

2016-01-01

# Gender Differences in Risk Behaviors and Health Outcomes due to Methamphetamine Use in a Mexico-U.S. Border City

Priscilla Guevara

University of Texas at El Paso, [pguevara92@gmail.com](mailto:pguevara92@gmail.com)

Follow this and additional works at: [https://digitalcommons.utep.edu/open\\_etd](https://digitalcommons.utep.edu/open_etd)



Part of the [Public Health Education and Promotion Commons](#)

---

## Recommended Citation

Guevara, Priscilla, "Gender Differences in Risk Behaviors and Health Outcomes due to Methamphetamine Use in a Mexico-U.S. Border City" (2016). *Open Access Theses & Dissertations*. 656.  
[https://digitalcommons.utep.edu/open\\_etd/656](https://digitalcommons.utep.edu/open_etd/656)

This is brought to you for free and open access by DigitalCommons@UTEP. It has been accepted for inclusion in Open Access Theses & Dissertations by an authorized administrator of DigitalCommons@UTEP. For more information, please contact [lweber@utep.edu](mailto:lweber@utep.edu).

GENDER DIFFERENCES IN RISK BEHAVIORS AND HEALTH OUTCOMES DUE TO  
METHAMPHETAMINE USE IN A MEXICO-U.S. BORDER CITY

PRISCILLA GUEVARA

Master's Program in Public Health

APPROVED:

---

Oralia Loza, Ph.D., Chair

---

Thenral Mangadu, Ph.D., M.D., M.P.H.

---

Edward Castaneda, Ph.D.

---

Charles Ambler, Ph.D.  
Dean of the Graduate School

Copyright ©

by

Priscilla Guevara

2016

## **Dedication**

I would like to dedicate my thesis to my family and friends. I want to thank them for their continuous love, support, and for their never-ending encouragement while I worked on my thesis. I will never be able to express my sincere appreciation to both my parents. You've inspired me to continue and strive for a higher education. I would not be where I am today without your seeds of love and support.

GENDER DIFFERENCES IN RISK BEHAVIORS AND HEALTH OUTCOMES DUE TO  
METHAMPHETAMINE USE IN A MEXICO-U.S. BORDER CITY

by

PRISCILLA GUEVARA, B.S.

THESIS

Presented to the Faculty of the Graduate School of  
The University of Texas at El Paso  
in Partial Fulfillment  
of the Requirements  
for the Degree of

MASTER OF PUBLIC HEALTH

Department of Public Health Sciences  
THE UNIVERSITY OF TEXAS AT EL PASO  
December 2016

## **Acknowledgements**

I would like to extend my gratitude to my thesis mentor, Dr. Oralia Loza for her constant, unwavering direction and support. I am grateful for the skills you have instilled in me. It was an honor working alongside you these past two and a half years. Additionally, I would like to thank Dr. Thenral Mangadu and Dr. Edward Castaneda for challenging me and providing me with the necessary guidance to improve myself as a student. I want to thank Vulnerability Issues in Drug Abuse (VIDA) grant (NIH NIDA 1R24DA029989-01) for the support and training in substance abuse research between November 2014 and March 2015.

## Abstract

**BACKGROUND:** Methamphetamine (meth) is a stimulant known to affect the central nervous system (CNS). When individuals are under the influence of meth, their judgment is impaired which can lead them to make irrational decisions and engage in high-risk behaviors, such as having unprotected sex and needle sharing. Thus the behaviors of meth users can place them at high risk of contracting infectious diseases such as human immunodeficiency virus (HIV) and other sexually transmitted diseases (STDs). Few studies highlight gender differences in meth use, fewer studies address high-risk behaviors and health outcomes attributed to meth use by gender. El Paso, TX is on the border across from Ciudad (Cd.) Juarez, Chihuahua, Mexico. El Paso is at risk of a meth outbreak because of social dislocation, an established drug trafficking route, stimulant use patterns, and base of drug users. **AIM:** This study will (1) describe a randomly selected sample of meth users in terms of their sociodemographic characteristics by gender; (2) describe the patterns of use of meth and other drugs by gender; (3) describe risk behaviors and health outcomes of meth use by gender; and (4) determine gender differences in high-risk behaviors and health outcomes. **METHODS:** This is a secondary data analysis of a dataset from a cross-sectional pilot study among 150 current meth users age 21 years or older with a history of meth use in the 3 months prior to study participation; and living in Cd. Juarez at the time of the study. All participants had abstained from alcohol and drug use one hour before signing informed consent. Face-to-face interviews were conducted and included questions on sociodemographic characteristics, meth use and other drug use, as well as drug using and sexual

risk behaviors and health outcomes (physiological problems, psychological effects, infectious diseases, and other health outcomes) attributed to meth use. **ANALYSIS:** To assess the association between gender differences in these factors, univariate, bivariate, and multivariate analyses were tested for significance ( $p\text{-value} < 0.05$ ). Multivariate analyses were adjusted for age, marital status, type of participant, and duration of meth use. **RESULTS:** The sample population included 49 women, one trans-woman, and 100 men with a mean age of 30.9 years. Significant gender differences were noted for lifetime meth use. Men snorted meth more by nose (71.0% vs. 50.0%;  $p = .012$ ) and used higher rates of meth powder (70.0% vs. 48.0%;  $p\text{-value} = .009$ ), and rock (58.0% vs. 34.0%;  $p\text{-value} = .006$ ) than women/trans-women who more frequently used meth in pill form (72.0% vs. 55.0%;  $p\text{-value} = .045$ ). Men had higher rates of risk behaviors that persisted after adjustment, such as driving a vehicle after using meth (63.0% vs. 6.0%;  $p\text{-value} = .029$ ) and giving meth or money in exchange for sex (19.6% vs. 4.0%;  $p\text{-value} = .008$ ) than women/trans-women who consumed meth more with principal sex partner (42.0% vs. 21.0%;  $p\text{-value} = .013$ ). Regarding health outcomes, rates of paranoia or persecution delusion were higher for men than women/trans-women (67.0% vs. 50.0%;  $p\text{-value} = .014$ ).

**CONCLUSIONS AND RECOMMENDATIONS:** Given that Cd. Juarez is vulnerable to a meth outbreak, the findings of this study are useful in designing intervention programs to reduce the spread of meth use and its effects. Meth reduction programs and treatment centers along the Mexico-U.S. border, should address gender individually. Addressing self-image problems among women who report using meth in pill form can help reduce initiation into meth as a motivator to



lose weight. For men living along the Mexico-U.S. border region, applying a strong emphasis on family commitment during motivational interventions (MI) can encourage them to seek drug treatment to improve their own quality of life and of their families.

## Table of Contents

Acknowledgements.....	v
Abstract.....	vi
Table of Contents.....	ix
List of Tables .....	xi
Chapter 1: Introduction.....	1
Chapter 2: Background and Significance .....	4
2.1 Methamphetamine and its Use.....	4
2.2 Risk Behaviors Associated with Methamphetamine Use .....	18
2.3 Health Outcomes Associated with Methamphetamine Use.....	25
2.4 Paso Del Norte Region.....	29
Chapter 3: Goal and Objective.....	34
3.1 Goal and objective .....	34
Chapter 4: Study Aims and Hypotheses .....	35
4.1 Aims.....	35
4.2 Hypotheses.....	35
Chapter 5: Methods and Materials.....	36
5.1 Parent Study .....	36
5.2 Thesis Study.....	38
Chapter 6: Results.....	45
6.2 Gender Differences .....	56
6.3 Multivariate Analyses .....	59
Chapter 7: Discussion .....	61
7.1 Conclusions.....	64
7.2 Recommendations.....	64
7.3 Methodological Strengths and Limitations.....	64
7.4 Analytical Strengths and Limitations.....	66

Chapter 8: Strategic Frameworks.....	67
8.1 Healthy People 2020 .....	67
8.2 Healthy Border 2020.....	68
8.3 Paso del Norte Regional Strategic Health Framework .....	69
Chapter 9: MPH Core Competencies.....	70
9.1 Social and Behavioral Sciences .....	70
9.2 Epidemiology .....	70
9.3 Biostatistics .....	70
9.4 Hispanic/Border Health Concentration.....	71
References.....	72
Appendix 1 .....	78
Appendix 2.....	80
Appendix 3.....	80
Vita.....	81

## List of Tables

<b>Table 1:</b> Descriptive Statistics and Gender Differences in Drug Use Behaviors, Risk Behaviors and Health Outcomes among Current Meth Users in Cd. Juarez .....	45
--	----

## **Chapter 1: Introduction**

Methamphetamine (meth) and other drugs have been known to affect the economic and social development. They generate different forms of delinquency through the acquisition of drugs in the illegal market. They have also caused an increase in public health related costs when regarding the spread of infectious (e.g., HIV, hepatitis B (HBV) and hepatitis C (HCV)) and chronic diseases (e.g., cardiovascular, psychological effects) (Medina-Mora, 2013; United Nations Office on Drugs and Crime (UNODC), 2012). There is a low prevalence of meth use in the general public as compared to other substances (e.g., alcohol, marijuana) (Office of National Drug Control Policy, 2010). Meth use and impact vary within a location. For example, within treatment centers located in Mexican states, such as Sinaloa and Sonora, there is a high prevalence of use and a high meth impact (Villatoro, 2012). Meth is a stimulant with the potential to be highly addictive (National Institute on Drug Abuse (NIDA), 2013c). Meth was synthesized in 1919 from amphetamines, the parent stimulant (Foundation for a Drug-Free World, 2016; National Institute on Drug Abuse (NIDA), 2013c). Amphetamines were first developed in 1887 in Germany to treat asthma, sleep disorders, and hyperactivity (University of Washington, 2016). According to Foundation for a Drug-Free World (2016), meth was issued to Japanese Kamikaze pilots during World War II before suicide missions to keep them awake (Foundation for a Drug-Free World, 2016). After the war, meth abuse reached an epidemic of meth-induced psychosis when military meth supplies were made available to the Japanese public (Foundation for a Drug-Free World, 2016). During the 1950's, meth was prescribed as a diet aid and to fight depression in North America, Asia, and Europe (Foundation for a Drug-Free World, 2016; United Nations Office on Drugs and Crime (UNODC), 2012). Meth is a substance classified by the United States (U.S.) Drug Enforcement Administration (DEA) as a Schedule II

stimulant, a drug with a high abuse risk that can cause severe psychological and physical dependence, but safe for individuals with medical surveillance (Texas State Board of Pharmacy, 2014). People who have been diagnosed with attention deficit hyperactivity disorder (ADHD) and who need assistance losing weight (as a short-term component) can obtain meth legally only through a non-refillable prescription (National Institute on Drug Abuse (NIDA), 2013c).

Although meth can be prescribed, some individuals have taken it for recreational use. The illegal substance comes in different forms (e.g., pill, liquid, powder, rock, smoke) and can be used in several ways (e.g., taken by mouth, smoked, inhaled, snorted, injected, as suppositories) National Institute on Drug Abuse (NIDA) (2014b). Meth is also referred to as “ice,” “crystal,” “glass,” “speed,” and among other terms (National Center for Biotechnology Information, 2015; National Institute on Drug Abuse (NIDA), 2013c). The primary components of meth include pseudoephedrine or ephedrine, hydriodic acid, and red phosphorus (Dye, 2006).

Those who use meth experience a “dopamine rush” and repeated meth use leads to addiction (National Institute on Drug Abuse (NIDA), 2014b). Meth affects the central nervous system (CNS), causing molecular changes in the brain. The changes can lead to impaired judgment causing individuals to make irrational decisions. Meth users have shown to use poor judgment and engage in risky behaviors, such as sharing needles and partaking in unsafe sex (National Institute on Drug Abuse (NIDA), 2013b). Individuals who use meth encounter various health outcomes that can affect the person's body systems (e.g., cardiovascular, gastrointestinal, nervous, reproductive system) (National Institute on Drug Abuse (NIDA), 2013c).

Previous studies have shown that meth affects both genders differently, where risk behaviors and health outcomes are significantly distinctive (Brecht, O'Brien, von Mayrhauser, & Anglin, 2004; Dluzen & Liu, 2008). Studies found gender differences in use (Dluzen & Liu,

2008; McCabe et al., 2007), as well as risk behaviors (Liu, Wang, Chu, & Chen, 2013; Schindler, Bross, & Thorndike, 2002) and health outcomes (Dluzen & Liu, 2008; Polcin, Buscemi, Nayak, Korcha, & Galloway, 2012) as a result of meth use.

Few studies highlight gender differences in substance abuse, even fewer studies focus on meth use. Due to the high impact meth has, it is essential to identify meth use in areas of high concentration (Mexico-U.S. ports of entry) and report the risk behaviors and health outcomes of a unique population, such as those residing in a Mexico-U.S. border city by gender.

## **Chapter 2: Background and Significance**

### *2.1 Methamphetamine and its Use*

Meth is an amphetamine that stimulates CNS activity and is sympathomimetic, meaning that it mimics the sympathetic pathway by releasing neurotransmitters (e.g., epinephrine, norepinephrine) (National Center for Biotechnology Information, 2015; National Institute on Drug Abuse (NIDA), 2014b). The substance acts by facilitating the release of catecholamines (e.g., norepinephrine, dopamine, serotonin), from nerve terminals in the brain and by inhibiting their uptake in the synapse (National Center for Biotechnology Information, 2015). As a result of the inhibition of the uptake of the neurotransmitters, there is an increase in concentration in the synapse and leads to the stimulation of postsynaptic receptors (National Center for Biotechnology Information, 2015). Neuroimaging studies among meth users have demonstrated alterations in the activity of the dopamine system pathway, the pathway that plays a significant role in the regulation of reward and movement. When an individual abuses meth, dopamine, fails to bind to dopamine transporters in the striatum (i.e., the area of the brain that is important in memory and movement) (National Institute on Drug Abuse (NIDA), 2013d). The alterations to the dopamine system pathway have shown reduced motor speed and impaired verbal learning (National Institute on Drug Abuse (NIDA), 2013b, 2013d).

The parent drug, amphetamine, stimulates both the CNS and the sympathetic division of the peripheral nervous system (PNS). Amphetamines act by increasing the synaptic activity of dopamine and norepinephrine neurotransmitter systems (University of Washington, 2016). As the stimulant increases the synaptic activity of dopamine, there is an increase of the release of dopamine from the axon terminals. Amphetamines can also block dopamine reuptake into the synaptic cleft, which inhibits the storage of dopamine vesicles and inhibit the destruction of



dopamine by enzymes (University of Washington, 2016). The two drugs are closely related, however, despite their similarities, the two drugs have different levels of potency and work in somewhat different ways. Amphetamines and meth differentially affect dopamine transporters *in vitro* and *in vivo* (Goodwin et al., 2009). A study by Goodwin et al., (2009) found that meth (e.g., from Sigma-Aldrich company) is more effective than amphetamine in stimulating the dopamine transporter to release dopamine into the synaptic cleft, with longer lasting effects at comparable doses. The elevated dopamine in the nucleus accumbens has been reported in playing a role in the development of drug addiction (Kalivas, Volkow, & Seamans, 2005).

The use of meth can significantly impact the behaviors and health of individuals. There are several risk behaviors (Case et al., 2008; Cheng et al., 2010; National Institute on Drug Abuse (NIDA), 2013b; Roth et al., 2015; Shannon et al., 2011) and health outcomes associated with meth use (Dye, 2006; Roth et al., 2015; Sommers, Baskin, & Baskin-Sommers, 2006). Meth abuse brings forth many negative consequences, such as addiction (National Institute on Drug Abuse (NIDA), 2013d). Besides addiction, other long-term effects of meth may include, psychosis, changes in brain structure and function, deficits in thinking and motor skills, increased distractibility, memory loss, aggressive or violent behavior, mood disturbances, severe dental problems, and weight loss (National Institute on Drug Abuse (NIDA), 2013d). Those addicted to meth are compulsively seeking the substance and have functional and molecular changes in the brain (National Institute on Drug Abuse (NIDA), 2013d). Other complications or systems meth use affects are the cardiovascular, gastrointestinal, nervous, reproductive system (National Institute on Drug Abuse (NIDA), 2013c).

#### Availability of Methamphetamine

The availability of meth plays a significant role in initiation and use. The initiation and use of a drug vary in different regions. A particular area can cause individuals to become more vulnerable to substance abuse. The availability of meth in Mexico and the U.S. differs due to drug regulation, price, and meth production.

In Mexico, the first time meth was documented was in the 1990's (Ministry of Health, 2012). In 2003, Mexico experienced a rise in meth availability and then experienced a sudden drop the year after (Ministry of Health, 2011; United Nations Office on Drugs and Crime (UNODC), 2012). After 2005, Mexico became the main provider of meth to the U.S. The reason Mexico became the primary provider was because the components to make meth were regulated behind the counter in the U.S. and not in Mexico. The regulation of prescription drugs that contained the components in the U.S. created a demand in Mexico. A literature review by Medina-Mora et al., (2013) stated that between 2002 and 2008, the incidence of meth had increased six-fold, from 0.08% to 0.5% among those between 12 to 65-year-olds living in rural and urban areas in Mexico (Medina-Mora, 2013). A report by United Nations Office on Drugs and Crime (UNODC) found that meth was most seized in Mexico, worldwide. The same report indicated that from 2009 to 2010 meth seizures more than doubled, from 6 to 13 tons (United Nations Office on Drugs and Crime (UNODC), 2012). Also, the report revealed that the price of meth worldwide increased in 2002 to 2007, from 46.42 pesos (kilogram equivalence) to 65.54 pesos (kilogram equivalence). In 2008, the price of meth worldwide dropped to 58.59 pesos (kilogram equivalence). A year later, the price of meth increased to 70.41 pesos (kilogram equivalence) (United Nations Office on Drugs and Crime (UNODC), 2012). The sharp increase in price of meth worldwide may have been a result of the seizures that occurred in Mexico in 2009 to 2010 when the seizures more than doubled.

In the U.S., the availability of meth differs from Mexico mainly because of the federal drug control policies established. A literature review by Franco (2007) found that meth use increased in the 1990's and spread into the northwestern states. In 2000, meth use spread to the Midwest and South compared to the Northeast and Mid-Atlantic regions (Franco, 2007). After 2006 producers of meth in the U.S. found ways to avoid the Combat of Methamphetamine Epidemic Act (CMEA), a federal legislation that regulates the retail of over-the-counter sales of ephedrine, pseudoephedrine, and phenylpropanolamine, to reduce the illegal production of meth and amphetamine (Office of National Drug Control Policy, 2010; U.S. Department of Justice, 2007). As a result of finding ways around the act, the number of clandestine meth labs has increased in the nation (Franco, 2007). A report by UNODC (2012) found that half of the meth lab seizures worldwide, occurred in the U.S. In 2010, the same report stated that the U.S. had a total of 22 tons of meth seized (United Nations Office on Drugs and Crime (UNODC), 2012).

According to a 2010 report by the Office of National Drug Control Policy on meth lab clandestine seizures, the states greatly affected by meth were Indianapolis (1,198 meth labs), followed by Missouri (1,571 meth labs), and Kentucky (696 meth labs). States in the South near the border, such as California (203 meth labs), followed by Texas (153 meth labs), New Mexico (46 meth labs), and Arizona (11 meth labs) had fewer labs seized (Office of National Drug Control Policy, 2010). Different states take a different amount of effort when they act on meth lab seizures, therefore number of lab seizures by states will differ and may not necessarily accurately reflect actual availability of meth or production per state.

As meth seizures and lab clandestine seizures increase, Mexico and U.S. can expect a higher rate of initiation and meth use. Meth availability is difficult to quantify due to the limited research. Estimates on the availability of meth are possible due to data retrieved from meth lab

clandestine seizures, meth-related emergency department visits, and treatment center reports. From these reports, public health workers can indicate region(s) where meth use is a potential problem.

### Initiation into Methamphetamine Use

There are several contextual factors which contribute to the initiation into meth use. These factors include individual (e.g., behaviors, prior use of drugs) and social (e.g., family composition, friend influence, support system) factors. For public health reasons, once identifying what the factors are, it is important to identify the impact, prevalence of the region, and age in which initiation into meth occurs to create a specific intervention program.

The reasons for initiation into meth use varies. Some of the reasons are associated with individual adjustment and lifestyle and psychological and social problems. A study by Brecht et al., (2004) observed meth use behaviors and gender differences among those formerly in treatment for meth. They found the commonly reported motivators for initiating into meth use were to escape (24%), followed by replacing another drug (20%), better sex (19%), weight loss (19%), productivity for work (15%). A literature review by Maxwell and Rutkowski (2008) identified that women were more likely to start using stimulants to lose weight.

In the U.S., more than half of new illicit drug users started with marijuana, followed by prescription pain relievers, and inhalants (National Institute on Drug Abuse (NIDA), 2015b). In a similar way, Mexico has people initiate into meth after using another substance. A report by Epidemiological Surveillance System for Addiction [*Sistema de Vigilancia Epidemiologica en Adicciones*] (SISVEA) retrieved information from 70,467 people suffering from a drug addiction in 1,118 treatment centers in Mexico. The substances most commonly reported by the participants in Mexico were alcohol (49.1%), followed by tobacco (18.4%), and marijuana

(17.8%) (Ministry of Health, 2012). Among the drugs of impact, alcohol (used by 41.7% people); followed by cocaine (used by 14.8% people); marijuana (used by 11.7% people), and meth (used by 9.9% people) were reported (Ministry of Health, 2011). The same report looked into substances that people first initiated into. Of individuals who first initiated drug use with alcohol, 49.1% reported using alcohol and approximately 2.8%-7.6% used meth as a second or third drug. Of individuals who first initiated with marijuana, 17.8% reported using marijuana and approximately 13.1%-13.4% used meth as a second or third drug. Of individuals who first initiated with inhalants, 6.0% reported using inhalants. The data for using meth as a second or third drug was not reported among those who first initiated into inhalants. Of individuals who first initiated drug use with cocaine, 4% reported using cocaine and approximately 15.0% used meth as a second or third drug (Ministry of Health, 2011). Although meth was not among a common substance first initiated into, the report revealed that meth was among the top four drugs of impact (i.e., drug that led someone to go into treatment). Having meth among the top four drugs of impact in Mexico increases the concerns and epidemiological vigilance since meth is not a common substance that people first initiate into.

In regards to the location where initiation of meth is more prevalent in Mexico, a report in 2004 among 3,508, 641 who used illicit drug(s), revealed higher rates of initiation and impact in the northern regions. The report showed the northern region had a 3.9% of initiation into meth use and a 19.2% impact of meth compared to the south region of Mexico, where the initiation into meth use was 0.1% and use of impact was 0.2% (Instituto Nacional de Psiquiatría, 2004). According to the Ministry of Health (2011) in Mexico, the states with the greatest meth impact are Baja California, Baja California Sur, Sinaloa, and Sonora (Ministry of Health, 2011).

In the U.S., according to the Drug Enforcement Administration (DEA) (2015) report, an

age of initiation into meth use has been identified as early as 12 years old. The same report by the DEA (2015) found that between 2002 and 2006, the age of initiation into meth decreased from 18.9 years in 2002 to 12 years, four years later. Since then, the age of initiation into meth use has remained stable (Drug Enforcement Administration (DEA), 2015). Another study by Klasser and Epstein (2005) revealed similar results. A 2003 national survey on drug use and health indicated that 12.3 million Americans 12 years or older (5.2% of the population) had tried meth at least once (Klasser & Epstein, 2005). Identifying the age of initiation into meth use during adolescent years generates a public health concern because the brain is still in the development stage.

In regards to the age of initiation into meth use, Mexico has had a similar experience as the U.S. According to a literature review by Medina-Mora (2013), 65% of adolescents who reported using a drug initiated into a substance before 17 years old (Medina-Mora, 2013).

Identifying the factors for initiation into meth use can help lay a foundation for a successful treatment center. People who first initiate into other substances, live in northern Mexico, and are adolescents can be targeted since they are considered high risk for initiating into meth use.

### *Methamphetamine Use*

Meth use varies because of the availability and price. It also varies in drug use combinations and routes of administration.

According to UNODC (2012), about 230 million adults in the world have consumed at least one illicit drug since 2010. Illicit drug users are estimated to be about 27 million adults (0.6%) in the world. The report adds by stating that the trends of illicit drug use across the world

have been stabilized. Although the worldwide trends of illicit drug use have been stabilized, there is still a need to reduce the adverse effects of these substances.

There is a lack of information regarding the prevalence of meth use due to the small percentage of individuals who use illicit substances. As a result, few agencies provide an estimate of meth use in the U.S. However, NIDA (National Institute on Drug Abuse (NIDA), 2013c) reported 2006, 731,000 individuals were current meth users (used meth within the last 30 days). In 2012, NIDA indicated that approximately 1.2 million people used meth (National Institute on Drug Abuse (NIDA), 2013a). This information can lead to the monitoring of meth use to increase intervention programs and treatment admissions for meth abuse.

In Mexico, Villatoro et al., (2012) found that the prevalence of consuming any drug within a lifetime increased significantly at the national level between 2002 and 2011, from 5.0% to 7.8%. Meanwhile, the use of illegal drugs increased from 4.1% to 7.2%. At a regional level, the use of any drug increased significantly in the West and Northwest (5.5% to 10.3%), North Central (7.5% to 9.2%), and Central South (4.2% to 7.5%) regions. The use of illegal drugs had a significant rise especially in the Central South region from 3.5% to 6.8% (Villatoro, 2012).

Meth use rates have been thought to be primarily among vulnerable populations based on: low socioeconomic status, less education, belonging to a minority group, among minorities (e.g., Hispanics) gay/bisexual males, adolescents, homeless, runaway, street youth, and older adult arrestees (Brecht et al., 2004). A study by McCabe et al., (2007) among people in different race/ethnic groups who used illicit drugs identified drug use to be significantly higher among Whites (OR=1.86,  $p<.01$ ) and Hispanics (OR=2.14,  $p<.01$ ). When the researchers controlled for gender, the odds of past year of drug use were statistically significantly higher among Whites (OR = 2.12,  $p<.01$ ), Hispanics (OR = 2.37,  $p<.01$ ), and other races (OR = 1.35,  $p<.05$ )

compared to African Americans (McCabe et al., 2007). The Addiction Research Institute reports the annual prevalence of “speed” use was 0.1% for meth in Mexico in 2002 and 1.4% of “stimulants” in the U.S. in 2006. The institute found that users were primarily White meanwhile, the proportion of Hispanic users increased with injection drug use common in rural areas (Maxwell & Rutkowski, 2008). A study by Brecht et al., (2004) found the commonly reported motivators for meth use were to get high (50%), followed by for fun (45%), had friends that used meth (45%), energy (44%), experiment (41%), and stay awake (34%). These reasons for meth use can be targeted when individuals go into treatment and create a plan for recovery.

There is a limited amount of studies among Hispanics who use meth in the U.S. Few studies identify meth use in the Mexico-U.S. border. An example of a study that fills in the gap in Hispanic meth research is a study by Case et al. (2008).

The study by Case et al., (2008) on the U.S.-Mexico border, between two cities, Tijuana and Ciudad (Cd.) Juarez, Mexico recruited 20 people who inject drugs (PWIDs) residing in Tijuana and 23 PWID living in Cd. Juarez. What Case et al., (2008) researchers found was that PWID in Tijuana were more experienced with a diverse number of slang names for meth as compared to PWID in Cd. Juarez, Mexico. Both cities had different perception about the forms and ways of meth use (Case et al., 2008). The results from the study give an insight to public health workers and law officials of the availability of meth in Tijuana-San Diego region. A study in Los Angeles, CA, recruited 350 (29% Hispanic) meth users and found that the most common route of meth was snorting (44%), followed by smoking (34%), and injecting (20%) (Brecht et al., 2004). Teaching about the ways of routes of meth helps public health workers implement strategic plans to educate and promote among those who use substances.

Few studies have investigated racial and ethnic differences in drug use. Meth use studies



tend to combine ethnicities into vague categories. For example, grouping Mexicans and other Latinos who use meth into a Hispanic group does not allow for a clear understanding of how patterns of use differ by subgroups of Hispanics. The lack of agreement of how to categorize individuals into the correct subgroups may be due to the way the individual self-reports himself or herself. People classified as Hispanics come from different backgrounds and therefore can have different beliefs, and that can lead to differences in ethnicity, especially when it comes to Mexicans living in Mexico and Mexicans living on the U.S.-Mexico border.

### *Gender Differences in Methamphetamine Use*

The evolving epidemiology of meth use has directed research focus on specific risk behaviors, reasons for initiation, patterns of current use, and access or options for treatment.

In Mexico, the use of any drug has increased from 8.6% to 13% and the use of illegal drugs have increased from 8.0% to 12.5% among men (Villatoro, 2012). In the same study by Villatoro et al., (2012), researchers found that among Mexican women, the prevalence of any drug rose from 2.1% to 3.0%. For the drug of choice, both men and women ages 12 to 65 years of age in Mexico were found to use marijuana and cocaine for 2002, 2008, and 2011 (Villatoro, 2012). A 2008 survey, the National Poll of Addictions in Mexico found that female adolescents between 12 to 17 years old and female, young adults, between 18 to 34 years old were more likely to use any substance, meanwhile males were more likely to use a substance between 18 to 34 years old (Medina-Mora, 2013). Men who are between 26 and 65 years old have a higher incidence of amphetamines or stimulants use compared to women in the same age group. However, women, between the ages of 26 and 25 years old are more likely to use cocaine, crack, and then meth (Ministry of Health, 2011).

The use of meth among women has increased substantially over the past decade; several

studies have identified the impact of meth, especially among younger females (Brecht et al., 2004; Maxwell & Rutkowski, 2008). A cross-sectional study examined 350 male and female former meth users in Los Angeles, CA. The study by Brecht et al., (2004) identified women were consuming stimulants intentionally to lose weight (36%) as compared to men (7%). In the same study by Brecht et al. (2004), men were more likely than women to report work problems (70% vs. 48%), and high blood pressure (31% vs. 16%), and females were more likely to report skin problems (47% vs. 27%). Males were more likely than women to steal meth (24% vs. 11%), men were also found to sell meth within a month of use compared to females (52% vs. 17%) (Brecht et al., 2004).

Another gender difference study surveyed 5,298 adolescents and young teenagers, who were 8<sup>th</sup> and 11<sup>th</sup>-grade students in Oregon. The study found that females had self-reported prevalence rates slightly higher than those for males ( $p=.088$ ) (Embry, Hankins, Biglan, & Boles, 2009). In the study by Embry et al., (2009) female participants who had friends who engaged in antisocial behavior were more likely to use meth. Alcohol consumption was a significant covariate for meth use for males.

A literature review by Northeastern Ohio Universities College of Medicine found that women who initiated meth use at a younger age appeared more dependent on meth, and also responded better to treatment than men (Dluzen & Liu, 2008). In the same literature review by Dluzen & Liu (2008) men were more likely to use other drugs in the absence of meth. Another study that identified women were initiating earlier into meth was conducted in Shandong Province, China. The study by Liu et al., (2015) found that compared to males, female meth users started using meth at a younger age (mean: 24.3 vs. 31.3 years old), had higher frequency of meth use (3.6 vs. 2.4 times per week), however, females had a shorter duration of meth use

(mean: 2.6 vs. 2.9 years) (Liu et al., 2013).

A study conducted in California among 1,073 men and women meth abusers saw that women reported initiation of meth use at an earlier age (19.2 years old) than men (20.6 years old;  $p=.005$ ). The same study indicated that males and females used meth regularly for an average of 8.7 or 8.8 years ( $p=.80$ ), although not significant by gender, when it came to treatment, women reported significantly more visits for treatments for drug use ( $p=.008$ ) than men, especially patients in outpatient programs (i.e., drug-free non-methadone program) ( $p=.002$ ) (Hser, Evans, & Huang, 2005).

Gender differences have reported the initiation of drug use, the progression to addiction, withdrawal, and relapse (Oetting, Donnermeyer, Trimble, & Beauvais, 1998). In general, more men than women engage in drug use in the U.S. (Becker & Hu, 2008). Some reasons for gender differences in drug use are cultural. The gender differences in drug use may reflect differences in cultural norms and levels of acculturation beyond social demographic characteristics than in addiction to vulnerability to drug use (Oetting et al., 1998; Warner et al., 2006). Some researchers have highlighted the role of ovarian hormones that contribute to gender differences in substance use (Lynch, Roth, & Carroll, 2002).

The Hispanic ethnic group is comprised of different subgroups. Among these subgroups are those of Mexican ancestry (accounts for approximately two-thirds in the U.S.), Central and South American Hispanics (14.3%), Puerto Ricans (8.6%), Cubans (3.7%), and the remaining (6.5%) are of other origins (Amaro, Arevalo, Gonzalez, Szapocznik, & Iguchi, 2006). When it comes to the culture of those of Mexican ancestry, there are elements of traditions, values, and norms that reflect it. In the traditional Hispanic family, the family is the most important unit of any community. The family unit goes beyond the parents and children; it also

includes the extended family. In majority Hispanic families, the father is the head of the family; meanwhile, the mother is responsible for the maintenance of the household. Traditional Hispanic families have a moral obligation to provide support to other family members when they experience financial problems, unemployment, poor health, or other issues (Clutter, 2009; Oetting et al., 1998). The male gender roles have been coined “masculine” or “machismo.” Their role as “*machos*” is to promote aggression, expression of anger, and lack of sadness (Galanti, 2003; Kulis, Marsiglia, & Nagoshi, 2012). Among Hispanic women, their role is to be passive, compliant, and expressive of feelings without showing anger (Galanti, 2003; Kulis et al., 2012). There is a negative dishonor, especially with females in the traditional Latino family to abuse substances (Oetting et al., 1998). For example, it is more common for men to abuse substance as compared to women because it is seen as masculine (Warner et al., 2006).

The course or progression of drug addiction among women has been reported to be shorter as compared to men. A shorter addiction among women may be due to the role women play. Women tend to have more responsibilities (e.g., caregivers) at home. The use of any drug is highly discouraged among women because of the role women play in with caring and raising their children (Oetting et al., 1998) A study on the Mexico-U.S. border by Loza et al., (2015) observed meth users in Cd. Juarez and they found that among women, pill and powder forms of meth are seen as more socially acceptable as compared to injecting or smoking the substance. Meanwhile, among men, it was reported that they used "stronger" drugs or forms of the drug as compared to women (Loza et al., 2015). The ability to seek help outside the family is often not encouraged. Hispanic families are more hesitant to reveal issues of personal importance, such as substance abuse misuse (Long, 2013). This could be a characteristic of why males have a higher

rate of substance abuse as compared to women because seeking help might make them less “macho.”

Acculturation is not only affected at the individual level but at different levels, with peers, family, and community (Warner et al., 2006). At the personal level, attitudes and beliefs can change, and individuals are at greater risk when they are U.S.-born. Under stress of higher expectations of attaining the American dream. A study examines immigrants current lives with U.S.-born Hispanics, and they found that U.S.-born were in more distress (Kulis et al., 2012). Acculturation may increase the risk for substance use by changing Hispanic’s norms to traditional gender role (Kulis et al., 2012; Warner et al., 2006). Substance abuse by cultural factors can exacerbate male dominance and female simplicity. By observing these differences, we can help Hispanics when dealing with substance abuse issues.

When examining gender differences in drug use, it is important also to note the role hormones play that can cause an individual to be more susceptible to initiate and use meth. There are a few studies that highlight the role of ovarian hormones (e.g., progesterone, estrogen) and how they contribute to substance use. Reports indicate that females are more vulnerable to adverse health problems of drug use as compared to males (Carroll, Lynch, Roth, Morgan, & Cosgrove, 2004; Lynch et al., 2002; Substance Abuse and Mental Health Services Administration (SAMHSA), n.d.). Most reported findings are based on laboratory research in animals, but there are other reports from human clinical studies (Carroll et al., 2004). The study shows that higher estrogen levels contribute to substance abuse (Lynch et al., 2002). In animal models, estrogen was found to enhance drug-seeking behavior in all phases of drug addiction. For example, progesterone is reported to increase the release of dopamine. Similar results are observed in rats following repeated cocaine exposure and amphetamine-stimulated dopamine

release (Carroll et al., 2004). The study by Carroll et al., (2004) revealed that estrogen and progesterone produced the greatest release of dopamine levels in the nucleus accumbens (the pleasure center). The increase can be a result of the gender differences in which why women are becoming more vulnerable to substance abuse misuse, specifically in meth use.

The literature findings on gender differences can be used to create prevention strategies and interventions for men and women who use meth to reduce the physical, emotional, and social effects of the drug exposure. By using specific gender interventions, public health workers can target risk factors that cause women to be more vulnerable to initiate into meth use and encourage treatment. For men, specific gender interventions can also be used to reduce the likelihood of meth use, abuse, and its health effects.

## 2.2 Risk Behaviors Associated with Methamphetamine Use

There are several risk behaviors related to meth use. Meth users tend to engage in activities that can place them and others in danger when they are under the influence. Risk behaviors, such as sharing needle equipment, engaging in polydrug use, and not practicing safe sex are just a few behaviors that have been noted in literature among meth users (Case et al., 2008; Cheng et al., 2010; National Institute on Drug Abuse (NIDA), 2013b).

### Methamphetamine Using Risk Behaviors

The use of meth has various public health and medical implications. Due to the limitation of harm reduction programs in the U.S. (e.g., needle exchange programs) individuals have trouble finding new and sterile syringes they can use without placing themselves at risk for an infectious disease (Case et al., 2008).

One of the behaviors associated with meth use is the sharing of syringe equipment. PWID such as meth, place themselves at risk for human immunodeficiency virus (HIV), hepatitis B

(HBV), hepatitis C (HCV), and other STDs (Case et al., 2008; Gonzales, Marinelli-Casey, Shoptaw, Ang, & Rawson, 2006; National Institute on Drug Abuse (NIDA), 2013b). A study conducted in Tijuana, Baja California, Mexico discovered that among PWIDs, 80% of participants shared a needle with a spouse, family member, or someone they trusted (Strathdee et al., 2005). Even with a needle exchange program, not all pharmacies comply and distribute sterile syringes to their clients in an appropriate manner. IDUs from Tijuana reported having problems with the pharmacists either by being refused as a customer or being charged at a higher price (Strathdee et al., 2005). In one study conducted in Cd. Juarez and Tijuana, Mexico, even after being educated about harm-reduction strategies that influence syringe disinfection practices, a participant reported washing the needle only with water after sharing to treat the withdrawal symptoms (Strathdee et al., 2005). Ideally, the goal is to increase awareness and advocate for needle exchange programs as well as other evidence-based harm reduction efforts in the U.S. and increase programs in Mexico to reduce disease transmission among this group.

Another meth use risk behavior is polydrug use. Particular attention needs to be directed to this group, as over 40% of PWID, specifically meth are also known to inject an opioid as a second drug (Trujillo, Smith, & Guaderrama, 2011). A different study found that majority of PWIDs (e.g., meth) living in Cd. Juarez, Chihuahua, and Tijuana, Baja California reported injecting meth in combination with a depressant, such as heroin (Case et al., 2008). In an animal model, combining an opioid and a stimulant resulted in a synergistic effect on behavioral activity, which leads to the enhancement of the drug's effects (Trujillo et al., 2011). According to NIDA (2014a), heroin is known to regulate blood pressure, arousal, and respiration. Individuals who inject heroin report a surge of euphoria, dry mouth, the warm flushing of the skin, a heaviness of the extremities, and clouded mental functioning. The combination of these two

substances is unsafe because an individual will not be able to feel the extreme effects of either, thus not being able to tell if they are approaching lethal levels of the drugs (National Institute on Drug Abuse (NIDA), 2014a). Hence, individuals who combine drugs place themselves at risk for an overdose, an increase in cognitive impairment that increases their risk of engaging in risk behaviors that are attributed to STDs (National Institute on Drug Abuse (NIDA), 2013d).

Binge use is defined as the ability to use large quantities of meth for a period. Binge meth use is another factor that places an individual at risk of engaging in risk behaviors attributed to infectious diseases (National Institute on Drug Abuse (NIDA), 2013b). According to a study by Cheng et al., (2010) among 451 HIV-negative meth users compromised using large quantities of meth for a period. Participants consumed on average 9.4 g (SD: 17.4) of meth and 29.5% reported IDU and associated with binge use (OR: 1.9; 95% CI: 1.2, 2.9) (Cheng et al., 2010). The same report by Cheng et al., (2010) found that a subgroup of meth users binged to prolong the euphoria and delay the inevitable crash (Cheng et al., 2010). As a result of their meth binge (average: 6.6 days), participants experienced sleeplessness (95.4%), weight loss (87.4%), financial problems (87.4%), family problems (86.2%), and dehydration (81.6%) (Cheng et al., 2010). Meth binge use is associated with higher number of consequences (e.g., overdose, increase in risky sexual activity) (Cheng et al., 2010). Individuals run the risk of experiencing the physical, social, and psychological effects of meth. Public health workers and substance abuse treatment centers and programs should emphasize the negative consequences of meth use, binge, and polydrug use, and reduce the number of people who “experiment” with the stimulant.

Individuals who use meth also have an increase risk of engaging in criminal activities (Sommers et al., 2006). A study identifies that meth affects their decision-making while being under the influence (Chang et al., 2005). In 2009, the Ministry of Health (2011) in Mexico



conducted a study among 8,254 Mexican youth who committed infractions. The study asked participants what substance they were under the influence at the time of the violation and found that less than half (48.8%) reported being under the influence of meth when the infraction occurred (Ministry of Health, 2011). Of those who reported meth use, 79% used it daily, 8.5% reported use two to three times per week, 7.3% reported once a week, 3.9% one to three times per month, and 1.3% said one to eleven times per year (Ministry of Health, 2011). The most common type of infraction these individuals were accused of included, stealing (66.7%), possession of a controlled substance while armed (43.3%), and the crime against health (12.4%) (Ministry of Health, 2011). Another study by Sommers et al., (2006) linked meth use to crime. The study recruited 205 meth users residing in Los Angeles who had committed crime. Results revealed that 55 reported committing a crime while under the influence of meth. Overall, the 55 respondents reported 80 separate violent events while using meth. Of these 80 events, 51.4% acts of violence involved domestic relationships, 28.6% of the violent events were drug related, 8.6% were gang related, and 11.3% committed random acts of violence (e.g., road rage, stranger assault) (Sommers et al., 2006). These studies support the literature, which indicates that binge and meth use negatively affects a person's individuals' physical, social, and psychological well-being.

### *Sexual Risk Behaviors*

Individuals who use meth have a high prevalence of engaging in sexual risk behaviors such as having multiple sex partners and unsafe sex. Binge meth use is associated with engaging in unprotected vaginal intercourse with anonymous or steady partners (Cheng et al., 2010; Springer, Peters, Shegog, White, & Kelder, 2007). There are different risk groups. The group's literature highlights are men who have sex with men (MSM), female sex workers (FSW), and

heterosexual populations who have multiple sex partners (National Institute on Drug Abuse (NIDA), 2013b).

Individuals who use meth have been known to increase libido leading to the increase in sexual partners and participation in marathon sex (Brecht et al., 2004). Because those who use meth experience judgment-altering functions, the intoxicating effects can lead people to engage in unsafe sex practices such as having the greater number of partners and decreased condom use (Brouwer et al., 2006). The practice of unsafe sex has been known to increase the risk of contracting or transmitting HIV, HCV, and other STDs (Brouwer et al., 2006; Klasser & Epstein, 2005; National Institute on Drug Abuse (NIDA), 2013b).

Meth use has been associated with higher number of sex partners and other risky sexual behaviors (Brecht et al., 2004; Cheng et al., 2010). Among current meth binge users who used meth on average for 6.6 days, 30.6% of participants reported using meth to “enhance sex or meet sex partners” (Cheng et al., 2010). Compared with non-binge users, binge meth users on average had 4.7 sex partners (SD: 6.1), 93.1% had a spouse or steady sex partner, and 88.9% had casual or anonymous sex partner (Cheng et al., 2010). Those who had used meth had increased odds of unprotected vaginal sex with a casual or anonymous sex partner (OR: 1.6; 95% CI: 1.1, 2.5), unprotected anal sex with a spousal or steady sex partner (OR: 1.6; 95% CI: 1.1, 2.4). Also, those who used meth had an increase odds of engaging in marathon sex while high (OR: 1.7; 95% CI: 1.1, 2.6) (Cheng et al., 2010). A national risk behavior survey among high school students found that those who used meth one time or greater had approximately two to 11 times increased likelihood of engaging in sexual risk behaviors (Springer et al., 2007).

Participants who reported using meth were significantly more likely to report engagement in sexual risk behaviors. Data revealed those who used meth had increased odds of having sex

with 4 or more individuals during a lifetime (OR: 8.3; 95% CI: 6.0, 11.6) and not using a condom during intercourse (OR: 1.8; 95% CI: 1.4, 2.4) (Springer et al., 2007). Another study, a cross-sectional study conducted in China provided evidenced where meth use has a strong association of engaging in sexual risk behaviors. Of 1,434 participants, 77.2% of participants had used meth in their lifetime. About half (52.6%) of drug users reported having sex after using club drugs. Among those who engaged in sexual activity after drug consumption, 79.8% had unprotected sex in the past year, and 75.2% had two or more sexual partners (Bao et al., 2015). The odds of engaging in sexual risk behaviors are higher among individuals who use meth. Thus, binge and meth use should be addressed in addition to safe sex practices to reduce the risk of people being infected with any infectious disease when they engage in any sexual activity, regardless of the age or country.

Meth use sexual risk behaviors have been well described among MSM, FSW, and heterosexuals who have multiple sex partners. The MSM populations have been associated with low rates of condom use, high levels of unprotected sex, prolonged sexual activity, multiple sex partners, and casual partners (Liu et al., 2013). A study in China that observed gender differences in the characteristics of non-injecting heterosexual meth users found that males had significantly higher proportions of having sex with multiple partners during meth use as compared to females (96.9% vs. 77.3%;  $p<0.05$ ) (Liu et al., 2013). In the same study, among 277 men who had sex with FSW, 69.4% never used a condom. Data also revealed that among 77 men who had sex with multiple partners who are FSW reported always or usually using condoms. Of those who had sex with FSW, majority never changed condoms when changing partners (87.0%) (Liu et al., 2013).

A study by Fletcher and Reback (2015) observed the risk behaviors of meth treatment-seeking gay and bisexual men. The study found that patients who experienced depression

indicated an increase in sexual risk behaviors (e.g., unprotected anal intercourse) (Fletcher & Reback, 2015). Researchers found that participants' meth use during the treatment period had a significant indirect but no direct or total effect on participants' sexual risk taking after accounting for the significant mediating and moderating effects of depression (Fletcher & Reback, 2015).

There is an association with elevated sexual risks, number of sexual partners, unprotected sex, and transactional sex among women. (Shannon et al., 2011) A study among FSWs in a Canadian setting found that FSW had an HIV prevalence of 23% with no statistically significant difference in the likelihood of meth use by HIV status ( $p=0.83$ ). FSW reported a mean of 12 and a median of six clients per week (IQR: 3-15), not having a significant difference in the number of customers by meth use among FSWs ( $p=0.38$ ) (Shannon et al., 2011).

Due to limited studies in risk behaviors attributed to meth use, studies worldwide have been reviewed to identify what behaviors each gender engages in while using the substance. To have successful meth reduction programs, specific gender interventions will need to take into account the different behaviors that each gender practices. Regardless of the region, studies show similar risk behaviors among meth users and that information can be applied for public health purposes. For example, street-based sex workers who use meth can be enrolled in a program that can focus on reducing the spread of HIV and other infectious diseases by teaching them about safe sex practices. Meth treatment centers and programs can promote and encourage safe sex practices with high risks populations, such as MSM, street-based sex workers, and those who have multiple sex partners. Providing each group with emotional support (especially among MSM and bisexual me) can guide them with the partnerships they encounter when they use meth.

### 2.3 Health Outcomes Associated with Methamphetamine Use

There are several short-term and long-term health outcomes associated with meth. However, other health outcomes may be associated with other health-related issues, due to withdrawal symptoms or the effects of combining drugs (National Institute on Drug Abuse (NIDA), 2015a). Meth directly affects physiological processes because of its toxic components, which lead to biochemical alterations that regulate neuronal function (Dye, 2006; National Institute on Drug Abuse (NIDA), 2013d).

#### *Physiological Problems*

There are several physiological problems due to meth use. Each meth user may experience various symptoms including cardiovascular (e.g., increase heart rate and blood pressure, vasoconstriction), neurological (e.g., impulsivity, punding, hallucinations, tremor, choreoathetosis, dystonias, ataxia, and gait disturbances, agitation, hallucinations, altered mental status, movement disorders, headaches, and seizures, euphoria, increase energy, alertness, libido, anxiety, increased locomotor activity, stereotypical movements, hyperthermia), respiratory (e.g., bronchodilatation), endocrine system (e.g., hyperglycemia), and gastrointestinal (e.g., suppress appetite) (Asser & Taba, 2015; Dye, 2006). Those who reported bingeing on meth (6.6 days), 85.6 % of the participants experienced physical problems such as lesions, dehydration, or diarrhea (Cheng et al., 2010).

There is sufficient clinical and experimental evidence to suggest that meth can have adverse and potentially fatal effects on the cardiovascular system. A literature review indicates that meth users are at elevated risk of cardiac pathology. The risk of heart pathology is greatest among chronic meth users due to how meth use is likely to exacerbate the risk of heart pathology and may, therefore, lead to premature mortality (Kaye, McKetin, Duflou, & Darke, 2007). Because meth causes chemical changes that result in sympathetic stimulation, an increased heart

rate and blood pressure occurs (Dye, 2006). Other cardiovascular symptoms an individual can experience includes hypertension, tachycardia, chest pain, dysrhythmias, cardiomyopathy, and myocardial infarction (Dye, 2006). Ho et al., (2009) indicates that meth use has no association with ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage, especially among young patients (Ho, Josephson, Lee, & Smith, 2009). In the same study, meth was not associated with the ischemic stroke due to an inflammatory etiology, but believe it is due to a process of accelerated atherosclerosis (Ho et al., 2009).

Methamphetamine use among women who are pregnant is another health concern. In the U.S., about 6.5% of all females over the age of 12 years old and 5% of pregnant women between 15 to 44 years old have reported illicit substance use, including meth (Diaz et al., 2014).

Prenatal exposure to meth use include gestational hypertension, preeclampsia, pre-term birth, low birth weight, abruption, intrauterine fetal death, neonatal death, infant death, jaundice, and gestational diabetes mellitus. A retrospective cohort study in California that included women with pregnancies that were associated with meth use found that children who were exposed to meth had significantly greater odds of gestational hypertension (OR: 1.8; 95% CI: 1.6, 2.0), preeclampsia (OR: 2.7; 95% CI: 2.4, 3.0), intrauterine fetal death (OR: 5.1; 95% CI: 3.7, 7.2), and abruption (OR: 5.5; 95% CI: 4.9, 6.3) (Gorman, Orme, Nguyen, Kent, & Caughey, 2014).

Additionally, the patients had significant higher odds of preterm birth (OR: 2.9; 95% CI: 2.7, 3.1), neonatal death (OR: 3.1; 95% CI: 2.3, 4.2), and infant death (OR: 2.5; 95% CI: 1.7, 3.7).

Meth use during pregnancy was found to be associated with specific patterns of increased maternal and fetal morbidity and death (Gorman et al., 2014). It is important to educate potential mothers about the dangers of meth use due to the impact it has on their child. Public health workers can reach potential mothers who are in treatment for an illicit substance and drug test

mothers at a health clinic to educate on the effects of meth during pregnancy, reproductive health, and safe sex. Thus, officials can reduce the cognitive problems and negative behavioral outcomes of prenatal exposure to meth use.

The physiological problems of meth have been highlighted by several publications most of which are studies conducted among individuals who are currently in treatment for meth and not in health care or clinical settings where health outcomes could be diagnosed. The proposed study aims to fill in the gap in the literature regarding self-reported physiological problems among meth users in Cd. Juarez, Chihuahua, on a Mexico-U.S. border city.

### *Psychological Effects*

Several studies identify the effects of an individual's brain on meth. Meth use causes significant changes to the CNS. A brain on meth is known to release dopamine, to the nucleus accumbens, the pleasure center (National Institute on Drug Abuse (NIDA), 2013b). The manufacturing of the nerve cell bodies located in the ventral tegmental area increases the production of dopamine (National Institute on Drug Abuse (NIDA), 2013b). Psychological effects observed with methamphetamine use include euphoria, paranoia, agitation, mood disturbances, violent behavior, anxiety, depression, and psychosis.

Independent meth abusers, impairment of learning, executive functions, and information processing is identified (Asser & Taba, 2015). A study by the Department of Psychiatry and Behavioral Neuroscience at the University of Chicago tested the executive functions among meth users, and found that when meth was administered at an encoding process of the study resulted in enhanced memory accuracy among those with adequate sleep (Ballard, Weafer, Gallo, & de Wit, 2015). Although we can see that brain activity was impaired, we also have to take into consideration the length of meth use to make that distinction.

Another neurological alteration seen among meth users has been psychosis. Psychosis, is common among chronic meth users, especially seen during withdrawal (Scott et al., 2007). Residual psychotic symptoms include vermiform hallucinations. A qualitative study recruited meth addicted patients with psychosis and interviewed them in hospitals of Iran. Patients with psychotic disorder due to meth showed rare symptoms that had been mostly reported in psychosis (Ghaffari-Nejad, Ziaadini, Saffari-Zadeha, Kheradmand, & Pouya, 2014).

### *Infectious Diseases*

Meth use is predominantly associated with infectious diseases such as HIV and HCV due to engaging in risk behaviors.

A study examined HIV-related high-risk sexual behaviors among 16 meth abusing gay males who participated in a treatment demonstration project. Researchers found a strong connection between meth abuse and high- sexual risk behavior. A year before treatment, 62.5% of participants reported having anal sex without a condom, and 56.3% reported having sex with someone who had HIV (Frosch, Shoptaw, Huber, Rawson, & Ling, 1996). Drug use before or during sex, measured on a 5-point Likert scale was frequently reported (M: 4.27, SD: 0.7) (Frosch et al., 1996). What this informs us is that more interventions need to be created to target high-risk populations such as MSM group. The intervention can help to reduce the rate of HIV transmission and infection.

There has been little research on the relationship between HCV and meth use in the transmission of the virus. A study examined the prevalence of HCV among a sample of 723 meth dependent individuals who sought outpatient treatment. Among the 723 participants, 15% were infected with HCV and 44% of those who reported as “injectors” were infected with HCV. Researchers found that HCV was more associated with injection drug use and older age



compared to participants who did not inject and younger aged participants (Gonzales et al., 2006). A study conducted among street-involved youth in Canada found that, after adjusting for age, engaging in sex work, experience sexual abuse, and ever injected drugs, the sole factor remaining associated with HCV status was ever injecting drugs (AOR: 26.9, 95% CI: 9.5–75.7) (Miller, Kerr, Fischer, Zhang, & Wood, 2009).

There is a need to creating interventions to help reduce the spread of infectious diseases (e.g., HIV, HCV) among groups who are at high risk (e.g., unprotected sex practices, multiple partners, MSM, FSW). Special interventions need to cater to each group due to the different risk factors each group encounters. Identifying the contextual factors that lead them to become a great risk is the key to prevention for these groups.

#### 2.4 Paso Del Norte Region

El Paso County, Cd. Juarez, and New Mexico are located in the U.S.-Mexico border in the Paso del Norte region.

##### *El Paso*

The City of El Paso, Texas (TX) is home to 851,883 individuals, nearly half of the population is male (48.9%) and 80.0% people report as "Hispanic/Latino" according to the Healthy Paso del Norte. In 2010, the population increased by 7%. The 2015 median household income in El Paso is \$43,132, and the average household income is \$59,576. In 2015, 20% of families in El Paso were living below the poverty level (Healthy Paso del Norte, 2015; UTEP Center for Interdisciplinary Health Research and Evaluation, 2011). El Paso, TX is the sister city of Cd. Juarez, Chihuahua, Mexico.

##### *Ciudad Juarez*

Cd. Juarez, Chihuahua, Mexico is a metropolitan area that is located South of West

Texas. The city is the second most populated, after Tijuana, Baja California. In 2010, the population was 1,332,131 (UTEP Center for Interdisciplinary Health Research and Evaluation, 2011). In 2009, 3,485,093 individuals resided in Chihuahua, Mexico (Interior & (SEGOB), 2009).

### *Drug Trafficking*

The production of meth is imported from in private homes or from superlabs (Drug Enforcement Administration (DEA), 2015). The synthetic substance is mostly manufactured in Mexico and distributed to the U.S., where Mexican transnational criminal organizations (TCOs) use established transportation routes and distribution networks such as the Southwest Border (Drug Enforcement Administration (DEA), 2015). The component of meth was quickly retrieved from over-the-counter medication until 2005 in the U.S. (Dye, 2006). According to the "Combat Methamphetamine Epidemic Act of 2005," all cold and allergy medicines that contain pseudoephedrine, requires costumers to purchase the product behind the counter with a photo identification while limiting the supply and keeping a record of purchase (U.S. Food and Drug Administration (FDA), 2014). After the act was passed, home production of the substance decreased in the U.S. and increased importation was seen from Mexico (Dye, 2006). As a result of the stricter laws, approximately 35% was produced in private home labs and 65% from Mexican cartels (Dye, 2006).

Changes in the production of meth lead to variations in the availability in both sides of the region. Several major Mexican TCOs facilitate the smuggling and transportation of illicit drugs, including meth, into the U.S. A local active TCO found in Cd. Juarez is the "Juarez Cartel" (Drug Enforcement Administration (DEA), 2015). Of the eight Mexican TCOs, the Sinaloa Cartel appears to be the most active supplier, controlling 70-90% of meth production and

distribution in the U.S. (Brouwer et al., 2006; Drug Enforcement Administration (DEA), 2015). Mexico's super labs can produce over 12 pounds (18,000 quarter gram doses) of meth every day, where more than \$50,000 is made per day (Dye, 2006). Majority imports from Mexico's superlabs come in the form of "crystal" or "ice" with a purity that ranges from 75% to 90% (Dye, 2006). According to the DEA, the availability of meth has increased in the U.S. by 33%, the reason for the availability was not mentioned. The substance has been ranked as the greatest drug threat in the Southwest region (69.7%) compared to West Central (66.5%), and Pacific (55.4%) regions of the U.S. (Drug Enforcement Administration (DEA), 2015). This increase of distribution and abuse of meth have contributed to violent and property crime rates in the U.S. (Drug Enforcement Administration (DEA), 2015). In 2014, El Paso DEA seized 238kg of meth, reporting a 245% seizure increase compared to 2013 (Drug Enforcement Administration (DEA), 2015). Such report did not acknowledge if there was an increase in efforts or because more meth was available.

One of the ports of entry (POE) for meth is the El-Paso-Cd. Juarez international bridge. In the region, the TCOs trafficking methods include using passenger vehicles or tractor-trailers when crossing over the Southwest Border international bridges. The Cd. Juarez-El Paso international bridge is the second largest POE into the U.S., after Tijuana, Mexico-San Diego, CA (U.S. Customs and Border Protection, 2015). The proximity between El Paso, TX, and Cd. Juárez, Chihuahua, facilitate border crossings between these two cities with a total of 39,200,816 crossings in 2014, accounting for pedestrians, personal vehicles, and passengers, and buses, train and passengers, empty and loaded rail containers, trucks, and empty and loaded truck containers (U.S. Department of Transportation, 2015). The high foot and vehicle traffic in the region is a threat to public health and law officials since meth has been previously stored in hidden

compartments when transported or are commingled with goods when transported in tractor-trailers (Drug Enforcement Administration (DEA), 2015).

The increase in meth purity may have an impact on the use and associated risks. The Department of Family and Community Medicine at the University of Arizona used a federal agency-submitted acquisitions submitted to (System to Retrieve Information from Drug Evidence) STRIDE, an administrative data system for drug evidence data acquired during DEA investigations, between 1990- 2004. The study examined whether the proximity to the U.S.–Mexico border (the U.S.’s primary drug import portal) was associated with geographic variation in U.S. meth, heroin and cocaine purity. Results showed that meth rose during 1990-1994, decreased with distance from the U.S.-Mexico border during 1995-1999, and increased again during 2000-2004 (Cunningham et al., 2010). Areas closer to the U.S.–Mexico border had relatively high illicit drug purity and more dynamic change in the purity of small drug amounts, compared to places further from the border (Cunningham et al., 2010). Another study by Cunningham et al., examined the impact of meth purity in the U.S. The researchers found that the overall median purity for meth was 44%. The methamphetamine purity exhibits increased from 7906 during 1985–89 to 28 341 during 2000–May 2005. Of the methamphetamine exhibits, were from the Southwest (42.8%), Northwest (19.1%), Midwest (13.9%), and South (9.6%). The Southwest had 70.1% of the total continental U.S. meth between 1985–1989 and 31.9% during 2000–May 2005 (Cunningham, Liu, & Callaghan, 2009). Changes in meth purity may have an impact on risk behaviors and health outcomes as it can foster the drug consumption.

According to a study on the use of injected meth in Tijuana and Cd. Juarez. Case et al., (2008) and other researchers hypothesized an equation of risk. The equation of risk has 4 elements that can reveal an emerging meth epidemic that renders communities more vulnerable

to an outbreak. The four elements include social dislocation this can include through war, poverty, economic disparities, natural disasters, or internal or external migration, a ready supply of methamphetamine through proximity to local manufacture or established drug trafficking routes, an established stimulant use patterns, and an established base of drug users. Each element of this hypothesized equation of risk is satisfied in Tijuana. The same equation is hypothesized for Cd. Juarez. The reason for this is each element has been detected, leading to a potential meth outbreak. Which is why meth use research should be addressed to reduce the risk of an outbreak.

## **Chapter 3: Goal and Objective**

### **3.1 Goal and objective**

The goal of the study was to understand the impact that meth had on individuals' health on the Mexico-U.S. Border. The objective of the study was to determine gender differences in risks behaviors and health outcomes among a predominantly Mexican sample of current meth users in Cd. Juarez.

## **Chapter 4: Study Aims and Hypotheses**

### 4.1 Aims

The aims of the proposed study were to:

*Aim 1:* Describe the sample of meth users in terms of their sociodemographic characteristics by gender.

*Aim 2:* Describe the patterns of use of meth and other substances by gender.

*Aim 3:* Describe risk behaviors and health outcomes attributed to meth use by gender.

*Aim 4:* Determine gender differences in drug use patterns, risk behaviors, and health outcomes attributed to meth use.

To address aim 4, the following hypotheses assessed the association between individual risk behaviors and health outcomes and gender.

### 4.2 Hypotheses

*Hypothesis 1:* There are gender differences in the following individual risk behaviors: men have higher rates of risk behaviors (lifetime risk behaviors and recent risk behaviors (past 12 months (mos.))) and sexual risk behaviors (lifetime sexual risk behaviors and recent sexual risk behaviors (past 12 mos.)) compared to women/trans-women.

*Hypothesis 2:* There are gender differences in the following individual health outcomes attributed to meth use: men have higher rates of physiological problems, psychological effects, infectious diseases, and other health outcomes compared to women/trans-women.

*Hypothesis 3:* Significant bivariate gender differences in the risk behaviors will persist after adjusting for age, marital status, type of participant, and duration of meth use.

## Chapter 5: Methods and Materials

### *5.1 Parent Study*

The parent study for this proposed study entitled “Social and Contextual Vulnerability on the U.S.-Mexico Border” or the “METH Pilot Study” was a pilot study under the UTEP “Vulnerability Issues in Drug Abuse (VIDA) Project,” a NIDA funded study. The aim of the study was to determine contextual individual (curiosity, prior use of other drugs), social (family composition, intergenerational drug use), and structural (health delivery system, law enforcement) factors associated with the initiation and progression of meth use in Cd. Juarez, Chihuahua Mexico.

### *Study Participants*

The eligibility criteria for the study participants included (1) age 21 years or older, (2) meth use in the past 3 months, (3) living or spending time in Cd. Juarez, and (4) who had abstained from alcohol and drugs one hour prior to signing informed consent.

### *Sample Size*

The “METH Pilot Study” recruited a total of 150 meth users in Cd. Juarez, Chihuahua, Mexico who meet the eligibility criteria and agreed to participate in the study.

### *Target Sample*

For the study, in order to achieve a well represented sample, the outreach workers targeted participants based on: age (50% 21-30 year olds, 31 and older), gender (33.3% women/transgender women, 66.6% men), types of participants (25% employees, 25% students/party scene, 50% drug-using community), and 50% cross-border mobility within the last 12 months (mo.) (yes, no). The personnel from the study targeted employees from *maquilas* and truck driving agencies, students and people in party scenes, and the drug-using community included



sex workers, and injection drug users. The actual distributions of participants interviewed were presented in the analysis.

### *Study Design*

The parent study was a cross-sectional study, hence data was collected at one time point. The interview included a quantitative and qualitative component. The qualitative measures were focused on initiation into meth. All other measures were collected quantitatively.

### *Data Collection*

The parent study hired personnel from Programa Compañeros to recruit and collect data in Cd. Juarez. The personnel, two-outreach workers, who had experience with marginalized populations, such as people who use drugs, used a snowball sampling to recruit participants. Potential participants were screened before the interview to identify if the individual meet eligibility criteria for the study. Participants who were eligible were given an informed consent form and were notified about their privacy prior to the interview. After participants agreed to participate and signed the informed consent form, the personnel from Programa Compañeros administered the questionnaire in the language of preference of the participant, using face-to-face interviews meanwhile the interview was recorded. A \$30 U.S. incentive was given to each participant who completed the questionnaire. In addition, participants were given brochures on drugs, STIs, and HIV prevention and prevention kits. The team who monitored the participants included personnel from Programa Compañeros, Alliance of Border Collaborative (ABC), and UTEP faculty.

### *Instrument*

The instrument was an adapted questionnaire comprised of sources of several instruments previously developed or used by Dr. Michele Shedlin (NYU College of Nursing), Dr. Carlos

Magis (former Director of Research at the National Council of Prevention and Control of AIDS for Mexico's Ministry of Health), and Dr. Josiah M. Heyman (UTEP faculty). The instrument also contained questions from the Screening and Intervention Programme for Sensible Drinking (SIPS) and Rapid Alcohol Problems Screen (RAPS4). These instruments were modified to focus on meth use and translated into Spanish, as needed. The parent study instrument assessed sociodemographic characteristics, cross-border mobility, imprisonment, meth terms use to refer to meth and combination use, contextual factors of meth use, initiation into meth use and other drug use and combination use, drug treatment, health and risk behaviors of meth, injection drug use and syringe sharing, sexual risk behaviors, and early detection of infection diagnosis.

#### *IRB Approval*

The UTEP Institutional Review Board (IRB) approved the, "Social and Contextual Vulnerability on the U.S.-Mexico Border: METH Pilot Study," through August 19, 2016. The Department of Social Services of Chihuahua approved the study in Mexico. The principal investigator (PI) of the study is Dr. Oralia Loza, PhD (UTEP College of Health Sciences, Department of Public Health), the Co-PI's are Dr. Joao Ferreira-Pinto, PhD (UTEP College of Health Sciences), Rebeca Ramos, MA, MPH (Alliance Border Collaboratives (ABC), and Maria Elena Ramos, BA, (Programa Compañeros, A.C.). The approval, IRB reference number: 164832-6, is based on a study design where risks were minimized and the study used an appropriate risk/benefit ratio to identify contextual influences on meth using behaviors located in Cd. Juarez, Chihuahua, Mexico.

#### 5.2 Thesis Study

This study is a secondary data analysis of the data collected in the "METH Pilot Study."

#### *Measures*

The following measures from the parent study were used and organized as follows: sociodemographic characteristics, meth use (lifetime meth use, recent meth use (past 12 months (mos.)), recent amphetamine use (past 12 mos.), other substance use (lifetime substance use), risk behaviors attributed to meth use (lifetime and recent (past 12 mos.) risk behaviors), sexual risk behaviors attributed to meth use (lifetime and recent (past 12 mos.) sexual risk behaviors), and health outcomes attributed to meth use (physiological problems, psychological effects, infectious diseases, and other health outcomes).

### Sociodemographic Characteristics

The sociodemographic characteristics of the sample included age, sex or gender (woman, man, transgender woman (from male to female), transgender man (from female to male), intersex, other), and sex at birth (male, female). Participants were also asked for their marital status (single, married/common law, divorce, separated, widowed), their highest level of education completed (elementary, middle school, high school, technical career, university) for those who studied, and monthly income in the last year (nothing, less than \$80.00 USD, \$80.00 - \$119.92 USD, \$120.00 - \$159.92 USD, \$160.00 - \$199.92 USD, \$200.00 - \$239.92 USD, \$240.00 - \$279.92 USD, more than \$280.00 USD).

Participants were also asked for their place of birth (México, U.S., other country) and if they were currently living in El Paso. To identify cross-border mobility, participants were asked if in the last 12 mos. they crossed the border into the U.S and to El Paso and if their reason for crossing to El Paso was for drugs.

### Meth Use

To describe the meth use of the sample, participants were asked to report age at first use of METH. Since first use, participants reported the ways (ingested/taken by mouth, smoked,

inhaled through nose, snorted by nose, injected, anally, other way) they consumed, forms (tablet/pill, liquid, powder, rock, smoke, other form), and works (nothing, pipe, light bulb, syringe, straw, foil, other) used to consume METH.

Participants were asked if they consumed (ingest/taken by mouth, smoked, inhaled through nose, snort by nose, inject, anally, other way) METH in the past 12 mos. If so, participants reported age at first use and the amount of different people they used METH with.

#### Other Substance Use

Participants reported if they had used any of the following drugs in combination with METH in the past 12 mos.: cocaine, heroin, and other drugs. If so, they were asked the age of first use of that combination.

#### Lifetime Substance Use

Participants were asked to report if they had ever used any of the following drugs: alcohol; tobacco; marijuana; heroin; methadone without medical prescription; methadone with prescription; cocaine/crack; other opioids (Tramadol, Darvon, Percocet); tranquilizers (Diazepam, Valium, Ativan or Restoril); barbiturates (Amytal, Nembutal, or Seconal), inhalants (celestial water, thinner, poppers, etc.); and other drugs. In addition, participants were asked if they had used any of the following drugs in the last 12 mos.: amphetamines in form of pill without prescription; amphetamines in form of pill with prescription; and other amphetamines, and if so, they reported age at first use.

Participants were asked if they used any of the following drug combinations: cocaine/heroin together; cocaine/crack and heroin together (speedball); and other combination. If so, they were asked to report age at first use of that drug combination.

#### Risk Behaviors Attributed to Meth Use

To describe risk behaviors of what participants engaged in, participants were asked to report their perilous actions that lead to undesirable outcomes. Participants were asked if in the last 12 months mos. they had crossed the border into El Paso to get drugs and were asked if they ever took METH along on a trip to El Paso. In addition, participants reported any of the following risk behaviors after using METH: driving a vehicle; taking imprudent risks; acting impulsively or doing things that were later regretted; or being in a quarrel.

Participants were asked to report if their METH consumption problem resulted in: spending/losing a lot of money; arrest for driving under the influence of meth; legal problems; an accident; being hurt, injured, or burned; or caused injury to someone else.

Lastly, participants were asked if they had injected drugs in the past 12 mos., and if so, the frequency of using a syringe or needle known or suspected to have been used by someone else.

#### Sexual Risk Behaviors Attributed to Meth Use

In terms of assessing sexual risk behaviors, participants were asked if they used METH with sexual partner(s). Participants were asked if they had ever consumed METH with their principal sex partner or other sexual partner in the past 12 mos. Participants reported the number of people they had vaginal, oral, or anal sex. In the past 12 mos., participants were asked to report with their last sexual partner the frequency (never, less than half the time, half of the time, more than half the time, always) of condoms use, lubricants use, and bleeding. In addition, they were asked if they ever had sexual relationships with someone knowing they were infected with HIV. In addition, in the past 12 mos. participants were asked to report if 2 hours before or during sex, frequency (never, less than half the time, half of the time, more than half the time, always) of: drinking alcohol; using METH; and using other drugs.

Participants were asked if they engaged in transactional sex. Those who “sold sex” or “received sex” in exchange for METH or money in the past 12 mos. were asked the age when it first occurred and the number of people that it occurred with. Participants were asked to report the frequency of using a condom (never, less than half the time, half of the time, more than half the time, always) during vaginal, anal, oral sex (did not have this type of sex, never, less than half the time, half of the time, more than half the time, always) when they received METH or money in the past 12 mos. In addition, participants were asked to report the frequency in the past 12 mos. of using METH with person who they received METH or money in exchange for sex.

The same questions above were also asked to participants who “received” or “gave” METH or money in exchange for sex.

#### Health Outcomes Attributed to Meth Use

To assess health outcomes of METH use, the instrument assessed measures for physiological problems, psychological effects, infectious diseases, and other health outcomes.

Participants were asked about their perceived physiological problems of METH use and frequency (never, once or a few times, one or two times a week, daily or almost everyday): having any health problem; not eating well; physical health suffering; and physical appearance being affected. Participants were asked to report if they had any of the following physiological problem symptoms, and if so, they were asked if they believed it was due to their METH use: having an overdose; been poisoned; had chest pain; cardiac/heart problems; respiratory/lung problems; pancreas problems like pancreatitis; dental problems like caries; emboli; premature birth; spontaneous abortion or lost the baby; and suffering from other health problem.

Participants were asked to report any psychological effects and if so, if they believed it had been due to their METH use: convulsions; insomnia; paranoia or persecution delusion; extreme anxiety or panic; hallucinations; depression; suicidal ideation or suicidal thoughts.

Participants were asked to report infectious diseases, such as what their result was of their HIV test or HCV (positive, negative) whether they had ever been tested. To identify the impact of infectious diseases, participants were asked to report if they had HCV, HIV/AIDS, chlamydia, gonorrhea, and syphilis, and if so, they were asked if they believed their infection was due to their METH use.

### *Statistical Analysis*

#### Database Management

The analyses were performed using Statistical Package for Social Sciences (SPSS), version 22 (Statistical Package for the Social Sciences (SPSS), 2013). Some variables were recoded and created for the secondary data analysis. The variable, duration of METH use, was created by taking the difference of current age and age when first used METH. The categorical variable gender (woman, man, transgender woman, transgender man, intersex, and other) was recoded combining (women and transgender women). The health outcome variables such as, premature birth and spontaneous abortion or loss of the baby were subset only to women.

This proposed study involved univariate, bivariate, and multivariate analyses. The study used a significant level,  $p < 0.05$  for all bivariate and multivariate analyses.

#### Univariate Analysis

A univariate analysis included parametric or non-parametric measures of associations, as appropriate. For continuous variables that were normally distributed, the sample size (N), mean, and standard deviation (SD) were reported. For variables that were not normally distributed, the

N, minimum, Q1, median, Q3, maximum were reported. The criteria to assess normality depended on the bell-shape and symmetry of the histogram and the value of skewness (value outside -1 to 1 is skewed). For categorical variables, N, frequencies, or percentages (%) were reported.

### Bivariate Analysis

Appropriate bivariate analyses were used to test hypotheses and identify gender differences in risk behaviors and health outcomes. For continuous variables, gender differences were determined by running Two Sample t-test when data was normally distributed or Mann-Whitney U-Test, when it was not. For categorical variables, gender differences were determined by running Pearson Chi-Square Test. When there were low expected cell counts, Fisher Exact Test for measures with 2 levels or Likelihood Ratio for measures with more than 2 levels were performed.

### Multivariate Analysis

Significant bivariate associations were adjusted for sociodemographic characteristics and key METH use variables (e.g., age, marital status, type of participant, and duration of METH use using logistic regression.

### *IRB Approval*

I submitted an exception application to the UTEP IRB Board for a secondary data analysis in Spring 2016 (Appendix 1). I have completed the Collaborative Institutional Training Initiative (CITI) courses; Social and Behavioral Researchers (Faculty & Students) and Social and Behavioral Responsible Conduct of Research courses on 12/04/2014 and 10/13/2014 (Appendix 2, Appendix 3).



## Chapter 6: Results

The results presented include univariate, bivariate, and multivariate results for sociodemographic characteristics, METH use, other substance use, risk behaviors and sexual risk behaviors, and health outcomes attributed to METH (Table 1). The following represents the results of the quantitative data analysis including descriptive statistics, gender differences, and multivariate analyses.

**Table 1:** Descriptive Statistics and Gender Differences in Drug Use Behaviors, Risk Behaviors, and Health Outcomes among Current Meth Users in Cd. Juarez

	OVERALL			WOMEN + TRANS-WOMEN			MEN			p-value	adj. p-value
	N	Freq	%	N	Freq	%	N	Freq	%		
	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)		
	Mean	SD	Mean	SD	Mean	SD					
<b>Sociodemographic Characteristics</b>											
Age (Years)	150	30.90	8.90	50	29.88	6.96	100	31.52	9.81	0.293	
<b>Gender</b>	150										
Women/Trans-women		50	33.3%								
Men		100	66.7%								
<b>Sex at Birth</b>	150			50			100			<0.001 **	
Female		45	30.0%		45	90.0%		0	0.0%		
Male		105	70.0%		5	10.0%		100	100.0%		
<b>Marital Status</b>	150			50			100			0.046 **	
Single		84	56.0%		27	54.0%		57	57.0%		
Married/Common law		53	35.3%		22	44.0%		31	31.0%		
Divorced		6	4.0%		0	0.0%		6	6.0%		
Separated		4	2.7%		0	0.0%		4	4.0%		
Widowed		3	2.0%		1	2.0%		2	2.0%		
<b>Type of Participant:</b>	149			50			99			0.006 **	
Employees		52	34.9%		9	18.0%		43	43.4%		
Party and Students		41	27.5%		16	32.0%		25	25.3%		
Users community		56	37.6%		25	50.0%		31	31.3%		
<b>Highest Level of Education Completed</b>	150			50			100			0.255	
Elementary		10	6.7%		4	8.0%		6	6.0%		
Completed Elementary		8	5.3%		2	4.0%		6	6.0%		
Middle School		23	15.3%		10	20.0%		13	13.0%		
Completed Middle School		15	10.0%		3	6.0%		12	12.0%		
High School		26	17.3%		7	14.0%		19	19.0%		
Completed High School		14	9.3%		4	8.0%		10	10.0%		
Technical Career		7	4.7%		1	2.0%		6	6.0%		
Completed Technical Career		3	2.0%		1	2.0%		2	2.0%		
University		27	18.0%		10	20.0%		17	17.0%		
Completed University		13	8.7%		8	16.0%		5	5.0%		
Other		4	2.7%		0	0.0%		4	4.0%		
<b>Monthly Income Before Taxes, Including Legal and Illegal</b>	146			50			96			0.759	
<b>Income in the Last 12 Months</b>											
Less than \$80.00 USD		2	1.4%		1	2.0%		1	1.0%		
\$80.00 - \$199.92 USD		5	3.4%		2	4.0%		3	3.1%		
\$120.00 - \$159.92 USD		7	4.8%		2	4.0%		5	5.2%		
\$160.00 - \$199.92 USD		15	10.3%		3	6.0%		12	12.5%		
\$200.00 - \$239.92 USD		5	3.4%		3	6.0%		2	2.1%		
\$240.00 - \$279.92 USD		10	6.8%		4	8.0%		6	6.3%		
More than \$280.00 USD		102	69.9%		35	70.0%		67	69.8%		
<b>Place of Birth</b>	150			50			100			0.318	
Mexico		119	79.3%		42	84.0%		77	77.0%		
U.S.		31	20.7%		8	16.0%		23	23.0%		
Other Country		0	0.0%		0	0.0%		0	0.0%		
Currently Living in El Paso	150	17	11.3%	50	4	8.0%	100	13	13.0%	0.362	
Crossed Border Into the U.S. in the Last 12 Months (mos.)	150	68	45.3%	50	21	42.0%	100	47	47.0%	0.562	
Has Crossed Over to El Paso in the Last 12 Mos.	150	67	44.7%	50	21	42.0%	100	46	46.0%	0.642	
Reason for Crossing the Border in the Last 12 Mos.: Drugs	67	13	19.4%	21	5	23.8%	46	8	17.4%	0.526	
<b>Methamphetamine (Meth) Use</b>											
<b>Lifetime Meth Use</b>	150	8.00	(4.8, 13.0)	50	8.50	(3.0, 14.0)	100	8.00	(5.0, 13.0)	0.693	
<b>Duration of METH use (Years)</b>											
<b>Ways meth has been consumed</b>	150	96	64.0%	50	36	37.5%	100	60	62.5%	0.149	
Ingested/taken by mouth	150	113	75.3%	50	35	70.0%	100	78	78.0%	0.284	
Smoked	150	85	56.7%	50	26	52.0%	100	59	59.0%	0.415	
Inhaled through nose	150	96	64.0%	50	25	50.0%	100	71	71.0%	0.012 **	0.005 ‡
Snorted by nose	150	43	28.7%	50	13	26.0%	100	30	30.0%	0.610	
Injected	150	5	3.3%	50	1	2.0%	100	4	4.0%	0.665	
Anally	150	6	4.0%	50	2	4.0%	100	4	4.0%	>.999	
Other way											
<b>Forms of meth use</b>	150	91	60.7%	50	36	72.0%	100	55	55.0%	0.045 **	0.019 ‡
Pill	150	29	19.3%	50	10	20.0%	100	19	19.0%	0.884	
Liquid	150	94	62.7%	50	24	48.0%	100	70	70.0%	0.009 **	0.005 ‡
Powder	150	75	50.0%	50	17	34.0%	100	58	58.0%	0.006 **	0.002 ‡
Rock	150	45	30.0%	50	16	32.0%	100	29	29.0%	0.705	
Smoke	150	23	15.3%	50	6	12.0%	100	17	17.0%	0.423	
Other form											
<b>Works used to consume meth</b>	150	71	47.3%	50	28	56.0%	100	43	43.0%	0.133	
Nothing	150	75	50.0%	50	21	42.0%	100	54	54.0%	0.166	
Pipe	150	86	57.3%	50	26	52.0%	100	60	60.0%	0.350	
Light bulb	150	40	26.7%	50	13	26.0%	100	27	27.0%	0.896	
Syringe	150	70	46.7%	50	20	40.0%	100	50	50.0%	0.247	
Straw	150	55	36.7%	50	18	36.0%	100	37	37.0%	0.905	
Foil	150	7	4.7%	50	2	4.0%	100	5	5.0%	>.999	
Paper money	150	51	34.0%	50	17	34.0%	100	34	34.0%	>.999	
Other											
<b>Age of Ways Meth was Consumed In (Years)</b>	150	18.00	(17.0, 23.3)	50	19.00	(17.0, 24.3)	100	18.00	(17.0, 23.0)	0.533	
<b>Age when first used meth (Years)</b>											
Taken meth orally	95	18.00	(17.0, 20.0)	36	18.50	(17.0, 22.8)	59	18.00	(17.0, 20.0)	0.692	
Smoked meth	111	20.00	(17.0, 25.0)	35	20.00	(17.0, 26.0)	76	20.00	(17.0, 25.0)	0.914	
Inhaled meth	77	22.40	7.24	24	22.50	6.81	53	22.36	7.49	0.937	
Snorted meth	89	20.00	(17.0, 23.5)	23	20.00	(17.0, 27.0)	66	20.00	(17.0, 23.3)	0.738	

	N	Freq	%	N	Freq	%	N	Freq	%	p-value	adj. p-value
	N	Mean	(Q1, Q3)	N	Mean	(Q1, Q3)	N	Mean	(Q1, Q3)		
<b>Sociodemographic Characteristics</b>											
<b>Age (Years)</b>	150	30.90	8.90	50	29.88	6.96	100	31.52	9.81	0.293	
Injected meth	43	26.00	(20.0, 32.0)	13	22.00	(19.0, 32.0)	30	27.50	(20.0, 32.5)	0.354	
Taken meth anally	5	29.00	(21.0, 37.5)	1	--	--	4	25.50	(20.5, 33.5)	--	
Meth other way	4	25.50	(20.8, 34.0)	--	--	--	4	25.50	(20.8, 34.0)	--	
<b>Stop / Reducing meth use</b>											
Attempted to stop using meth	150	99	66.0%	50	34	68.0%	100	65	65.0%	0.715	
Been to treatment for meth use	99	20	20.2%	34	8	23.5%	65	12	18.5%	0.551	
Currently enrolled in a program to stop using meth	20	2	10.0%	8	1	12.5%	12	1	8.3%	>.999	
<b>Recent Meth Use (past 12 mos.)</b>											
<b>Ways meth has been used</b>											
Taken orally	150	82	54.7%	50	31	62.0%	100	51	51.0%	0.202	
Smoked	150	95	63.3%	50	30	60.0%	100	65	65.0%	0.549	
Inhaled	150	55	36.7%	50	12	24.0%	100	43	43.0%	0.023 **	0.005 ‡
Snorted	150	53	35.3%	50	10	20.0%	100	43	43.0%	0.005 **	0.003 ‡
Injected	150	34	22.7%	50	11	22.0%	100	23	23.0%	0.890	
Taken anally	150	3	2.0%	50	0	0.0%	100	3	3.0%	--	
Other way	150	1	0.7%	50	0	0.0%	100	1	1.0%	--	
<b>Meth combinations used</b>											
Meth and Cocaine	149	70	47.0%	50	20	40.0%	99	50	50.5%	0.225	
Meth and Heroin	150	33	22.0%	50	10	20.0%	100	23	23.0%	0.676	
Meth and Marijuana	150	38	25.3%	50	10	20.0%	100	28	28.0%	0.288	
Meth and Alcohol	150	19	12.7%	50	8	16.0%	100	11	11.0%	0.385	
Meth and Hallucinogens (Mushrooms, Acid)	150	9	6.0%	50	4	8.0%	100	5	5.0%	0.482	
Other combination of meth	149	8	5.4%	50	4	8.0%	99	4	4.0%	0.443	
<b>Recent Amphetamine Use (past 12 mos.)</b>											
<b>Amphetamine in form of pill without prescription</b>											
Used	150	36	24.0%	50	12	24.0%	100	24	24.0%	>.999	
Age when first used (Years)	64	18.50	(16.3, 23.8)	21	20.00	(17.0, 27.0)	43	18.00	(15.0, 20.0)	0.135	
<b>Amphetamine in the form of pill with prescription</b>											
Used	149	13	8.7%	50	8	16.0%	99	5	5.1%	0.033 **	0.053
Age when first used (Years)	23	22.00	(16.0, 26.0)	12	25.50	(18.0, 29.0)	11	18.00	(15.0, 25.0)	0.107	
<b>Other amphetamines</b>											
Used	149	9	6.0%	50	3	6.0%	99	6	6.1%	>.999	
Age when first used (Years)	21	20.00	(16.5, 27.0)	5	26.00	(17.5, 38.0)	16	20.00	(16.3, 21.8)	0.147	
<b>Other Substance Use</b>											
<b>Lifetime Substance Use</b>											
<b>Alcohol</b>											
Used Alcohol	150	147	98.0%	50	48	96.0%	100	99	99.0%	0.258	
Age (Years)	147	14.46	2.80	48	14.63	3.12	99	14.38	2.65	0.626	
<b>Tobacco-smoked</b>											
Used Tobacco	150	141	94.0%	50	47	94.0%	100	94	94.0%	>.999	
Age (Years)	141	14.00	(12.0, 16.0)	47	15.00	(13.0, 17.0)	94	14.00	(12.0, 16.0)	0.109	
<b>Marijuana smoked</b>											
Used Marijuana smoked	150	139	92.7%	50	44	88.0%	100	95	95.0%	0.181	
Age (Years)	139	15.00	(13.0, 17.0)	44	15.50	(14.0, 17.0)	95	15.00	(13.0, 17.0)	0.170	
<b>Heroin</b>											
Used Heroin	148	57	38.5%	50	20	40.0%	98	37	37.8%	0.791	
Age (Years)	56	19.00	(16.0, 23.8)	19	20.00	(16.0, 28.0)	37	19.00	(15.5, 21.5)	0.179	
<b>Methadone without medical prescription</b>											
Used Methadone without medical prescription	148	10	6.8%	50	4	8.0%	98	6	6.1%	0.734	
Age (Years)	6	25.50	(23.0, 28.3)	3	25.00	(17.0, 26.0)	3	28.00	(25.0, 29.0)	0.184	
<b>Methadone with prescription</b>											
Used Methadone	149	31	20.8%	50	13	26.0%	99	18	18.2%	0.267	
Age (Years)	26	26.00	(22.8, 29.0)	12	25.50	(24.3, 29.8)	14	26.50	(21.5, 28.3)	0.959	
<b>Cocaine/Crack</b>											
Used Cocaine/Crack	150	136	90.7%	50	42	84.0%	100	94	94.0%	0.071	
Age (Years)	135	18.00	(15.0, 20.0)	42	18.00	(15.0, 23.0)	93	18.00	(15.0, 20.0)	0.482	
<b>Other Opioids (Tramadol, Darvon, Percocet)</b>											
Used other Opioids (Tramadol, Darvon, Percocet)	150	48	32.0%	50	18	36.0%	100	30	30.0%	0.458	
Age (Years)	43	22.00	(19.0, 31.0)	15	31.00	(22.0, 33.0)	28	20.50	(17.3, 22.8)	0.004 **	0.038 ‡
<b>Tranquilizers (Diazepam, Valium, Ativan or Restoril)</b>											
Used Tranquilizers (Diazepam, Valium, Ativan or Restoril)	149	99	66.4%	49	32	65.3%	100	67	67.0%	0.837	
Age (Years)	93	18.00	(16.0, 23.0)	32	20.00	(17.0, 26.0)	61	18.00	(15.0, 21.0)	0.007 **	0.030 ‡
<b>Barbiturates (Amytal, Nembutal, or Seconal)</b>											
Used Barbiturates (Amytal, Nembutal, or Seconal)	149	3	2.0%	49	1	2.0%	100	2	2.0%	>.999	
Age (Years)	3	24.00	(17.0, 25.0)	1	--	--	2	--	--	--	
<b>Inhalants (Celestial Water, Thinner, Poppers, etc.)</b>											
Used Inhalants (Celestial Water, Thinner, Poppers, etc.)	150	92	61.3%	50	31	62.0%	100	61	61.0%	0.906	
Age (Years)	91	17.00	(14.0, 20.0)	31	18.00	(14.0, 22.0)	60	17.00	(14.0, 20.0)	0.382	
<b>Cocaine/Heroin</b>											
Used Cocaine/Heroin	150	48	32.0%	50	18	36.0%	100	30	30.0%	0.458	
Age (Years)	47	19.00	(17.0, 25.0)	17	24.00	(15.5, 27.5)	30	19.00	(17.0, 23.5)	0.357	
<b>Cocaine/Crack and Heroin</b>											
Used Cocaine/Crack and Heroin together (Speedball)	147	45	30.6%	48	15	31.3%	99	30	30.3%	0.907	
Age (Years)	45	19.00	(16.5, 25.0)	15	18.00	(15.0, 27.0)	30	19.00	(17.0, 24.3)	0.837	
<b>Risk Behaviors Attributed to Meth Use</b>											
<b>Lifetime Risk Behaviors</b>											
Took meth along on trip to El Paso	82	18	22.0%	30	3	10.0%	52	15	28.8%	0.047 **	0.077
<b>After consuming meth</b>											
Have taken imprudent risks	150	97	64.7%	50	28	56.0%	100	69	69.0%	0.116	

	N	Freq	%	N	Freq	%	N	Freq	%	p-value	adj. p-value
	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)		
<b>Sociodemographic Characteristics</b>											
<i>Age (Years)</i>	150	30.90	8.90	50	29.88	6.96	100	31.52	9.81	0.293	
Acted impulsively or done things that were later regretted	150	92	61.3%	50	28	56.0%	100	64	64.0%	0.343	
Have been involved in a quarrel when meth was consumed	150	75	50.0%	50	23	46.0%	100	52	52.0%	0.488	
<b>Meth consumption problem resulted in</b>											
Spending/losing a lot of money	150	121	80.7%	50	37	74.0%	100	84	84.0%	0.144	
Arrest for driving under the influence of	150	17	11.3%	50	6	12.0%	100	11	11.0%	0.855	
Legal problems	150	32	21.3%	50	11	22.0%	100	21	21.0%	0.888	
Accident	150	26	17.3%	50	6	12.0%	100	20	20.0%	0.222	
Being hurt, injured, or burned	150	58	38.7%	50	19	38.0%	100	39	39.0%	0.906	
Caused injury to someone else	150	37	24.7%	50	11	22.0%	100	26	26.0%	0.592	
Alcohol/Meth/Other drug 2 hours before or during sex	150	136	90.7%	50	49	98.0%	100	87	87.0%	0.035 **	0.108
<b>Recent Risk Behaviors (past 12 mos.)</b>											
Have drove a vehicle after using meth	150	86	57.3%	50	23	6.0%	100	63	63.0%	0.047 **	0.029 ‡
Injected drugs	150	56	37.3%	50	18	36.0%	100	38	38.0%	0.811	
<b>Frequency of using a syringe or needle known or suspected to have been used by someone else</b>	55			18			37			0.426	
Never		17	30.9%		4	22.2%		13	35.1%		
Sometimes		25	45.5%		8	44.4%		17	45.9%		
Always		13	23.6%		6	33.3%		7	18.9%		
<b>Sexual Risk Behaviors Attributed to Meth Use</b>											
<b>Lifetime Sexual Risk Behaviors</b>											
Used meth with: sexual partner(s)	145	36	24.8%	48	15	31.3%	97	21	21.6%	0.208	
Received meth or money in exchange for sex	142	37	26.1%	50	18	36.0%	92	19	20.7%	0.047 **	0.167
Gave meth or money to other person in exchange for sex	142	20	14.1%	50	2	4.0%	92	18	19.6%	0.011 **	0.008 ‡
Received meth or money in exchange for sex: age when first occurred ( <i>Years</i> )	37	20.00 (17.5, 26.5)		18	22.00 (17.5, 26.3)		19	20.00 (17.0, 28.0)		0.939	
Gave meth or money to other person in exchange for sex: age when first occurred ( <i>Years</i> )	19	23.00 (19.0, 30.0)		2	--	--	17	22.00 (19.0, 29.5)		--	
Had sex with someone knowing they were infected with HIV	146	6	4.1%	47	4	8.5%	99	2	2.0%	0.085	
<b>Recent Sexual Risk Behaviors (past 12 mos.)</b>											
<b>Meth consumed with</b>											
Principal sex partner	150	42	28.0%	50	21	42.0%	100	21	21.0%	0.007 **	0.013 ‡
Other sexual partner	150	16	10.7%	50	5	10.0%	100	11	11.0%	0.852	
<b>Transactional Sex (Received)</b>											
Received meth or money in exchange for sex	37	29	78.4%	18	14	77.8%	19	15	78.9%	>.999	
Amount of people who offered meth or money ( <i>People</i> )	29	3.00 (1.0, 6.50)		14	4.00 (1.8, 7.0)		15	3.00 (1.0, 6.0)		0.690	
<b>Frequency of using condom</b>											
In exchange for vaginal sex	29			14			15			0.029 **	>.999
No vaginal sex		5	17.2%		0	0.0%		5	33.3%		
Never		8	27.6%		4	28.6%		4	26.7%		
Less than half the time		1	3.4%		1	7.1%		0	0.0%		
Half the time		1	3.4%		1	7.1%		0	0.0%		
More than half the time		2	6.9%		2	14.3%		0	0.0%		
Always		12	41.4%		6	42.9%		6	40.0%		
In exchange for anal sex	29			14			15			0.113	
No anal sex		2	6.9%		1	7.1%		1	6.7%		
Never		10	34.5%		7	50.0%		3	20.0%		
Less than half the time		2	6.9%		1	7.1%		1	6.7%		
Half the time		1	3.4%		0	0.0%		1	6.7%		
More than half the time		2	6.9%		2	14.3%		0	0.0%		
Always		12	41.4%		3	21.4%		9	60.0%		
In exchange for oral sex	28			14			14			0.101	
No oral sex		1	3.6%		0	0.0%		1	7.1%		
Never		12	42.9%		6	42.9%		6	42.9%		
Less than half the time		1	3.6%		1	7.1%		0	0.0%		
Half the time		0	0.0%		0	0.0%		0	0.0%		
More than half the time		3	10.7%		3	21.4%		0	0.0%		
Always		11	39.3%		4	28.6%		7	50.0%		
<b>Received meth or money in exchange for sex: frequency of using meth with that person</b>	29			14			15			0.073	
Never		7	24.1%		2	14.3%		5	33.3%		
Less than half the time		5	17.2%		4	28.6%		1	6.7%		
Half the time		3	10.3%		3	21.4%		0	0.0%		
More than half the time		3	10.3%		1	7.1%		2	13.3%		
Always		11	37.9%		4	28.6%		7	46.7%		
<b>Transactional Sex (Gave)</b>											
Gave meth or money to other person in exchange for sex	150	11	55.0%	2	1	50.0%	18	10	55.6%	>.999	
Amount of people who they offered meth or money ( <i>People</i> )	11	2.00 (2.0, 4.0)		1	--	--	10	3.00 (2.0, 4.3)		--	
<b>Frequency of using condom</b>											
In exchange for vaginal sex	11			1			10			--	
No vaginal sex		3	27.3%		1	100.0%		2	20.0%		
Never		3	27.3%		0	0.0%		3	30.0%		
Less than half the time		1	9.1%		0	0.0%		1	10.0%		
Half the time		1	9.1%		0	0.0%		1	10.0%		
More than half the time		1	9.1%		0	0.0%		1	10.0%		
Always		2	18.2%		0	0.0%		2	20.0%		
In exchange for anal sex	11			1			10			--	
No anal sex		2	18.2%		1	100.0%		1	10.0%		

	N	Freq	%	N	Freq	%	N	Freq	%	p-value	adj. p-value
	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)		
<b>Sociodemographic Characteristics</b>											
Age (Years)	150	30.90	8.90	50	29.88	6.96	100	31.52	9.81	0.293	
Never		3	27.3%		0	0.0%		3	30.0%		
Less than half the time		1	9.1%		0	0.0%		1	10.0%		
Half the time		1	9.1%		0	0.0%		1	10.0%		
More than half the time		0	0.0%		0	0.0%		0	0.0%		
Always		4	36.4%		0	0.0%		4	40.0%		
In exchange for oral sex	11			1			10			--	
No oral sex		1	9.1%		1	100.0%		0	0.0%		
Never		5	45.5%		0	0.0%		5	50.0%		
Less than half the time		1	9.1%		0	0.0%		1	10.0%		
Half the time		1	9.1%		0	0.0%		1	10.0%		
More than half the time		0	0.0%		0	0.0%		0	0.0%		
Always		3	27.3%		0	0.0%		3	30.0%		
Gave meth or money to other person in exchange for sex:	10			1			9			--	
frequency of using meth with that person											
Never		2	20.0%		1	100.0%		1	11.1%		
Less than half the time		0	0.0%		0	0.0%		0	0.0%		
Half the time		1	10.0%		0	0.0%		1	11.1%		
More than half the time		1	10.0%		0	0.0%		1	11.1%		
Always		6	60.0%		0	0.0%		6	66.7%		
Sexual relationships including vaginal, oral, or anal sex: number of people (People)	142	3.00	(1.0, 10.0)	50	3.00	(1.0, 9.3)	92	4.00	(2.0, 10.0)	0.453	
<b>Penetrated during anal sex with last sexual partner</b>											
Frequency of using condom	23			16			7			0.839	
Never		8	34.8%		6	37.5%		2	28.6%		
Sometimes		11	47.8%		7	43.8%		4	57.1%		
Always		4	17.4%		3	18.8%		1	14.3%		
Frequency of using lubricant	23			16			7			0.508	
Never		7	30.4%		6	37.5%		1	14.3%		
Sometimes		8	34.8%		5	31.3%		3	42.9%		
Always		8	34.8%		5	31.3%		3	42.9%		
Frequency of self bleeding	23			16			7			0.679	
Never		10	43.5%		7	43.8%		3	42.9%		
Sometimes		12	52.2%		8	50.0%		4	57.1%		
Always		1	4.3%		1	6.3%		0	0.0%		
<b>2 hours before or during sex</b>											
Drank Alcohol	149	114	76.5%	50	42	84.0%	99	72	72.0%	0.125	
Used Meth	149	112	75.2%	50	40	80.0%	99	72	72.7%	0.332	
Used other drugs	149	103	69.1%	50	37	74.0%	99	66	66.7%	0.360	
Used other drugs: Frequency	140			49			91			0.809	
Never		37	26.4%		12	24.5%		25	27.5%		
Less than half the time		28	20.0%		11	22.4%		17	18.7%		
Half the time		20	14.3%		5	10.2%		15	16.5%		
More than half the time		20	14.3%		7	14.3%		13	14.3%		
Always		35	25.0%		14	28.6%		21	23.1%		
<b>Health Outcomes Attributed to Meth Use</b>											
<b>Physiological Problems</b>											
Had a health problem due to meth use	147	71	48.3%	49	28	57.1%	98	43	43.9%	0.129	
Have not eaten well due to the problem with meth use	150	118	78.7%	50	39	78.0%	100	79	79.0%	0.888	
<b>Had health problem</b>											
Chest pain	150	68	45.3%	50	21	42.0%	100	47	47.0%	0.562	
Cardiac/Heart problems	146	38	26.0%	50	15	30.0%	96	23	24.0%	0.430	
Respiratory/Lung problems	150	47	31.3%	50	20	40.0%	100	27	27.0%	0.106	
Pancreas problems like Pancreatitis	149	5	3.4%	49	2	4.1%	100	3	3.0%	0.664	
Dental problems like caries	150	103	68.7%	50	35	70.0%	100	68	68.0%	0.803	
Emboli	150	1	0.7%	50	1	2.0%	100	0	0.0%	--	
Premature birth	48	11	22.9%	46	11	23.9%					
Spontaneous abortion or lost the baby	48	15	31.3%	47	15	31.9%					
Suffering from other health problem	30	25	83.3%	17	14	82.4%	13	11	84.6%	>.999	
<b>Psychological Effects</b>											
Convulsions	149	21	14.1%	49	7	14.3%	100	14	14.0%	0.962	
Insomnia	150	127	84.7%	50	40	80.0%	100	87	87.0%	0.262	
Paranoia or persecution delusion	150	92	61.3%	50	25	50.0%	100	67	67.0%	0.044 **	0.014 ‡
Extreme anxiety or panic	150	108	72.0%	50	39	78.0%	100	69	69.0%	0.247	
Hallucinations	150	91	60.7%	50	32	64.0%	100	60	60.0%	0.635	
Depression	149	96	64.4%	50	36	72.0%	99	60	60.6%	0.170	
Suicidal ideation or suicidal thoughts	146	49	33.6%	50	20	40.0%	96	29	30.2%	0.234	
<b>Infectious Disease</b>											
<b>Has been tested and received results for HIV</b>											
HIV test	111	5	4.5%	37	1	2.7%	74	4	5.4%	0.663	
HIV Results	150			50			100			0.796	
Positive		5	3.3%		1	2.0%		4	4.0%		
Negative		106	70.7%		36	72.0%		70	70.0%		
Not tested		39	26.0%		13	26.0%		26	26.0%		
<b>Has been tested and received results for HCV</b>											
HCV test	66	16	24.2%	23	6	26.1%	43	10	23.3%	0.798	
HCV Results	150			50			100			0.910	
Positive		16	10.7%		6	12.0%		10	10.0%		
Negative		50	33.3%		17	34.0%		33	33.0%		

	N	Freq	%	N	Freq	%	N	Freq	%		
	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)	N	Median	(Q1, Q3)	p-value	adj. p-value
	N	Mean	SD	N	Mean	SD	N	Mean	SD		
<b>Sociodemographic Characteristics</b>											
Age (Years)	150	30.90	8.90	50	29.88	6.96	100	31.52	9.81	0.293	
Not tested		84	56.0%		27	54.0%		57	57.0%		
<b>History of STDs</b>											
HCV	144	15	10.4%	47	6	12.8%	97	9	60.0%	0.566	
HIV/AIDS	147	5	3.4%	49	1	2.0%	98	4	4.1%	0.665	
Chlamydia	145	2	1.4%	48	0	0.0%	97	2	2.1%	--	
Gonorrhea	149	10	6.7%	50	1	2.0%	99	9	9.1%	0.165	
Syphilis	149	6	4.0%	50	3	6.0%	99	3	3.0%	0.403	
<b>Other Health Outcomes</b>											
Physical health has suffered due to consumption of meth	150	90	60.0%	50	31	62.0%	100	59	59.0%	0.724	
Physical appearance has been affected due to consumption of meth	150	99	66.0%	50	29	58.0%	100	70	70.0%	0.144	
<b>Meth use problem believed to have caused</b>											
HCV	15	7	46.7%	6	2	33.3%	9	5	55.6%	0.608	
HIV/AIDS	6	0	0.0%	1	0	0.0%	5	0	0.0%	--	
Chest pain	66	53	80.3%	21	17	81.0%	45	36	80.0%	>.999	
Cardiac/Heart problems	150	31	81.6%	15	11	73.3%	23	20	87.0%	0.401	
Respiratory/Lung problems	44	35	79.5%	18	14	77.8%	26	21	80.8%	>.999	
Pancreas problems like Pancreatitis	5	4	80.0%	2	2	100.0%	3	2	66.7%	>.999	
Chlamydia	2	1	50.0%	--	--	--	2	1	100.0%	--	
Gonorrhea	10	1	10.0%	1	0	0.0%	9	1	11.1%	--	
Syphilis	5	2	40.0%	2	1	50.0%	3	1	33.3%	>.999	
Dental problems like caries	102	76	74.5%	35	25	71.4%	67	51	76.1%	0.606	
Emboli	2	1	50.0%	1	1	100.0%	1	0	0.0%	--	
Convulsions	19	16	84.2%	7	5	71.4%	12	11	91.7%	0.523	
Insomnia	125	118	94.4%	40	38	95.0%	85	80	94.1%	>.999	
Paranoia or persecution delusion	92	89	96.7%	25	24	96.0%	67	65	97.0%	>.999	
Extreme anxiety or panic	108	101	93.5%	39	37	94.9%	69	64	92.8%	>.999	
Hallucinations	92	81	88.0%	32	27	84.4%	60	54	90.0%	0.506	
Depression	95	83	87.4%	35	32	91.4%	60	51	85.0%	0.526	
Suicidal ideation or suicidal thoughts	49	38	77.6%	20	15	75.0%	29	23	79.3%	0.740	
Premature birth	11	6	54.5%	11	6	54.5%					
Spontaneous abortion or lost the baby	14	6	42.9%	14	6	42.9%					
Other health problem	25	21	84.0%	14	12	85.7%	11	9	81.8%	>.999	

\*\* significant p-values < 0.05

† statistically significant bivariate differences adjusted for age, marital status, type of participant, and duration of meth use

-- could not be calculated or tested due to low sample size

## 6.1 Descriptive Statistics

The data analyzed 150 adults (21 years of older) who used METH in Cd. Juarez.

### *Sociodemographic Characteristics*

The sample consisted of women (n=49), transgender women (n=1), and men (n=100). The mean age for participants was 30.9 (SD=8.9) years old. The majority of participants were born male (70.0%). Participants were single (56.0%), married/common law (35.3%), divorced (4.0%), separated (2.7%), and widowed (2.0%). Participants in this sample were either recruited from a community of users (37.6%) (e.g., sex workers and PWIDs), based on their employment (34.9%) (e.g., *maquila* workers, truck drivers), or from the party scene or students (27.5%) (e.g., gay clubs, universities). Participants reported less than a high school education (37.3%) and a monthly income of \$280 USD or more in the last 12 months (69.9%). A majority of participants (79.3%) were born in Mexico.

Based on recruitment targets, the sample included participants who reported whether they lived in El Paso (11.3%), whether they crossed the border into the U.S. in the past 12 mos. (45.3%), specifically to El Paso (44.7%). Cross border mobility was also included as part of the recruitment target. Of those who crossed to El Paso in the past 12 mo., 19.4% crossed to get drugs.

### *Meth Use*

METH use measures assessed were based on lifetime use, recent use (past 12 mo.), and recent amphetamine use. Lifetime METH use included duration of METH use, ways, forms, and works used to consume METH. For duration of METH use, the median age participants reported was 8 years old (IQR: 13.0-4.8).

The most common ways METH was consumed included smoking (75.3%), followed by ingesting/taking by mouth (64.0%), snorting (64.0%), inhaling through nose (56.7%), injecting (28.7%), another way (4.0%), and anal use (3.3%). Forms in which METH was used were powder (62.7%), followed by pill (60.7%), rock (50.0%), smoke (30.0%), liquid (19.3%), and other form (15.3%). Works used to consume METH included a light bulb (57.3%), followed by pipe (50.0%), nothing (47.3%), straw (46.7%), foil (36.7%), other work (34.0%), syringe (26.7%), and paper bill (4.7%).

The median age for age of initiation into METH use was 18.0 years old (IQR: 23.3-17.0). The youngest reported median ages were for those who first used METH orally at 18.0 years old (IQR: 20.0-17.0), followed by smoked (median: 20.0 years old; IQR: 25.0-17.0) and snorted (median: 20.0 years old; IQR: 23.5-17.0). Participants also reported attempting to stop using METH (66.0%), receiving treatment (20.2%), or being in a program to stop using METH (10.0%).

In terms of recent METH use, ways in which METH was used included smoking (63.3%), ingesting (54.7%), inhaling (36.7%), snorting (35.3%), injecting (22.7%), anal use (2.0%), and other way (0.7%). The most common METH combinations reported by the participants were METH and cocaine (47.0%), METH and marijuana (25.3%), and METH and heroin (22.0%).

For recent amphetamine use, participants reported using: amphetamine in pill form without prescription (24.0%), with prescription (8.7%), and other types of amphetamines (6.0%). Participants who first initiated into amphetamine in pill form without prescription had the youngest median age of 18.5 years old (IQR: 23.8-16.3), followed by use of other opioids of 20.0



years old (IQR: 27.0-16.5), and amphetamine in pill form with prescription at 22.0 years old (IQR: 26.0-16.0).

#### *Other Substance Use*

For lifetime substance use, the most common substances reported by the participants were drinking alcohol (98.0%), followed by smoking tobacco (94.0%), smoking marijuana (92.7%), and smoking cocaine/crack (90.7%). The youngest median age was for smoking tobacco at 14.0 years old (IQR: 16.0-12.0). Participants also had a young mean age for alcohol drinking at 14.5 years old (SD: 2.8). The third youngest age reported was for those who reported smoking marijuana with a median age at 15.0 years old (IQR: 17.0-13.0). An inverse relationship was observed between lifetime substance use and median age of initiation. Drugs used at higher rates over a lifetime, such as alcohol, tobacco, and marijuana were observed to first be used at a younger median age as compared to substances that had low rates were first used at older median age.

#### *Risk Behaviors Attributed to Meth Use*

The risk behaviors attributed to METH use included lifetime and recent (past 12 mo.) behaviors. Participants reported taking METH along on a trip to El Paso (22.0%). After consuming METH, participants reported taking imprudent risks (64.7%), acting impulsively or did things that they later regretted (61.3%), or involved in a quarrel (50.0%). When METH was consumed, participants reported experiencing problems such as, spending/losing a lot of money (80.7%) and being hurt, injured, or burned (38.7%). Majority of the participants (90.7%) also reported using alcohol, METH, or other drug two hours before or during sex. Concerning recent risk behaviors, participants reported driving a vehicle after using METH (57.3%) or injecting

drugs (37.3%). Of those who injected, participants reported sometimes (45.5%) or always (23.6%) using a syringe known or suspected to have been used by someone else.

#### *Sexual Risk Behaviors Attributed to Meth Use*

In reference to sexual risk behaviors attributed to METH use, measures are based on lifetime and recent (past 12 mo.) behaviors. Under lifetime transactional sex, a quarter of participants (24.8%) used METH with their sexual partner. Over a quarter of participants reported receiving (26.1%) and one-seventh of participants reported giving (14.1%) METH or money in exchange for sex. Participants reporting receiving METH or money in exchange for sex at a median age of 20.0 years old (IQR: 26.5-17.5) and giving METH or money in exchange for sex at an older median age of 23.0 years old (IQR: 30.0-19.0). Participants also reported having sex with someone they knew was infected with HIV (4.1%). For recent sexual risk behaviors, participants reported using METH more with principal sex partner compared to other sex partner (28.0% vs. 10.7%).

Involvement in transactional sex or sex in exchange for METH or money were reported by both those who engaged in sex trade and their clients. A majority of participants (78.4%) reported receiving METH or money in exchange for recent sex with a median number of 3 people (IQR: 6.5-1.0). The frequency of using a condom half the time or less during vaginal sex (34.4%), anal sex (44.8%), and oral sex (46.5%) were reported. Participants also reported using METH more than half the time with sexual partner when receiving sex as clients (48.2%).

Half of the participants (55.0%) reported giving METH or money in exchange for recent sex with a median number of 2 people (IQR: 4.0-2.0) as clients. The frequency of using a condom half the time or less during vaginal sex (45.5%), anal sex (45.5%), and oral sex (63.7%)

were reported. Participants also reported using METH more than half the time and always with sexual partner when giving sex (70.0%).

Those who reported being penetrated during anal sex with their last sexual partner reported the frequency of using a condom, using lubricant, and self-bleeding. Participants reported not always consistently using a condom (82.6%) and lubricant (65.2%). More than half (56.5%) of the participants reported self-bleeding.

Participants reported using substances such as alcohol (76.5%), METH (75.2%), or other drugs (69.1%) two hours before or during sex. Half of the participants who reported using other drugs reported using them half the time, more, and always (53.6%).

#### *Health Outcomes Attributed to Meth Use*

For recent health outcomes attributed to METH use, measures included physiological problems, psychological effects, infectious diseases, and other health outcomes. Less than half of participants reported having a health problem (48.3%) and a majority of participants (78.7%) reported not eating well as a result of their METH use.

As for physiological problems, participants reported suffering from other health problems (83.3%), followed by dental problems like caries (68.7%), chest pain (45.3%), and respiratory/lung problems (31.3%). Among women, premature birth (22.9%) and spontaneous abortion or loss of the baby (31.3%) were reported.

In terms of psychological effects, the most common problems reported were insomnia (84.7%), followed by extreme anxiety or panic (72.0%), depression (64.4%), and paranoia or persecution delusion (61.3%).

Under infectious diseases, among the 4.5% of participants who were tested for HIV, 3.3% tested positive. Among the 24.2% of participants who were tested for HCV, 10.7% tested

positive. Participants also reported a history of STDs, 10.4% of participants reported a history of HCV, 6.7% a history of gonorrhea, and 4.0% a history of syphilis.

Other health outcomes due to METH use were self-reported. Participants complained of their physical health suffering (60.0%) and an affected physical appearance (66.0%) due to METH use. The most common health outcomes participants believed METH use caused were paranoia or persecution delusion (96.7%), followed by insomnia (94.4%), hallucinations (88.0%), and depression (87.4%).

## 6.2 Gender Differences

Gender differences were assessed for all factors. Statistically significant gender differences were determined with a  $p\text{-value} < .05$ .

### *Sociodemographic Characteristics*

There were significant gender differences for sex at birth status ( $p\text{-value} < .001$ ), marital status ( $p\text{-value} = .046$ ), and for type of participant ( $p\text{-value} = .006$ ). More women/trans-women were younger than men (mean=29.9 vs. 31.5 years). All men were born males and 10.0% of women/trans-women were born male. In terms of marital status, most men (57.0%) and women (54.0%) reported being single, but more women/trans-women than men reported being married (44.0% vs. 31.0%). In respect to the recruitment criteria for type of participant, more men were employed (43.4%) than women/trans-women (18.0%).

### *Meth Use*

For lifetime METH use, there were significant gender differences for ways and forms of METH use. More men than women/trans-women snorted METH by nose (71.0% vs. 50.0%;  $p\text{-value} = .012$ ). More women/trans-women than men used METH in form of pill (72.0% vs. 55.0%;  $p\text{-value} = .045$ ). In all cases, except for pill, men used higher rates of METH powder (70.0% vs.

48.0%; p-value=.009), and rock (58.0% vs. 34.0%; p-value=.006) than women/trans-women. A relationship was observed for ways METH was consumed and forms of METH use, in which significant gender difference for METH was snorted by nose was in accordance with significant gender differences for powder and rock form.

There were significant gender differences in ways METH was used in the past 12 mos. More men used METH by inhaling (43% vs. 24%; p-value=.023) and snorting (43.0% vs. 20%; p-value=.005) compared to women/trans-women. There were significant gender differences for recent amphetamine use in the past 12 mos. More women/trans-women used amphetamine in the form of pill with prescription (16.0% vs. 5.1%; p-value=.033) compared to men.

#### *Other Substance Use*

There were significant gender differences for age at first use for other opioids (Tramadol, Darvon, Percocet) (p-value=.004) and tranquilizers (Diazepam, Valium, Ativan or Restoril) (p-value=.007). More men than women/trans-women had a younger median age of initiation for other opioids (20.5 vs. 31.0 years old; IQR: 22.8-17.3 vs. IQR: 33.0-22.0) and men had a younger median age of initiation for tranquilizers (18.0 vs. 20.0 years old; IQR: 21.0-15.0 vs. IQR: 26.0-17.0).

#### *Risk Behaviors Attributed to Meth Use*

There was a significant gender difference for risk behaviors attributed to METH use, for those who took METH along on a trip to El Paso (p-value=.047) and used alcohol, METH, or other drug two hours before or during sex (p-value=.035). More men took METH along on a trip to El Paso than women/ trans-women (28.8% vs. 10.0%). More women/trans-women (98.0% vs. 87.0%) used alcohol, METH, or other drugs two hours before or during sex compared to men.

There was also a significant gender difference for the recent risk behaviors, for driving a vehicle after using METH (p-value=.047). Men had higher rates of driving a vehicle after using METH compared to women/ trans-women (63.0% vs. 6.0%).

#### *Sexual Risk Behaviors Attributed to Meth Use*

There were significant gender differences for lifetime sexual risk behaviors, specifically for those who received (p-value=.047), gave (p-value=.011) METH or money in exchange for sex. Women/trans-women had higher rates of receiving METH or money than men (36.0% vs. 20.7%) while men had higher rates of giving METH or money in exchange for sex than women/trans-women (19.6% vs. 4.0%).

There were also significant gender differences for recent sexual risk behaviors (past 12 mo.), exclusively for those who used METH with principal partner (p-value=.007) and for rates of condom use (p-value=.029). Women/trans-women had higher rates of having a principal sex partner (42.0% vs. 21.0%) and not always consistently using a condom during vaginal sex, compared to men (57.1% vs. 26.7%).

#### *Health Outcomes Attributed to Meth Use*

Of all health outcomes including physiological problems, psychological effects, infectious diseases, and other health outcomes, a significant gender difference found were for psychological effects. Rates of paranoia or persecution delusion were higher for men than women/trans-women (67.0% vs. 50.0%; p-value=.044).

There were some statistically significant bivariate gender differences that were not determined due to a low sample size. The following measures were not determined due to the inability of running a statistical test. Under lifetime METH, age when first took METH anally and age when first took METH another way were not determined. Under recent METH use,

METH taken anally and in another way were not determined. Under other substance use, age when first used barbiturates was not determined. Under lifetime sexual risk behaviors, age when they first gave METH or money in exchange for sex was not determined. Under recent sexual risk behaviors, the amount of people who they offered METH or money (*people*), frequency of using condom in exchange for vaginal, anal, and oral sex, and frequency of using METH with the person they gave METH to in exchange, were not determined.

Under health outcomes, had an emboli, history of chlamydia, METH use problem believed to have caused: HIV/AIDS, chlamydia, gonorrhea, or emboli were not determined. The majority of tests could not be performed due to not having a large sample size in either gender group to compare. The following measures under other health outcomes, premature birth and spontaneous abortion or lost the baby were measures that were subset only to women/ trans-women, therefore no statistical tests were conducted.

### 6.3 Multivariate Analyses

Bivariate associations between gender and measures for METH use were adjusted for sociodemographic variables which differed by gender using logistic regression. These include age, marital status, and type of participant. METH key variables that were of interest included duration of METH use. To assess possible collinearity, measures were assessed for correlation using Spearman correlation ( $-0.6 < R < 0.6$ ). Gender (women/ trans-women vs. men) and sex at birth (female, male) were highly positively correlated (Spearman  $R = .926$ ), hence analysis was not adjusted for sex at birth to avoid collinearity. Statistically significant gender differences adjusted for age of participants, marital status, type of participant, and duration of METH use ( $p < 0.05$ ) are noted.

The following measures were statistically significant gender differences after adjustment. Measures assessed under lifetime METH use included METH snorted by nose and METH use in the form of pill, powder, and rock. Under recent METH use, inhaled and snorted METH and use of amphetamine in the form of pill with prescription were included. Concerning lifetime substance use, age of use of other opioids (Tramadol, Darvon, Percocet) and age of use of Tranquilizers (Diazepam, Valium, Ativan or Restoril) were also included. Lifetime risk behaviors that were statistically significant after adjustment included using alcohol, METH, or other drug 2 hours before or during sex. Regarding recent risk behaviors, significant adjusted gender differences were determined for driving a vehicle after using METH, giving METH or money in exchange for sex, consuming METH with principal sex partner, and experiencing psychological effects, paranoia or persecution delusion.



## **Chapter 7: Discussion**

### 7.1 Conclusions

The thesis study found statistical significant gender differences for lifetime METH use in accordance with other studies that cite that women used meth in pill form compared to men (Brecht et al., 2004; Maxwell & Rutkowski, 2008).

Significant gender differences for lifetime risk behaviors are in accordance with other studies that cite that men have higher rates of taking imprudent risks, acting impulsively or doing things that were later regretted (Ministry of Health, 2011; Roth et al., 2015; Sommers et al., 2006). In the thesis study, results indicated that men had higher rates of taking METH along on a trip to El Paso and driving a vehicle after using METH. In addition, men also had higher rates of giving METH or money in exchange for sex, as a result of acting on impulse.

For physiological problems, dental problems like caries (68.7%) and chest pain (45.3%) were common physiological problems that were self-reported by the participants in the thesis study. These health outcomes classified under physiological problems were in accordance with studies that identified the effects of METH use (Kaye et al., 2007; Yu, Larson, & Watson, 2003). A gender difference study by Brecht et al., (2004) was in accordance with the thesis study bivariate results, in which women/trans-women had slightly higher rates of dental problems compared to men. In addition, the study was in accordance with the thesis study in which men reported higher rates of hallucinations and paranoia compared to women/trans-women. The percentage of health outcomes by gender such as dental problems, hallucinations and paranoia were not statistically significant in the gender difference study by Brecht et al., (2004). The only self-reported psychological effect that persisted after adjustment was paranoia or persecution delusion, in which no studies were in accordance with this statistically significant finding.

When participants were asked to report health problems attributed to METH use, categorized under physiological problems, a majority of participants reported experiencing “other health problem.” Health problems that were reported by other studies and not included in the parent study questionnaire include psychosis, irritability, agitation, antisocial personality, mania, and bipolar disorder, confusion, deficits in episodic memory (e.g., encoding, the process of learning and retrieval and consolidation, the process of retention), inattentiveness and distractibility, libido, HBV, dehydration, parkinsonism like symptoms (e.g., movement abnormalities like fine-motor movement and coordination), increased body temperature, sweating, skin sores (caused by scratching), and fatigue (Asser & Taba, 2015; Ballard et al., 2015; Diaz et al., 2014; Marshall & Werb, 2010; National Institute on Drug Abuse (NIDA), 2013b, 2013d, 2014b; Scott et al., 2007; Sommers et al., 2006). A study on maternal and prenatal outcomes associated with METH use found gestational hypertension and preeclampsia (Gorman et al., 2014).

METH use is known to negatively affect different body systems. However, drug use combinations and chronic viral infection(s) (e.g., HCV, HIV), and other co-morbid clinical conditions may also play a role in the health effects. More research is needed to evaluate the etiology of the molecular changes that occur in the different body systems when exposed to METH while controlling for confounding variables using multivariate regression analysis. The lack of a consistent association between METH use and health outcomes may be due to measurement bias in the gathering of outcomes as a result of use (Marshall & Werb, 2010). Future studies can consider including these additional health outcomes experienced by METH users to help develop new therapeutic approaches for treatment.

The sample consisted of 49 women, one transgender woman, and 100 men. In the analysis, the transgender woman was combined with women. We felt this was the best way to handle the data given that 5 of 50 women were born as male but did not identify as trans-women. We did not exclude the trans-women given that transgender women are a hard to reach and understudied population. The thesis study was able to describe and determine risk behaviors and health outcomes by gender.

## 7.2 Recommendations

The thesis findings can serve to direct efforts towards tailoring prevention and treatment programs that can be used more effectively with female and male participants.

In the thesis study women had higher rates of METH use in pill-form as compared to men. Studies have identified women to be at greater risk for initiating METH at a younger age compared to men (Becker & Hu, 2008; Brecht et al., 2004; Maxwell & Rutkowski, 2008). For women who go into treatment and report use of METH in pill form, public health workers along the Mexico-U.S. border can target the motivators for meth use. Literature has shown that more women use meth in pill form as a motivator to lose weight as compared to men (Brecht et al., 2004; Maxwell & Rutkowski, 2008). Therefore, addressing self-image problems in substance abuse treatment may help reduce meth use in pill form to lose weight among women who used it for that reason.

Studies have reported higher rates of METH use among men compared to women (Becker & Hu, 2008; Medina-Mora, 2013; Ministry of Health, 2011). Higher use and stronger forms (e.g., powder, rock) of METH among Mexican and Hispanic men has been reported so that they appear more masculine (Kulis et al., 2012; Loza et al., 2015; Medina-Mora, 2013; Oetting et al., 1998; Warner et al., 2006). According to Kulis et al., (2012) Mexican culture

traditionally promotes two primary gender roles, *machismo* and *marianismo*. There is an adaptive and maladaptive aspect of *machismos*. The adaptive characteristics are honor, respect, bravery, and a commitment to family. In the contrary, the maladaptive aspects of *machismo* include invulnerability, patriarchal dominance, and aggressiveness. *Marianismo* is characterized by adaptive characteristics such as self-sacrifice, collectivism, family devotion, and nurturing others (Kulis et al., 2012).

The gender role of maladaptive *machismo* has been reported to play a role in substance use among Mexican and Hispanic men (Galanti, 2003). The mindset of appearing more masculine can be attributed to having men less readily admit drug addiction, thus causing them not to seek drug treatment (Amaro et al., 2006; Hser et al., 2005). For men who enter the criminal justice system or become hospitalized as a result of meth use, public health workers should address barriers to seeking drug use treatment by using motivational interventions (MI) (i.e., method to facilitate and engage in intrinsic motivation to change behavior) to promote treatment entry, increase adherence to treatment, promote attendance, and achieve drug abstinence (Amaro et al., 2006). By applying a strong emphasis on family commitment during MI, men living along the Mexico- U.S. border will be encouraged to seek drug treatment to improve their own quality of life and of their families. As a result of MI, men can feel secured of being admitted into drug treatment centers.

There were several methodological and analytical limitations and strengths of the thesis study. In general, the methodological and analytic strengths and limitations of the parent study were also strengths and limitations of the study.

### 7.3 Methodological Strengths and Limitations

#### *Strengths*

With regards to methodological strengths, this study had a unique sample, which included a hard to reach population of current METH users who were predominantly Mexican. This allows the findings of this study to fill in gaps in literature regarding drug use by gender in this population. Another strength that was inherited from the parent study was the recruitment of participants. The personnel used a snowball sampling to recruit the target sample (hard to reach population) by referral. Understanding the bias that comes with snowball sampling, the parent study used it to help with recruitment. Lastly, the pilot study helped identify the feasibility of recruiting such samples and retrieving data when asking such sensitive questions on drug use.

#### *Limitation*

A limitation that was inherited from the parent study was that the study was conducted in one Mexico-U.S. border city, Cd. Juarez. If the parent study had included El Paso, TX, the data collected would have provided further information of the gender differences among Mexicans living in different sides the border.

Snowball sampling was listed as a strength and limitation. Snowball sampling is also categorized as a limitation because it came with bias, reducing the inclusion of people from other social networks. However, it was still used to reach the target sample.

Another limitation was the study design, by design, did not allow for causal relationships, which are key in the aims of this study regarding changes in risk behaviors and health outcomes. Lastly, the participants' responses were taken without any form of verification. The personnel took the participants response as is and relied on their memory. It is plausible that some participants did not give an honest response when answering the questionnaire because of the sensitive topic or due to time lapsed since events occurred.

#### 7.4 Analytical Strengths and Limitations

##### *Strengths*

A strength of the thesis analysis was the quality control of the data. To improve the quality control of the data, each interview was recorded, if errors were made, going back to the audio, corrected the issue. In addition, syntax was used to clean data systematically; error checks were completed to eliminate errors and improved the quality of the data. Lastly, reports of the errors to the team from El Paso, TX and Cd. Juarez, Chihuahua improved the subsequent data collected.

##### *Limitations*

A limitations of the thesis study was that there was missing data, as a result to changes in the instrument early in the study, due to human error on the part of the interviewer unintentionally skipping a question, or the participant refusing to answer or forgetting. In some cases however, when the interviewer did ask the question but failed to record the responses on the instrument, that data was retrieved from the audio files. Missing data was not imputed for the analysis. Lastly, the frequent responses under “other” responses were recorded into new levels or existing levels to depict the diversity of responses in the analysis. All METH measures were not captured for the parent study and therefore inherited to the thesis study.

## **Chapter 8: Strategic Frameworks**

The Masters in Public Health (MPH) Program at the University of Texas at El Paso (UTEP) refers to three strategic frameworks: Healthy People 2020, Healthy Border 2020, and Paso del Norte Regional Strategic Health Frameworks. These frameworks were integrated with this thesis study to provide aims and goals to improve the quality of life of those living in the U.S., specifically those living along the Mexico-U.S. border.

### 8.1 Healthy People 2020

Healthy People 2020 (HP 2020) is a national health promotion and disease prevention initiative managed by the U.S. Department of Health and Human Services (DHHS) that is grounded on improving the lives of Americans by eliminating health disparities, reach health equity, and improve the health of all groups.

One of the topics HP2020 addresses is substance abuse, in order to “protect the health, safety, and quality of life for all, especially children” (Office of Disease Prevention and Health Promotion, 2016). Substance abuse has sub-topics in policy and prevention, screening and treatment, and epidemiology and surveillance. Under each sub-topic, it addresses objectives targeting mostly adolescents. An objective that closely relates to the thesis study is, “SA-2.4: Increase the proportion of high school seniors never using substances – illicit drugs.” This objective targets illicit drugs by having a 10.0% improvement of never using illicit drugs among high school seniors. Although the study doesn’t address individuals in high school, it can be used as an approach for illicit drug use prevention within a younger age group.

Another objective that closely relates to the study is “SA-7: Increase the number of admission to substance abuse treatment for injection drug use.” A work used to consume METH

is with a syringe, this objective plans on having a 10.0% improvement in the number of admissions to treatment for injection drug use. In addition to the previous objective that addresses treatment, HP2020 also tackles illicit drug treatment by stating an increase in “objective SA-8: the proportion of persons who need alcohol and/or illicit drug treatment and received specialty treatment for abuse or dependence in the past year” by 10.0%. HP2020 also plans on a 10.0% improvement for the reduction of “SA-13: the proportion of adults reporting use of any illicit drug during the past 30 days” (Office of Disease Prevention and Health Promotion, 2016).

HP2020 does not specifically address a reduction plan for METH use within their objectives, but does so for illicit drugs. These objectives can be used and applied to reduce METH use and increase admission for METH treatment.

### 8.2 Healthy Border 2020

Healthy Border 2020 is a prevention and health promotion initiative along the U.S.-Mexico border to improve the health and well-being of border residents, managed by the U.S.-Mexico Border Health Commission (BHC) known as “the Commission” is a binational organization. The initiative addresses five public health objectives, listed as priorities of binational concern. These include chronic and degenerative diseases; infectious diseases; and mental health and addiction; and injury prevention (U.S.-Mexico Border Health Commission (BHC), 2015).

One of the health objectives that closely relates to the study is mental health- addiction. Addiction falls under mental health as it addresses “poverty; genetics/biological family dysfunction of all types; addictions; disability; lack of social support and education information.” The BHC plans to reduce the prevalence of first time illegal drug use among 12 to 17 year old



population to 10.0%. This objective although does not address METH use and the same age group of the study sample, recommends strategies to increase access to services, train service providers, and educate the public to reduce consumption of substances (U.S.-Mexico Border Health Commission (BHC), 2015). These strategies can be used to develop, improve, and maintain a binational drug abuse treatment center to serve those in the U.S.-Mexico border.

### 8.3 Paso del Norte Regional Strategic Health Framework

The Paso del Norte Health Foundation is a local initiative that promotes the health and prevents disease in the region through leadership in health education, research, and advocacy (Paso Del Norte Health Foundation, 2016). The foundation has a regional strategic framework that reports substance abuse by having three aims.

These aims include the reduction of alcohol and drug use among youth; a decrease in the prevalence of alcohol and drug abuse among adults, and the establishment of substance abuse treatment centers. The aims don't address METH directly, however they provide an example of what public health officials should do to advocate for substance abuse treatment and education, to reduce initiation and use of METH.

## **Chapter 9: MPH Core Competencies**

There are five discipline specific core competencies embedded in the MPH program at UTEP. These include: social and behavioral sciences, health services administration and policy, epidemiology, environmental health, and biostatistics. This study integrates four disciplines: social and behavioral sciences, epidemiology, biostatistics, and Hispanic/border health concentration competencies.

### 9.1 Social and Behavioral Sciences

The social and behavioral sciences in public health addresses the behavioral, social, and cultural factors related to individual and population health, which identifies research in health disparities. This thesis study identified the contextual factors, risk factors, and correlates to METH use.

### 9.2 Epidemiology

Epidemiology in public health is the study of patterns of disease and injury in human populations. This study summarized national reports and reported results of METH and other drug use. Additionally, this study reported data of current METH users in Cd. Juarez, Mexico to describe the sample of METH users in terms of their socioeconomic characteristics by gender and describe the patterns of METH use and other drug use by gender.

### 9.3 Biostatistics

Biostatistics in public health is the study of development and applications of statistical reasoning and methods to address, analyze, and solve problems. This study managed and cleaned data before performing univariate, bivariate, multivariate analyses to describe and determine

gender differences in risk behaviors and health. The results of this study were interpreted accordingly and offered in a written and oral presentation.

#### 9.4 Hispanic/Border Health Concentration

The Hispanic and border health concentration addresses the health challenges among Hispanic border communities. This study identified gender differences, and accessed gaps in literature in METH use behaviors, risk behaviors, and health outcomes attributed to METH use of those living in the Mexico-U.S. border.

## References

- Amaro, H., Arevalo, S., Gonzalez, G., Szapocznik, J., & Iguchi, M. Y. (2006). Needs and scientific opportunities for research on substance abuse treatment among Hispanic adults. *Drug Alcohol Depend*, 84 Suppl 1, S64-75.  
doi:10.1016/j.drugalcdep.2006.05.008
- Asser, A., & Taba, P. (2015). Psychostimulants and movement disorders. *Front Neurol*, 6, 75.  
doi:10.3389/fneur.2015.00075
- Ballard, M. E., Weafer, J., Gallo, D. A., & de Wit, H. (2015). Effects of acute methamphetamine on emotional memory formation in humans: encoding vs consolidation. *PLoS One*, 10(2), e0117062. doi:10.1371/journal.pone.0117062
- Bao, Y., Liu, Z., Li, J., Zhang, R., Hao, W., Zhao, M., . . . Lu, L. (2015). Club drug use and associated high-risk sexual behaviour in six provinces in China. *Addiction*, 110(1), 11-19.
- Becker, J. B., & Hu, M. (2008). Sex differences in drug abuse. *Front Neuroendocrinol*, 29(1), 36-47. doi:10.1016/j.yfrne.2007.07.003
- Brecht, M. L., O'Brien, A., von Mayrhauser, C., & Anglin, M. D. (2004). Methamphetamine use behaviors and gender differences. *Addict Behav*, 29(1), 89-106.
- Brouwer, K. C., Case, P., Ramos, R., Magis-Rodriguez, C., Bucardo, J., Patterson, T. L., & Strathdee, S. A. (2006). Trends in production, trafficking, and consumption of methamphetamine and cocaine in Mexico. *Subst Use Misuse*, 41(5), 707-727.  
doi:10.1080/10826080500411478
- Carroll, M. E., Lynch, W. J., Roth, M. E., Morgan, A. D., & Cosgrove, K. P. (2004). Sex and estrogen influence drug abuse. *Trends Pharmacol Sci*, 25(5), 273-279.  
doi:10.1016/j.tips.2004.03.011
- Case, P., Ramos, R., Brouwer, K. C., Firestone-Cruz, M., Pollini, R. A., Fraga, M. A., . . . Strathdee, S. A. (2008). At the borders, on the edge: use of injected methamphetamine in Tijuana and Ciudad Juarez, Mexico. *J Immigr Minor Health*, 10(1), 23-33. doi:10.1007/s10903-007-9051-0
- Chang, L., Cloak, C., Patterson, K., Grob, C., Miller, E. N., & Ernst, T. (2005). Enlarged striatum in abstinent methamphetamine abusers: a possible compensatory response. *Biol Psychiatry*, 57(9), 967-974. doi:10.1016/j.biopsych.2005.01.039
- Cheng, W. S., Garfein, R. S., Semple, S. J., Strathdee, S. A., Zians, J. K., & Patterson, T. L. (2010). Binge use and sex and drug use behaviors among HIV(-), heterosexual methamphetamine users in San Diego. *Subst Use Misuse*, 45(1-2), 116-133.  
doi:10.3109/10826080902869620
- Clutter, A. W., and Zubieta, A.C. . (2009). Fact Sheet Family and Consumer Sciences. *The Ohio State University Extension*. Retrieved from  
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.183.6912&rep=rep1&type=pdf>
- Cunningham, J. K., Liu, L. M., & Callaghan, R. (2009). Impact of US and Canadian precursor regulation on methamphetamine purity in the United States. *Addiction*, 104(3), 441-453. doi:10.1111/j.1360-0443.2008.02458.x
- Cunningham, J. K., Maxwell, J. C., Campollo, O., Cunningham, K. I., Liu, L. M., & Lin, H. L. (2010). Proximity to the US-Mexico border: a key to explaining geographic variation

- in US methamphetamine, cocaine and heroin purity. *Addiction*, 105(10), 1785-1798. doi:10.1111/j.1360-0443.2010.03032.x
- Diaz, S. D., Smith, L. M., LaGasse, L. L., Derauf, C., Newman, E., Shah, R., . . . Lester, B. M. (2014). Effects of prenatal methamphetamine exposure on behavioral and cognitive findings at 7.5 years of age. *J Pediatr*, 164(6), 1333-1338. doi:10.1016/j.jpeds.2014.01.053
- Dluzen, D. E., & Liu, B. (2008). Gender Differences in Methamphetamine Use and Responses: A Review. *Gender Medicine*, 5(1), 12.
- Drug Enforcement Administration (DEA). (2015). *2015 National Drug Threat Assessment Summary*. Retrieved from [http://www.dea.gov/docs/2015 NDTA Report.pdf](http://www.dea.gov/docs/2015%20NTA%20Report.pdf)
- Dye, L. R. (2006). Recipe for disaster: Mexican methamphetamine. *J Med Toxicol*, 2(2), 81-82.
- Embry, D., Hankins, M., Biglan, A., & Boles, S. (2009). Behavioral and social correlates of methamphetamine use in a population-based sample of early and later adolescents. *Addict Behav*, 34(4), 343-351. doi:10.1016/j.addbeh.2008.11.019
- Fletcher, J. B., & Reback, C. J. (2015). Depression Mediates and Moderates Effects of Methamphetamine Use on Sexual Risk Taking Among Treatment-Seeking Gay and Bisexual Men. *Health Psychol*. doi:10.1037/hea0000207
- Foundation for a Drug-Free World. (2016). The Truth About Crystal Meth *History of Methamphetamine*. Retrieved from <http://www.drugfreeworld.org/drugfacts/crystallmeth/the-truth-about-drugs.html>
- Franco, C. (2007). *Methamphetamine/ Background, Prevalence, and Federal Drug Control Policies*. Retrieved from <http://congressionalresearch.com/RL33857/document.php?study=Methamphetamine+Background+Prevalence+and+Federal+Drug+Control+Policies>
- Frosch, D., Shoptaw, S., Huber, A., Rawson, R. A., & Ling, W. (1996). Sexual HIV risk among gay and bisexual male methamphetamine abusers. *J Subst Abuse Treat*, 13(6), 483-486.
- Galanti, G. A. (2003). The Hispanic family and male-female relationships: an overview. *J Transcult Nurs*, 14(3), 180-185.
- Ghaffari-Nejad, A., Ziaadini, H., Saffari-Zadeha, S., Kheradmand, A., & Pouya, F. (2014). A study of the phenomenology of psychosis induced by methamphetamine: a preliminary research. *Addict Health*, 6(3-4), 105-111.
- Gonzales, R., Marinelli-Casey, P., Shoptaw, S., Ang, A., & Rawson, R. A. (2006). Hepatitis C virus infection among methamphetamine-dependent individuals in outpatient treatment. *J Subst Abuse Treat*, 31(2), 195-202. doi:10.1016/j.jsat.2006.04.006
- Goodwin, J. S., Larson, G. A., Swant, J., Sen, N., Javitch, J. A., Zahniser, N. R., . . . Khoshbouei, H. (2009). Amphetamine and methamphetamine differentially affect dopamine transporters in vitro and in vivo. *J Biol Chem*, 284(5), 2978-2989. doi:10.1074/jbc.M805298200
- Gorman, M. C., Orme, K. S., Nguyen, N. T., Kent, E. J., 3rd, & Caughey, A. B. (2014). Outcomes in pregnancies complicated by methamphetamine use. *Am J Obstet Gynecol*, 211(4), 429 e421-427. doi:10.1016/j.ajog.2014.06.005
- Healthy Paso del Norte. (2015). Demographics. *County: El Paso, TX*. Retrieved from <http://www.healthypasodelnorte.org/index.php?module=DemographicData&type=user&func=ddview&varset=1&ve=text&pct=2&levels=1>

- Ho, E. L., Josephson, S. A., Lee, H. S., & Smith, W. S. (2009). Cerebrovascular complications of methamphetamine abuse. *Neurocrit Care*, 10(3), 295-305. doi:10.1007/s12028-008-9177-5
- Hser, Y. I., Evans, E., & Huang, Y. C. (2005). Treatment outcomes among women and men methamphetamine abusers in California. *J Subst Abuse Treat*, 28(1), 77-85. doi:10.1016/j.jsat.2004.10.009
- Instituto Nacional de Psiquiatría. (2004). *Maestria en Reduccion de la Demanda de Drogas*. Retrieved from <http://www.sev.gob.mx/prevencion-adicciones/files/2012/11/C18SituacionActualConsumoDrogas.pdf>
- Interior, M. o., & (SEGOB). (2009). *Datos de Proyecciones*. Retrieved from [http://www.conapo.gob.mx/es/CONAPO/Proyecciones\\_Datos](http://www.conapo.gob.mx/es/CONAPO/Proyecciones_Datos)
- Kalivas, P. W., Volkow, N., & Seamans, J. (2005). Unmanageable motivation in addiction: A pathology in prefrontal-accumbens glutamate transmission. *Neuron*, 45(5), 647-650. doi:10.1016/j.neurons.2005.02.005
- Kaye, S., McKetin, R., Duflo, J., & Darke, S. (2007). Methamphetamine and cardiovascular pathology: a review of the evidence. *Addiction*, 102(8), 1204-1211. doi:10.1111/j.1360-0443.2007.01874.x
- Klasser, G. D., & Epstein, J. (2005). Methamphetamine and its impact on dental care. *J Can Dent Assoc*, 71(10), 759-762.
- Kulis, S., Marsiglia, F. F., & Nagoshi, J. L. (2012). Gender roles and substance use among Mexican American adolescents: a relationship moderated by acculturation? *Subst Use Misuse*, 47(3), 214-229. doi:10.3109/10826084.2011.630438
- Liu, D., Wang, Z., Chu, T., & Chen, S. (2013). Gender difference in the characteristics of and high-risk behaviours among non-injecting heterosexual methamphetamine users in Qingdao, Shandong Province, China. *BMC Public Health*, 13, 30. doi:10.1186/1471-2458-13-30
- Long, L. (2013). The Latino Community: The Culture, Values, and Behaviors Retrieved from <https://psychsocialissues.com/2013/04/05/the-latino-community-the-culture-values-and-behaviors/>
- Loza, O., Ramos, R., Ferreira-Pinto, J., Hernandez, M. T., & Villalobos, S. A. (2015). A qualitative exploration of perceived gender differences in methamphetamine use among women who use methamphetamine on the Mexico-U.S. border. *J Ethn Subst Abuse*, 1-20. doi:10.1080/15332640.2015.1070392
- Lynch, W. J., Roth, M. E., & Carroll, M. E. (2002). Biological basis of sex differences in drug abuse: preclinical and clinical studies. *Psychopharmacology (Berl)*, 164(2), 121-137. doi:10.1007/s00213-002-1183-2
- Marshall, B. D., & Werb, D. (2010). Health outcomes associated with methamphetamine use among young people: a systematic review. *Addiction*, 105(6), 991-1002. doi:10.1111/j.1360-0443.2010.02932.x
- Maxwell, J. C., & Rutkowski, B. A. (2008). The prevalence of methamphetamine and amphetamine abuse in North America: a review of the indicators, 1992-2007. *Drug Alcohol Rev*, 27(3), 229-235. doi:10.1080/09595230801919460
- McCabe, S. E., Morales, M., Cranford, J. A., Delva, J., McPherson, M. D., & Boyd, C. J. (2007). Race/ethnicity and gender differences in drug use and abuse among college students. *J Ethn Subst Abuse*, 6(2), 75-95. doi:10.1300/J233v06n02\_06

- Medina-Mora, M. E., Real, T., Villatoro, J., Natera, G. (2013). Las drogas y la salud pública: ¿hacia dónde vamos? *Psicologica Social*, 55(1).
- Miller, C. L., Kerr, T., Fischer, B., Zhang, R., & Wood, E. (2009). Methamphetamine injection independently predicts hepatitis C infection among street-involved youth in a Canadian setting. *J Adolesc Health*, 44(3), 302-304.  
doi:10.1016/j.jadohealth.2008.08.007
- Ministry of Health. (2011). *Perfil Epidemiológico de las Adicciones en México 2010*. Retrieved from Mexico:  
[http://www.epidemiologia.salud.gob.mx/doctos/infoepid/publicaciones/2011/monografias/P\\_EPI\\_DE\\_LAS\\_ADICCIONES\\_EN\\_MEXICO\\_2010.pdf](http://www.epidemiologia.salud.gob.mx/doctos/infoepid/publicaciones/2011/monografias/P_EPI_DE_LAS_ADICCIONES_EN_MEXICO_2010.pdf)
- Ministry of Health. (2012). *Encuesta Nacional de Adicciones (ENA) 2011*, . Retrieved from Mexico: [http://www.conadic.salud.gob.mx/pdfs/ENA\\_2011\\_DROGAS\\_ILICITAS\\_.pdf](http://www.conadic.salud.gob.mx/pdfs/ENA_2011_DROGAS_ILICITAS_.pdf)
- National Center for Biotechnology Information. (2015). PubChem Compound Database: Methamphetamine. Retrieved from  
[http://pubchem.ncbi.nlm.nih.gov/compound/methamphetamine - section=Top](http://pubchem.ncbi.nlm.nih.gov/compound/methamphetamine-section=Top)
- National Institute on Drug Abuse (NIDA). (2013a, September 2013). Methamphetamine. *What is the scope of methamphetamine abuse in the United States?* Retrieved from <https://www.drugabuse.gov/publications/research-reports/methamphetamine/what-scope-methamphetamine-abuse-in-united-states>
- National Institute on Drug Abuse (NIDA). (2013b, September 2013). Methamphetamine. *Are people who abuse methamphetamine at risk for contracting HIV/AIDS and hepatitis B and C?* Retrieved from <http://www.drugabuse.gov/publications/research-reports/methamphetamine/are-methamphetamine-abusers-risk-contracting-hiv-aids-hepatitis->
- National Institute on Drug Abuse (NIDA). (2013c, September 2013). Methamphetamine. *What is methamphetamine?* Retrieved from <http://www.drugabuse.gov/publications/research-reports/methamphetamine/what-scope-methamphetamine-abuse-in-united-states>
- National Institute on Drug Abuse (NIDA). (2013d, September 2013). What are the long-term effects of methamphetamine abuse? Retrieved from <http://www.drugabuse.gov/publications/research-reports/methamphetamine/what-are-long-term-effects-methamphetamine-abuse>
- National Institute on Drug Abuse (NIDA). (2014a). Drug Facts. *Heroin*. Retrieved from <http://www.drugabuse.gov/publications/drugfacts/heroin>
- National Institute on Drug Abuse (NIDA). (2014b). *DrugFacts*. Retrieved from <http://www.drugabuse.gov/publications/drugfacts/methamphetamine>
- National Institute on Drug Abuse (NIDA). (2015a). Commonly Abused Drugs Charts. Retrieved from [http://www.drugabuse.gov/drugs-abuse/commonly-abused-drugs-charts - meth](http://www.drugabuse.gov/drugs-abuse/commonly-abused-drugs-charts-meth)
- National Institute on Drug Abuse (NIDA). (2015b, June 2015). Drug Facts. *Nationwide Trends*. Retrieved from <https://www.drugabuse.gov/publications/drugfacts/nationwide-trends>
- Oetting, E. R., Donnermeyer, J. F., Trimble, J. E., & Beauvais, F. (1998). Primary socialization theory: culture, ethnicity, and cultural identification. The links between culture and substance use. IV. *Subst Use Misuse*, 33(10), 2075-2107.

- Office of Disease Prevention and Health Promotion. (2016). Healthy People.gov. *Substance Abuse*. Retrieved from <http://www.healthypeople.gov/2020/topics-objectives/topic/substance-abuse>
- Office of National Drug Control Policy. (2010). *Fact Sheet*. Retrieved from [https://www.whitehouse.gov/sites/default/files/ondcp/Fact\\_Sheets/pseudoephedrine\\_fact\\_sheet\\_7-16-10\\_0.pdf](https://www.whitehouse.gov/sites/default/files/ondcp/Fact_Sheets/pseudoephedrine_fact_sheet_7-16-10_0.pdf)
- Paso Del Norte Health Foundation. (2016, 2012). Priority Areas/Initiatives. Retrieved from <http://www.pdnhf.org>
- Polcin, D. L., Buscemi, R., Nayak, M., Korcha, R., & Galloway, G. (2012). Gender Differences in Psychiatric Symptoms among Methamphetamine Dependent Residents in Sober Living Houses. *Addict Disord Their Treat*, 11(2), 53-63. doi:10.1097/ADT.0b013e3182213ef1
- Roth, A. M., Armenta, R. A., Wagner, K. D., Roesch, S. C., Bluthenthal, R. N., Cuevas-Mota, J., & Garfein, R. S. (2015). Patterns of drug use, risky behavior, and health status among persons who inject drugs living in San Diego, California: a latent class analysis. *Subst Use Misuse*, 50(2), 205-214. doi:10.3109/10826084.2014.962661
- Schindler, C. W., Bross, J. G., & Thorndike, E. B. (2002). Gender differences in the behavioral effects of methamphetamine. *Eur J Pharmacol*, 442(3), 231-235.
- Scott, J. C., Woods, S. P., Matt, G. E., Meyer, R. A., Heaton, R. K., Atkinson, J. H., & Grant, I. (2007). Neurocognitive effects of methamphetamine: a critical review and meta-analysis. *Neuropsychol Rev*, 17(3), 275-297. doi:10.1007/s11065-007-9031-0
- Shannon, K., Strathdee, S., Shoveller, J., Zhang, R., Montaner, J., & Tyndall, M. (2011). Crystal methamphetamine use among female street-based sex workers: Moving beyond individual-focused interventions. *Drug Alcohol Depend*, 113(1), 76-81. doi:10.1016/j.drugalcdep.2010.07.011
- Sommers, I., Baskin, D., & Baskin-Sommers, A. (2006). Methamphetamine use among young adults: health and social consequences. *Addict Behav*, 31(8), 1469-1476. doi:10.1016/j.addbeh.2005.10.004
- Springer, A. E., Peters, R. J., Shegog, R., White, D. L., & Kelder, S. H. (2007). Methamphetamine use and sexual risk behaviors in U.S. high school students: findings from a national risk behavior survey. *Prev Sci*, 8(2), 103-113. doi:10.1007/s11121-007-0065-6
- Statistical Package for the Social Sciences (SPSS). (2013) (Version 22): International Business Machines (IBM). Retrieved from <http://www-01.ibm.com/software/analytics/spss/products/statistics/>
- Strathdee, S. A., Fraga, W. D., Case, P., Firestone, M., Brouwer, K. C., Perez, S. G., . . . Fraga, M. A. (2005). "Vivo para consumirla y la consumo para vivir" ["I live to inject and inject to live"]: high-risk injection behaviors in Tijuana, Mexico. *J Urban Health*, 82(3 Suppl 4), iv58-73. doi:10.1093/jurban/jti108
- Substance Abuse and Mental Health Services Administration (SAMHSA). (n.d.). Drug Abuse among Hispanics. *A Brief Evidence-Based Guide for Providers*. Retrieved from <https://store.samhsa.gov/shin/content/SMA07-4288/SMA07-4288.pdf>
- Texas State Board of Pharmacy. (2014, 2014). Controlled Drugs. *What is a controlled (scheduled) drug?* Retrieved from <https://www.pharmacy.texas.gov/consumer/broch2.asp>



- Trujillo, K. A., Smith, M. L., & Guaderrama, M. M. (2011). Powerful behavioral interactions between methamphetamine and morphine. *Pharmacol Biochem Behav*, 99(3), 451-458. doi:10.1016/j.pbb.2011.04.014
- U.S. Customs and Border Protection. (2015). Imperial Beach Station. Retrieved from <http://www.cbp.gov/border-security/along-us-borders/border-patrol-sectors/san-diego-sector-california/imperial-beach-station>
- U.S. Department of Justice. (2007). Combat Meth Epidemic Act (CMEA) Retrieved from [https://www.deadiversion.usdoj.gov/meth/q\\_a.htm](https://www.deadiversion.usdoj.gov/meth/q_a.htm)
- U.S. Department of Transportation. (2015, June 2015). Border Crossing/Entry Data: Query Detailed Statistics Retrieved from [http://transborder.bts.gov/programs/international/transborder/TBDR\\_BC/TBDR\\_BCQ.html](http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html)
- U.S. Food and Drug Administration (FDA). (2014, July 30, 2014). Legal Requirements for the Sale and Purchase of Drug Products Containing Pseudoephedrine, Ephedrine, and Phenylpropanolamine. Retrieved from <http://www.fda.gov/drugs/drugsafety/informationbydrugclass/ucm072423.htm>
- U.S.-Mexico Border Health Commission (BHC). (2015). *Healthy Border 2020: A Prevention & Health Promotion Initiative* Retrieved from [http://www.borderhealth.org/files/res\\_2805.pdf](http://www.borderhealth.org/files/res_2805.pdf).
- United Nations Office on Drugs and Crime (UNODC). (2012). *Informe Mundial Sobre las Drogas 2012*. Retrieved from New York: [https://www.unodc.org/documents/data-and-analysis/WDR2012/WDR\\_2012\\_Spanish\\_web.pdf](https://www.unodc.org/documents/data-and-analysis/WDR2012/WDR_2012_Spanish_web.pdf)
- University of Washington. (2016). Amphetamines. Retrieved from <https://faculty.washington.edu/chudler/amp.html>
- UTEP Center for Interdisciplinary Health Research and Evaluation. (2011, June 29, 2011). Juárez City and County Demographics. Retrieved from [http://chs.utep.edu/cihre/demographic/juarez\\_city\\_and\\_county\\_demographics.php](http://chs.utep.edu/cihre/demographic/juarez_city_and_county_demographics.php)
- Villatoro, J., Medina-Mora, M.E., Fleiz Bautista, C., Moreno López, M., Oliva Robles, N., Bustos Gamiño, M., Fregoso Ito, D., De Lourdes Gutiérrez López, M., Amador Buenabad, N. . (2012). El consumo de drogas en México: Resultados de la Encuesta Nacional de Adicciones, 2011. *Salud Mental*, 35(6), 447-457.
- Warner, L. A., Valdez, A., Vega, W. A., de la Rosa, M., Turner, R. J., & Canino, G. (2006). Hispanic drug abuse in an evolving cultural context: an agenda for research. *Drug Alcohol Depend*, 84 Suppl 1, S8-16. doi:10.1016/j.drugalcdep.2006.05.003
- Yu, Q., Larson, D. F., & Watson, R. R. (2003). Heart disease, methamphetamine and AIDS. *Life Sci*, 73(2), 129-140.

# Appendix 1

## Appendix 1: IRB Exempt Determination Form



**THE UNIVERSITY OF TEXAS AT EL PASO**  
Office of the Vice President for Research and Sponsored Projects  
**Institutional Review Board**  
El Paso, Texas 79968-0587  
phone: 915 747-8841 fax: 915 747-5931

**FWA No: 00001224**

DATE: April 8, 2016

TO: Priscilla Guevara, B.S.

FROM: University of Texas at El Paso IRB

STUDY TITLE: [894084-1] Gender Differences in Risk Behaviors and Health Outcomes due to Methamphetamine Use in a Mexico - U.S. Border City

IRB REFERENCE #: College of Health Sciences

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: April 8, 2016

REVIEW CATEGORY: 45 CFR 46.101(b)(4)

Thank you for your submission of New Project materials for this research study. University of Texas at El Paso IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

Exempt protocols do not need to be renewed. Please note that it is the Principal Investigator's responsibility to resubmit the proposal for review if there are any modifications made to the originally submitted proposal. This review is required in order to determine if "Exemption" status remains.

We will put a copy of this correspondence on file in our office.

If you have any questions, please contact the IRB Office at (915) 747-8841 or [irb.orsp@utep.edu](mailto:irb.orsp@utep.edu). Please include your study title and reference number in all correspondence with this office.

cc:

## Appendix 2

### Appendix 2: Collaborative Institute (CITI): Social and Behavioral Researchers (Faculty & Students)

#### COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COURSEWORK REQUIREMENTS REPORT\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Priscilla Guevara (ID: 3252084)
- **Email:** pguevara2@miners.utep.edu
- **Institution Affiliation:** University of Texas at El Paso (ID: 2114)
- **Institution Unit:** Biological Sciences
- **Phone:** (915) 747-5000
  
- **Curriculum Group:** Social & Behavioral Researchers (Faculty & Students)
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.
  
- **Report ID:** 14445203
- **Completion Date:** 12/04/2014
- **Expiration Date:** 12/03/2017
- **Minimum Passing:** 90
- **Reported Score\*:** 92

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction	12/23/12	3/3 (100%)
Students in Research	12/23/12	10/10 (100%)
History and Ethical Principles - SBE	12/04/14	4/5 (80%)
Defining Research with Human Subjects - SBE	12/04/14	5/5 (100%)
The Federal Regulations - SBE	12/23/12	5/5 (100%)
Assessing Risk - SBE	12/23/12	5/5 (100%)
Informed Consent - SBE	12/04/14	5/5 (100%)
Privacy and Confidentiality - SBE	12/23/12	5/5 (100%)
Research with Prisoners - SBE	12/04/14	2/5 (40%)
Research with Children - SBE	12/23/12	4/4 (100%)
Research in Public Elementary and Secondary Schools - SBE	12/23/12	4/4 (100%)
Internet-Based Research - SBE	12/23/12	5/5 (100%)
Vulnerable Subjects - Research Involving Workers/Employees	12/23/12	4/4 (100%)
Conflicts of Interest in Research Involving Human Subjects	12/23/12	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research	12/23/12	3/3 (100%)
International Studies	12/25/12	1/3 (33%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

**CITI Program**  
 Email: [citisupport@miami.edu](mailto:citisupport@miami.edu)  
 Phone: 305-243-7970  
 Web: <https://www.citiprogram.org>

## Appendix 3

### Appendix 3: Social and Behavioral Responsible Conduct of Research

#### COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COURSEWORK REQUIREMENTS REPORT\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Priscilla Guevara (ID: 3252084)
- **Email:** pguevara2@miners.utep.edu
- **Institution Affiliation:** University of Texas at El Paso (ID: 2114)
- **Institution Unit:** Biological Sciences
- **Phone:** (915) 747-5000
  
- **Curriculum Group:** Social and Behavioral Responsible Conduct of Research
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.
  
- **Report ID:** 14014933
- **Completion Date:** 10/13/2014
- **Expiration Date:** 10/12/2017
- **Minimum Passing:** 85
- **Reported Score\*:** 94

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Responsible Conduct of Research (RCR) Course Introduction	09/12/14	No Quiz
Research Misconduct (RCR-SBE)	10/13/14	5/5 (100%)
Data Management (RCR-SBE)	10/13/14	5/5 (100%)
Authorship (RCR-SBE)	10/13/14	4/5 (80%)
Peer Review (RCR-SBE)	10/13/14	5/5 (100%)
Mentoring (RCR-Interdisciplinary)	12/26/12	5/5 (100%)
Using Animal Subjects in Research (RCR-Basic)	01/03/13	8/8 (100%)
Conflicts of Interest (RCR-SBE)	10/13/14	5/5 (100%)
Collaborative Research (RCR-SBE)	10/13/14	3/5 (60%)
Research Involving Human Subjects (RCR-Basic)	01/03/13	5/5 (100%)
Responsible Conduct of Research (RCR) Course Conclusion	01/03/13	No Quiz

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

**CITI Program**  
Email: [citisupport@miami.edu](mailto:citisupport@miami.edu)  
Phone: 305-243-7970  
Web: <https://www.citiprogram.org>

## Vita

Priscilla Guevara has a Bachelors Degree in Biological Sciences from the University of Texas at El Paso (UTEP). She worked as an undergraduate researcher in a cancer research project where she helped test and evaluate the characterization of *cis-Diphenyl Pyridineamine Platinum (II) Complexes* as potential anti-breast cancer agents between January 2012 and October 2013.

Between November 2014 to March 2015, Priscilla was a research assistant for the UTEP Vulnerability Issues in Drug Abuse (VIDA) Project, in which she entered, managed, and cleaned data for the METH Pilot Study. Her work has been primarily focused on substance abuse, focusing on substance use along the U.S.-Mexico border. In April 2015, she worked as a research assistant for a UTEP Minority Serving Institution and Community Based Organization Initiative known as Hasta La Vista. The initiative works to reduce substance abuse, HIV, and Hepatitis C in El Paso, TX. As a graduate research assistant, Priscilla took the role as a program coordinator, where she helped conduct individual and group interviews for the needs assessment, facilitate information between UTEP faculty and local organizations, supervise the progress of student participants, and contribute to the quarterly and annual evaluation report to Substance Abuse and Mental Health Services Administration (SAMHSA).

During Summer 2016, her MPH practicum brought her to work alongside Shift Positive and the City of El Paso Department of Public Health. Her practicum project consisted of creating and implementing a new Policy Analysis Standard Operating Procedure (SOP). After Priscilla graduates with her MPH in December 2016, she plans on attending medical school and working on substance abuse prevention and reduction.

Contact Information: [pguevara92@gmail.com](mailto:pguevara92@gmail.com)

This thesis/dissertation was typed by Priscilla Guevara.