1%)	49 (53.3%)	426 (66.0%)	X^2 :7.75, p:005
Contaminated Food & Water	194 (34.9%)	32 (36.0%)	226 (35.0%)	X^2 :19.52, p:001
Depleted Uranium	132 (24.2%)	16 (17.8%)	148 (23.3%)	X^2 :1.77, p:183
Biological Weapons	68 (12.3%)	9 (10.1%)	77 (12.0%)	X^2 :.35, p:552

Table 27.2 Veterans Self-Reported , Medical Concerns**Gender Number (%)**

Medical Concern	Male N (% within Male)	Female N (% within Female)	Total N (% within Total)	Test Statistic
Back	351 (61.4%)	64 (68.1%)	415 (62.3%)	χ^2 ;1.55, p:.213
Weakness	201 (35.6%)	40 (43.5%)	241 (36.7%)	χ^2 ;2.13, p:.145
Gastrointestinal	180 (32.3%)	40 (42.1%)	220 (33.7%)	χ^2 ;3.52, p:.061
Extremities	150 (31.5%)	32 (34.0%)	182 (31.9%)	χ^2 ;2.97, p:.549
High Temperature	150 (26.3%)	46 (49.5%)	196 (29.5%)	χ^2 ;20.68, p:.000
Difficulty Breathing	138 (24.2%)	35 (36.8%)	173 (26.0%)	χ^2 ;6.75, p:.009
HBP	50 (34.7%)	6 (6.3%)	56 (24.3%)	χ^2 ;79, p:.543
Constipation/Loose Bowel	92 (22.7%)	28 (29.7%)	120 (24.0%)	χ^2 ;6.23, p:.042
Shakiness	131 (23.3%)	26 (27.4%)	157 (23.8%)	χ^2 ; .77, p:.381
Night Urination	126 (22.7%)	26 (27.1%)	152 (23.5%)	χ^2 ;1.08, p:.298
Dizziness	116 (20.6%)	29 (30.9%)	145 (22.1%)	χ^2 ;4.92, p:.027
Chest Pain	121 (84.6%)	22 (15.4%)	143 (22.0%)	χ^2 ; .13, p:.716
Weight Loss	115 (20.7%)	19 (20.9%)	134 (20.7%)	χ^2 :.001, p:.972
Increased Perspiration	112 (19.9%)	22 (23.4%)	134 (20.4%)	χ^2 :.63, p:.429
Cough	96 (80.0%)	24 (20.0%)	120 (19.1%)	χ^2 ;4.69, p:.030
Swelling	90 (15.9%)	28 (30.1%)	118 (17.9%)	χ^2 ;10.97, p:.001
Nausea	85 (14.9%)	33 (34.7%)	118 (17.7%)	χ^2 ;22.02, p:.000
Sensitivity to Temperature	72 (13.7%)	20 (26.3%)	92 (15.3%)	χ^2 ;8.09, p:.004
Palpitations	77 (14.1%)	20 (21.0%)	95 (14.3%)	χ^2 ; 3.19, p:.154
Change in Smell/Taste	74 (13.0%)	17 (18.1%)	91 (13.7%)	χ^2 ;1.78, p:.183
Change in Menstruation	0 (0.0%)	29 (46.8%)	30 (13.4%)	χ^2 ;82.36, p:.000
Dental Issues	44 (10.9%)	11 (15.5%)	55 (11.6%)	χ^2 ;1.27, p:.260
Difficulty Swallowing	49 (8.6%)	5 (5.3%)	54 (8.1%)	χ^2 ;1.17, p:.280
Frequent Urination	37 (6.5%)	7 (7.4%)	44 (6.6%)	χ^2 :.13, p:.723
Fainting	21 (3.7%)	8 (8.4%)	29 (4.4%)	χ^2 ;4.34, p:.037
Paralysis	27 (4.8%)	0 (0.0%)	27 (4.1%)	χ^2 ;4.74, p:.029
Seizures	8 (1.4%)	2 (2.2%)	10 (1.5%)	χ^2 :.28, p:.598

Table 27.3, Exposure Concerns, Identified by WRIISC Assessment**Gender Number (%)**

Exposure Concern	Male N (% within Male)	Female N (% within Female)	Total N (% within Total)	Test Statistic
Burning Trash	380 (55.3%)	51 (46.4%)	431 (54.1%)	χ^2 ;3.06, p:.080
Sandstorms	310 (45.1%)	55 (50.0%)	365 (45.8%)	χ^2 :.91, p:.341
Petrochemicals	170 (24.7%)	26 (23.6%)	196 (24.6%)	χ^2 :.06, p:.802
Depleted Uranium	138 (20.1%)	11 (10.0%)	149 (18.7%)	χ^2 ;6.35, p:.012
Oil Well Fires	108 (15.7%)	9 (8.2%)	117 (14.7%)	χ^2 ;.30, p:.580
Burning Hardware	108 (15.7%)	9 (8.2%)	117 (14.7%)	χ^2 ;4.30, p:.039
Anthrax Vaccine	95 (13.8%)	20 (18.2%)	115 (14.4%)	χ^2 ;1.46, p:.228
Noise	95 (13.8%)	15 (13.6%)	110 (13.8%)	χ^2 ;.003, p:.957
Vehicular Exhaust	94 (13.7%)	15 (13.6%)	109 (13.7%)	χ^2 ;.000, p:.990
Contaminated Food & Water	87 (12.7%)	16 (14.5%)	103 (12.9%)	χ^2 ;.30, p:.585
Multiple Vaccinations	84 (12.2%)	14 (12.7%)	98 (12.3%)	χ^2 ;.02, p:.882
Asbestos	68 (9.9%)	7 (6.4%)	75 (9.4%)	χ^2 ;1.39, p:.238
Insects	52 (7.6%)	10 (9.1%)	62 (7.8%)	χ^2 ;.31, p:.580
Pesticides	51 (7.4%)	9 (8.2%)	60 (7.5%)	χ^2 ;.08, p:.780
Enemy Fire	47 (6.8%)	3 (2.7%)	50 (6.3%)	χ^2 ;2.73, p:.099
Air Pollution	39 (5.7%)	8 (7.3%)	47 (5.9%)	χ^2 ;.44, p:.509
Human Corpses	36 (5.2%)	5 (4.5%)	41 (5.1%)	χ^2 ;.09, p:.759
Non-Ionizing Radiation	39 (5.7%)	2 (1.8%)	41 (5.1%)	χ^2 ;2.89, p:.089
Mefloquine	33 (4.8%)	1 (0.9%)	34 (4.3%)	χ^2 ;.352, p:.561
Biological Weapons	20 (2.9%)	4 (3.6%)	24 (3.0%)	χ^2 ;.17, p:.679
Pyridostigmine	16 (2.3%)	1 (0.9%)	17 (2.1%)	χ^2 ;.92, p:.339
Chemical Alarms	13 (1.9%)	2 (1.8%)	15 (1.9%)	χ^2 ;.003, p:.958
Body Fluids	11 (1.6%)	1 (0.9%)	12 (1.5%)	χ^2 ;.31, p:.580
Lead	10 (1.5%)	1 (0.9%)	11 (1.4%)	χ^2 ;.21, p:.648
Ionizing Radiation	8 (1.2%)	1 (0.9%)	9 (1.1%)	χ^2 ;.06, p:.814
Animals	6 (0.9%)	2 (1.8%)	8 (1.0%)	χ^2 ;.85, p:.356
MOPP	1 (0.1%)	0 (0.0%)	1 (0.1%)	χ^2 ;3.52, p:.061

Table 27.4 , Medical Concerns Identified by WRIISC Assessment**Gender Number (%)**

Medical Concern	Male N (% within Male)	Female N (% within Female)	Total N (% within Total)	Test Statistic
Allergies - Sinusitis	121 (82.3%)	21 (77.8%)	142 (81.7%)	χ^2 :.31, p:.576
Musculoskeletal	474 (65.6%)	248 (71.9%)	556 (66.6%)	χ^2 :1.74, p:.187
Cardiac - HBP	86 (43.0%)	5 (31.2%)	91 (42.1%)	χ^2 :.84, p:.360
Cardiac-Cholesterol	80 (40.0%)	6 (37.5%)	86 (39.8%)	χ^2 :.04, p:.844
Neurological	227 (31.4%)	54 (47.4%)	281 (33.6%)	χ^2 :11.19, p:.001
Gastrointestinal	234 (31.9%)	42 (36.8%)	276 (33.0%)	χ^2 :.88, P:.350
Sleep	221 (30.6%)	33 (28.9%)	254 (30.4%)	χ^2 :.13, p:.720
ENT	191 (26.5%)	24 (21.1%)	215 (25.7%)	χ^2 :1.50, p:.220
Cardiac	193 (26.7%)	15 (13.2%)	208 (24.8%)	χ^2 :9.71, p:.002
Respiratory	139 (19.3%)	23 (20.2%)	162 (19.4%)	χ^2 :.05, p:.817
Allergies	131 (18.1%)	24 (21.1%)	155 (18.5%)	χ^2 :.55, p:.458
Cardiac Triglycerides	38 (19.0%)	0 (0.0%)	38 (17.6%)	χ^2 :3.69, p:.055
Autoimmune - RA	4 (18.2%)	1 (14.2%)	5 (17.2%)	χ^2 :.06, p:.812
Skin	125 (17.3%)	18 (15.8%)	143 (16.9%)	χ^2 :.16, p:.688
Genitourinary	63 (8.7%)	11 (9.6%)	74 (8.9%)	χ^2 :.10, p:.747
Cardiac - Palpitations	16 (8.0%)	3 (18.8%)	19 (8.8%)	χ^2 : 2.13, p:.144
Vision	59 (8.2%)	5 (4.3%)	64 (7.7%)	χ^2 :1.99, p:.158
MUS	46 (6.4%)	13 (11.4%)	59 (7.1%)	χ^2 :3.80, p:.051
Vision, Other	59 (8.1%)	4 (3.5%)	63 (7.4%)	χ^2 :7.82, p:1.000
Allergies - Hayfever	8 (5.4%)	3 (11.1%)	11 (6.3%)	χ^2 :1.24, p:.266
Hematology	39 (5.4%)	14 (12.3%)	53 (6.3%)	χ^2 :7.85, p:.005
Endocrine	36 (5.0%)	10 (8.7%)	46 (5.5%)	χ^2 :2.71, p:.099
Autoimmune - Lupus	0 (0.0%)	1 (14.2%)	27 (3.7%)	χ^2 :3.26, p:.071
Autoimmune – Raynaud’s	0 (0.0%)	1 (14.2%)	1 (3.4%)	χ^2 :3.26, p:.071
Physical, Other	19 (2.5%)	5 (4.3%)	24 (2.8%)	χ^2 :35.18, p:.066
Infectious	17(2.4%)	4 (3.5%)	21 (2.5%)	χ :.54, p:.464
Allergies - Food	2 (1.3%)	2 (7.4%)	4 (2.3%)	χ^2 :3.71, p:.054
Allergies - Urticaria	4 (2.7%)	0 (0.0%)	4 (2.2%)	χ^2 :.75, p:.386
Reproductive	10 (1.3%)	6 (5.3%)	16 (1.9%)	χ^2 :7.89, p:.005

Table 27.4 (Continued) , Medical Concerns Identified by WRIISC Assessment**Gender Number (%)**

Medical Concern	Male N (% within Male)	Female N (% within Female	Total N (% within Total)	Statistical Measure
Cardiac , Other	11 (1.4%)	1 (0.9%)	12 (1.4%)	X ² :8.15, p:.773
Autoimmune	7 (0.9%)	5 (4.4%)	12(1.4%)	X ² :8.12, p:.004
Cardiac Vascular	2 (1.0%)	1 (6.3%)	3 (1.4%)	X ² :2.98, p:.084
Autoimmune, Other	3 (0.4%)	2 (1.8%)	5 (0.6%)	X ² ;13.36, p:.020
Autoimmune - Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune - MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac-Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune - Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac-Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 28.1, Veterans Self-Reported Exposure Concerns
Race Number (%)

Exposure Concern	American Indian/Alaskan N (% within AI/A)	Asian N (% within Asian)	Black N (% within Black)	Hawaiian/Pacific Islander N 9% with H/PI)	White N (% within White)	Other N (% within Other)	Unknown N (% within Unknown)	Total N (% within Total)	Test Statistic
Anthrax Vaccine	6 (85.7%)	17 (85.0 %)	139 (86.3 %)	6 (100.0%)	260 (84.1 %)	61 (78.2 %)	5 (83.3%)	494 (84.2 %)	X ² :3.81, p:704
Petrochemicals	7 (100.0%)	18 (90.0 %)	125 (21.4 %)	4 (66.7%)	266 (85.8 %)	65 (85.5 %)	5 (100.0%)	490 (83.9 %)	X ² :9.11, p:168
Air Pollution	5 (71.4%)	18 (90.0 %)	132 (80.5 %)	5 (83.3%)	255 (81.7 %)	65 (84.4 %)	5 (83.3%)	485 (81.9 %)	X ² :1.98, p:922
Multiple Vaccinations	6 (85.7%)	16 (80.0 %)	120 (75.5 %)	5 (83.3%)	253 (84.1 %)	57 (76.0 %)	6 (100.0%)	463 (79.3 %)	X ² :02, p:662
Insects	7 (100.0%)	18 (90.0 %)	116 (70.7 %)	4 (66.7%)	250 (80.1 %)	60 (76.9 %)	5 (83.3%)	460 (77.6 %)	X ² :93, p:128
Pesticides	7 (100.0%)	17 (85.0 %)	101 (62.7 %)	4 (66.7%)	234 (75.2 %)	51 (65.4 %)	4 (66.7%)	418 (71.0 %)	X ² :03, p:541
Human Corpses	5 (71.4%)	15 (75.0 %)	94 (57.7 %)	4 (66.7%)	216 (70.4 %)	52 (65.8 %)	1 (16.7%)	387 (65.8 %)	X ² :14.92, p:021
Contaminated Food & Water	2 (28.6%)	8 (40.0 %)	48 (29.3 %)	1 (16.7%)	118 (38.3 %)	30 (39.5 %)	1 (16.7%)	208 (35.4 %)	X ² :.07, p:115
Depleted Uranium	3 (42.9%)	6 (30.0 %)	24 (15.0 %)	0 (0.0%)	88 (28.5 %)	14 (8.4%)	0 (0.0%)	135 (23.2 %)	X ² :03, p:504
Biological Weapons	3 (42.9%)	2 (10.5 %)	17 (10.5 %)	0 (0.0%)	34 (11.0 %)	11 (14.3 %)	0 (0.0%)	67 (11.4 %)	X ² :9.23, p:161

Table 28.2, Veterans Self-Reported Medical Concerns**Race Number (%)**

Medical Concern	American Indian/Alaskan N (% within AI/A)	Asian N (% within Asian)	Black N (% within Black)	Hawaiian/Pacific Islander N (% within H/PI)	White N (% within White)	Other N (% within Other)	Unknown N (% within Unknown)	Total N (% within Total)	Test Statistic
Back	6 (85.7%)	13 (65.0%)	93 (55.4%)	2 (33.3%)	202 (62.9%)	1 (16.7%)	56 (71.8%)	373 (61.6%)	$\chi^2:15.39$, p:017
Weakness	4 (57.1%)	6 (31.6%)	55 (33.1%)	0 (0.0%)	118 (37.3%)	2 (33.3%)	28 (35.4%)	213 (35.6%)	$\chi^2:5.74$, p:453
Gastrointestinal	2 (28.6%)	8 (40.0%)	42 (25.1%)	0 (0.0%)	116 (37.5%)	2 (33.3%)	23 (29.5%)	193 (32.5%)	$\chi^2:11.46$, p:075
Constipation/Loose Bowel	2 (40.0%)	5 (41.6%)	29 (29.0%)	0 (0.0%)	49 (29.7%)	14 (34.1%)	0 (0.0%)	99 (29.9%)	$\chi^2:5.32$, p:008
Extremities	3 (42.9%)	5 (26.5%)	46 (27.8%)	3 (50.1%)	78 (24.5%)	26 (48.1%)	0 (0.0%)	161 (26.6%)	$\chi^2:12.97$, p:78
Difficulty Breathing	0 (0.0%)	5 (25.0%)	41 (24.3%)	0 (0.0%)	85 (26.7%)	21 (26.6%)	2 (33.3%)	154 (25.5%)	$\chi^2:5.09$, p:532
High Temperature	0 (0.0%)	4 (20.0%)	43 (25.7%)	1 (16.7%)	102 (31.8%)	2 (33.3%)	22 (28.2%)	174 (28.8%)	$\chi^2:5.83$, p:442
Shakiness	1 (0.7%)	3 (2.2%)	26 (18.7%)	0 (0.0%)	91 (28.6%)	1 (0.7%)	17 (12.2%)	139 (23.2%)	$\chi^2:13.58$, p:035
Chest Pain	3 (42.9%)	2 (10.5%)	37 (22.0%)	0 (0.0%)	63 (20.3%)	2 (40.0%)	20 (26.3%)	127 (21.5%)	$\chi^2:7.23$, p:300
Night Urination	1 (16.7%)	1 (5.9%)	28 (20.0%)	0 (0.0%)	64 (22.9%)	1 (20.0%)	18 (24.3%)	113 (21.4%)	$\chi^2:5.08$, p:534
Dizziness	1 (16.7%)	3 (15.0%)	28 (16.8%)	0 (0.0%)	72 (22.7%)	2 (40.0%)	21 (26.9%)	127 (21.2%)	$\chi^2:7.134$, p:309
Increased Perspiration	0 (0.0%)	4 (21.1%)	25 (15.2%)	1 (16.7%)	75 (23.3%)	15 (20.5%)	2 (33.3%)	122 (20.4%)	$\chi^2:6.93$, p:328
Weight Loss	2 (28.6%)	3 (15.8%)	29 (17.5%)	1 (16.7%)	66 (21.6%)	16 (20.8%)	3 (50.0%)	120 (20.4%)	$\chi^2:4.96$, p:549
Cough	2 (40.0%)	2 (10.5%)	35 (21.5%)	0 (0.0%)	60 (19.8%)	10 (13.3%)	0 (0.0%)	109 (18.9%)	$\chi^2:7.26$, p:298
Swelling	3 (42.9%)	2 (10.5%)	23 (13.7%)	0 (0.0%)	54 (17.0%)	0 (0.0%)	22 (28.9%)	104 (17.3%)	$\chi^2:15.05$, p:020

Table 28.2, (continued) Veterans Self-Reported Medical Concerns**Race Number (%)**

Medical Concern	American Indian/Alaskan N (% within AI/A)	Asian N (% within Asian)	Black N (% within Black)	Hawaiian/Pacific Islander N (% within H/PI)	White N (% within White)	Other N (% within White)	Unknown N (% within Unknown)	Total N (% within Total)	Test Statistic
Nausea	1 (1.0%)	0 (0.0%)	24 (23.5%)	0 (0.0%)	59 (57.8%)	17 (16.7%)	1 (1.0%)	102 (16.8%)	$\chi^2: 7.90$, p:245
Palpitations	2 (28.2%)	6 (100.0%)	22 (13.1%)	0 (0.0%)	50 (16.6%)	10 (9.8%)	2 (2.6%)	92 (15.3%)	X: 6.41, p:82
Sensitivity to Temperature	1 (14.3%)	5 (26.3%)	16 (10.4%)	0 (0.0%)	44 (15.3%)	14 (19.7%)	0 (0.0%)	80 (14.6%)	$\chi^2: 7.42$, p:283
Change in Menstruation	0 (0.0%)	1 (25.0%)	12 (18.2%)	0 (0.0%)	9 (9.7%)	6 (24.0%)	0 (0.0%)	28 (14.5%)	$\chi^2: 5.48$, p:483
Change in Smell/Taste	1 (14.3%)	2 (10.0%)	16 (9.5%)	0 (0.0%)	48 (15.0%)	10 (13.0%)	0 (0.0%)	77 (12.7%)	$\chi^2: 4.93$, p:552
Dental Issues	0 (0.0%)	4 (26.7%)	14 (11.7%)	0 (0.0%)	24 (10.9%)	8 (14.8%)	1 (25.0%)	51 (12.0%)	X:5.89, p:436
Difficulty Swallowing	1 (14.3%)	2 (10.0%)	7 (4.2%)	0 (0.0%)	30 (9.3%)	6 (7.8%)	0 (0.0%)	46 (7.6%)	$\chi^2: 5.75$, p:452
Frequent Urination	0 (0.0%)	0 (0.0%)	12 (7.1%)	0 (0.0%)	21 (6.6%)	1 (16.7%)	1 (1.3%)	35 (5.8%)	$\chi^2: 7.20$, p:302
Fainting	0 (0.0%)	0 (0.0%)	4 (2.4%)	0 (0.0%)	18 (5.7%)	0 (0.0%)	3 (3.9%)	25 (4.1%)	$\chi^2: 4.89$, p:559
Paralysis	1 (14.3%)	0 (0.0%)	6 (3.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (16.7%)	22 (3.7%)	$\chi^2: 9.49$, p:148
HBP	1 (14.3%)	2 (10.5%)	21	0 (0.0%)	24 (7.8%)	5 (6.5%)	0 (0.0%)	53 (8.8%)	$\chi^2: .05$, p:431
Seizures	0 (0.0%)	1 (5.3%)	3 (1.8%)	0 (0.0%)	4 (1.3%)	0 (0.0%)	0 (0.0%)	8 (1.4%)	$\chi^2: 3.70$, p:717

**Table 28.3, Exposure Concerns, Identified by WRIISC Assessment,
RaceNumber (%)**

Exposure	American Indian/ Alaskan (N, % within AI/A)	Asian (N, % within Asian)	Black/ African Heritage (N, % within B/A)	Hawaiian / Pacific Islander (N, % within H/P Islander)	White (N, % within white)	Other (N, % within other)	Unknown (N, % with Unknown)	Total (N, % of Total)	Test Statistic
Burning Trash	3 (30.0%)	7 (35.0%)	98 (49.0%)	2 (28.6%)	229 (70.2%)	45 (52.3%)	6 (85.7%)	394 (54.3%)	X2:13.03 , p:.043
Sandstorms	6 (60.0%)	5 (25.0%)	98 (49.0%)	4 (57.1%)	182 (46.0%)	33 (38.4%)	2 (28.6%)	330 (45.5%)	X2:8.21, p:.223
Petrochemicals	0 (0.0%)	6 (30.0%)	49 (24.5%)	3 (42.9%)	100 (25.3%)	21 (24.4%)	2 (28.6%)	181 (24.9%)	X2:4.90, p:.557
Depleted Uranium	4 (40.0%)	1 (5.0%)	25 (12.5%)	0 (0.0%)	97 (24.5%)	8 (9.3%)	0 (0.0%)	135 (18.6%)	X2:27.59 , p:.000
Air Pollution	5 (50.0%)	0 (0.0%)	32 (16.0%)	1 (14.3%)	56 (14.1%)	14 (20.9%)	1 (14.3%)	109 (15.0%)	X2:13.63 , p:.034
Oil Well Fires	4 (40.0%)	0 (0.0%)	35 (17.5%)	0 (0.0%)	57 (14.4%)	10 (11.6%)	0 (0.0%)	106 (14.6%)	X2:12.96 p:.044
Anthrax	3 (30.0%)	4 (20.0%)	28 (14.0%)	0 (0.0%)	60 (15.2%)	11 (12.8%)	0 (0.0%)	106 (14.6%)	X2:5.14, p:.526
Vehicular Exhaust	2 (20.0%)	5 (25.0%)	20 (10.0%)	0 (0.0%)	60 (15.2%)	12 (14.0%)	2 (28.6%)	101 (13.9%)	X2:7.81, p:.252
Noise	2 (20.0%)	1 (5.0%)	28 (14.0%)	0 (0.0%)	58 (14.6%)	10 (11.6%)	1 (14.3%)	100 (13.8%)	X2:3.39, p:.765
Contaminated Food & Water	3 (30.0%)	2 (10.0%)	26 (13.0%)	0 (0.0%)	51 (12.9%)	12 (14.0%)	1 (14.3%)	95 (13.1%)	X2:2.93, p:.059
Multiple Vaccinations	1 (10.0%)	2 (10.0%)	20 (10.0%)	0 (0.0%)	58 (14.6%)	12 (14.0%)	0 (0.0%)	94 (12.9%)	X2:3.92, p:.688
Asbestos	0 (0.0%)	1 (5.0%)	18 (9.0%)	1 (14.3%)	42 (10.6%)	5 (5.8%)	1 (14.3%)	68 (9.4%)	X2:3.91, df:689
Insects	2 (20.0%)	1 (5.0%)	16 (8.0%)	0 (0.0%)	32 (8.1%)	5 (5.8%)	1 (14.3%)	57 (7.9%)	X2:3.79, p:.705
Pesticides	1 (10.0%)	1 (5.0%)	7 (3.5%)	1 (14.3%)	35 (8.8%)	7 (8.1%)	0 (0.0%)	52 (7.2%)	X2:7.17, p:.306
Enemy Fire	1 (10.0%)	0 (0.0%)	16 (8.0%)	0 (0.0%)	24 (6.1%)	5 (5.8%)	0 (0.0%)	46 (6.3%)	X2:3.55, p:.737
Burning Hardware	0 (0.0%)	1 (5.0%)	12 (6.0%)	0 (0.0%)	27 (6.8%)	5 (5.8%)	0 (0.0%)	45 (6.2%)	X2:1.93, p:.926

**Table 28.3, (continued) Exposure Concerns, Identified by WRIISC Assessment,
Race Number (%)**

Exposure	American Indian/ Alaskan (N, % within AI/A)	Asian (N, % within Asian)	Black/ African Heritage (N, % within B/A)	Hawaiian / Pacific Islander (N, % within H/P Islander)	White (N, % within white)	Other (N, % within other)	Unknown (N, % with Unknown)	Total (N, % of Total)	Test Statistic
Human Corpses	1 (10.0%)	0 (0.0%)	6 (3.0%)	1 (14.3%)	25 (6.3%)	5 (5.8%)	0 (0.0%)	38 (5.2%)	X2:2.61, p:.411
Mefloquine (Yes)	0 (0.0%)	0 (0.0%)	4 (2.0%)	1 (14.3%)	23 (5.8%)	0 (0.0%)	4 (4.7%)	32(4.0%)	X2:7.93, p:.243
Biological Weapons	0 (0.0%)	1 (5.0%)	2 (1.0%)	0 (0.0%)	17 (4.3%)	2 (2.3%)	0 (0.0%)	22 (3.0%)	X2:6.11,, p:.411
Pyridostigmine	0 (0.0%)	0 (0.0%)	5 (2.5%)	0 (0.0%)	9 (2.3%)	2 (2.3%)	0 (0.0%)	16 (2.2%)	X2:6.24,, p:397
Chemical Alarms	0 (0.0%)	0 (0.0%)	2 (1.0%)	0 (0.0%)	11 (2.8%)	0 (0.0%)	0 (0.0%)	13 (1.8%)	X2:5.28, p:.509
Body Fluids	0 (0.0%)	0 (0.0%)	3 (1.5%)	0 (0.0%)	7 (1.8%)	1 (1.2%)	0 (0.0%)	11 (1.5%)	X2:3.82, p:.701
Lead	0 (0.0%)	1 (5.0%)	3 (1.5%)	0 (0.0%)	7 (1.8%)	0 (0.0%)	0 (0.0%)	11 (1.5%)	X23.49, p:.745
Animals	0 (0.0%)	0 (0.0%)	2 (1.0%)	0 (0.0%)	6 (1.5%)	0 (0.0%)	0 (0.0%)	8 (1.1%)	X2:2.09, p:.911
Ionizing Radiation	0 (0.0%)	1 (5.0%)	4 (2.0%)	0 (0.0%)	3(0.8%)	0 (0.0%)	0 (0.0%)	8 (1.1%)	X2:5.93, p:.432
Non-Ionizing Radiation	0 (0.0%)	0 (0.0%)	2 (1.0%)	0 (0.0%)	6 (1.5%)	0 (0.0%)	0 (0.0%)	8 (1.1%)	X2:6.78, p:.333
MOOP	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 28.4, Medical Concerns Identified by WRIISC Assessment**RaceNumber (%)**

Exposure	American Indian/Alaskan N (%) within AI/A)	Asian N (%) within Asian)	Black/African Heritage N (%) within B/A)	Hawaiian / Pacific Islander N (%) within H/P) Islander	White N (%) within White)	Other N (%) within Other)	Unknown N (%) within Unknown)	Total N (%) within Total)	Statistical Measure
Allergies, Sinusitis	1 (50.0%)	2 (66.6%)	28 (73.7%)	2 (100.0%)	83 (85.6%)	17 (85.0%)	0 (0.0%)	133 (82.1%)	X ² :5.06, p:408
Musculoskeletal	10 (100.0%)	14 (70.0%)	131 (62.9%)	7 (87.5%)	268 (64.8%)	70 (73.7%)	5 (62.5%)	505 (66.2%)	X ² :10.64, p:100
Cardiac, HBP	2 (50.0%)	3 (50.0%)	31 (50.9%)	1 (50.0%)	41 (38.7%)	10 (43.5%)	1 (50.0%)	89 (44.1%)	X ² :3.17, p:787
Cardiac, Cholesterol	0 (0.0%)	1 (16.7%)	24 (40.7%)	1 (50.0%)	41 (38.7%)	10 (43.5%)	1 (50.0%)	78 (38.6%)	X ² :4.29, p:637
Neurological	6 (60.0%)	5 (25.0%)	72 (34.6%)	2 (25.0%)	133 (32.1%)	36 (37.8%)	1 (12.5%)	255 (33.4%)	X ² :6.94, p:326
Gastrointestinal	4 (40.0%)	4 (20.0%)	67 (32.2%)	0 (0.0%)	140 (33.8%)	29 (30.5%)	6 (75.0%)	250 (32.8%)	X ² :12.55, p:051
Sleep	3 (30.0%)	4 (20.0%)	61 (29.3%)	2 (25.0%)	33.6% (33.6%)	25 (26.3%)	1 (12.5%)	235 (30.8%)	X ² :5.09, p:533
ENT	5 (50.0%)	10 (50.0%)	38 (18.3%)	1 (12.5%)	122 (29.5%)	17 (17.9%)	4 (50.0%)	197 (25.8%)	X:24.53, p:000
Cardiac	4 (40.0%)	6 (30.0%)	58 (27.9%)	2 (25.0%)	100 (24.2%)	22 (23.1%)	2 (25.0%)	194 (25.4%)	X ² :2.62, p:855
Respiratory	5 (50.0%)	2 (10.0%)	41 (19.7%)	1 (12.5%)	77 (18.6%)	18 (18.9%)	3 (37.5%)	147 (19.3%)	X ² :9.27, p:159
Autoimmune, RA	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (26.7%)	1 (25.0%)	0 (0.0%)	5 (20.0%)	X ² :1.98, p:372
Allergies	2 (20.0%)	3 (15.0%)	30 (14.4%)	2 (25.0%)	91 (22.0%)	17 (17.9%)	0 (0.0%)	145 (19.0%)	X ² :7.57, p:271
Skin	1 (10.0%)	3 (15.0%)	30 (14.4%)	2 (25.0%)	71 (17.1%)	19 (20.0%)	2 (25.0%)	128 (16.8%)	X ² :2.72, p:843
Cardiac, Triglycerides	0 (0.0%)	2 (33.3%)	6 (10.2%)	0 (0.0%)	19 (17.9%)	7 (30.4%)	0 (0.0%)	34 (16.8%)	X ² :7.79, p:254

Table 28.4, (continued) Medical Concerns Identified by WRIISC Assessment**Race Number (%)**

Exposure	American Indian/Alaskan N (%) within AI/A)	Asian N (%) within Asian)	Black/African Heritage N (%) within B/A)	Hawaiian / Pacific Islander N (%) within H/P) Islander	White N (%) within White)	Other N (%) within Other)	Unknown N (%) within Unknown)	Total N (%) within Total)	Statistical Measure
Autoimmune	0 (0.0%)	0 (0.0%)	3 (1.4%)	0 (0.0%)	6 (1.4%)	3 (3.2%)	0 (0.0%)	12 (15.7%)	χ^2 :2.341, p:886
Physical, No Concerns	0 (0.0%)	0 (0.0%)	3 (1.4%)	0 (0.0%)	6 (1.4%)	3 (3.2%)	0 (0.0%)	12 (15.7%)	χ^2 :2.34, p:886
Genitourinary	1 (10.0%)	0 (0.0%)	25 (12.0%)	0 (0.0%)	33 (7.9%)	12 (12.6%)	0 (0.0%)	71 (9.6%)	χ^2 :7.63, p:266
Cardiac, Palpitations	1 (25.0%)	0 (0.0%)	8 (13.6%)	0 (0.0%)	5 (4.7%)	4 (17.4%)	0 (0.0%)	18 (8.9%)	χ^2 :8.16, p:227
MUS	0 (0.0%)	1 (5.0%)	14 (6.7%)	0 (0.0%)	31 (7.5%)	9 (9.5%)	0 (0.0%)	55 (7.2%)	χ^2 :3.104, p:807
Vision	2 (20.0%)	3 (15.0%)	10 (4.8%)	1 (12.5%)	29 (7.0%)	9 (9.5%)	0 (0.0%)	54 (7.1%)	χ^2 :7.88, p:247
Vision, Other	2 (20.0%)	3 (15.0%)	9 (4.3%)	1 (12.5%)	29 (6.9%)	9 (9.5%)	0 (0.0%)	53 (6.9%)	χ^2 :265.61, p:002
Hematology	0 (0.0%)	0 (0.0%)	29 (13.9%)	1 (12.5%)	17 (4.1%)	3 (3.2%)	1 (12.5%)	51 (6.7%)	χ^2 :26.89, p:000
Allergies, Hayfever	0 (0.0%)	1 (33.3%)	3 (7.9%)	0 (0.0%)	5 (5.2%)	1 (5.0%)	0 (0.0%)	10 (6.2%)	χ^2 :4.50, p:480
Endocrine	2 (20.0%)	3 (15.0%)	10 (4.8%)	1 (12.5%)	22 (5.3%)	4 (4.2%)	1 (12.5%)	43 (5.6%)	χ^2 :9.31, p:157
Autoimmune, Lupus	0 (0.0%)	0 (0.0%)	1 (16.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	χ^2 :3.29,, p:192
Physical, Other	0 (0.0%)	1 (4.8%)	5 (2.4%)	0 (0.0%)	13 (3.1%)	1 (12.5%)	2 (25.0%)	22 (2.8%)	χ^2 :170.15, p:014
Infectious	0 (0.0%)	0 (0.0%)	8 (3.9%)	0 (0.0%)	10 (2.4%)	2 (2.1%)	0 (0.0%)	20 (2.6%)	χ^2 :2.63,, p:854
Allergies, Food	0 (0.0%)	0 (0.0%)	1 (2.6%)	0 (0.0%)	3 (3.1%)	0 (0.0%)	4 (2.5%)	4 (2.5%)	χ^2 :84, p:974

Table 28.4, Medical Concerns Identified by WRIISC Assessment
RaceNumber (%)

Exposure	American Indian/ Alaskan N (%) within AI/A)	Asian N (%) within Asian)	Black/ African Heritage N (%) within B/A)	Hawaiian/ Pacific Islander N (%) within H/P) Islander	White N (%) within White)	Other N (%) within Other)	Unknown N (%) within Unknown)	Total N (%) within Total)	Statistical Measure
Allergies, Urticaria	1 (50.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (3.1%)	0 (0.0%)	0 (0.0%)	4 (2.5%)	χ^2 :20.51, p:001
Cardiac, Vascular	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (2.8%)	0 (0.0%)	0 (0.0%)	3 (1.5%)	χ^2 :2.76,, p:839
Cardiac, Other	1 (10.0%)	0 (0.0%)	2 (0.9%)	0 (0.0%)	6 (1.4%)	2 (2.1%)	1 (12.5%)	12 (1.6%)	χ^2 :196.78,, P:.000
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	(0.0%)	0 (0.0%)	0 (0.0%)	(0.0%)	(0.0%)	
Autoimmune, Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Other	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 29.1 , Veterans Self-Reported Exposure Concerns
Years of Education Number (%)

Exposure Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4)	Total N (% within Total)	Test Statistic
Petrochemicals	168 (85.7%)	239 (84.2%)	81 (80.2%)	32 (80.0%)	520 (83.7%)	χ^2 :1.94, p:585
Anthrax Vaccine	157 (81.3%)	248 (86.7%)	82 (78.8%)	30 (78.9%)	517 (83.3%)	χ^2 :4.91, p:178
Air Pollution	154 (77.4%)	235 (82.7%)	87 (82.9%)	31 (79.5%)	507 (80.9%)	χ^2 ::2.52, p:471
Multiple Vaccinations	137 (71.4%)	228 (80.3%)	89 (86.4%)	35 (87.5%)	489 (79.0%)	χ^2 :12.19, p:007
Insects	156 (78.8%)	221 (77.0%)	78 (74.3%)	32 (82.1%)	487 (77.4%)	χ^2 :1.31, p:727
Pesticides	140 (71.1%)	207 (72.4%)	67 (65.7%)	29 (74.4%)	443 (71.0%)	χ^2 :1.88, p:598
Human Corpses	131 (66.5%)	189 (66.8%)	66 (64.1%)	25 (64.1%)	411 (66.1%)	χ^2 :33, p:.954
Depleted Uranium	48 (24.9%)	62 (22.0%)	23 (22.8%)	9 (23.1%)	142 (23.1%)	χ^2 :54, P.909
Contaminated Food & Water	27 (13.6%)	35 (12.2%)	12 (11.9%)	9 (23.7%)	83 (13.3%)	χ^2 :4.02, p:259
Biological Weapons	29 (14.8%)	33 (11.7%)	8 (7.7%)	3 (7.7%)	73 (11.8%)	χ^2 :4.11, p:260

Table 29.2, Veterans Self-Reported Medical Concerns
Years of Education Number (%)

Medical Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4)	Total N (%) within Total)	Test Statistic
Back	123 (60.3%)	183 (63.2%)	62 (57.9%)	30 (71.4%)	398 (62.0%)	χ^2 :2.79, p:424
Extremities	28 (37.3%)	38 (34.5%)	18 (40.0%)	5 (55.6%)	89 (37.2%)	χ^2 :1.78, p:619
Gastrointestinal	63 (31.0%)	91 (32.4%)	39 (36.7%)	18 (45.0%)	211 (33.5%)	χ^2 :3.68, p:308
Sensitivity to Temperature	57 (27.9%)	79 (27.4%)	33 (30.8%)	15 (35.7%)	184 (28.7%)	χ^2 :1.68, p:641
Change in Menstruation	2 (28.6%)	8 (40.0%)	0 (0.0%)	0 (0.0%)	10 (27.8%)	χ^2 :4.95, p:175
Shakiness	57 (28.4%)	61 (21.5%)	20 (18.7%)	10 (23.3%)	148 (23.3%)	χ^2 :4.68, p:197
Weight Loss	6 (18.2%)	91 (20.5%)	31 (21.2%)	0 (0.0%)	128 (20.6%)	χ^2 :16, p:926
Swelling	34 (16.7%)	42 (14.8%)	20 (18.9%)	15 (34.9%)	111 (17.5%)	χ^2 :10.61, p:014
Nausea	29 (14.3%)	55 (19.0%)	17 (16.0%)	9 (20.9%)	110 (17.1%)	χ^2 :22, p:898
Weakness	14 (18.7%)	12 (11.2%)	6 (13.0%)	0 (0.0%)	32 (13.6%)	χ^2 :1.83, p:400
Night Urination	8 (10.7%)	11 (10.1%)	4 (8.9%)	1 (11.1%)	24 (10.1%)	χ^2 :.11, p:.991
Difficulty Breathing	5 (6.6%)	10 (9.3%)	6 (13.0%)	1 (12.5%)	22 (9.2%)	χ^2 :86, p:650
Dental Issues	8 (10.9%)	12 (11.0%)	2 (4.3%)	1 (11.1%)	23 (9.7%)	χ^2 :1.85, p:605
Chest Pain	5 (6.7%)	8 (7.4%)	4 (8.7%)	0 (0.0%)	17 (7.1%)	χ^2 :89, p:826
Increased Perspiration	5 (6.7%)	9 (8.3%)	3 (6.5%)	0 (0.0%)	17 (7.1%)	χ^2 :1.24, p:537
Constipation/Loose Bowel	5 (6.8%)	7 (6.5%)	4 (8.7%)	0 (0.0%)	16 (6.8%)	χ^2 :93, p:818
Frequent Urination	10 (4.9%)	21 (7.3%)	8 (7.4%)	2 (4.7%)	41 (6.4%)	χ^2 :.15, p:674
Cough	5 (6.7%)	5 (4.6%)	4 (8.7%)	1 (11.1%)	15 (6.3%)	χ^2 :1.33, p:723
Dizziness	2 (2.7%)	8 (7.4%)	1 (2.2%)	2 (2.2%)	13 (5.5%)	χ^2 :.65, p:723
Palpitations	6 (8.1%)	5 (4.6%)	1 (2.2%)	1 (11.1%)	13 (5.5%)	χ^2 :2.66, p:448

Table 29.2 (Continued) , Veterans Self-Reported Medical Concerns
Years of Education Number (%)

Medical Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4)	Total N (%) within Total)	Test Statistic
HBP	2 (2.7%)	7 (6.4%)	3 (6.7%)	0 (0.0%)	12 (5.1%)	$\chi^2: .97, p: .008$
Fainting	7 (3.5%)	14 (4.8%)	4 (3.8%)	2 (4.7%)	27 (4.2%)	$\chi^2: .59, p: .897$
Change in Smell/Taste	4 (5.4%)	1 (0.9%)	3 (6.7%)	2 (2.2%)	10 (4.2%)	$\chi^2: .18, p: >.915$
Difficulty Swallowing	1 (1.4%)	2 (1.8%)	0 (0.0%)	0 (0.0%)	3 (1.3%)	$\chi^2: .99, p: .802$
Paralysis	2 (2.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.0%)	$\chi^2: 1.45, p: .484$
Seizures	1 (1.4%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	2 (0.8%)	$\chi^2: .69, p: .875$

Table 29.3, Exposure Concerns, Identified by WRIISC Assessment
Years of Education Number (%)

Exposure Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4)	Total N (%) within Total)	Test Statistic
Burning Trash	136 (60.7%)	189 (52.8%)	68 (51.5%)	22 (47.8%)	415 (54.6%)	χ^2 :5.21, p:.157
Sandstorms	99 (44.2%)	169 (47.2%)	66 (50.0%)	18 (39.1%)	352 (46.3%)	χ^2 :2.19, p:.533
Contaminated Food & Water	68 (30.4%)	108 (30.2%)	45 (34.1%)	13 (28.3%)	234 (30.8%)	χ^2 :.89, p:.826
Petrochemicals	53 (23.7%)	98 (27.4%)	31 (23.5%)	5 (10.9%)	187 (24.6%)	χ^2 :6.36, p:.096
Depleted Uranium	53 (23.7%)	64 (17.9%)	21 (15.9%)	8 (17.4%)	146 (19.2%)	χ^2 :4.29, p:.231
Oil Well Fires	37 (16.5%)	41 (11.5%)	31 (23.5%)	5 (10.9%)	114 (15.0%)	χ^2 :12.01, p:.007
Anthrax Vaccine	26 (11.6%)	55 (15.4%)	23 (17.4%)	8 (17.4%)	112 (14.7%)	χ^2 :2.88, p:.411
Air Pollution	30 (13.4%)	56 (15.6%)	19 (14.4%)	6 (13.0%)	111 (14.6%)	χ^2 :.67, p:.881
Vehicular Exhaust	23 (10.3%)	62 (17.3%)	16 (12.1%)	3 (6.5%)	104 (13.7%)	χ :8.49, p:.037
Noise	29 (12.9%)	50 (14.0%)	19 (14.4%)	6 (13.0%)	104 (13.7%)	χ^2 :.20, p:.978
Multiple Vaccinations	25 (11.2%)	46 (12.8%)	22 (16.7%)	3 (6.5%)	96 (12.6%)	χ^2 :3.96, p:.266
Asbestos	25 (11.2%)	33 (9.2%)	11 (8.3%)	4 (8.7%)	73 (9.6%)	χ^2 :.98, p:.807
Insects	19 (8.5%)	29 (8.1%)	9 (6.8%)	2 (4.3%)	59 (7.8%)	χ^2 :1.133, p:.769
Pesticides	13 (5.8%)	27 (7.5%)	9 (6.8%)	7 (15.2%)	56 (7.4%)	χ^2 :5.03, p:.170
Burning Hardware	16 (7.1%)	18 (5.0%)	11 (8.3%)	3 (6.5%)	48 (6.3%)	χ^2 :2.17, p:.537
Enemy Fire	14 (6.3%)	22 (6.1%)	9 (6.8%)	1 (2.2%)	46 (6.1%)	χ^2 :1.37, p:.712
Human Corpses	10 (4.5%)	23 (6.4%)	4 (3.0%)	3 (6.5%)	40 (5.3%)	χ^2 :2.72, p:.437
Non-Ionizing Radiation	12 (5.4%)	19 (5.3%)	6 (4.5%)	0 (0.0%)	37 (4.9%)	χ^2 :2.65, p:.449
Mefloquine	9 (4.0%)	15 (4.2%)	5 (3.8%)	4 (8.7%)	33 (4.3%)	χ^2 :2.27, p:.518
Biological Weapons	7 (3.1%)	10 (2.8%)	2 (1.5%)	4 (8.7%)	23 (3.0%)	χ^2 :6.14, p:.105
Pyridostigmine	4 (1.8%)	5 (1.4%)	4 (3.0%)	3 (6.5%)	16 (2.1%)	χ^2 :5.89, p:.117
Chemical Alarms	1 (0.4%)	8 (2.2%)	2 (1.5%)	2 (4.3%)	13 (1.7%)	χ^2 :4.65, p:.200
Body Fluids	5 (2.2%)	5 (1.4%)	2 (1.5%)	0 (0.0%)	12 (1.6%)	χ^2 :1.43, p:.698
Lead	4 (1.8%)	4 (1.1%)	2 (1.5%)	1 (2.2%)	11 (1.4%)	χ^2 :.63, p:.890
Ionizing Radiation	3 (1.3%)	4 (1.1%)	2 (1.5%)	0 (0.0%)	9 (1.2%)	χ^2 :.74, p:.865
Animals	3 (1.3%)	2 (0.6%)	3 (2.3%)	0 (0.0%)	8 (1.1%)	χ^2 :3.39, p:.335
MOPP	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 29.4 , Medical Concerns Identified by WRIISC Assessment
Years of Education Number (%)

Medical Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4	Total N (%) within Total)	Test Statistic
Allergies, Sinusitis	49 (86.0%)	58 (78.4%)	22 (81.5%)	8 (72.7%)	137 (81.1%)	χ^2 :1.74, p:628
Musculoskeletal	165 (66.8%)	239 (65.1%)	99 (72.8%)	30 (61.2%)	533 (66.7%)	χ^2 :3.35, p:341
Cardiac, HBP	28 (41.1%)	41 (44.6%)	14 (38.9%)	7 (41.2%)	90 (42.5%)	χ^2 :.38, p:.945
Cardiac, Cholesterol	27 (40.3%)	40 (43.5%)	14 (38.9%)	4 (23.5%)	85 (40.1%)	χ^2 :2.40, p:493
Gastrointestinal	74 (34.0%)	129 (35.1%)	46 (33.8%)	17 (34.7%)	266 (33.3%)	χ^2 :1.87, p:.601
Neurological	82 (33.2%)	117 (31.9%)	46 (33.8%)	20 (40.8%)	265 (33.2%)	χ^2 :1.59, p:.661
Sleep	73 (29.6%)	116 (31.6%)	38 (27.9%)	15 (30.6%)	242 (30.3%)	χ^2 :.72, p:868
Cardiac	65 (26.3%)	90 (24.5%)	34 (25.0%)	16 (32.7%)	205 (25.7%)	χ^2 :1.59, p:.661
ENT	64 (25.9%)	102 (27.8%)	29 (21.3%)	10 (20.4%)	205 (25.7%)	χ^2 :2.93, p:.402
Respiratory	44 (17.8%)	70 (19.1%)	32 (23.5%)	12 (24.5%)	158 (19.8%)	χ^2 :2.61, p:.456
Allergies	50 (20.2%)	67 (18.3%)	25 (18.4%)	8 (16.3%)	150 (18.8%)	χ^2 :.62, p:.892
Cardiac, Triglycerides	14 (20.9%)	15 (16.3%)	6 (16.7%)	2 (11.8%)	37 (17.5%)	χ^2 :1.03, p:.793
Skin	39 (15.8%)	69 (18.8%)	20 (14.7%)	7 (14.3%)	135 (16.9%)	χ^2 :1.87, p:.601
Cardiac, Palpitations	7 (10.4%)	8 (8.7%)	2 (5.6%)	2 (11.8%)	19 (9.0%)	χ^2 :.87, p:834
Genitourinary	23 (9.3%)	31 (8.4%)	11 (8.1%)	6 (12.2%)	71 (8.9%)	χ^2 :.93, p:.818
Vision	20 (8.1%)	24 (6.5%)	8 (5.9%)	6 (12.2%)	58 (7.3%)	χ^2 :2.73, p:.435
MUS	11 (4.5%)	32 (8.7%)	8 (5.9%)	3 (6.1%)	54 (6.8%)	χ^2 :4.52, p:.211
Allergies, Hayfever	0 (0.0%)	8 (10.8%)	3 (11.1%)	0 (0.0%)	11 (6.5%)	χ^2 :7.92, p:.048
Hematology	15 (6.1%)	22 (6.0%)	12 (8.8%)	3 (6.1%)	52 (6.5%)	χ^2 :1.45, p:.695
Vision, Other	19 (7.7%)	14 (3.7%)	8 (5.9%)	6 (12.2%)	47 (5.8%)	χ^2 :122.31, p:.218
Endocrine	9 (3.6%)	22 (6.0%)	10 (7.4%)	4 (8.2%)	45 (5.6%)	χ^2 :3.28, p:.351
Physical, No Concerns	9 (3.6%)	14 (3.8%)	3 (2.2%)	1 (2.0%)	27 (3.4%)	χ^2 :1.11, p:.775

Table 29.4 (Continued) , Medical Concerns Identified by WRIISC Assessment
Years of Education Number (%)

Medical Concern	0-12 N (%) within Group 1)	13-15 N (%) within Group 2)	16 N (%) within Group 3)	>16 N (%) within Group 4)	Total N (%) within Total)	Test Statistic
Physical, Other	8 (3.2%)	12 (3.2%)	1 (0.7%)	1 (2.0%)	22 (2.7%)	$X^2:52.29, p:.890$
Infectious	6 (2.4%)	8 (2.2%)	5 (3.7%)	0 (0.0%)	19 (2.4%)	$X^2:2.25, p:.523$
Allergies, Food	0 (0.0%)	4 (5.4%)	0 (0.0%)	0 (0.0%)	4 (2.4%)	$X^2:5.26, p:.154$
Allergies, Urticaria	1 (1.8%)	2 (2.7%)	1 (3.7%)	0 (0.0%)	4 (2.4%)	$X^2:60, p:.895$
Reproductive	4 (1.6%)	6 (1.6%)	3 (2.2%)	1 (2.0%)	14 (1.8%)	$X^2:.24, p:.971$
Autoimmune	3 (1.2%)	7 (1.9%)	1 (0.7%)	1 (2.0%)	12 (1.5%)	$X^2:1.18, p:.757$
Cardiac, Other	4 (1.6%)	4 (1.1%)	2 (1.4%)	2 (4.0%)	12 (1.5%)	$X^2:53.99, P:.028$
Cardiac, Vascular	1 (1.5%)	1 (1.1%)	1 (2.8%)	0 (0.0%)	3 (1.4%)	$X^2:80, p:.850$
Autoimmune, Raynaud's	0 (0.0%)	1 (1.3%)	4 (14.8%)	0 (14.8%)	5 (0.6%)	$X^2:1.51, p:.680$
Autoimmune, Other	2 (0.8%)	3 (0.8%)	0 (0.0%)	0 (0.0%)	5 (0.6%)	$X^2:8.05, p:.922$
Autoimmune, RA	1 (0.4%)	3 (3.9%)	1 (3.7%)	0 (0.0%)	5 (0.6%)	$X^2:1.61, p:.658$
Autoimmune, Lupus	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	$X^2:12.89, p:.005$
Autoimmune, Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 30.1, Veterans Self-Reported Exposure Concerns
Marital Status Number (%)

Exposure Concern	Married N (% within Married)	Not Married N (% within Not Married)	Total N (% within Total)	Test Statistic
Anthrax Vaccine	198 (84.9%)	312 (82.9%)	510 (83.7%)	χ^2 :2.84, p:725
Petrochemicals	200 (86.8%)	310 (82.9%)	510 (83.7%)	χ^2 :8.48, p:.132
Air Pollution	195 (81.6%)	305 (81.3%)	500 (81.4%)	χ^2 :8.60, p:.126
Insects	204 (86.1%)	272 (71.2%)	476 (77.3%)	χ^2 :6.48, p:.263
Pesticides	176(74.2%)	257 (68.5%)	433 (70.8%)	χ^2 :9.70, p:.084
Human Corpses	47 (62.7%)	89 (64.9%)	136 (64.2%)	χ^2 :6.98, p:.539
Contaminated Food & Water	94 (40.0%)	127 (33.8%)	217 (35.5%)	χ^2 :10.11, p:.072
Depleted Uranium	58 (25.0%)	82 (22.1%)	140 (23.2%)	χ^2 :9.15, p:.103
Multiple Vaccinations	204 (88.7%)	277 (73.5%)	481 (19.2%)	χ^2 :6.94, p:.225
Biological Weapons	27 (11.4%)	45 (12.2%)	72 (11.9%)	χ^2 :1.36, p:.928

Table 30.2, Veterans Self-Reported Medical Concerns**Marital Status Number (%)**

Medical Concern	Married N (% within Married)	No Married N (% within Not Married)	Total N (% within Total)	Test Statistic
Back	172 (70.2%)	217 (56.5%)	389 (61.8%)	χ^2 :17.896, p:.003
Weakness	107 (43.7%)	118 (30.8%)	225 (36.9%)	χ^2 :19.279, p:.002
HBP	93 (38.0%)	133 (34.6%)	226 (36.5%)	χ^2 :1.870, p:369
Gastrointestinal	95 (38.9%)	110 (28.6%)	205 (33.2%)	χ^2 :5.440, p:.245
High Temperature	81 (33.2%)	103 (27.0%)	184 (29.2%)	χ^2 :11.751, p:.038
Extremities	66 (26.9%)	104 (28.0%)	170 (27.8%)	χ^2 :2.769, p:882
Difficulty Breathing	78 (31.8%)	87 (22.7%)	165 (27.0%)	χ^2 :7.179, p:208
Shakiness	65 (27.4%)	85 (23.1%)	150 (24.7%)	χ^2 :4.151, p:528
Dizziness	64 (26.1%)	73 (19.0%)	137 (22.5%)	χ^2 :19.564, p:.002
Increased Perspiration	50 (20.4%)	77 (21.0%)	127 (20.8%)	χ^2 :4.714, p:.452
Weight Loss	54 (22.0%)	71 (18.5%)	125 (20.5%)	χ^2 :6.650, p:248
Night Urination	62 (25.3%)	53 (13.8%)	115 (18.9%)	χ^2 :21.725, p:.001
Constipation/Loose Bowel	55 (22.4%)	54 (14.1%)	109 (17.9%)	χ^2 :5.089, P:1.236
Swelling	63 (25.7%)	48 (12.7%)	111 (17.8%)	χ^2 :32.398, p:.000
Cough	42 (17.1%)	68 (17.7%)	110(17.7%)	χ^2 :916, p:922
Nausea	39 (15.9%)	68 (19.2%)	107 (17.0%)	χ^2 :3.436, p:.633
Palpitations	49 (20.0%)	46 (11.9%)	95 (15.2%)	χ^2 :2.876, p:.098
Sensitivity to Temperature	37 (15.1%)	51 (13.3%)	88 (14.4%)	χ^2 :9.291, p:098
Change in Smell/Taste	45 (18.4%)	40 (10.4%)	85 (13.9%)	χ^2 :14.352, p:.014
Change in Menstruation	4 (6.2%)	23 (18.2%)	27 (13.4%)	χ^2 :11.294, p:.046
Dental Issues	27 (11.0%)	25 (6.5%)	52 (8.5%)	χ^2 :7.286, p:.200
Difficulty Swallowing	28 (11.4%)	22 (5.7%)	50 (8.0%)	χ^2 :7.931, p:160
Frequent Urination	23 (9.4%)	15 (3.9%)	38 (6.0%)	χ^2 :31.826, p:.000
Fainting	13 (5.3%)	13 (3.4%)	26 (4.2%)	χ^2 :2.558, p:.768
Paralysis	11 (4.4%)	12 (3.1%)	23 (3.8%)	χ^2 :2.345, p:.800
Chest Pain	6 (2.4%)	10 (2.6%)	16 (2.5%)	χ^2 :5.512, p39
Seizures	5 (2.0%)	4 (1.0%)	9 (1.5%)	χ^2 :11.383, p:044

Table 30.3, Exposure Concerns, Identified by WRIISC Assessment**Marital Status Number (% with Concern)**

Exposure Concern	Married N (% within Married)	Not Married N (% within Not Married)	Total N (% of Total)	Test Statistic
Burning Trash	168 (54.0%)	233 (53.9%)	401 (54.0%)	$\chi^2:5.02, p:413$
Sandstorms	147 (47.3%)	194 (31.0%)	341 (45.9%)	$\chi^2:1.48, p:916$
Petrochemicals	82 (26.4%)	103 (23.8%)	185 (24.9%)	$\chi^2:4.92, p:426$
Depleted Uranium	56 (18.0%)	85 (19.7%)	141 (18.9%)	$\chi^2:8.65, p:132$
Oil Well Fires	50 (16.1%)	62 (14.4%)	112 (15.1%)	$\chi^2:7.99, p:156$
Air Pollution	41 (13.2%)	68 (19.9%)	109 (14.7%)	$\chi^2:2.54, p:770$
Anthrax	49 (15.8%)	60 (13.9%)	109 (14.7%)	$\chi^2:5.05, p:410$
Vehicular Exhaust	44 (14.1%)	59 (13.7%)	103 (13.9%)	$\chi^2:4.44, p:488$
Noise	47 (15.1%)	53 (12.3%)	100 (13.5%)	$\chi^2:5.96, p:310$
Contaminated Food & Water	39 (12.5%)	60 (13.9%)	99 (13.3%)	$\chi^2:3.63, p:605$
Multiple Vaccinations	39 (12.5%)	54 (12.5%)	93 (12.5%)	$\chi^2:3.29, p:656$
Asbestos	32 (10.3%)	41 (9.5%)	73 (9.8%)	$\chi^2:1.62, p:899$
Insects	21 (6.8%)	36 (8.3%)	57 (7.7%)	$\chi^2:5.99, p:307$
Pesticides	27 (8.7%)	27 (6.3%)	54 (7.3%)	$\chi^2:5.15, p:398$
Burning Hardware	22 (7.1%)	25 (5.8%)	47 (6.3%)	$\chi^2:5.27, p:383$
Enemy Fire	23 (7.4%)	20 (4.6%)	43 (5.8%)	$\chi^2:6.08, p:299$
Human Corpses	15 (4.8%)	25 (5.9%)	40 (5.4%)	$\chi^2:7.11, p:213$
Non-Ionizing Radiation	13 (4.2%)	24 (5.6%)	37 (4.9%)	$\chi^2:5.88, p:318$
Mefloquine	14 (4.5%)	19 (4.4%)	33 (4.5%)	$\chi^2:1.29, P:936$
Biological Weapons	15 (4.8%)	8 (1.9%)	23 (3.1%)	$\chi^2:9.01, p:109$
Pyrodostigimine	10 (3.2%)	6 (1.3%)	16 (2.2%)	$\chi^2:6.03, p:303$
Chemical Alarms	6 (1.9%)	5 (1.2%)	11 (1.5%)	$\chi^2:2.74, p:739$
Lead	3 (0.9%)	7 (1.6%)	10 (1.4%)	$\chi^2:4.51, p:479$
Ionizing Radiation	5 (1.6%)	4 (0.9%)	9 (1.2%)	$\chi^2:9.81, p:081$
Animals	4 (1.3%)	4 (0.9%)	8 (1.1%)	$\chi^2:2.38, p:795$
MOPP	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 30.4, Medical Concerns Identified by WRIISC Assessment**Marital Status Number (%)**

Medical Concern	Married N (% within Married)	Not Married N (% within Not Married)	Total N (% within Total)	Statistical Measure
Allergies, Sinusitis	61 (78.9%)	74 (82.2%)	135 (81.3%)	$X^2:1.57, p:905$
Musculoskeletal	226 (72.9%)	299(69.2%)	525 (70.7%)	$X^2:3.64, p:.602$
Autoimmune	2 (25.0%)	10 (55.6%)	12 (46.1%)	$X^2:5.06, p:409$
Cardiac, BP	39 (34.8%)	49 (45.3%)	88 (41.8%)	$X^2:4.15, p:528$
Cardiac Cholesterol	40 (40.0%)	44 (40.1%)	84 (40.0%)	$X^2:6.23, p:.284$
Gastrointestinal	110 (35.5%)	148 (34.3%)	258 (34.7%)	$X^2:7.26, p:202$
Neurological	110 (35.4%)	154 (35.7%)	264(35.5%)	$X^2:2.39, p:792$
Sleep	118 (37.9%)	122 (28.2%)	240 (32.3%)	$X^2:10.24, p:.069$
Cardiac	98 (31.5%)	105 (24.3%)	203 (27.3%)	$X^2:11.35, p:.045$
ENT	89 (28.6%)	112 (25.9%)	201 (27.1%)	$X^2:2.38, p:795$
Respiratory	60 (19.3%)	93 (21.5%)	153(20.6%)	$X^2:1.45, p:919$
Allergies	66 (21.1)	82 (18.9)	148 (19.9)	$X^2:2.54, p:771$
Autoimmune, RA	1 (12.5%)	4 (22.2%)	5 (19.2%)	$X^2:1.22, p:749$
Cardiac, Triglycerides	20 (20.0%)	18 (16.7%)	38 (18.1%)	$X^2:2.81, p:730$
Skin	54 (17.4%)	76 (17.6%)	130 (17.5%)	$X^2:6.82, p:.234$
Genitourinary	34 (10.9%)	37 (8.6%)	71 (9.6%)	$X^2:6.54, p:.265$
Cardiac, Palpitations	10 (10.0%)	9 (8.3%)	19 (9.0%)	$X^2:1.69, p:889$
Vision	25 (8.0%)	31 (7.2%)	56 (7.5%)	$X^2:2.98, p:.703$
MUS	31 (9.9%)	25 (5.8%)	56 (7.5%)	$X^2:6.80, p:236$
Hematology	16 (5.1%)	36 (8.3%)	52 (7.0%)	$X^2:16.29, p:.006$
Allergies, Hayfever	2 (2.6%)	9 (10.0%)	11 (6.6%)	$X^2:6.05, p:301$
Endocrine	20 (6.4%)	23 (5.3%)	43 (5.8%)	$X^2:1.49, p:915$
Vision, Other	25 (8.0%)	19 (4.4%)	44 (5.9%)	$X^2:112.46, p:1.000$
Autoimmune, Raynaud's	1 (12.5%)	0 (0.0%)	1 (3.8%)	$X^2:1.04, p:792$
Autoimmune, Lupus	1 (12.5%)	0 (0.0%)	1(3.8%)	$X^2:2.34, p:505$
Physical, No Concerns	8 (2.6%)	19 (4.4%)	27 (3.6%)	$X^2:3.97, p:553$
Physical, Other	9 (2.9%)	14 (3.2%)	23 (3.1%)	$X^2:51.71, p:1.000$
Infectious	5 (1.6%)	15 (3.5%)	20 (2.7%)	$X^2:5.64, p:.343$
Allergies, Food	1 (1.3%)	3 (3.3%)	4 (2.4%)	$X^2:17.49, p:.004$
Reproductive	6 (1.9%)	8 (1.9%)	14 (1.9%)	$X^2:2.49, p:.778$
Cardiac, Other	6 (1.9%)	6 (1.4%)	12 (1.6%)	$X^2:60.70, p:450$
Cardiac, Vascular	3 (3.0%)	0 (0.0%)	3 (1.4%)	$X^2:3.35, p:.647$
Autoimmune, Other	1 (0.3%)	2 (0.4%)	3 (0.4%)	$X^2:44.65, p:.010$
Autoimmune, Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 31.1, Veterans Self-Reported Exposure Concerns
Employment Status Number (%)

Exposure	Employed N (% within Employed)	No Employed N (% within Not Employed)	Total N (% within Total)	Test Statistic
Petrochemicals	283 (86.3%)	240 (81.1%)	523 (83.8%)	χ^2 :3.101, p:.078
Air Pollution	258 (77.9%)	248 (83.2%)	506 (80.4%)	χ^2 :2.775, p:.096
Multiple Vaccinations	257 (78.8%)	231 (77.8%)	488 (78.3%)	χ^2 :.102, p:.749
Insects	260 (78.8%)	224 (74.4%)	484 (76.7%)	χ^2 :1.682, p:.195
Pesticides	236 (72.0%)	205 (68.6%)	441 (70.3%)	χ^2 :.861, p:.353
Human Corpses	211 (64.3%)	201 (67.7%)	412 (65.9%)	χ^2 :.777, p:.378
Anthrax Vaccine	110 (33.5%)	11 (37.2%)	221 (35.3%)	χ^2 :.942, p:.332
Contaminated Food & Water	110 (33.5%)	111 (37.2%)	221 (35.3%)	χ^2 :.942, p:.332
Depleted Uranium	75 (23.1%)	69 (23.4%)	144 (23.3%)	χ^2 :.005, p:.943
Biological Weapons	31 (9.5%)	42 (14.2%)	73 (11.7%)	χ^2 :3.381, p:.066

Table 31.2, Veterans Self-Reported Medical Concerns
Employment Status Number (%)

Medical Concern	Employed N (% within Employed)	Not Employed N (% within Not Employed)	Total N (% within Total)	Test Statistic
HBP	48 (33.3%)	96 (66.7%)	144 (63.7%)	χ^2 :.06, p:.802
Back	202 (59.9%)	196 (63.6%)	398 (61.7%)	χ^2 :.93, p:.335
Cough	67 (21.3%)	248 (78.7%)	315 (51.8%)	χ^2 :1.73, p:.189
Fainting	110 (33.4%)	219 (66.6%)	329 (51.8%)	χ^2 :.02, p:.883
Chest Pain	61 (18.8%)	264 (81.2%)	325 (51.5%)	χ^2 :4.94, p:.026
Extremities	94 (37.0%)	80 (38.6%)	174 (37.8%)	χ^2 :1.85, p:.438
Weakness	130 (39.3%)	103 (33.8%)	233 (36.6%)	χ^2 :2.07, p:.150
Gastrointestinal	110 (33.4%)	104 (34.0%)	214 (33.7%)	χ^2 :.02, p:.883
Constipation/Loose Bowel	65 (34.4%)	53 (32.9%)	118 (33.7%)	χ^2 :1.76, p: .874
High Temperature	108 (32.0%)	85 (27.8%)	193 (30.0%)	χ^2 :1.33, p:.248
Difficulty Breathing	79 (23.4%)	92 (30.0%)	171 (26.6%)	χ^2 :3.51, p:.061
Shakiness	78 (23.1%)	75 (24.8%)	153 (23.9%)	χ^2 :.23, p:.634
Night Urination	78 (24.1%)	72 (23.6%)	150 (23.8%)	χ^2 :.02, p:.891
Dizziness	69 (20.8%)	69 (22.5%)	138 (21.7%)	χ^2 :.27, p:.602
Increased Perspiration	70 (20.8%)	62 (20.5%)	132 (20.7%)	χ^2 :.01, p:.925
Weight Loss	70 (21.5%)	57 (18.9%)	127 (20.3%)	χ^2 :.65, p:.419
Swelling	64 (19.0%)	53 (17.5%)	117 (18.3%)	χ^2 :.26, p:.612
Nausea	61 (18.2%)	55 (17.8%)	116 (18.0%)	χ^2 :.01, p:.907
Sensitivity to Temperature	53 (17.4%)	38 (13.8%)	91 (15.7%)	χ^2 :1.43, p:.232
Palpitations	49 (14.8%)	47 (14.2%)	96 (15.1%)	χ^2 :.165, p:.069
Change in Smell/Taste	45 (13.4%)	45 (14.7%)	90 (14.0%)	χ^2 :.24, p:.621
Change in Menstruation	14 (11.0%)	16 (17.8%)	30 (13.8%)	χ^2 :2.11, p:.156
Dental Issues	24 (9.4%)	29 (14.0%)	53 (11.5%)	χ^2 :2.33, p:.127
Difficulty Swallowing	29 (8.7%)	24 (7.8)	53 (8.3%)	χ^2 :.15, p:.700
Frequent Urination	19 (5.6%)	22 (7.2%)	41 (6.3%)	χ^2 :.66, p:.416
Paralysis	10 (3.0%)	17 (5.6%)	27 (4.2%)	χ^2 :2.76, p:.097
Seizures	3 (0.9%)	7 (2.3%)	10 (1.6%)	χ^2 :1.91, p:.167

Table 31.3, Exposure Concerns Identified by WRIISC Assessment
Employment Status Number (%)

Exposure	Employed N (% within Employed)	Not Employed N (% within Not Employed)	Total N (% within Total)	Test Statistic
Burning Trash	209 (56.2%)	201 (52.6%)	410 (54.4%)	χ^2 :.97, p:.326
Sandstorms	170 (45.7%)	178 (46.6%)	348 (46.2%)	χ^2 :.06, p:.805
Petrochemicals	95 (25.5%)	93 (24.3%)	188 (24.9%)	χ^2 :1.14, p:.705
Depleted Uranium	58 (15.6%)	86 (22.5%)	144 (19.1%)	χ^2 :5.84, p:.016
Oil Well Fires	43 (11.6%)	70 (18.3%)	113 (15.0%)	χ^2 :6.77, p:.009
Anthrax Vaccine	57 (15.3%)	52 (13.6%)	109 (14.5%)	χ^2 :.47, p:.504
Air Pollution	51 (13.7%)	57 (14.9%)	108 (14.3%)	χ^2 :.23, p:.635
Vehicular Exhaust	59 (15.9%)	47 (12.3%)	106 (14.1%)	χ^2 :1.97, p:.160
Noise	53 (14.2%)	50 (13.1%)	103 (13.3%)	χ^2 :.21, p:.643
Contaminated Food & Water	47 (12.6%)	51 (13.4%)	98 (13.0%)	χ^2 :.09, p:.770
Multiple Vaccinations	44 (11.8%)	47 (12.3%)	91 (12.1%)	χ^2 :.04, p:.841
Asbestos	40 (10.8%)	34 (8.9%)	74 (9.8%)	χ^2 :.73, p:.393
Insects	33 (8.9%)	27 (7.1%)	60 (8.0%)	χ^2 :.84, p:.360
Pesticides	24 (6.5%)	34 (8.9%)	58 (7.7%)	χ^2 :1.59, p:.207
Enemy Fire	28 (7.5%)	18 (4.7%)	46 (6.1%)	χ^2 :2.61, p:.106
Burning Hardware	24 (6.5%)	21 (5.5%)	45 (6.0%)	χ^2 :.31, p:.580
Human Corpses	23 (6.2%)	17 (4.5%)	40 (5.3%)	χ^2 :1.13, p:.289
Non-Ionizing Radiation	24 (6.5%)	14 (1.0%)	38 (5.0%)	χ^2 :3.06, p:.080
Mefloquine	17 (4.6%)	15 (3.9%)	32 (4.2%)	χ^2 :.19, p:.661
Biological Weapons	7 (1.9%)	16 (4.2%)	23 (3.1%)	χ^2 :3.391, p:.066
Pyridostigimine	6 (1.6%)	11 (2.9%)	17 (2.3%)	χ^2 :1.37, p:.241
Chemical Alarms	5 (1.3%)	8 (2.1%)	13 (1.7%)	χ^2 :.63, p:.429
Lead	6 (1.6%)	5 (1.3%)	11 (1.5%)	χ^2 :.12, P:.728
Body Fluids	4 (1.1%)	6 (1.6%)	10 (1.3%)	χ^2 :.35, p:.552
Ionizing Radiation	5 (1.3%)	4 (1.0%)	9 (1.2%)	χ^2 :.14, p:.707
Animals	1 (0.26%)	7 (1.9%)	8 (1.1%)	χ^2 :4.71, p:.030
MOPP	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 31.4, Medical Concerns Identified by WRIISC Assessment
Employment Status Number (%)

Medical Concern	Employed N (% within Employed)	Not Employed N (% within Not Employed)	Total N (% within Total)	Test Statistic
Allergies, Sinusitis	66 (76.7%)	70 (86.4%)	136 (81.4%)	χ^2 :2.58, p:.108
Musculoskeletal	263(49.7%)	134 (50.9%)	397 (50.1%)	χ^2 :.11, p:.744
Cardiac, HBP	48 (45.7%)	37 (37.8%)	85 (41.9%)	χ^2 :1.32, p:.251
Cardiac, Cholesterol	44 (4.2%)	38 (38.8%)	82 (40.4%)	χ^2 :.21, P>650
Neurological	124 (31.2%)	144 (36.5%)	268 (33.8%)	χ^2 :2.41, p:.120
Gastrointestinal	137 (34.5%)	128 (32.4%)	265 (33.4%)	χ^2 :.39, p:.530
Sleep	118 (29.7%)	121 (30.6%)	239 (30.2%)	χ^2 :.08, p:.780
ENT	96 (24.2%)	107 (27.1%)	203 (25.6%)	χ^2 :.88, p:.349
Cardiac	102 (25.7%)	94 (23.8%)	196 (24.7%)	χ^2 :.38, p:.537
Respiratory	71 (17.9%)	87 (22.2%)	158 (19.9%)	χ^2 :2.13, p:.145
Allergies	73 (18.4%)	75 (19.0%)	148 (18.7%)	χ^2 :.05, p:.829
Cardiac, Triglycerides	23 (21.9%)	14 (14.3%)	37 (18.2%)	χ^2 :1.97, p:.160
Autoimmune, RA	2 (14.3%)	3 (21.4%)	5 (17.8%)	χ^2 :.24, p:.622
Skin	64 (16.1%)	76 (19.2%)	140 (17.7%)	χ^2 :1.32, p:.250
Genitourinary	33 (8.3%)	39 (9.8%)	72 (9.1%)	χ^2 :.58, p:.445
Cardiac, Palpitations	7 (6.7%)	10 (10.2%)	17 (8.4%)	χ^2 :.83, p:.363
Vision	30 (7.6%)	27 (6.8%)	57 (7.2%)	χ^2 :.15, p:.695
MUS	26 (6.5%)	30 (7.6%)	56 (7.1%)	χ^2 :.33, p:.566
Vision, Other	29 (7.3%)	27 (7.7%)	56 (7.0%)	χ^2 :34.91, p:.567
Hematology	31 (7.8%)	21 (5.3%)	52 (6.6%)	χ^2 :2.01, p:.157
Endocrine	34 (8.6%)	10 (2.5%)	44 (5.6%)	χ^2 :13.73, p:.000
Allergies, Hayfever	6 (6.9%)	3 (3.7%)	9 (5.4%)	χ^2 :.88, p:.349
Autoimmune, Lupus	1 (7.1%)	0 (0.0%)	1 (3.6%)	χ^2 :1.04, p:.309
Autoimmune, Raynaud's	1 (7.1%)	0 (0.0%)	1 (3.6%)	χ^2 :1.04, p:.309
Physical, No Concerns	10 (2.5%)	15 (3.8%)	25 (3.2%)	χ^2 :1.06, p:.303
Physical, Other	8 (2.0%)	15 (3.7%)	23 (2.9%)	χ^2 :23.03, p:.459
Infectious	9 (2.3%)	12 (3.0%)	21 (2.7%)	χ^2 :.46, p:.500
Allergies, Food	2 (2.3%)	2 (2.5%)	4 (2.4%)	χ^2 :.01, p:.952
Allergies, Urticaria	3 (3.5%)	1 (1.2%)	4 (2.4%)	χ^2 :.91, p:.341
Reproductive	6 (1.5%)	9 (2.2%)	15 (1.9%)	χ^2 :.63, p:.428
Autoimmune	6 (1.5%)	6 (1.5%)	12 (1.5%)	χ^2 :.000, p:.993
Cardiac, Vascular	1(0.9%)	2 (2.1%)	3 (1.5%)	χ^2 :.41, p:.521
Cardiac, Other	6 (1.5%)	6 (1.5%)	12 (1.5%)	χ^2 :12.00, p:.446
Autoimmune, Other	2 (0.5%)	3 (0.7%)	5 (0.6%)	χ^2 :4.99, p:.416
Autoimmune, Psoriasis	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, MS	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Angina	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Hashimoto	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Autoimmune, Scleroderma	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Cardiac, Heart Attack	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 32.1, Veteran Self-Reported Exposure Concerns**Age in Years Number (%)**

Medical Concern	20-29 N (% within 20-29)	30-39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥ 60 N (% within ≥ 60)	Total N (% within Total)	Test Statistic
Petrochemicals	284 (84.0%)	116 (82.3%)	103 (87.3%)	34 (87.2%)	4 (57.1%)	541 (84.1%)	X:5.342, p:254
Anthrax Vaccine	284 (83.5%)	117 (81.8%)	97 (82.9%)	33 (89.2%)	5 (83.3%)	536 (83.4%)	X:1.176, p:882
Air Pollution	276 (81.7%)	118 (82.5%)	90 (95.0%)	31 (77.5%)	6 (85.7%)	521 (80.4%)	X:3.305, p:508
Multiple Vaccinations	297 (79.0%)	112 (80.0%)	92 (78.0%)	28 (73.7%)	6 (85.7%)	505 (78.8%)	X:972, p:914
Insects	259 (75.7%)	113 (77.9%)	93 (80.2%)	32 (80.0%)	5 (71.4%)	502 (77.2%)	X:1.357, p:852
Pesticides	237 (69.5%)	107 (75.4%)	78 (66.1%)	30 (78.9%)	5 (71.4%)	457 (70.7%)	X:4.177, p:383
Human Corpses	234 (69.0%)	91 (64.5%)	75 (63.6%)	20 (50.0%)	5 (83.3%)	425 (66.0%)	X:7.197, p:126
Depleted Uranium	62 (18.7%)	45 (31.7%)	33 (28.2%)	6 (15.8%)	2 (28.6%)	148 (23.3%)	X:12.462, p:014
Contaminated Food & Water	55 (16.2%)	14 (9.9%)	15 (12.5%)	3 (7.7%)	1 (16.7%)	88 (13.6%)	X:4.919, p:296
Biological Weapons	36 (10.7%)	16 (11.3%)	22 (18.5%)	1 (2.6%)	2 (28.6%)	77 (12.0%)	X:10.295, p:036

Table 32.2, Veteran Self-Reported Medical Concerns**Age in Years Number (%)**

Medical Concern	20-29 N (% within 20-29)	30-39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥ 60 N (% within ≥ 60)	Total N (% within Total)	Test Statistic
Back	216 (61.5%)	94 (64.8%)	75 (62.0%)	29 (69.0%)	1 (14.3%)	415 (62.3%)	X:8.712, p:085
Extremities	101 (29.6%)	38 (26.4%)	28 (22.8%)	13(32.5%)	2 (28.6%)	182 (27.4%)	X ² : 5.54, p:112
HBP	17 (31.4%)	21 (41.2%)	12(75.2%)	6 (80.6%)	0 (0.0%)	56 (65.3%)	X ² :2.12, p:095
Weakness	107 (31.2%)	63 (43.8%)	54 (43.9%)	16 (40.0%)	1 (14.3%)	241 (36.7%)	X:12.005, p:017
Gastrointestinal/Loose Bowel	110 (32.2%)	54 (37.0%)	44 (37.0%)	11 (28.2%)	1 (14.3%)	220 (33.7%)	X:3.346, p:502
High Temperature	93 (26.8%)	48 (32.7%)	38 (31.4%)	16 (38.1%)	1 (14.3%)	196 (29.5%)	X:4.398, p:355
Difficulty Breathing	87 (25.1%)	44 (30.1%)	31 (25.0%)	10 (24.4%)	1 (14.3%)	173 (26.0%)	X:2.072, p723
Night Urination	58 (18.4%)	23 (19.3%)	33 (34.4%)	11 (34.4%)	1 (16.7%)	126 (22.1%)	X:14.391, p:006
Chest Pain	76 (22.1%)	36 (24.8%)	23 (19.7%)	8 (21.1%)	0 (0.0%)	143 (22.0%)	X:3.048, p:550
Dizziness	64 (18.6%)	42 (29.0%)	26 (21.7%)	13 (31.7%)	0 (0.0%)	145 (22.1%)	X:10.418, p:034
Increased Perspiration	70 (20.3%)	38 (25.9%)	17 (14.3%)	8 (19.5%)	1 (14.3%)	134 (20.4%)	X:5.617, p:230
Weight Loss	68 (19.9%)	32 (22.4%)	25 (21.6%)	8 (21.1%)	1 (14.3%)	134 (20.7%)	X:612, p:962
Cough	55 (16.5%)	28 (20.4%)	30 (26.3%)	7 (19.4%)	0 (0.0%)	120 (19.1%)	X:7.152, p:128
Swelling	44 (12.8%)	33 (22.9%)	30 (24.8%)	10 (23.8%)	1 (14.3%)	118 (17.9%)	X:13.653, p:008
Nausea	63 (18.1%)	29 (19.9%)	19 (15.4%)	6 (14.6%)	1 (14.3%)	118 (17.7%)	X:1.247, p:870
Sensitivity to Temperature	45 (14.1%)	25 (18.4%)	15 (14.7%)	7 (19.4%)	0 (0.0%)	92 (15.3%)	X:2.958, p:565
Change in Smell/Taste	41 (11.7%)	24 (16.4%)	19 (16.0%)	7 (16.7%)	0 (0.0%)	91 (13.7%)	X:4.033, p402
Change in Menstruation	15 (12.2%)	8 (17.4%)	7 (16.7%)	0 (0.0%)	0 (0.0%)	30 (13.4%)	X:3.185, p:527
Dental Issues	30 (11.6%)	12 (12.4%)	8 (8.9%)	5 (19.2%)	0 (0.0%)	55 (11.6%)	X:2.843, p:584
Difficulty Swallowing	23 (6.6%)	19 (13.0%)	9 (7.5%)	2 (4.8%)	1 (14.3%)	54 (8.1%)	X:6.785, p:148

Table 32.2 (Continued), Veteran Self-Reported Medical Concerns**Age in Years Number (%)**

Medical Concern	20-29 N (% within 20-29)	30-39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥ 60 N (≥ 60)	Total N (% within Total)	Test Statistic
Palpitations	44 (12.6%)	30 (22.1%)	14 (11.7%)	8 (20.1%)	1 (14.3%)	97 (14.6%)	X ² : 1.70, p:043
Seizures	5 (1.5%)	4 (2.8%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	10 (1.5%)	X:2.475, p:649
Paralysis	13 (3.8%)	9 (6.2%)	4 (3.3%)	1 (2.5%)	0 (0.0%)	27 (4.1%)	X:2.496, p:645
Fainting	12 (3.4%)	9 (6.2%)	4 (3.3%)	4 (9.8%)	0 (0.0%)	29 (4.4%)	X:5.387, p:250
Frequent Urination	18 (5.2%)	13 (8.8%)	7 (5.7%)	6 (14.3%)	0 (0.0%)	44 (6.6%)	X:7.011, p:135

Table 32.3, Exposure Concerns Identified by WRIISC Assessment**Age in Years Number (%)**

Military Exposure	20-29 N (% within 20-29 Years	30-39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥60 N (% within ≥ 60)	Total N (% within Total)	Test Statistic
Burning Trash	221 (54.0%)	100 (55.6%)	81 (54.4%)	25 (50.0%)	4 (44.4%)	431 (54.1%)	X:84, p:934
Sandstorms	185 (45.2%)	86 (47.8%)	68 (45.6%)	22 (44.0%)	4 (44.4%)	365 (45.8%)	X:41, p:982
Contaminated Food & Water	126 (30.8%)	54 (30.0%)	48 (32.2%)	10 (20.0%)	3 (33.3%)	241 (30.2%)	X:2.87, p:580
Petrochemicals	102 (24.9%)	39 (21.7%)	39 (26.2%)	16 (32.0%)	0 (0.0%)	196 (24.6%)	X:5.47, p:242
Oil Well Fires	36 (8.8%)	40 (22.2%)	27 (18.1%)	11 (22.0%)	3 (33.3%)	117 (14.7%)	X:25.51, p:000
Depleted Uranium	66 (16.1%)	38 (21.1%)	34 (22.8%)	11 (22.0%)	0 (0.0%)	149 (18.7%)	X: 6.55, p:162
Anthrax Vaccine	58 (14.2%)	25 (13.9%)	23 (15.4%)	7 (14.0%)	2 (22.2%)	115 (14.4%)	X:64, p:.959
Air Pollution	61 (14.9%)	23 (12.8%)	23 (15.4%)	7 (14.0%)	0 (0.0%)	114 (14.3%)	X:2.13, p:712
Noise	57 (13.9%)	22 (12.2%)	22 (14.8%)	9 (18.0%)	0 (0.0%)	110 (13.8%)	X:2.68, p:612
Vehicular Exhaust	59 (14.4%)	23 (12.8%)	21 (14.1%)	6 (12.0%)	0 (0.0%)	109 (13.7%)	X:1.89, p:757
Multiple Vaccinations	49 (12.0%)	29 (16.1%)	19 (12.8%)	1 (2.0%)	0 (0.0%)	98 (12.3%)	X:8.67, p:070
Asbestos	37 (9.0%)	17 (9.4%)	14 (9.4%)	7 (14.0%)	0 (0.0%)	75 (9.4%)	X:2.23, p:693
Insects	31 (7.6%)	14 (7.8%)	15 (10.1%)	1 (2.0%)	1 (11.1%)	62 (7.8%)	X:3.58, p:466
Pesticides	26 (6.4%)	20 (11.1%)	12 (8.1%)	1 (2.0%)	1 (11.1%)	60 (7.5%)	X:6.55, p:162
Enemy Fire	22 (5.4%)	13 (7.2%)	9 (6.0%)	5 (10.0%)	1 (11.1%)	50 (6.3%)	X:2.39, p:665
Burning Hardware	26 (6.4%)	10 (5.6%)	8 (5.4%)	3 (6.0%)	2 (22.2%)	49 (6.1%)	X:4.33, p:363
Human Corpses	21 (5.1%)	9 (5.0%)	9 (6.0%)	2 (4.0%)	0 (0.0%)	41 (5.1%)	X:88, p:928
Non-Ionizing Radiation	24 (5.9%)	12 (6.7%)	5 (3.4%)	0 (0.0%)	0 (0.0%)	41 (5.1%)	X:5.47, p:242

Table 32.3 (Continued), Exposure Concerns Identified by WRIISC Assessment**Age in Years Number (%)**

Exposure Concern	20 -29 N (% within 20-29)	30 -39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥ 60 N (% within ≥ 60)	Total N (% within Total)	Test Statistic
Mefloquine	26 (6.4%)	6 (3.3%)	1 (0.7%)	0 (0.0%)	1 (11.1%)	34 (4.3%)	X:12.74, p:013
Biological Weapons	8 (2.0%)	7 (3.9%)	6 (4.0%)	2 (4.0%)	1 (11.1%)	24 (3.0%)	X:4.75, p:314
Pyridostigmine	2 (0.5%)	6 (3.3%)	6 (4.0%)	3 (6.0%)	0 (0.0%)	17 (2.1%)	X:12.88, p:012
Chemical Alarms	4 (1.0%)	6 (3.3%)	1 (0.7%)	2 (4.0%)	2 (22.2%)	15 (1.9%)	X:26.43, p:000
Body Fluids	6 (1.5%)	1 (0.6%)	4 (2.7%)	1 (2.0%)	0 (0.0%)	12 (1.5%)	X:2.72, p:606
Lead	7 (1.7%)	0 (0.0%)	3 (2.0%)	1 (2.0%)	0 (0.0%)	11 (1.4%)	X:3.56, p:470
Ionizing Radiation	6 (1.5%)	0 (0.0%)	2 (1.3%)	1 (2.0%)	0 (0.0%)	9 (1.1%)	X:2.98, p:562
Animals	1 (0.2%)	3 (1.7%)	4 (2.7%)	0 (0.0%)	0 (0.0%)	8 (1.0%)	X:8.00, p:091
MOPP	1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	X:95, p:917

Table 32.4, Medical Concerns Identified by WRIISC Assessment**Age in Years Number (%)**

Medical Concern	20-29 N (% within 20-29)	30-39 N (% within 30-39)	40-49 N (% within 40-49)	50-59 N (% within 50-59)	≥ 60 N (% within ≥ 60)	Total N (% within Total)	Test Statistic
Allergies, Sinusitis	71 (81.6%)	31 (79.5%)	28 (84.8%)	11 (78.6%)	1 (100.0%)	142 (81.6%)	X:659, p:956
Musculoskeletal	299 (68.4%)	122 (64.9%)	94 (62.7%)	37 (71.2%)	4 (44.4%)	556 (66.5%)	X:4.402, p:354
Cardiac, HBP	24 (34.3%)	28 (42.4%)	26 (46.4%)	10 (50.0%)	3 (75.0%)	91 (42.1%)	X:4.474, p:346
Cardiac, Cholesterol	30 (42.9%)	24 (36.4%)	21 (37.5%)	10 (50.0%)	1 (25.0%)	86 (39.8%)	X:1.956, p:744
Neurological	135 (30.9%)	79 (42.0%)	46 (30.7%)	20 (38.5%)	1 (11.1%)	281 (33.6%)	X:10.579, p:032
Gastrointestinal	141 (32.3%)	65 (34.6%)	52 (34.7%)	15 (28.8%)	3 (33.3%)	276 (33.0%)	X:912, p:923
Sleep	113 (25.9%)	67 (35.6%)	50 (33.3%)	20 (38.5%)	4 (44.4%)	254 (30.4%)	X:9.748, p:045
ENT	116 (26.5%)	49 (26.1%)	33 (22.0%)	16 (30.8%)	1 (11.1%)	215 (25.7%)	X:2.953, p:566
Cardiac	67 (15.3%)	65 (34.6%)	54 (36.0%)	19 (36.5%)	3 (33.3%)	208 (24.9%)	X:44.820, p:000
Endocrine	85 (19.5%)	37 (19.7%)	32 (21.3%)	8 (15.4%)	0 (0.0%)	162 (19.4%)	X:3.074, p:546
Allergies	78 (17.8%)	35 (18.6%)	30 (20.0%)	11 (21.2%)	1 (11.1%)	155 (18.5%)	X:915, p:922
Cardiac, Triglycerides	14 (20.0%)	11 (16.7%)	10 (17.9%)	3 (15.0%)	0 (0.0%)	38 (17.6%)	X:1.268, p:867
Autoimmune, RA	1 (5.6%)	1 (25.0%)	2 (40.0%)	1 (50.0%)	0 (0.0%)	5 (17.2%)	X:5.211, p:157
Skin	78 (17.8%)	34 (18.1%)	20 (13.3%)	9 (17.3%)	2 (22.2%)	143 (17.1%)	X:1.971, p:741
Genitourinary	35 (8.0%)	16 (8.5%)	16 (10.7%)	5 (9.6%)	2 (22.2%)	74 (8.9%)	X:3.056, p:549
Cardiac, Palpitations	7 (10.0%)	9 (13.6%)	2 (3.6%)	1 (5.0%)	0 (0.0%)	19 (8.8%)	X:4.704, p:319
Vision	30 (6.9%)	13 (6.9%)	16 (10.7%)	5 (9.6%)	0 (0.0%)	64 (7.7%)	X:3.485, p:480
MUS	23 (5.3%)	19 (10.1%)	16 (10.7%)	1 (1.9%)	0 (0.0%)	59 (7.1%)	X:10.561, p:032
Vision, Other	24 (5.4%)	13 (6.8%)	16 (10.4%)	5 (9.6%)	0 (0.0%)	58 (6.8%)	X:140.534, p:807

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