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Public Knowledge of Global Health Issues

Dr. Melody Knight[1] Dr. Lorraine Killion[2], & Dr. Marsha Allen[3], M.D

Abstract

Global travel has increased the risk of spreading viruses like West Nile, Zika, and Ebola to the U.S. Viruses such as smallpox and anthrax, easily disseminated and transmitted to others, are being tested for use as biological weapons and worldwide overuse and misuse of antibiotics has led to new strains of antibiotic resistant bacteria. Environmental disasters like Chernobyl in 1986, contaminated the surrounding area with radiation and negative health consequences continue, as food grown in radioactive soil is consumed. The purpose of this study was to determine if information about these various Global Health Issues is known. Upon IRB approval, 259 individuals were administered a 15-item questionnaire. Participants were selected from 9-83 years of age. ANOVA results yielded significance for scores by age [$F(3,255) = 20.831$, $p=.000$]. Scores for younger individuals were lower ($M=9.33.22$, $SD=1.69$) than for adults ($M=12.02$, $SD=2.00$). The mean score across all surveyed was 10.5 and alarmingly, only 48.3% of participants posted a passing score. Education and an increase in public awareness are necessary if people want to protect themselves. We must educate students, parents, and communities of the potential risks and preventive measures needed to deal with these continually evolving health issues.

Keywords: virus, superbugs, bacteria, bioweapons

1. Introduction

Health threats are no longer a local, state or even national problem. Health threats from the other side of the world are now threatening Americans. Emerging viruses like West Nile, Zika, and Ebola (Morse, 1998; CDC, 2014), increasing numbers of antibiotic resistant bacteria, threats of diseases being used as agents of biological warfare, and environmental health disasters are all of concern. The Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) both post website information and alerts for public awareness, yet much of the public remains uninformed.

1.1. Viral diseases

In Geneva, on December,10, 2015, a group of scientists and health experts at WHO created a list of diseases in urgent need of further research.There are few, if any, treatment options for these diseases which could cause severe epidemics in the future.This list includesCrimean Congo hemorrhagic fever, Ebola virus, Marburg virus, Lassa fever, MERS and SARS coronavirus diseases, Nipah and Rift Valley fever and Zika.

[1] Melody Knight, Ph.D., RN, MCHES, is a Professor of Health in the Health & Kinesiology Department at Texas A&M University-Kingsville. Kfmy000@tamuk.edu, 202 Reef Ave., #500, Corpus Christi, Texas 78402,
[2] Lorraine Killion, Ed.D., is an Associate Professor and EC-12 Physical Education Program Coordinator in the Health & Kinesiology Department at Texas A&M University-Kingsville. lorraine.killion@tamuk.edu, 7221 S. Staples #132, Corpus Christi, Texas 78413.
[3] Marsha Allen, M.D., is a Medical Doctor with Health by Design providing medical services for the employees of the Valero Refinery in Corpus Christi, Texas.mmmyrt@gmail.com, 906 Waterview, Portland, Texas 78374.

Annually or when new diseases emerge, this list is reviewed (WHO, 2017). Because disease control and research networks already exist for malaria, dengue fever, tuberculosis, HIV/AIDS and Avian influenza, they were not included in the list.Most of these diseases are not currently a major concern in the United States; however, viruses such as Ebola, chikungunya virus (CHIKV), Zika virus and dengue virus have been acquired by Americans during travel and mosquitos carrying chikungunya and Zika virus have now been found in the U.S., and West Nile virus is already endemic (CDC, 2017) 1,2,3.

The Ebola virus epidemic in West Africa was widely publicized because of fears of pandemic. The CDC worked with theWorld Health Organization (WHO), state and local health departments, and physicians to acquire information about the disease and to manage the public health risks. During the 2014 outbreak, over 28,000 people contracted the disease and over 11,000 died (CDC, 2016). On May 11, 2017, another Ebola outbreak in the Democratic Republic of the Congo (CDC, 2017) was announced.

Ebola virus disease (EVD) is acquired through contact with the meat or body fluids of an infected person or animal (Andreas, et al., 2015). Transmission can also occur from contact with blood or bodily fluids including urine, sweat, saliva, vomitus, feces, breast milk, and semen, as well as through contaminated objects like needles and syringes. In May 2015, it was released that Ebola can be sexually transmitted and is active in the semen after blood specimens have tested negative (Christie et al., 2015). In fact, Ebola virus has now been found in the semen of an Ebola survivor 565 days after recovery from the disease (Purpura, et al., 2017).The CDC now recommends that contact with the semen of male Ebola survivors be avoided, that a condom be used every time, that used condoms be properly disposed of and that any skin that comes in contact with semen or condom be thoroughly washed with soap and water (CDC, 2015). The first symptom of Ebola is usually abrupt onset of fever 8 to12 days after exposure. Initially patients have nonspecific signs and symptoms like chills, myalgia, and malaise in addition to fever. Because these are non-specific symptoms common to infectious diseases such as influenza,malaria, typhoid fever, meningococcemia, and other bacterial infections like pneumonia, EVD can be difficult to diagnose. The most common signs and symptoms reported from West Africa during the outbreak were fever (87%), fatigue (76%), vomiting (68%), diarrhea (66%), and loss of appetite (65%) (CDC, 2016).

There is no Food and Drug Administration (FDA)-approved vaccine available for prevention, post-exposure, or treatment of the Ebola virus. Health care workers can try to maintain hydration, blood pressure and oxygenation, control pain, and provide nutritional support. Several investigational drugs along withblood plasma of recovered Ebola virus disease patients have been used to treat patients with EVD. Unfortunately, there is little data about the safety, efficacy or effectiveness of these efforts (Haaris, et al., 2014). Therefore, prevention and education of the public are key control efforts in addition to the WHO phased response which includes determining methods to interrupt chains of transmission, identifying, managing and responding to consequences of the remaining Ebola risks, and establishing resilient health systems (WHO, 2015).

CHIKV, and Zikaare two of the other diseases that are considered 'serious' and have been addressed by WHO. CHIKV is a virus transmitted by mosquitoes. The word chikungunya comes from an African language and literally means “bent over in pain” (Wilemon, 2014). Characteristic symptoms of chikungunya are acute onset of joint pain, fever, rash and myalgia, arthralgia, and arthritis accompanied by headache and back pain. Arthritic symptoms are bilateral and symmetrical and are often seen in the hands, wrists, interphalangeal joints, shoulders, knees, feet, and ankles. Symptoms usually occur 3 to 7 days after being bitten by the mosquito and recovery usually occurs within about 3 weeks. Unlike the Ebola virus, chikungunya is rarely fatal (Cunha, 2017). Prior to 2013, CHIKV was found only in Africa, Asia, Europe and the Indian and Pacific Islands. Now it has been found in 45 countries and territories in the Americas with more than 1.7 million suspected cases (CDC, 2017). Most cases in the United States have been in people traveling in the Caribbean, Puerto Rico, and South America, but in the last year there have been cases diagnosed in people who have not traveled out of the country, meaning that local mosquitos are now spreading the virus (Wilemon, 2015).

There is no vaccine to prevent or treat Chikungunya and no real treatment. Therefore, the only precautionary measure is to prevent mosquito bites. The Florida Department of Health has posted recommendations including draining standing water, putting screens on doors and windows, wearing long sleeves and pants when outdoors, and using Environmental Protection Agency (EPA) registered insect repellants containing one of the following active ingredients: DEET, picaridin, oil of lemon eucalyptus (OLE) or para-menthane-diol (PMD), and IR3535. These are the same recommendations being made to prevent the Zika virus (Iupkin, 2014; CDC, 2017).

West Nile virus (WNV) is another virus mainly transmitted to humans through the bites of infected mosquitoes and ticks.It causes encephalitis. Infected peoplecan be asymptomatic or havea flu-like fever. WNV is the leading cause of arboviral disease in the United States (Reimann, et al., 2008). In 2012, there was an outbreak of the West Nile virus in Texas with approximately 1,900 cases. Since then, the disease has become endemic (Murray, et al., 2013). As of January 17, 2017, a total of 47 states and the District of Columbia reported WNV infections with 2,038 cases reported to the CDC (CDC,2017). Morbidity due to arboviruses is increasing in the U.S. and is highest between April and September when there are more mosquitos. The only measures that can be taken to avoid these diseases are efforts by individuals and communities to decrease mosquito populations by applying insecticides, reducing breeding sites, using repellants, and wearing protective clothing. Even these are not foolproof since mosquitos carrying viruses seem to be developing resistance to insecticides and communities and individuals need to change insecticides periodically for continued protection (CDC, 2014).

1.2. Antibiotic resistant bacteria

Viruses are not the only diseases that need to be considered**.** In 1928 Alexander Fleming, discovered the first antibiotic, penicillin. It was called the "Miracle drug" and it was thought that the world would now be safe from bacterial infectious diseases. However, during his speech accepting the Nobel Prize for the development of this drug, Fleming warned that bacteria could become resistant to penicillin (The Economist, 2011). That has now proved true. Worldwide overuse and misuse of antibiotics has led to new strains of antibiotic resistant bacteria, or superbugs, which can also move easily across borders, and fewer new antibiotics are being developed to combat them (Krans, 2016). Antibiotics protect the body from infections by killing the illness or disease-causing bacteria. When bacteria resist the effects of antibiotics, they do not stop growing or get killed. This is called Antibiotic Resistance. A study by the RAND Corporation has estimated that antibiotic resistance will be responsible for 10 million deaths and cost the global economy $100 trillion by 2050 (Molloy, 2014a). In 2013, 58,000 infants in India died due to one antibiotic resistant bacteria. In the United States, 20,000 die from these infections each year and 2 million get sick with an estimated cost of 21-34 billion (Molloy,2014b). According to the CDC, patients with resistant infections are more likely to die and survivors have significantly longer hospital stays than patients with other types of infections (CDC, 2014). The World Economic Forum (WEF) has concluded that antibiotic resistant bacteria is "arguably the greatest risk to human health"(Howell, 2013).

Antibiotics have become some of the most widely prescribed drugs in the world. A WHO report warned that antibiotic resistance is rising to dangerously high levels in all parts of the world and that common infections could become killers as a result (WHO, 2016).WHO has now initiated measures at all levels of society to reduce deaths caused by these resistant infections.These precautions include actions that must be taken by individuals as well as by institutions and governments and include using antibiotics only when necessary and only when prescribed by a health professional, never using leftover antibiotics or antibiotics prescribed for someone else, regularly washing hands, preparing food hygienically, avoiding close contact with sick people, practicing safer sex, and keeping vaccinations up to date (WHO, 2016). Even this may not be enough (Spellberg, 2013). The number of new antibiotics has steadily decreased in the past three decades. In 1980 there were 16 new antibiotics approved by the FDA. In 2011 there were only 2 (The Economist, 2011).

Multiple systems have been created in the United States to track this problem. In 1996, the National Antimicrobial Resistance Monitoring System (MARMS) was established. Since then the National Healthcare Safety Network (NHSN), the Gonococcal Isolate Surveillance Program (GIPS), the National Tuberculosis Surveillance System (NTSS), and the Emerging Infections Program (EIP) have also been started (CDC, 2013). Though there are some new antibiotics in the making, none of them are expected to be effective against the most dangerous forms of antibiotic-resistant bacteria. Therefore, tackling this problem has become a high priority for WHO. That organization has initialized a global action plan on antibiotic resistance which was endorsed at the World Health Assembly to include actions that need to be taken by individuals in addition to actions by physicians, researchers, and others. This plan emphasizes the need to improve awareness and understanding of antimicrobial resistance, reducing the incidence of infection, and optimizing the use of antibiotic medications (WHO, 2015). Following the first objective of the global action plan, WHO is leading a global, multi-year campaign with the theme "Antibiotics: Handle with care." This campaign was launched during the first World Antibiotic Awareness Week in November 2015.

In addition to developing new antibiotics, other avenues for protection are being sought, specifically, the use of probiotics in lieu of antibiotics for treating certain diseases of host organisms (Reid, 2006; Muñoz-Atienza et al., 2013; Imperial, 2016). Studies showed that instead of killing pathogenic bacteria through antibiotics, introducing live beneficial microbes (Probiotic use) into the body helps prevent diseases and improve health. Public awareness of the benefits of probiotic use would, therefore, also be beneficial.

1.3. Biological weapons

Emerging viruses and antibiotic resistant bacteria are only two types of disease threats faced globally. Another threat from diseases is the use of diseases as weapons. There are a number of diseases that have been identified by the CDC for possible use as biological weapons. Those are listed by category below. These diseases are grouped in three categories A,B, and C according to their possibility of use and their impact on public health. Of these, the use of smallpox and anthrax have been most widely discussed and are listed in group A, indicating that they are easily disseminated and transmitted from person to person and result in high mortality rates(CDC, 2017). Table 1 categorizes these threats.

Table 1. Threat Categories

Category	Organism/disease
A	Smallpox
	Anthrax
	Tularemia
	Plague
	Botulism
	Viral hemorrhagic fevers
B	Brucellosis
	Glanders
	Ricin toxin
	Typhus fever
	Q fever
	Staphylococcal enterotoxin B
	Viral encephalitis (alphavirus: VEE, EEE, WEE)
	Water Safety threats (e.g., Vibrio cholera, Cryptosporidium parvum)
C	Emerging infectious diseases such as Nipah virus and Hantavirus

Smallpox was a common epidemic disease until 1796 when Edward Jenner demonstrated that inoculation with cowpox provided protection. After this the vaccine was quickly introduced in England, Europe and North America. Once the population was vaccinated use of the disease as a biological weapon seemed pointless. During World War II, however, it was discovered that the vaccine did not provide lifelong immunity and revaccination was necessary, making research for use as a weapon once again viable. By 1950, many countries had begun implementing control measures and endemic smallpox was slowly being eradicated in most parts of Europe and North America. In 1958 the World Health Assembly decided to make global eradication of smallpox a WHO goal. WHO began an international campaign in 1967 and achieved its' goal in 1977. On May 8,1980 the World Health Assembly announced that the world was free of smallpox (Fenner, et al., 1988). A WHO committee recommended that the stocks of variola (smallpox) virus be destroyed in all laboratories except two, one at the CDC in Atlanta and one in Moscow, that were to retain them for research. Although smallpox was eradicated worldwide and all countries reported the destruction in 1981, not all samples were destroyed, and the long history of using smallpox as a weapon may continue. Despite the international success in eradicating smallpox, the variola virus remains a hazardous Category A biological warfare agent (Reidel, 2005).

Smallpox has been used as a biological weapon throughout history. In the 16th century, smallpox helped the Spanish conquer the Aztecs and the Incas. Whether this was intentional or accidental, it was effective. Since the natives had no immunity to smallpox large numbers of them died.In other instances, infection was obviously intentional. During the French and Indian Wars in the 18th century(1754-63) Sir Jeffrey Amherst, the Commander-in-Chief of the British forces in North America asked Colonel Henry Bouquet to infect the Native American tribe with the virus.

The Native Americans, who had never been exposed to the disease before and had no immunity were killed by smallpox contracted from blankets and handkerchiefs which had been contaminated (Global Security, 2017).Sources claim that smallpox was used during the American Revolutionary War (1775-83) as well when, during the winter of 1775-76, American forces were attempting to free Quebec from British control. After the capture Montreal, it seemed as if the Americans might win until, in December 1775, the British fort commander reportedly sent infected civilians to infect the American troops. An epidemic broke out among the American troops, killing about 5,000 soldiers. The Americans retreated after burying their dead in mass graves (Becker, 2004).

The biological weapons research agenda which had reemerged during World War II, was stopped in November 1969, when President Nixon officially halted the US offensive biological weapons program. An international agreement was also reached preventing their developmentand production when the United States, the Soviet Union, and Great Britain all signed an agreement at the Biological Weapons Convention in 1972.In spite of this agreement the Soviet Union startedBiopreparat in 1974, a civilian pharmaceutical company which was a front for a Soviet biological weapons program. A Soviet microbiologist who defected in 1989, provided information about the development of India 67, a virulent strain of smallpox which could be used as a biological weapon. Embryonic chicken eggs were used to cultivate large amounts of the smallpox virus. They also created chimera viruses by inserting genetic material from other viruses into smallpox(Thavaselvam & Vijayaraghavan, 2010).

It is feared that some of this virus has become available. After the fall of the Soviet Union in 1991, smallpox scientists may have sold virus or information to rogue states engaged in illicit biological weapons development.In addition, unrecorded samples could have been left over from the time when the disease was endemic. After remaining smallpox samples were moved to high security laboratories in Russia and America, there were no inspections to verify that other countries had destroyed their stocks of the virus. It is feared that North Korea, Iraq, and Russia may currently have smallpox stockpiles and the ability to deploy it. Other countries suspected of having retained specimens of the virus include China, Cuba, India, Iran, Israel, Pakistan, and Yugoslavia (Flight,2011). Use of smallpox as a weapon of bioterrorism is more feasible than it was during World War II since populations are no longer vaccinated against the virus (Thavaselvam & Vijayaraghavan, 2010).

Anthrax is another virus that multiplies and spreadsquickly in man, animals, and plants (Rogers, 2014). There are three forms of anthrax in humans: cutaneous (spores come in contact with the skin and develop into black lesions), ingestion (consumption of infected animal products, raw meats), and inhalational/ respiratory (inhalation of spores). The resistance of the spores to harsh environmental conditions like heat and humidity, disinfectants, and UV radiation make anthrax the most important biological warfare agent (WHO). Anthrax is a disease caused by a bacterium called *Bacillus anthracis* which is a gram-negative, anaerobic, non-motile, and spore forming bacterium. It can survive in the soil for over 40 years and is commonly found in Asia, southern Europe, Africa, and parts of Australia (Kortepeter & Parker, 1999).

In the early stages, Anthrax is treated with penicillin (IV), doxycycline, tetracycline, or ciprofloxacin. But anthrax can have a delayed onset, making recognition and treatment even more difficult. In the outbreak of inhalation anthrax in Sverdlovsk in 1979, some patients became sick up to six weeks after exposure (Kortepeter & Parker, 1999). A recombinant protective protein antigen is being used in many countries to protect humans from anthrax. These vaccines are still very new, expensive and sometimes ineffective without adjuvant therapies (Nascimento,& Leite, 2012).

In 2001, only 7 days after the 9/11 terrorist attack in New York City, the anthrax scare began. Letters containing anthrax spores were mailed to media and public officials. During the next 3 months, 15 people were infected and 5 died. Since that time, the CDC has posted anthrax bioterrorism training online (NPR, 2011; CDC, 2014).

1.4. Environmental Threats

Environmental Health Threats can include nuclear disasters like the reactor meltdowns and radiation leaks at Chernobyl, Three Mile Island, and Fukushima (Novella, 2014); oil spills like the BP spill in the Gulf of Mexico or the Exxon Valdez tanker disaster in Alaska; or even volcanic eruptions and acid rain.

Environmental disasters like Chernobyl, where the negative health consequences once seemed to be localized, are once again a threat as food grown in radioactive soil is sold to unsuspecting nations (Heintz, Vasileva, DeCristofaro, & Pogatchnik, 2016). The health issues faced by humans due to oil spills are not limited to skin and eye irritation, but can include breathing problems like asthma and lead poisoning (USEPA, 2017). Acid rain damages trees, contaminates soil and water bodies, and kills fish (NIH, 2017). Unfortunately, these important health issues are the subject of much coverage for only very short periods of time while the consequences can be extremely long lasting. Chernobyl is a great example of this. One such well known incident was the Chernobyl Plant meltdown. The Russian reactor 4 melted down during an output test. The power surge in reactor 4 caused the core to overheat. To date the city of Chernobyl is uninhabitable.

At Chernobyl, 200 workers experienced health problems and at the end of 1992 the death toll as a direct result of the meltdown in Ukraine was over 6000. At that time, all the meat, dairy and other food products which were affected were rejected by customers on a large scale. This caused an economic problem resulting in millions of dollars of loses and rendered large areas of land unusable for farming. Thirty years after the Chernobyl disaster, Caesium-137 and Strontium-90 have fallen a little, but the soil is still contaminated with dangerously high radiation levels still being found in milk, grain, and other food products. Radiation levels in grain have actually increased. Not only are local people consuming this food, but it is being sold to other areas and other countriesand the Ukraine has stopped testing for contamination (Reuters, 2016). Radiation has made it into the food in the United States from the Fukushima disaster in Japan in 2011. Milk, spinach, and strawberries grown in California contain cesium-137 and cesium-134 which can be traced directly to that nuclear site (Kilham, 2011). This is not something that is considered when purchasing these "healthy" foods.

2. Purpose of the Study

The purpose of this study was to determine who is aware of global health issues and who is not. Are there differences in characteristics between those who are informed and those who are not?This study examined how much individuals actually know about Global Health Issues. The variables of age, gender, ethnicity, education level and socio-economic status were all examined in order to find a profile of an individual informed about the global health issues that face us. With this information, appropriate education methods about these topics can be developed.

3. Method

3.1Participants

Participants for the study were selected across ages 9-83 and were from a southern region of the U.S. Children who participated were enrolled in a local middle school, young adults surveyed were from a small regional university in the same area and older people surveyed lived in a local condominium residence. A total of 259 individuals (n=138 females; n=121 males) participated by completing the survey.

3.2 Procedure

Upon university IRB approval, individuals were asked to participate.Consent forms were then administered and signed by all participants who volunteered for the study. Participants were asked to self-report the designated variables on the information page. The participants were then administered a questionnaire and asked to answer either 'true' or 'false' to questions posed.

3.3 Questionnaire

The participants were administered a 15-item questionnaire which included true/false questions regarding knowledge/awareness of viruses, antibiotic resistant bacteria, environmental health issues, bioweapons and governmental involvement.

3.4 Measures

Demographic variables of age, gender, ethnicity, education level and socioeconomic status were collected.The sample was comprised of 53.3% (n=138) female and 46.7% (n=121) male. Data for ethnicity yielded: 54.4% (n=141) Hispanic, 30.5% (n=79) White, 9.7% (n=25) Black, .4% (n=1) Asian, and 5.0% (n=13) Other. For socioeconomic data, 23.5% (n=61) reported themselves as below middle class, 65.6% (n=170) reported to be middle class, and 10.8% (n=28) reported themselves to be above middle class. For the initial examination, participants were divided into 5 age categories.

These categories were ages <18 (*n*=36), ages 18-25 (*n*=131), ages 26-39 (*n*=32), ages 40-65 (*n*=39), and ages 66 and above (*n*=21). A 15-item questionnaire concerning: viruses (6 items), superbugs (4 items), bioweapons (3 items), environmental issues (1 item) and the government's ability to protect us from these issues (1 item) was administered in survey form.

4. Results

Mean scores for correct responses were calculated for the questionnaire as a whole and by content area. ANOVA results yielded significance for scores by age [$F(3,255) = 20.831$, $p=.000$]. Scores for younger individuals were lower ($M=9.33.22$, $SD=1.69$) than for adults ($M=12.02$, $SD=2.00$). The mean score across all surveyed was 10.5 with only 48.3% of participants posting a passing score. ANOVA results can be found in Table 2.

Table 2. ANOVA - Threat Knowledge

	Sum of Squares	*df*	Mean Square	*F*	**Significance** α
Between Groups	2.673	1	2.673	11.195	.001
Within Groups	74.743	313	.239		
Total	77.416	314			

Of particular concern was the lack of knowledge about how viruses are spread and how diseases are treated. Younger participants scored lower than older participants, and 42% of all respondents thought there was a vaccine for Ebola, 53% thought MRSA could be easily treated and 59% thought West Nile Virus could be cured with antibiotics. In addition, 78% were sure that the U.S. government is currently developing many new antibiotics. Lack of knowledge of virus threats yielded West Nile as the most under recognized (34.4%), followed by superbugs (27%), smallpox (25.5%), anthrax (21.2%), and MRSA (13.9%). With the rapid threat of viruses increasing, it is crucial to get vital information to the public. Results for the knowledge of diseases is shown in Table 2. Knowledge differences by age are shown in Table 3.

Table 2. Knowledge of Diseases

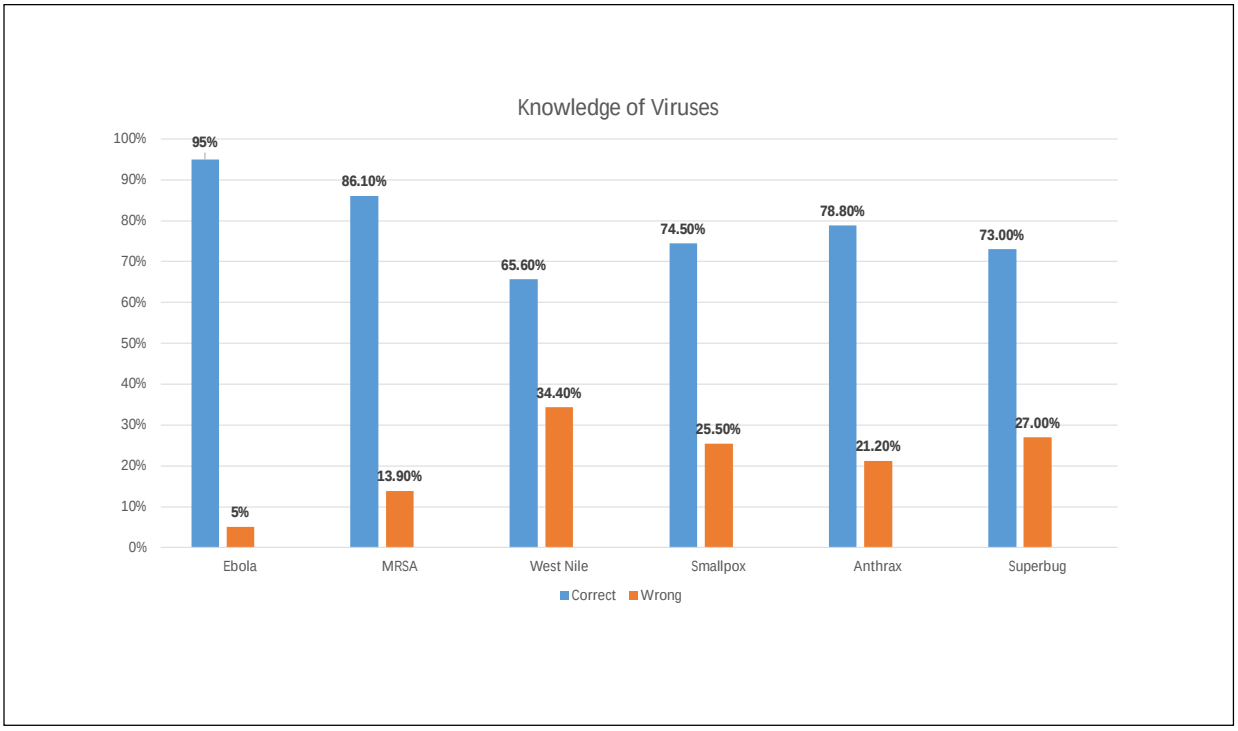
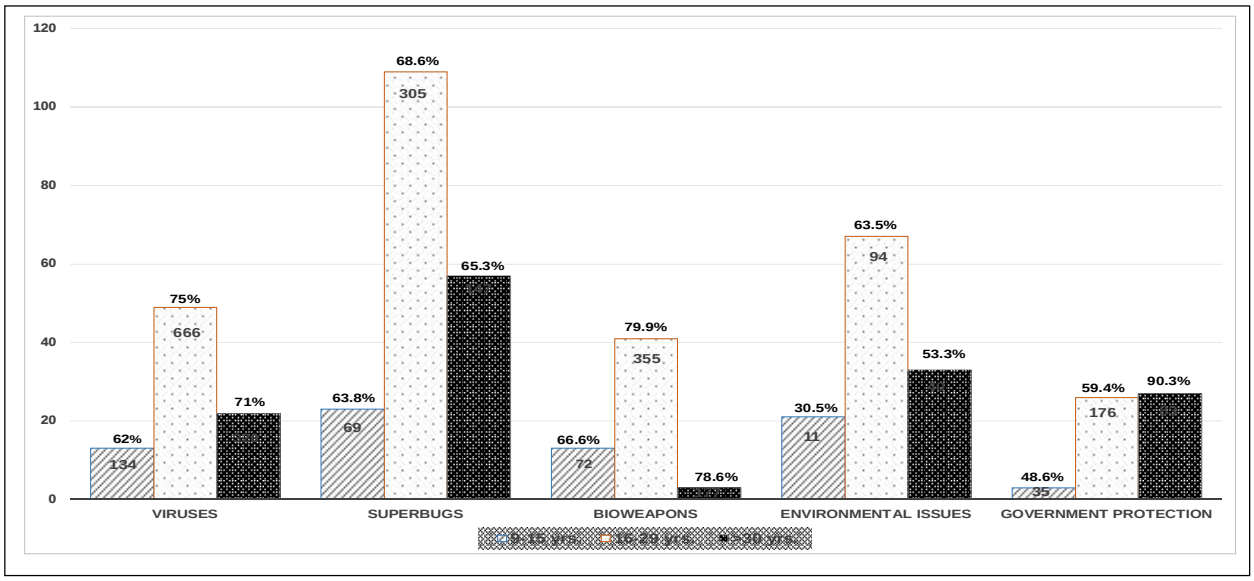


Table 3. Knowledge by Age



To further evaluate differences by age, the items (15) were collapsed into three categories: 1) *Internal Threats* (viruses + superbugs), 2) *External Threats* (bioweapons + environment), and *3) Government Protection* (government + hospital). When the categories were collapsed, ANOVA results demonstrated that for Category 1 *(Internal Threats),* were significant [$F(4, 254) = 9.03$, $p=.000$]. For Category 2 (*External Threats),* ANOVA results were significant [$F(4, 254) = 8.27$, $p=.000$], and for Category 3 *(Government),* ANOVA results were significant [$F(4, 254) = .845$, $p=.009$]. Though the post hoc examinations showed marginal differences between the groups, the overall knowledge level for all three categories remained low across all age groups.

5. Discussion

Of greatest note in this study was the overall lack of knowledge by participants in the study. Many participants in the study did not know or were unaware of problem viruses and lack of vaccines for them. They were also unaware of antibiotic resistant bacteria, the lack of new, potent antibiotics, and the few efforts that are being made to develop new ones. Very little was known about the risk of diseases that have been researched for use as biological weapons, indeed this seemed to be of little concern. Few survey participants under the age of 40 even knew what happened at Chernobyl and certainly were unaware that there were any continuing health concerns caused by it. Most seemed to feel secure and protected from these potential problems. Though there were individuals in each group who were well informed, participants as a whole, regardless of age, gender, ethnicity, education level or socioeconomic status were not. Though the mean score for those participating in the survey was 70%, only 48.3% posted a passing score. From this it can be concluded that many of those taking the survey were poorly informed indeed. Also of concern were the lower scores posted by younger individuals. Older participants who were well informed could be better informed about these issues simply due to longer information exposure, they could have more interest or they could possibly have had a more personal past experience with them. Younger people, especially those who are still in school, are not educated about these issues and possibly pay little attention to information about these issues when presented by the media or others because they do not feel personally threatened by them. Participants, especially those in the younger age groups, felt amazingly safe from all these threats. This could be because they are so poorly informed or because they expect the government or others in authority to protect everyone from all threats. If anyone is negatively affected by a health issue, global or otherwise, it is expected that it will be adequately treated with minimal effort and expense to the individual.

Lack of knowledge about diseases that have been of recent public concern is particularly alarming. West Nile virus, which has only been supplanted in the news fairly recently by concerns about the Zika virus, is particularly unknown. Even though it is transmitted by the same hard to control mechanism, mosquitos, most participants knew very little about it. Many thought it was contracted by drinking dirty water, did not know that is a virus and thought it could be easily cured with antibiotics.

MRSA was better recognized; however, many still thought it could be easily cured with antibiotics. Other antibiotic resistant bacteria, or superbugs, were less well recognized. There seemed to be little concern about a lack of antibiotics. In fact, most respondents felt confident that antibiotics are being developed by our government and will always be available and effective. Use of diseases like anthrax and smallpox as bioweapons was also of little concern. It was unclear whether this is because participants did not know these diseases have been tested by some countries to be used as weapons, whether they did not recognize the deadly nature and contagion potential of these diseases, or because people in the United States feel protected. Further study will be needed to determine what is causing this lack. Memory about environment disasters with global impact is short. Possibly it seemed of little importance because it happened so long ago and so far away from the U.S.

This study indicates that people in the United States, regardless of age, gender, ethnicity, education level or socioeconomic status, are poorly informed about health issues that are of global concern. In order for individuals to take personal responsibility for their own health and to practice disease prevention strategies, it is necessary for them to recognize and understand health threats. Better ways to disseminate information is needed. Schools should make a more concerted effort to raise awareness and educate students, parents, and communities of the potential risks and preventive measures needed to deal with these continually evolving health issues.Social media, public media, and public information campaigns about these health issues should be mounted. More emphasis about the possible impact of global health issues on America is needed if the population is to protect itself.

There have been some efforts to aid in this education. The Public Broadcasting Services has provided online materials and lesson plans for educators of students in grades 9-12 (PBS, 2017). Other organizations are also involved in this effort. UNICEF, the Healthypeople initiative, the National Institutes of Health (NIH), CDC, WHO, Henry J. Kaiser Family Foundation, and the United Nations all have websites that provide information regarding current global health issues. Information is available;however, there must be an awareness that this information is important and has some bearing on individual lives before it will be accessed and learned.

6. Limitations

This study was limited by the low numbers of questions is the areas of environmental health issues and governmental involvement and support. More questions were needed in these areas to further evaluate knowledge. Also, the number of participants in the various age groups were unbalanced. Greater numbers of respondents in all age groups except ages 18-25 were needed to evaluate knowledge levels in all other age groups. Finally, sampling individuals from other regional areas are needed to determine if the results from this study are representative of a much larger population.

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