

**PREVALENCE OF SEXUALLY TRANSMITTED INFECTIONS (STI'S) AMONG INCOMING REFUGEES
IN MARICOPA COUNTY, ARIZONA**

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TITLE: Prevalence of Sexually Transmitted Infections (STI's) among Incoming Refugees in Maricopa County, Arizona.

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ABSTRACT

Objective: The aim for this study was to determine the prevalence rate of Sexually Transmitted Infections (STI'S) among incoming refugees in Maricopa County in the state of Arizona.

Design: A retrospective study

Setting: Maricopa County Public Health Department

Participants: 1,471 refugees from the Maricopa County

Main outcome measures: Prevalence of Chlamydia, Gonorrhea, HIV and syphilis among incoming refugees compared to the Maricopa County prevalence.

Results: The overall prevalence rates among those tested were 1.12% (90 of 8,055) for Chlamydia, 0.19% (15 of 8,055) for Gonorrhea, 0.73% (80 of 11,018) for HIV, and 55.5% (71 of 138) for Syphilis (+TPPA+RPR). The prevalence rates of Chlamydia($p<0.001$), HIV ($p<0.001$) and Syphilis ($p<0.001$) were statistically significant when compared to the Maricopa County rates while the rate of Gonorrhea ($p<0.84$) did not show statistical difference. There was no statistically significant difference noted in the all the STI's tested among males and females. Between the various age groups, Chlamydia was statistically higher among the age group of 15-25 $p<0.04$ while HIV was statistically significant among the age group of 36-45 $p<0.04$. Among

the different regions, syphilis, the seroprevalence rate was highest among those from the Caribbean (73.7%) $p < 0.02$ than among persons from the other three region (South/southeast Asia, Sub-Saharan Africa, Middle East and North Africa). Chlamydia had the highest prevalence among those from the Middle East/ North Africa (2.0%) $p < 0.04$. There was no statistically significant among the prevalence of Chlamydia, Gonorrhea, HIV and Syphilis and HIV over the years from 2013-2017.

Conclusion: Overall, the higher prevalence rates of Chlamydia, HIV and Syphilis when compared to the population they immigrate into indicate the importance of routine screening of incoming refugees and utility of CDC refugee post-arrival screening and evaluation recommendations.

KEYWORDS: refugee health, sexually transmitted infection, immigrant health

INTRODUCTION

According to the World Health Organization (WHO), there are more than 340 million new cases of bacterial and protozoal sexually transmitted infections annually worldwide with 1 of 4 STIs: chlamydia (131 million), gonorrhea (78 million), syphilis (5.6 million) and trichomoniasis (143 million). (1) The highest rates of STI's occur in South and Southeast Asia, followed by sub Saharan Africa, Latin America and Caribbean (2)

Sexually transmitted infections are major cause of acute disease, infertility and mortality worldwide if not treated resulting in severe sequelae mostly affecting women and new born babies (2). About 40% untreated gonococcal and chlamydial infections in women will result in pelvic inflammatory disease and one in four of these will result in infertility. In pregnancy,

untreated early syphilis will result in a stillbirth rate of 25% and be responsible for 14% of neonatal deaths estimated to be an overall perinatal mortality of about 40%. Up to 4000 newborn babies worldwide will become blind every year because of eye infections attributable to untreated maternal gonococcal and chlamydial infections(1)

In addition to the health consequences, sexual transmitted infections constitute a huge social and economic burden on national health services and household incomes(3) Globally, these infections account for 17% of economic losses caused by ill-health(4) and rank among the top 10 reasons for health-care visits. Furthermore, sequelae of untreated STI such as perinatal morbidity care, childhood blindness, pulmonary disease in children, screening and treatment of cervical cancer, infertility, management of liver disease and chronic pelvic pain accounts for a large proportion of tertiary health care costs(1)(3)

There are currently 22.5 million refugees worldwide according to the most recent United Nations data (5). 84,989 refugees were resettled in the United states in 2016 through the U.S refugee resettlement program with Arizona being the 6th largest recipient of refugees(6)

Since its establishment in 1978, the Arizona Refugee settlement has resettled over 60,000 refugees (7)

Refugees settling in America arrive mostly from conflict areas in Sub Saharan African, Middle east, Central and South Asia where incidence of STI are high (1) (6) Areas of armed conflicts constitute “complex emergencies” due to increased lawlessness, discrimination, exploitation, lack of access to health supplies and services, poor sanitary conditions and increased exposure to sexual violence (8). Such humanitarian crisis leave refugee populations more vulnerable and at

an increased risk for sexually transmitted infections (9) Mass migration due to displacement from armed conflicts can also create epidemics in other countries that can increase the rate of transmission of HIV and STI's(9)

The prevalence and magnitude of STDs in refugee populations is unknown due to limited reliable data and likely varies among refugee populations.(10)(11)(12) Available data mostly depends on the STIs services provided which may only exist in some countries. Refugees are also frequently excluded from the national health care systems of host countries which can affect the quality of reporting to health services. In addition, refugees may have traveled to or lived in other countries with high HIV prevalence rates prior to residing in their host countries(13) Due to the indolent clinical presentation of early stages of STI's many patients may appear to be asymptomatic(2) and not seek medical treatment. Furthermore, diagnosis of STI's is affected by social and religious stigma preventing people from seeking treatment(13) and being forthcoming if they are victims of physical and sexual violence.

Given the increased risk vulnerability and risk for STI's, lack of reliable data and inconsistent reporting between and within regions and countries, It is important to monitor STIs in refugee populations to reduce transmission to others and prevent acute and chronic sequelae (10). This can be accomplished through developing and implementing a scientific and rational approach to surveillance, screening, and preventing disease morbidity and mortality (3)(14)

Before arriving in the U.S, refugees are required to undergo a medical examination conducted by a Physician selected by the Department of State for inadmissible conditions. In January 2010,

HIV was removed from the list of inadmissible infections and is no longer routinely tested for overseas(15)

For all refugees ≥ 15 years of age, clinical evaluation and treatment are mandatory for Gonorrhea and Syphilis with laboratory testing required. Testing is done according to the CDC Technical Instructions for Syphilis and Gonorrhea for Panel Physicians. A nontreponemal test such Venereal Disease Research Laboratory [VDRL] or Rapid Plasma Reagin [RPR]) is used for initial screening for Syphilis. A positive or reactive result on screening tests should be confirmed using a treponemal test such as T. pallidum passive particle agglutination (TP-PA) assay, Treponema pallidum haemagglutination (TPHA) test or enzyme immunoassays (EIAs) to confirm a diagnosis of Syphilis. A nucleic acid amplification test (NAAT) should be performed on specimens such urine (from men and women), endocervical or vaginal swabs (women), or urethral swabs (men) for initial screening of gonorrhea. A positive NAAT in men and women or a gram stain on urethral secretions demonstrating polymorphonuclear leukocytes with intracellular Gram-negative diplococci in asymptomatic male is considered diagnostic for gonorrhea test. Refugees < 15 years must be tested if there is a history of syphilis, gonorrhea or there is substantial reason to suspect infection. Routine testing for Chlamydia is no longer required (16) As of March 28, 2016, chancroid, lymphogranuloma venerum, and granuloma inguinale were also removed from the list of communicable diseases of public health significance and routine evaluation and screening is no longer required(17)

The domestic medical screening guidelines was developed by the CDC to provide guidelines to state public health departments and medical providers in the United States.(10) These screenings are usually conducted 30-90 days post-arrival in the United States. The CDC recommends testing

all incoming refugees for Syphilis, Chlamydia, Gonorrhea, Chancroid, Granuloma inguinale/donovanosis, Lymphogranuloma venereum, Genital herpes, Genital warts, Trichomoniasis and HIV during the new arrival medical examination. Testing for STI's includes obtaining a medical history, physical examination and diagnostic testing(10) Although this implementation has been recommended, there are not mandated and have been used in states such as Arizona and Minnesota. There is limited published on the effectiveness of these recommendation and its implications(12)

The aim for this study was to determine the prevalence rate of STI'S among incoming refugees in Maricopa County in the state of Arizona. This was a retrospective study examining medical records of all refugees at the Maricopa Public health county during their first post arrival medical screening. The STI'S investigated included Syphilis, Chlamydia, Gonorrhea and HIV. The medical screening is in accordance with the guidelines issued by the Center for Disease Control and Prevention (10)

METHODS

All refugees resettled in Arizona must undergo an initial medical screening in accordance with State of Arizona mandate (18). De-Identified data was collected electronically from February 1st, 2013 to January 31st, 2017 at Maricopa County Public Health Department. The data was obtained from the electronic database EClinicalWorks. Of the 11,471 records obtained, 3492 refugees missed at least one STD lab results. Data elements included in this study were: date of birth, age, sex, date of immigration to the US, country of origin, year of visit, lab specimen collection date, HIV status, pregnancy status, Syphilis test result (RPR& TPPA), Chlamydia and Gonorrhea urine test results. Only lab results for patients who came for a refugee screening were

used in this study. Patient records with a lab specimen collection date 30 days after the initial refugee screening visit were also excluded in this study. If patient had more than 1 lab results within 30 days of initial refugee screening, only the most recent one was included in the data. Chlamydia and Gonorrhea testing was performed in refugees >12 and older while Syphilis and HIV testing was performed on all incoming refugees regardless of age. Females refugees between the ages of 12 to 62 also underwent a urine pregnancy test. A positive NAAT is diagnostic for chlamydia and gonorrhea infection as it considered the most sensitive and specific test(19). A positive RPR titer confirmed with a positive TPPA titer is considered diagnostic for syphilis infection(10). Refugees were categorized by sex (male and female), grouped into four age ranges: < 15 years, 15–25 years, 26-35, 36-45,>50, region of origin (Sub-Saharan Africa, Middle East, Southeastern Asia, Central America) to compare the prevalence between these group. Demographics and disease outcomes were reported as frequencies and percentages. Fisher's Exact Test was used to assess differences in in the percentages of disease outcomes relative to demographic covariates. All data analyses were conducted using STATA version 15.

RESULTS

The overall prevalence rates among those tested were 1.12% (90 of 8,055) for Chlamydia, 0.19% (15 of 8,055) for Gonorrhea, 0.73% (80 of 11,018) for HIV, and 55.5% (71 of 138) for Syphilis (+TPPA+RPR).

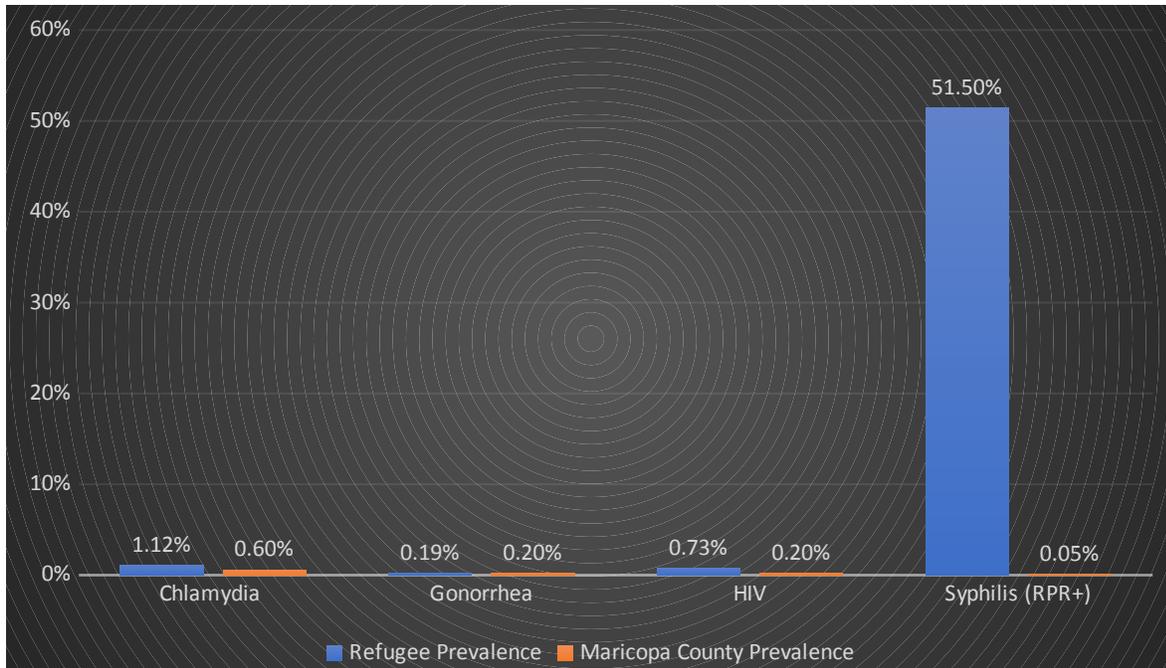


Figure 1: Overall prevalence of selected STI's among incoming refugee vs Maricopa county prevalence.

There were statistically significant differences among the prevalence rates when compared to the 2018 prevalence rates in Maricopa county as shown in Figure 1(20,21). The prevalence rates of Chlamydia($p<0.001$), HIV ($p<0.001$) and Syphilis (<0.001) were statistically significant when compared to the Maricopa County rates while the rate of Gonorrhea ($p<0.84$) did not show statistical difference. (Table 1)

	Chlamydia N=8055	Gonorrhea N=8055	HIV N=11018	Syphilis (RPR+) N=138
Result	1.12%	0.19%	0.73%	51.5%
Maricopa county prevalence	0.6%	0.2%	0.2%	0.05%
P-value (<0.05)	<0.001	0.84	<0.001	<0.001
Sex				
M	1.05%	0.14%	0.74%	49.3%
F	1.19%	0.23%	0.71%	53.6%
P-value	0.53	0.34	0.81	0.60
Age group				
<15	0.82%	0.21%	0.64%	36.7%
15-25	1.68%	0.17%	0.47%	55.2%
26-35	1.06%	0.30%	0.80%	30.9%
36-45	1.30%	0.0%	1.28%	58.3%
>45	0.58%	0.19%	0.56%	35.7%
P-value ((<0.05)	0.04	0.36	0.04	0.19
Region				
Caribbean	0.60 %	0.27%	1.00%	73.7%
South/Southeast Asia	1.05%	0.18%	0.47%	50.0%
Sub Saharan Africa	1.03%	0.08%	0.90%	42.5%
Middle East/North Africa	2.00%	0.32%	0.82%	41.7%
P-value (<0.05)	0.002	0.28	0.32	0.02

Table 1: Prevalence of selected STI's by sex, age range and region of origin group among newly arrived.

There was no statistically significant difference noted in the all of the STI's tested among males and females. However, there were difference between selected age groups. For Chlamydia, the highest rates of 1.68% was noted be among those age 15-25 (p<0.04) while the prevalence rate among the other age groups were 0.82% (<15), 1.06% (26-35), 1.30% (36-45), 0.58% (>45). The

prevalence rate of HIV was highest within the 36-45 age range (1.28% $p < 0.04$) with the lowest rate among 15-25 age group (0.47%).

There were statistically significant differences between selected regions groups. For syphilis, the seroprevalence rate was highest among those from the Caribbean (73.7%) than among persons from the other three regions. Seroprevalence was statistically higher among those from South/Southeast Asia (50%), Sub-Saharan Africa (42.5%) than from Middle East/North Africa (41.7%) ($p < 0.02$). For *Chlamydia*, the highest prevalence was among persons from Middle East (2.0%), then in South/Southeast Asia (1.05%), Sub-Saharan Africa (1.03%) and Caribbean (0.60) ($P = 0.04$). For gonorrhoea, the highest prevalence was among person from the Middle East/ North Africa while the among those tested for HIV, the highest prevalence was among people for the Caribbean (0.90%). However, the prevalence of Gonorrhoea and HIV among the four regions were not statistically significant.

	Chlamydia N=8055	Gonorrhoea N=8055	HIV N=11018	Syphilis N=138
Result	1.12%	0.19%	0.73%	51.5%
Year of Arrival				
2013	1.71%	0.07%	0.88%	55.0%
2014	1.17%	0.21%	0.73%	48.3%
2015	1.03%	0.20%	0.71%	51.4%
2016	0.84%	0.25%	0.67%	52.0%
2017	0.39%	0.0%	0.54%	50.0%
P-value (<0.05)	0.13	0.75	0.93%	0.99%

Table 2: Prevalence of selected STI's from 2013-2017 among new arrived refugees.

Table 2 shows the prevalence of STI among newly arrived refugees in Maricopa County from 2013-2017. The prevalence of Chlamydia over the years has been decreasing with only 1 case noted in 2017. The prevalence of Gonorrhea, HIV and Syphilis were also lower in 2017 compared to 2016. However, there was no statistically significant among the prevalence of Chlamydia, Gonorrhea, HIV and Syphilis and HIV over the years from 2013-2017.

DISCUSSION

The higher prevalence rates of Chlamydia, HIV and Syphilis when compared to the population they immigrate into indicate the importance of routine screening of incoming refugees and utility of CDC refugee post-arrival screening and evaluation recommendations.

Hypotheses of the results

The prevalence of *Chlamydia* (1.12%) was well above the prevalence in Maricopa county in 2018 (0.6%) and statistically higher among the age group of 15-25 $p < 0.04$ and those among persons from the Middle East/ North Africa (2.0%) $p < 0.04$. On the other hand, the prevalence of Gonorrhea among incoming refugees was noted to be lower (0.19%) compared to Maricopa county census (0.2%) with no significance difference between various age groups and regions.

The above data indicates that certain regions and age groups have a higher rate of one of the selected STI's and should be screened more carefully. Although the current CDC guidelines recommend concurrent testing of Chlamydia and Gonorrhea in refugee women under the age of 25 and in symptomatic males (urethral discharge, dysuria, penile discharge), the prevalence of chlamydia and Gonorrhea were not statistically different among females and males. This suggests that additional screening even in asymptomatic males maybe helpful in detecting

Chlamydia and Gonorrhea among male refugee patients. The prevalence of seropositive syphilis among incoming refugees 55.5% (71 cases of 138) was higher when compared to the rate in Maricopa county 0.05% (52.28 for every 100,000).

The prevalence of HIV was statistically significant at 0.73% (80 of 11,018) $p < 0.001$ compared to Maricopa census 0.2% (12.2 per 100,000). The data used in this study was obtained from 2013 and represents the period which HIV was not an inadmissible factor to the United States and is no longer routinely tested overseas. However, the CDC highly encourages screening for HIV in newly arriving refugees and the data above shows a statistical significance of HIV higher rate among incoming refugees(22).

Comparison with other studies

The results of this study differ with previous study that showed substantially lower prevalence of Chlamydia (0.6% vs. 1.2%) but similar prevalence in Gonorrhea (0.2% vs. 0.19%) infections among incoming refugees in Minnesota(12). However, this study is first of its kind to analyze the refugee population in Arizona.

Limitations

This study had a few limitations. Only those refugees arriving in Maricopa County were included and they may not be representative of all refugee populations in Arizona. We were unable to obtain prior medical records of refugees who had already received antibiotic treatment prior to their arrival in the United States. Furthermore, not all refugees were tested for the same disease and as a result we were able to investigate the rate of co-infection among refugees.

The low number of patients tested for syphilis among the refugees in remains unclear (138/11,471). Only 1% of the overall population used in the study were tested for syphilis and therefore, the prevalence rate of syphilis may not be indicative of the general refugee population. Among those tested, there was high prevalence noted and this may reflect a selection bias toward those who were suspected of having the disease.

Policy implications

The results of this study indicate that the current domestic medical screening recommendations developed by the CDC are appropriate for all newly arriving refugee populations. Additional testing of other sexually transmitted infections included in the guidelines (Chancroid, Granuloma inguinale/donovanosis, Lymphogranuloma venereum, Genital herpes, Genital warts and Trichomoniasis) should also be evaluated.

In conclusion, this study found a higher prevalence of Chlamydia, HIV and Syphilis which suggests that incoming refugees to the United States have a higher rate than the population in which they settle in. It is important to screen refugees and we recommend the implementation of the CDC post-arrival screening and evaluation recommendations.

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