

How does HIV knowledge, attitudes and behaviors of young adults in Arizona compare to those of China and Taiwan?

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How does HIV knowledge, attitudes and behaviors of young adults in Arizona compare to those of China and Taiwan?

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Abstract:

INTRODUCTION: The Centers for Disease Control (CDC) 2018 HIV Surveillance Report indicates that 13.6 per 100,000 people were diagnosed with HIV in the United States². In Arizona specifically, this value was 12.7 per 100,000 in 2018². According to the Arizona Department of Health, groups most susceptible to contracting HIV in Arizona are African Americans, men, men having sex with men (MSM), and those ages 20-29³. These data can be compared to countries, like China and Taiwan, that studied their college students using the International AIDS Questionnaire – English (IAQ-E). **METHODS:** The IAQ-E is a knowledge, attitudes, and behaviors (KAB) assessment that tells us the respondents' level of understanding given different facts, myths, risks, and attitudes. We sought to assess the KAB of young Arizonans by presenting them with the IAQ-E and assessing respondents' level of agreement using a Likert scale (strongly disagree =1 to strongly agree = 5). **HYPOTHESIS:** Based on Arizona's sexual education curriculum and overall cultural stigma, we hypothesized that the results would show relatively moderate knowledge and negative attitudes and understanding of behaviors related to HIV/AIDS. **RESULTS:** The IAQ-E and demographic survey was distributed to college students in Arizona using Qualtrics, totaling 591 participants. The average age range was between 21-22, 77.2% biologically female, 19.9% biologically male and almost 3% non-binary/other or transgender, 2.2 % African American, and 22.84% identified with the LGBTQ community. Overall, students in Arizona have higher knowledge of HIV/AIDS compared to both China and Taiwan, and their attitudes were more positive than China, yet more negative than Taiwan. The behaviors showed positive understanding in all three groups, despite culture differences. Arizona participants exhibited increasing levels of understanding with increasing age ($p < 0.0001$), increasing GPA ($p < 0.0001$), and being married ($p = 0.002$). **CONCLUSION:** The purpose of this project was to better understand the general knowledge, attitudes and behaviors regarding HIV/AIDS in young Arizonans and compare that to other countries. Understanding these differences can help design targeted public health interventions to decrease future transmission within the state and beyond.

Introduction:

In the year 1981, acquired immunodeficiency syndrome (AIDS) was discovered in America, and it is still not completely understood how the human immunodeficiency virus (HIV)

was initially carried over¹. For many years, it was thought to have been brought in by Gaetan Dugas, a highly sexually active Canadian airline steward; however, it is now thought to have come from the Caribbean from either an immigrant, American tourists (possibly by sex tourism) or contaminated blood¹. It takes about five to ten years without medication for HIV to manifest into AIDS. This means that though AIDS was discovered in 1981, HIV could have been transmitted in America for as much as ten years¹. The Centers for Disease Control (CDC) 2018 HIV Surveillance Report indicates that 13.6 per 100,000 people were diagnosed with HIV in the United States², and in Arizona this value was 12.7 per 100,000, one of the higher values in the country².

Arizona is one of the largest and fastest growing states in the United States, with a population of 7,278,717 people as of 2019. Within that population 18,524 have HIV/AIDS as of 2018³. Those most susceptible groups contracting HIV in Arizona are African Americans, men, men having sex with men (MSM), and ages 20 to 34³. Traditional college aged students fall and are therefore at high risk for HIV transmission. In order to assess within this range what is causing this age range in America to be more susceptible to infection, one can examine knowledge, attitudes and behaviors (KAB) compared to other places, like China and Taiwan that followed similar methods. There have been a variety of HIV/AIDS KAB studies that have looked at different populations, interventions, and methods in hopes to understand transmission rates and risks. Throughout these studies you can find vast differences in KAB per population, which brings up the question of how the state of Arizona may compare.

Another notable study was conducted by Robin Ray Roberts of the University of Arizona called "College adolescents: An emerging risk group for HIV/AIDS Acquisitions" in 1998. Roberts completed a KAB cross-sectional study at the University of Arizona involving 172 undergraduate students using two questionnaires. The two questionnaires used a quantitative scale to measure the answers, and from the results it was interpreted that there were important misconceived concepts that allowed for risky behavior which could lead to transmission. The results showed that there was an overall high knowledge about HIV/AIDS but had misconception about transmission, 41% admitted to not always using condoms and 25% believe it was unlikely anyone they slept with was infected. Later it was suggested that an interventional plan should be implemented to target this population and try to understand why there is a lack of condom use within this age group. Almost twenty years later many new types of HIV/AIDS interventions and research have emerged, so one might expect to observe increased knowledge but consistent attitudes and behavior toward the disease because of the social stigma surrounding the disease. This hypothesis is difficult to confirm considering the use of different questionnaires, so herein it will only be compared qualitatively⁵.

The IAQ is a questionnaire that is a reliable tool used to measure the KAB of a population. It was developed by and validated by Cindy Davis to be used in for a Chinese population and was later translated to an English version (IAQ-E). In the article "The International AIDS Questionnaire - English Version", Cindy Davis studies the reliability and validity of the survey. A total of 274 English speaking students from the US and Australia completed the survey. The survey was translated to English then back to Chinese to show consistency in translation, and it proved to be consistent with the IAQ-C covering all four dimensions (myths, facts, personal risk and attitudes)⁹.

Hypothetically the results will be a relatively moderate knowledge due to ease of information access, but negative results in attitude and behavior, due to widely known misconception and cultural stigma, similar to what Robin Ray Roberts found. We believe that the key to reducing transmission is to educate those at high risk and beyond. Having a solid understanding and knowing the difference between fact and myth about HIV/AIDS can foster a less stigmatized understanding possibly leading to decrease in transmission rates across the board. By targeting this type of education to the high risk college age students we can make a huge difference.

Methodology: The survey was sent out to Arizona students using an encrypted online internet survey program, Qualtrics, after IRB approval was attained. The data we collected was done between 2018-2019 from four different colleges located in Arizona. A flyer was distributed throughout campuses and by college listserv emails. Survey participants were excluded if the individual was not between the ages of 18-29. An anonymous International AIDS Questionnaire - English (IAQ-E) survey was sent along with demographic questions. The scores are rated by the Likert scale (1= strongly disagree, to 5 = strongly agree). A lower score meant participants were agreeable to the statements. The percentages of participants who agreed to each statement will be compared. These calculations will come from the Likert scale used in the IAQ-E. The primary outcome of this power and sample size calculation will be the proportional difference of adequate HIV knowledge between a 2-sample comparison. Assuming a 30% baseline knowledge rate, 186 (93 in each group) people are needed to detect a difference of 20% to achieve a statistical power of 80%. If the difference increases to 30%, 86 (43 in each group) people are needed to achieve a statistical power of 80%. Secondary outcomes compare the percentages of correctness between males and females, ages, class standing, major, etc. The Demographic and survey characteristics will be assessed using means, standard deviations for continuous variables and frequencies, proportions for categorical variables. The Kruskal-Wallis Test was used to compare continuous variables between groups while Chi-squared/Fisher's exact will be used to compare categorical variables. Logistic regression will be used to ascertain associations between survey components, demographic characteristics to the likelihood of having adequate HIV knowledge. All p-values are 2-sided and $p < 0.05$ will be considered statistically significant.

Table 1. Demographics of Participants	Values (n=591)
Age, years (n, %)	
≤ 21	180 (30.5)
>21 - < 22	153 (25.9)
>22 - < 24	125 (21.2)
>24	133 (22.5)
Biological Sex (male, %)	118 (19.9)
Gender Identification (n, %)	
Female	156 (77.2)
Male	118 (19.9)
Other	17 (2.88)
Sexual Orientation (n, %)	
Heterosexual	437 (73.9)
Homosexual	37 (6.26)
Bisexual	78 (13.2)
Pansexual	20 (3.38)
Other/Prefer not to say	19 (3.21)
Race (n, %) (Missing 10)	
Caucasian	390 (65.9)
Hispanic/Latino/Spanish	133 (22.5)
African American	13 (2.20)
Asian	18 (3.05)
American Indian/Native Hawaiian.	27 (4.57)
Marital Status (n, %)	
Never Married	534 (90.4)
Married	49 (8.29)
Separated/Divorced	8 (1.35)
Income (n, %) (Missing 73)	
< 10000	102 (17.3)
10,000 – 29,999	112 (18.9)
30,000 – 49,999	73 (12.4)
50,000 – 69,999	66 (11.2)
70,000 – 99,999	67 (11.3)
>100,000	98 (16.6)
Highschool State (n, %) (Missing 11)	
Other	126 (21.3)
AZ	381 (64.5)
CA	73 (12.4)
Year in College (n, %) (missing 7)	
Freshmen	45 (7.61)
Sophomore	94 (15.9)
Junior	176 (29.8)
Senior	179 (30.3)
Graduate/Professional	90 (15.2)
What is your major and minor if applicable? (STEM, %) (Missing 33)	322 (54.5)
GPA (n, %) (Missing 12)	
<3.0	58 (9.81)
3.0 - <3.5	130 (22.0)
≥3.5 - <3.8	171 (28.9)
≥3.8	220 (37.2)

Note. All answers were not completed by some participants and are noted as missing n

Result Arizona

Demographics. We had 591 participants with an average age range was between 21-22, 77.2% biologically female, almost 3% identifying as non-binary/other or transgender, 2.2 % African American, and 22.84% identified with the LGBTQ community. Most participants were college seniors (30.3%), followed closely by juniors (29.8%) and most had never been married (90.4%).

Facts. The participants mostly agreed that condoms decrease the risk of transmission, HIV can spread through infected sperm, and the HIV was transmitted from mother to baby, 91.54%, 70.22% and 79.7% respectively (see Chart 1).

Myths. The results suggested that Arizona students were mostly not swayed by myths. As presented in Table 2 most did not agree that coughing, sneezing, sharing cigarettes, hugging infected persons, swimming pools, toilet seats and air transmission were ways HIV could be transmitted. However, 45.52% agreed that mosquitoes can transmit HIV.

Attitude. Participants' attitude toward HIV/AIDS was consistent with a positive attitude towards those living with HIV/AIDS. Only 65.48% agreed they would be willing to volunteer with AIDS patients, and 12.01% did not agree or disagree with this statement.

Personal risk. Students also tended to understand risk and behaviors that lead to transmission, with the exception that 16.75% believed that they can protect themselves with an AIDS vaccine. It's also important to note that over 11% of participants agreed that persons of their own ethnic group are at less risk compared to other ethnic groups. We found that 58.4% of the participants had not been tested for STI in the last year and of that group 34.5% reported being abstinent and 35.9% reported using safe practices.

Arizona LGBTQ. One of the most important things to note is the large number of LGBTQ community that is represented in this study. A total of 135 participant (22.84%) identified with the LGBTQ community including those who identified as homosexual, bisexual and pansexual. Not many studies have this amount of representation for that specific community, including those for China, who did not report on these demographics and Taiwan with 3 participants (3.8%) identifying with the LGTBQ community. Furthermore, individuals who identify as being non binary showed significantly more knowledge, less risky behavior, and more positive attitudes toward those with HIV/AIDS ($p < 0.012$).

Overall. Evaluating the trends, being older ($p < 0.0001$), higher school year ($p > 0.0001$), have higher academic grades ($p < 0.003$) and GPAs ($p < 0.003$) showed to have better knowledge, less risky behavior, and more positive attitudes toward those with HIV/AIDS. Interesting enough there was no significant correlation with having formal sex education in high school or in college. Overall this population was fairly knowledgeable about the disease with only a couple misconceptions, showed to have a positive attitude toward those infected with HIV/AIDS and were knowledgeable about risky behavior.

Interesting trends in Arizona. There were a few trends that were developed when applying the Kruskal-Wallis Test and looking at each outcome. They included:

- Those identified as African Americans more less agreeable that HIV only spreads with IV drug use, prostitution andn homosexuals compared other races(p<0.006).
- Those who identified females (biologically and gender identity) were more agreeable to the statement that mothers can transmit HIV to their babies compared to those identified as males (biologically and gender identity) and non-binary/other (p<0.001).
- Those that identified with the LGBTQ community were more agreeable to volunteer with AIDS patients compared heterosexual individuals (p<0.02)
- Though not significantly significant those who reported going to high school in california were less agreeable to myths.

Table 2. HIV Knowledge and Attitudes (N = 591)	Mean (SD)
MYTHS	
HIV can be spread through coughing and sneezing.	1.67 (1.05)
AIDS can be contracted through sharing cigarettes.	1.94 (1.21)
HIV/AIDS can be spread through hugging an infected person.	1.13 (0.46)
HIV can be transmitted through the air.	1.15 (0.45)
HIV can be spread through swimming pools.	1.79 (1.05)
HIV can be contracted through toilet seats.	1.79 (1.09)
Mosquitoes can transmit HIV. ^a	3.07 (1.41)
ATTITUDES	
People with HIV should be kept out of schools.	1.26 (0.63)
I would end my friendship if my friend had AIDS.	1.12 (0.42)
I am willing to do volunteer work with AIDS patients.	3.87 (1.15)
If a family member contracts HIV, he/she should move out.	1.19 (0.52)
People with HIV should stay home or in a hospital.	1.37 (0.75)
PERSONAL RISK & BEHAVIOR	
Persons of my ethnic group are less susceptible of contracting AIDS than others ethnic groups.	1.87 (1.15)
AIDS only affects intravenous (IV) drug users, prostitutes, and homo sexuals.	1.24 (0.76)
You can protect yourself against AIDS by being vaccinated for it. ^a	2.05 (1.26)
FACTS	
Condoms will decrease the risk of HIV transmission. ^a	4.42 (0.88)
HIV is transmitted from mother to baby. ^a	4.05 (0.99)
HIV is spread through infected sperm. ^a	3.79 (1.38)
Overall Score	38.7 (6.34)

Note. Items scored on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree

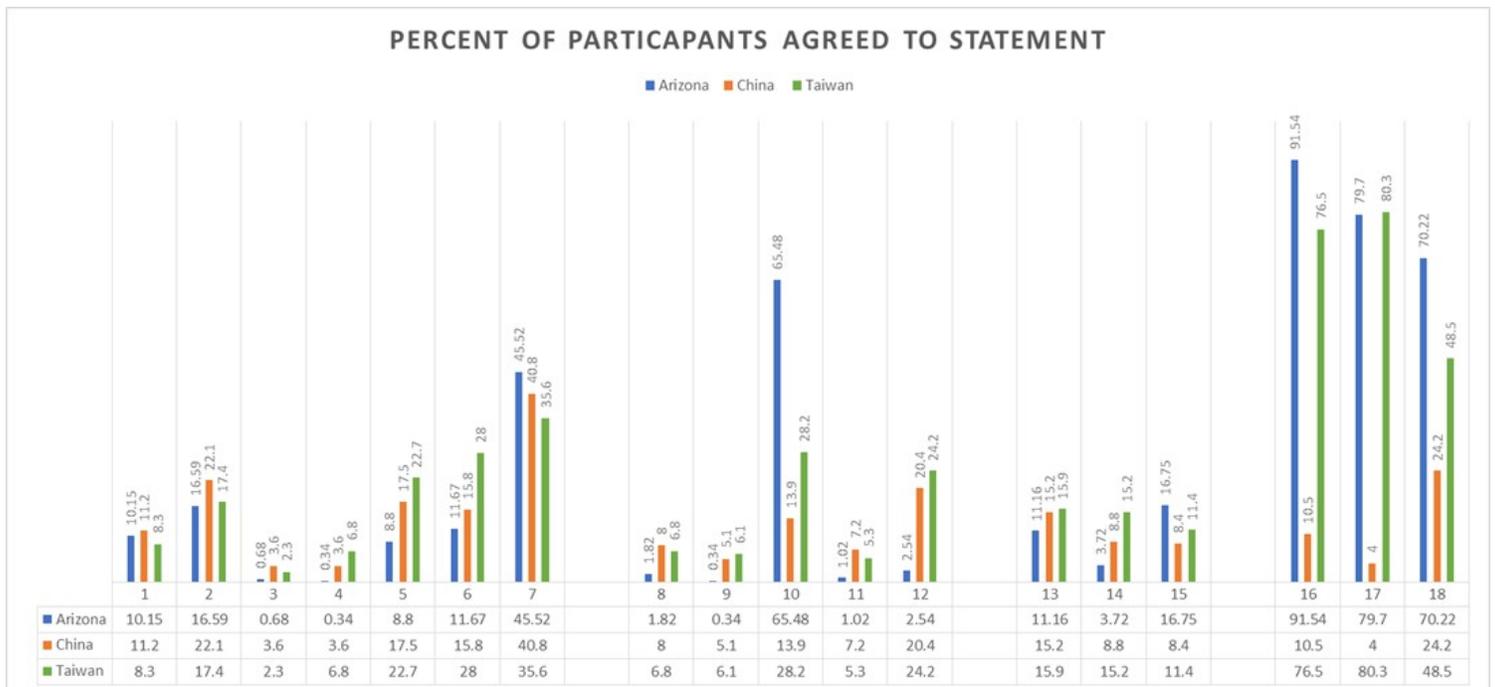
^aItems reversed only when computing for subscale mean and standard deviation. All other data presented in its original form.

Comparing Taiwan and China

In China in 2011, a study was conducted about the KAB of 529 Chinese college students in the west and central region of china. They used an internet survey called the “International AIDS Questionnaire – Chinese version (IAQ-C),” and the scores were rated by the Likert scale (1= strongly agree to 5 = strongly disagree), the **reverse of what was used in the IAQ-E**. A higher score meant positive and accurate views on HIV/AIDS. Two other questionnaires were used to assess from which resources students previously received information regarding HIV/AIDS, as well as student sexual history and condom use, if applicable. There was a 90.3 % response rate (475 valid surveys) with an age range of 18 to 35, with most participants being males (58.1%), freshmen (31.8%) and never married (97.9%). The results showed that many

students were unknowledgeable about HIV/AIDS prevention; however, they scored well in the subject of transmission, indicating possible deficits in sex education curriculum concerning HIV/AIDS. In regard to behavior, 17.9% of the students reported being sexually active, which was higher than previous studies, 37% reported having more than one partner, and 21% reported almost never using condoms⁷.

In Taiwan in 2008, a study was conducted about the KAB of 132 Taiwanese college students from two private universities. The same survey, IAQ-C, was used in this study. A higher score implied more positive and accurate views concerning HIV/AIDS. The age range for the study was 20 to 26 and most participants were females (60.6%), sophomores (61.4%), and never married (100%). The results of this study indicated that general knowledge about HIV/AIDS was poor but showed positive attitude towards those infected by HIV/AIDS. In regard to behavior 29.5% reported being sexually active, more than 60% reported having more than one partner and 50% reported sometimes using condoms⁸.



Discussion

Comparison. When evaluating all three locations we can see some differences between the different countries in how they agreed to certain statements (Chart 1). Overall, students in Arizona have higher knowledge of HIV/AIDS compared to both China and Taiwan. We can speculate that there are many sources that contribute to HIV/AIDS education including television, Internet, schools and health professionals, though having formal sex education in high school or college did not have any significant correlation in this study. Taiwan had the more positive attitude toward the HIV/AIDS community followed by Arizona then China. In all three groups they all understood risky behaviors that can lead to transmission of HIV.

Some of the differences between these three geographic locations can be due to the difference in time of the surveys being distributed, demographics of the populations and the differing cultural norms. One major difference between the groups were their reported sexual behaviors. Though the participant showed to have a good understanding of what risky behaviors that led to transmission, it is important to note that 76.8% of students in Arizona reported being sexually active and 37.4% reported having more than one partner at a given time. In all sexually active participants the average times a condom was used during intercourse was 56.4% and 8.49% reported not using condoms ever. In Taiwan, 29.5% reported ever being sexually active, and of that group 86.1% had more than one partner. Condom use was on average used sometime by participants with 12.8% reporting they never used condoms. As for China, 17.9% reported being sexually active and of that 37.6 percent had more than one partner. Lastly, 24.7 percent of participants never used condoms.

Conclusion

The significance of these results can be useful in tackling the early deficit of HIV/AIDS knowledge in Arizona implementing accessible prevention education. Though there was no correlation between formal high school or college sex education and KAB, there is a significant positive correlation with being more educated. Finding what young adults do not know and understand can lead us in the direction of being more efficient and effective at creating criteria to teach what is not being understood. Evaluating how different countries and groups score on the KAB, assessing where they do better and implementing how we can improve based on their models is a positive step forward. In addition to learning more about the disease, it would be promising to find a reduction of negative stigma towards HIV/AIDS patients in the communities which can strongly affect prevention and treatment efforts. Being more informed about resources and promoting behavior change will be necessary in further increasing regular testing and lowering the rate of transmission in Arizona.

Limitations. With that said some of the limitations we encountered included those related to self reporting and timing of survey distributions. Science is changing swiftly and people are learning more and more as we gain more access to information through smart devices. The lack of diversity in participants was something we tried to avoid by reaching out to all the different schools, colleges, programs, and interests groups to distribute the survey. This can maybe be avoided in the future with some form of incentive for more participants to join. Further and similar studies could be conducted within other groups including age, race and socioeconomic regions, to further understand the specific barriers of each community. It would also be helpful to know participants' sexual health history, religions, and zip codes for further details and understanding. Hopefully Arizona could be leading other places around the world to an HIV free era.

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APPENDIX 1.

INTERNATIONAL AIDS QUESTIONNAIRE–ENGLISH
VERSION (IAQ-E)

Please circle the number that best represents your degree of agreement to each of the items below

	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
1. HIV can be spread through coughing and sneezing.	1	2	3	4	5
2. AIDS can be contracted through sharing cigarettes.	1	2	3	4	5
3. HIV/AIDS can be spread through hugging an infected person.	1	2	3	4	5
4. HIV can be transmitted through the air.	1	2	3	4	5
5. HIV can be spread through swimming pools.	1	2	3	4	5
6. HIV can be contracted through toilet seats.	1	2	3	4	5
7. Mosquitoes can transmit HIV.	1	2	3	4	5
8. People with HIV should be kept out of school.	1	2	3	4	5
9. I would end my friendship if my friend had AIDS.	1	2	3	4	5
10. I am willing to do volunteer work with AIDS patients.	1	2	3	4	5
11. If a family member contracts HIV he/she should move out.	1	2	3	4	5
12. People with HIV should stay home or in a hospital.	1	2	3	4	5
13. _____ are less susceptible of contracting AIDS than other ethnic groups.	1	2	3	4	5
14. AIDS only affects intravenous (IV) drug users, prostitutes, and homosexuals.	1	2	3	4	5
15. You can protect yourself against AIDS by being vaccinated for it.	1	2	3	4	5
16. Condoms will decrease the risk of HIV transmission.	1	2	3	4	5
17. HIV can be transmitted from mother to baby.	1	2	3	4	5
18. HIV is spread through infected sperm.	1	2	3	4	5

*Items number reversed scored: 10, 16, 17, 18

**FACTORS: Transmission Myths (Items 1-7); Attitudes (Items 8-12); Personal Risk (Items 13-15); Facts (Items 16-18).