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Current Trends of Substance Use in Iraq: Examining Data from the 2014 Iraqi National Household Survey of Alcohol and Drug Use

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Current Trends of Substance Use in Iraq:

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Iraqi National Household Survey of Alcohol and Drug Use

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Public Health

by

Rufaidah Dabbagh

2017

ABSTRACT OF THE DISSERTATION

Current Trends of Substance Use in Iraq:

Examining Data from the 2014

Iraqi National Household Survey of Alcohol and Drug Use

by

Rufaidah Dabbagh

Doctor of Public Health

University of California, Los Angeles, 2017

Professor Susan D. Cochran, Chair

Background

There is growing concern about the impacts of war on unhealthy substance use in Iraq. However, little is known about the country's current substance use trends.

Objectives

To investigate gender differences in cigarette and water-pipe use, to examine trends of unhealthy alcohol consumption (at-risk drinking and binge drinking) in men and women, and to examine trends of illicit and prescription drug misuse in Muslim men and its relation to residing in ISIL-targeted governorates.

Study Design and Population

The population included participants from the Iraqi National Household Survey of Alcohol and Drug Use, who were not displaced and non-institutionalized adult Iraqi residents. This survey was cross-sectional and sampled 911 women and 2,289 men from all 18 Iraqi governorates, using a multi-stage cluster sampling approach. The response rate was 91.6%.

Methods

Substance use indicators included cigarette smoking, water-pipe smoking, at-risk drinking, and binge drinking, in the past month, in addition to past-year illicit drug use and prescription drug misuse. Covariates included sex, age, education, employment, marital status, ethnicity, religion and residency in ISIL-targeted governorates. For every substance use indicator, weighted prevalence and adjusted odds ratios (AOR), with corresponding 95% confidence intervals (CI), were estimated.

Results

Men were at greater odds for smoking cigarettes (AOR=34.57, 95% CI=19.99, 59.79), and using water-pipes (AOR=33.5, 95% CI=7.79, 144.15), compared to women. Age and college education were positively associated with tobacco use in women, but the opposite was observed in men. Overall alcohol use was low, however, most men who reported past-month drinking were at-risk (65.7%, 95% CI=55.48, 74.62) and binge drinkers (72.8%, 95% CI=62.06, 81.43). Muslim men reported past-year prescription drug misuse (1.9%, 95% CI=1.18, 3.16) more frequently than illicit drug use (0.35%, 95% CI=0.15, 0.82). The odds for past-year prescription drug misuse was lower in ISIL-targeted governorates compared to untargeted governorates (AOR=0.23, 95% CI=0.02, 2.32), and no men reported using Illicit drugs in ISIL-targeted governorates.

Conclusions

The current focus on substance use prevention in Iraq should be on tobacco use, especially in young men. Awareness should be raised about unhealthy alcohol consumption and its complications, and the harms associated with prescription drug misuse.

This dissertation of Rufaidah Dabbagh is approved.

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2017

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Some of the estimates reported in this dissertation have been previously published by Nesif Al-Hemiary and colleagues.[*] These include overall male and female past-month prevalence estimates for cigarette and water-pipe use reported in Table 3.2, male and female prevalence estimates for lifetime alcohol consumption reported in Table 4.2, and overall prevalence estimates for past-month alcohol consumption in men and women, reported in the results section of Chapter 4.

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[*] Al-Hemiary N, Dabbagh R, Hashim MT, Al-Hasnawi S, Abutiheen A, Abdulghani EA, et al. Self-reported substance use in Iraq: findings from the Iraqi National Household Survey of Alcohol and Drug Use, 2014. *Addiction* 2017. doi/10.1111/add.13800/full

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Presentations and Conferences

- "Drug Use in Relation to Tobacco and Alcohol Use in Iraqi Men," presented as a poster at the National Institute on Drug Abuse (NIDA) International Forum. Palm Springs, California, 2016.

- "World Health Day 2009" King Saud University, College of Medicine Event, organizer. Riyadh, Saudi Arabia, 2009.

- "Psychosocial Aspects of HIV/AIDS," presented at the "World AIDS Day 20th Anniversary" King Saud University, College of Medicine Event. Riyadh, Saudi Arabia, 2008.

Research Interests

- Substance Use
- Mental Health
- Research Capacity Building
- Community Health Education

Chapter 1

Assessing Substance Use in Iraq: What is the Public Health Significance?

Background

The Republic of Iraq is one of the 22 members of the Arab League States. With a surface area of approximately 168,726 square miles, its latest estimated population count is 32,778,000 individuals, of which 69% reside in urban areas.[1-3] The country consists of 18 governorates, three of which are governed by Kurds [Figure 1.1]. It is a young country. More than half of the Iraqi population is under 19 years of age while only 3% of the population is over 60 years of age.[1,4]

The country is classified by the World Health Organization (WHO) as a middle-income country, with an annual gross national income (GNI) per capita, based on purchasing power parity (PPP), of $4,230 (regional GNI Per Capita, PPP, is $3,992) (WHO 2014 b).[5] In 2012, adult literacy was estimated at 78.5% (85.8% and 72.2%, for males and females, respectively).[6] The Iraqi population is a rapidly growing one, with a total fertility rate of 5 live births per female, which is considered the highest in the Eastern Mediterranean Region (EMR).[3] This is coupled with a relatively low under-five mortality rate of 34 per 1000 live births - the regional average is 57 per 1000 live births.[5]

Figure 1.1. Political Map of Iraq

Note: The governorates of Dohouk, Erbil and Al-Sulaimaniya comprise the region of Iraqi Kurdistan.[7]
Map Source: Al-Hemiary et al., 2017.[8]

Like other middle-income Arab nations, Iraq is undergoing a major epidemiologic transition from communicable to non-communicable disease.[4,9] As a result of rapid industrialization in the Arab World, these member states have adopted many behaviors that contribute to non-communicable disease burden.[10-12] Risk behaviors such as tobacco use and low rates of physical activity, as well as high blood pressure, diabetes, obesity, dyslipidemia are found in high proportions in the Arab World, especially in high/middle-income countries.[11,12] The four major risk behaviors for many non-communicable diseases are tobacco use, harmful alcohol use, physical inactivity and unhealthy dietary habits.[13] These

behaviors are "modifiable risk factors" and when prevented can significantly reduce non-communicable disease risk.[13]

In the following sections I present a brief review of some of these modifiable behaviors namely the use of tobacco and alcohol, and the illicit use of drugs. I describe health implications and commonly reported socio-demographic determinants for using each of these substances, and provide recent prevalence estimates worldwide and in the Arab world, with more focus on Iraq. I then conclude with the focus of the dissertation and the research questions I used to address the gap in knowledge around substance use and misuse in Iraq.

Tobacco use

Tobacco use is considered the "leading cause of preventable death" worldwide and is the main risk factor for a large number of non-communicable diseases.[14,15] Approximately 6,000,000 deaths are annually attributed to tobacco use posing an economic burden, especially on developing countries where money spent on tobacco negatively affects productivity and development.[15] In 2012, tobacco use was responsible for 12% of all deaths among male adults age 30 years and older in the EMR and 2% of deaths among similar females.[16] Globally, it accounts for 36% of all respiratory disease deaths, 70% of all lung cancer deaths and 9% of all non-communicable disease deaths.[16] The latest reports from WHO estimate that approximately 31% of males and 4% of females currently use tobacco in Iraq.[5]

In response to the alarming rise in numbers of tobacco consumers worldwide, the WHO established a framework to help combat the tobacco epidemic. The first step in this framework involves monitoring the prevalence of tobacco use through national surveys.[16] However, not all countries have representative survey monitoring systems for tobacco use. According to latest WHO data, globally only 54 countries are covered by effective and

representative tobacco use monitoring systems.[15] These countries include the United States, Canada and almost all countries of the European Region; yet only 4 countries from the EMR.[15]

Several recent studies have addressed the prevalence of tobacco use in the Arab world [Table 1.1]. Like the rest of the world, tobacco use in this region is positively correlated with being male, older in age and having a low income.[10,17-21] However, there are also inconsistent trends in associated risk factors across the region. For example, in Saudi Arabia, being married appears to be a positive correlate for smoking in one region for both sexes in the general population, while the opposite phenomenon has been observed in another study on male military personnel.[10,22] Unlike the general negative relationship between higher educational level and tobacco use observed in most of the world, in the Arab world tobacco use seems to be highest among adults with secondary school education, compared to other levels of education.[10,18]

Prevalence of tobacco use is higher for men as compared to women. Although men seem to have higher rates for all forms of tobacco use in the region, the gender gap becomes narrower for hookah smoking. The latter is more culturally acceptable and practiced more frequently among women as compared to cigarette smoking.[23-27] In general, experimenting with hookah smoking is thought to occur similarly in both sexes among Arab youth.[28] Conversely, this was not the case in a population-based survey for tobacco use that was conducted in 11 EMR countries in 2012, where hookah smoking was reported at higher frequency among men in all these countries, as compared to women.[29] In sum, observed associations of socio-demographic factors with frequency and intensity of tobacco use in the Arab world are inconsistent and general conclusions remain unclear.

Other than data provided by WHO, few studies have addressed tobacco use patterns and its determinants in Iraq specially [Table 1.2]. These studies have consistently reported a

higher prevalence of tobacco use among men as compared to women[27,30-34] Most recently, studies that involved the assessment of tobacco use at the population level include the Non-communicable Disease Risk Factor Survey (2006) and the Iraqi Family Health Survey (2007).[27,30] Other surveys were conducted on school or college populations, making it difficult to obtain population-based estimates.[31,34] Limiting studies to restricted populations (such as school or university students, military personnel and healthcare professionals) resulted in highly variable estimates within the same country. Thus, information from representative population-based surveys on tobacco use in the region is lacking.

Table 1.1. Reported prevalence of cigarette smoking in recent tobacco use studies in the Arab World

Authors	Country	Year Published	Sample Size	Sample Description	Prevalence of Cigarette Use		
					Total	Male	Female
Al-Zalabani A, *et al.*[17]	KSA*	2015	3,322	7th-12th grade school students	15.17%	21.3%	8.3%
Al-Khashan HI, *et al.*[22]	KSA	2014	10,299	Military personnel	35%	35%	NA
Abdelrahim BE, *et al.*[10]	KSA	2014	4,326	Hospital-based	23.5%	30.5%	6.5%
Ahmed HG, *et al*[18].	Northern Sudan	2013	207	Visitors of a cancer awareness campaign	19.5%	NA	NA
Aden B, *et al.*[19]	UAE*	2013	2,309	Hospital-based	19.3%	34.7%	0.7%
Khattab A, *et al.*[29]	*Several:*	2012	62,096	Population-based COPD Survey			
	Algeria		3,671		26%	49.5%	1.8%
	Egypt		9,761		26.9%	50%	5%
	Jordan		3,578		35.9%	56.3%	13.8%
	Lebanon		3,387		47.7%	53.5%	42.1%
	Morocco		3,981		15.2%	29.7%	1.4%
	Saudi Arabia		9,552		22.1%	32.8%	3.3%
	Syria		3,389		33.4%	55.9%	11.5%
	Tunisia		1,950		17.9%	33.9%	2.3%
	UAE		3,450		21.5%	35.4%	6.6%
Al-Kubaisy W, *et al.*[35]	Syria	2012	745	Private University Students	20.8%	26.1%	9.5%
Shishani K, *et al.*[20]	Jordan	2011	918	Nurses & physicians from 10 hospitals	38.8%	50.6%	14.9%
Mohammed HR, *et al.*[21]	Kuwait	2010	2,972	Student and employees at a university	20.3%	34.9%	3.9%

*KSA=Kingdom of Saudi Arabia, UAE=United Arab Emirates.

Table 1.2. Tobacco use among Iraqi populations, from Iraqi reports in the literature between 2006 and 2013

Authors	Country	Year Published	Sample Size	Sample Description	Prevalence of Cigarette Use		
					Total	Male	Female
IMOH[30]	Iraq	2006	4,503	Population-based (Non-communicable Disease Risk Factor Survey), people ages 25-65 years	21.9%	41.5%	6.9%
IMOH[†]/WHO[31]	Iraq	2007	10,860	Population-based (Iraqi Family Health Survey), people ages 15 year and over	14.8%	26.5%	2.9%
Siziya, *et al.*[32]	Iraq	2007	1,989	13-15 year olds in Kurdistan (GYTS)	15.3%	25.1%	2.7%
CDC[33]	Iraq	2009	2,182	13-15 year olds in Baghdad (GYTS[¥])	3.2%	3.3%	2.7%
Ashor[36]	Iraq	2012	361	Medical students with ADHD[¥] symptoms	45%	NA	NA
Hussein & Abdul Sattar[34]	Iraq	2013	1,750	7th-12th grade student from 20 schools in Baghdad	13.9%	27.1%	12.7%

[†] IMOH= Iraqi Ministry of Health

[¥] ADHD= Attention Deficit Hyperactivity Disorder, GYTS = Global Youth Tobacco Survey.

Alcohol Use

Alcohol consumption is a major risk factor for more than 200 diseases and its association with liver cirrhosis, liver failure and liver cancer is well known.[37] In general, males are higher consumers of alcohol as compared to females, and proportional deaths attributable to alcohol are also more common among males (7.6% of males and 4% of females).[38] Worldwide, the average alcohol per capita consumption for people ages 15 years and older is 6.2 liters per year. When frequency of consumption is compared across WHO regions, the highest consumption rate is observed in the European Region and the lowest is in the EMR.[38]

Benefits of moderate alcohol consumption have been well established in the research literature. Studies have shown that drinking wine within "moderate" quantities offers protection against hypertension and cardiovascular disease, and improves overall mortality risk.[39] The U.S. National Institute on Alcohol Abuse and Alcoholism (NIAAA) has defined moderate drinking levels for adults ages 65 years and younger as those not exceeding 1 drink per day for women and not exceeding 2 drinks per day for men (the average drink ranging from 12-14g).[40] The problem arises when consumption of alcohol becomes uncontrolled, where people exceed these moderate-drinking limits and engage in higher consumption patterns. Not only are the volume and frequency of drinking important, but the pattern of drinking is also of public health significance.[38,41-43] For example, a person may not necessarily consume alcohol on a daily basis, but rather consume it in exceptionally large amounts at one occasion, which is called binge drinking. This is defined as consuming more than 5 average drinks on at least one occasion in men, and more than 4 drinks on at least one occasion in women, in the past 30 days.[44]

Worldwide, binge drinking most frequently occurs in young adult males in their early twenties.[38] In the U.S., population-based estimates of self-reported binge drinking have been

measured using nationwide surveys such as the National Survey on Drug Use and Health (NSDUH) and the Behavioral Risk Factor Surveillance System (BRFSS).[45] Results from both surveys suggest that binge drinking occurs more frequently among adults between the ages of 18 and 35 compared to those older than 35, and more frequently among males as compared to females.[45] In 2014, Schoenborn and colleagues explored patterns of binge drinking and its association with mortality using data from the National Health Interview Survey (NHIS). Their findings showed that 60% of the sample reported having at least one drink during the past year, and 32.9% of these individuals reported having at least one binge-drinking event.[46] Furthermore, increasing levels of drinking and frequency of binge drinking events were positively associated with increased mortality risk.[46] Unfortunately, it is difficult to determine the socio-demographic profile of binge drinkers in the EMR, where the prevalence of binge drinking is very low and its correlates are not clear.[38]

Stringent measures are adopted in Middle Eastern countries to control alcohol consumption that are heavily governed by Muslim law. Islamic text strictly forbids the consumption of alcohol and many Muslims abide by this strict law.[47,48] The degree to which governments and societies in the Arab world restrict alcohol use differs by country with the majority of Arab countries restricting vendors that stock alcohol in order to reduce availability. However, Saudi Arabia and Kuwait, where possession and consumption of alcohol is strictly illegal and punishable by law, do not allow restricted vendors.[48]

As a result of cultural constraints on the consumption of alcohol in the Arab world, there is sparse information about the status of alcohol use in this region and few studies have addressed this topic in population-based samples. A population-based survey conducted among 44,000 Egyptians from 8 provinces explored the use of alcohol and other psychoactive substances.[49] Results show that the self-reported lifetime prevalence for alcohol use is low (2.2%) and that men are 12 times at greater odds to use any substance compared to

women.[49] In a Lebanese study conducted in 1999 using university students (where 68% of the sample was Christian), the overall lifetime alcohol use was reported at 70.8% (87.5% in Christians, 67.4% in Druze and 43.8% in Muslims), and the lifetime alcohol dependence was 5.3%.[50] Additionally, higher frequencies of alcohol consumption were observed among male when compared to female students.[50] None of these studies, however, examine types of alcohol used, amounts of alcohol consumed or binge drinking.

In the more culturally conservative countries of the Gulf Cooperation Council (GCC), alcohol use has been studied tentatively in patients attending psychiatric or addiction treatment centers and institutionalized populations.[48] Among these special populations, the prevalence of alcohol use disorders ranges from 9.5% to 11.2% for males.[51,52] An older study conducted among female hospitalized psychiatric patients in Saudi Arabia, reports a prevalence of 1.7% for alcohol-related disorders.[53] In another study, lifetime alcohol use was reported by 15.5% of university students in Kuwait.[48] In general, the few studies conducted in the GCC suggest that alcohol consumers are most frequently young adults in their mid twenties and that alcohol consumption is positively correlated with unemployment and decreasing level of education.[48] However, this information is derived from restricted samples of college students or psychiatric treatment centers. Representative information on frequency and patterns of alcohol consumption in the general GCC population is lacking.

Like other Arab nations, alcohol use in Iraq specifically has received little attention in the literature. As is the case for tobacco use, the most recent population estimates for alcohol use are available from The Iraqi Mental Health Survey, which was conducted between 2006 and 2007. Here, lifetime prevalence of alcohol use was reported as 6.8% among adult males and 0.6% among adult females.[54] A somewhat dated study from 1982 described features of 50 patients admitted to a hospital for alcohol-related medical conditions. The majority of these patients reported consuming the unrecorded type of alcohol, locally known as Arak,

which is estimated to contain an alcohol concentration of 30-35%.[55] Scarcity of information about alcohol consumption patterns in Iraq comes as no surprise, as it is a country where the majority population is Muslim, and so the consumption of alcohol is heavily stigmatized and is considered sinful in this community. At present, there is no official ban on consuming alcohol in Iraq. However, in October 2016, the government issued a new regulation that prohibits the manufacturing and sale of alcohol in Iraq.[56]

Illicit drug use

Understanding the extent of illicit drug use in a population is often quite challenging due to the reluctance of both survey makers and respondents to report on socially discouraged behaviors. Providing estimates for these socially unsanctioned behaviors is not always feasible.[57] Illicit drug use refers to the non-medical use of drugs that are under international control.[57] This may include a variety of substances that may be illegal or may be controlled by requiring prescriptions when used for medicinal purposes.[57] Drugs that are prohibited from being sold or used and are considered illegal in most countries worldwide include cannabis, amphetamine-type stimulants (ATS), cocaine, heroin and hallucinogens. Controlled prescription drugs that sometimes fall under illicit use include synthetic opioids prescribed for pain relief (such as fentanyl, methadone, tramadol and oxycodone), central nervous system depressants (such as benzodiazepines and barbiturates), central nervous system stimulants (such as methamphetamine and methylphenidate), and, in some parts of the world, muscle relaxants (such as Somadril and benzhexol).[58]

Several national surveys in the United States routinely provide information about the U.S. population's current patterns and trends of illicit drug use as well as correlates of use.[59] This information is useful for contemplating possible common patterns of drug use in Iraq where such surveys have not been done. One such U.S. survey is the NSDUH.[60] The 2013

NSDUH estimates show that 13% of individuals who were free of mental illnesses reported using at least one illicit drug during the past year (including cannabis, cocaine, opioids, hallucinogens, inhalants and non-medical use of controlled prescription drugs).[60] Data from the 2007 NSDUH suggested that non-medical use of controlled prescription drugs (e.g, pain relief medication, muscle relaxants, central nervous system depressants, and stimulants) in the previous year was 5.1% for individuals ages 12 years and older. The general trend in these national surveys on drug use suggests that being male, having low education and low income, being unemployed, being a tobacco smoker and consuming alcohol are all associated with an increased odds for reporting use of illicit drugs.[57,59,61,62] Furthermore, U.S. population data from the National Comorbidity Survey-Replication shows that greater levels of religiosity (the degree to which religion or spirituality is important to a person's life) are negatively associated with using tobacco, alcohol or illicit drugs.[63]

Non-medical use of prescription drugs is a major public health concern, particularly in developing countries.[58,64-66] Several studies from Eastern Mediterranean countries, other than Iraq, have explored drug use in various populations.[11,49,67-77] Most of these were conducted in Iran. As with findings from the United States, the overall pattern suggests that drug use is positively correlated with being male and using other substances such as tobacco or alcohol, but negatively correlated with socioeconomic level.[49,70,75] However, patterns of drug use show great regional variability. For example, in Iran the majority of research reports opium as the most common illegal drug used in the region. Most of these studies are conducted among high school or college students or patients admitted to addiction treatment centers[70,72,73,78] One of the Iranian surveys reports that 17.1% of the individuals surveyed report using opium at least once in their lives.[69]

In GCC countries, most studies only collect information from men and most only sample from students or psychiatric patients. Here, studies observe that there is no single

popular drug.[48] In Kuwait, a study conducted among 1,473 male students from both private and public colleges reported a 14.4% prevalence of lifetime use of any illegal drug (including cannabis, cocaine, heroin or stimulants). This included lifetime prevalence of 11% for cannabis, 7.1% for stimulants, 2.2% for cocaine and 1.3% for heroin.[75] Unlike other studies which found a negative association between drug use and socioeconomic level, this later study suggested that students with higher family income and greater parental educational attainment were more likely to report ever using these drugs.[76] Another Kuwaiti study reported that lifetime self-reported opioid use was 2.1% among male college students.[48] In the United Arab Emirates, a neighboring country, a study conducted on 250 male patients admitted to substance abuse treatment center found that 25% of the selected patients were poly-substance users (using a combination of alcohol, cannabis, opioids and prescription medication).[79] The study also reported that prescription opioids (such as tramadol and codeine) were preferred to illegal opioids (such as heroin and morphine), especially among patients below the age of 30.[79]

Other Arab nations report similar estimates. In Egypt, for example, results from The National Addiction Research Program suggest that lifetime use of any substance (including alcohol, cannabis, prescription drugs, opioids, stimulants or inhalants) is 9.6% among both Egyptian men and women, and that cannabis was the most reported substance. Results for this program also show that lifetime use for individual illicit drugs is 7.4% for cannabis, 0.6% for opioids, 0.13% for stimulants (ATS and cocaine) and 0.03% for inhalants.[49] Inhalant use was also investigated in a Saudi study, where 5.3% of male school students reported ever using inhalants.[48] In Jordan, a survey that compared anabolic steroid use between male athletes and college students found that steroid use was reported in 4.2% of college students and in 26% of athletes.[68]

The WHO reports indicate that as of 2014, there was no organizational body that collected national data on drug use in Iraq.[80] The WHO estimated that the one-year prevalence for any drug use disorder (drug abuse or drug dependence) in Iraq is 0.66% among males and 0.24% among females.[80] However, there is limited research about the extent of drug use among the general Iraqi population, without reaching the level of "drug use disorder".[81] The reason for the scarcity of population-based drug use behavior in Iraq is likely twofold. First, estimating the prevalence of illegal and socially unacceptable behaviors is quite challenging, especially in a country like Iraq where people are generally conservative and abide by religious principles.[82] Second, years of warfare and security instability greatly reduce the feasibility of conducting nationwide surveys.

Other important sources for collecting national information about drug use in Iraq include psychiatrist narratives, hospital records and drug seizure reports.[81] These suggest that prescription drug misuse is more common in the general population than using illegal drugs and that the most confiscated illegal substance is cannabis.[81]

Focus of the dissertation

The ongoing exposure to violence and conflict in Iraq has taken a toll on the country's economic and health infrastructures; these systems are necessary for proper substance use monitoring and control.[82] Continuous security instability in the country is likely to have an effect on people's health and to encourage patterns of unhealthy risky behaviors such as using tobacco and illegal substances. Thus, it is necessary to provide baseline estimates for substance use and their correlates in Iraq, which can be used as a building block for monitoring future trends.

The purpose of this dissertation is to provide a comprehensive look at the current trends and patterns of tobacco use, alcohol use and illicit drug use in Iraq. To do so, I utilized

information from the 2014 Iraqi National Household Survey of Alcohol and Drug Use. After explaining the detailed research methods of this survey (Chapter 2), I present three separate studies (in Chapters 3-5) that address the following key questions:

1) What is the current prevalence and pattern of tobacco use in the Iraqi population? And what are the gender differences in trends?

2) What is the prevalence of alcohol use in the Iraqi population and what is the risk for problematic use? Also, is risky alcohol use associated with socio-demographic characteristics? This information will greatly aid in targeting prevention efforts.

3) What is the proportion of Iraqi adults who use illicit drugs (including illegal drugs and using prescription-controlled drugs outside of medical purposes)? And how is this related to regions with high conflict zones?

Investigating substance use in the current population-based Iraqi National Household Survey on Alcohol and Drug Use can greatly assist in delineating current patterns and correlates of substance use in the Iraqi community. This is important in directing policy for substance use prevention and control in Iraq going forward. Sharing this information with the public health community at both national and regional levels can also encourage existing tobacco, alcohol and illicit drug use monitoring systems in the Arab world to share their surveillance experience, and to inform regional policy makers of the best methods for establishing and sustaining a framework for substance use surveillance.

Chapter 2

Research Methods for the Iraqi National Household Survey of Alcohol and Drug Use 2014

Introduction

Until 2014, Iraq lacked national population-based statistics on substance use in the general population.[81] To better understand the magnitude of substance use and its effects on public health, the Iraqi Ministry of Health developed a national substance use surveillance program, in collaboration with substance use researchers from the U.S., and with financial support from the U.S. Substance Abuse and Mental Health Services Administration.[81] This program adopted methods used by the U.S. Community Epidemiology Work Group, which uses all available data sources for substance use including records from hospitals, drug treatment centers, law enforcement, national surveys and centers for public health, in order to gain insight on the epidemiology of substance use nationally.[81] Thus, the Iraqi Community Epidemiology Work Group was created.

In 2012, the first Iraqi Community Epidemiology Work Group meeting was held. The meeting concluded with a recommendation to conduct a national survey on substance use in order to inform future meetings and help direct policy decisions.[81] From this recommendation, the Iraqi National Household Survey of Alcohol and Drug Use (INHSAD) was borne.[8]

Objectives of the INHSAD

The overall objective of the INHSAD was to understand the extent of substance use in Iraq. The survey focused on four substance categories: tobacco, alcohol, non-prescription illegal substances, and illicit use of prescription drugs.[8] Secondary aims were to explore the prevalence of substance use, patterns of use, reasons for use, and correlates of substance use.

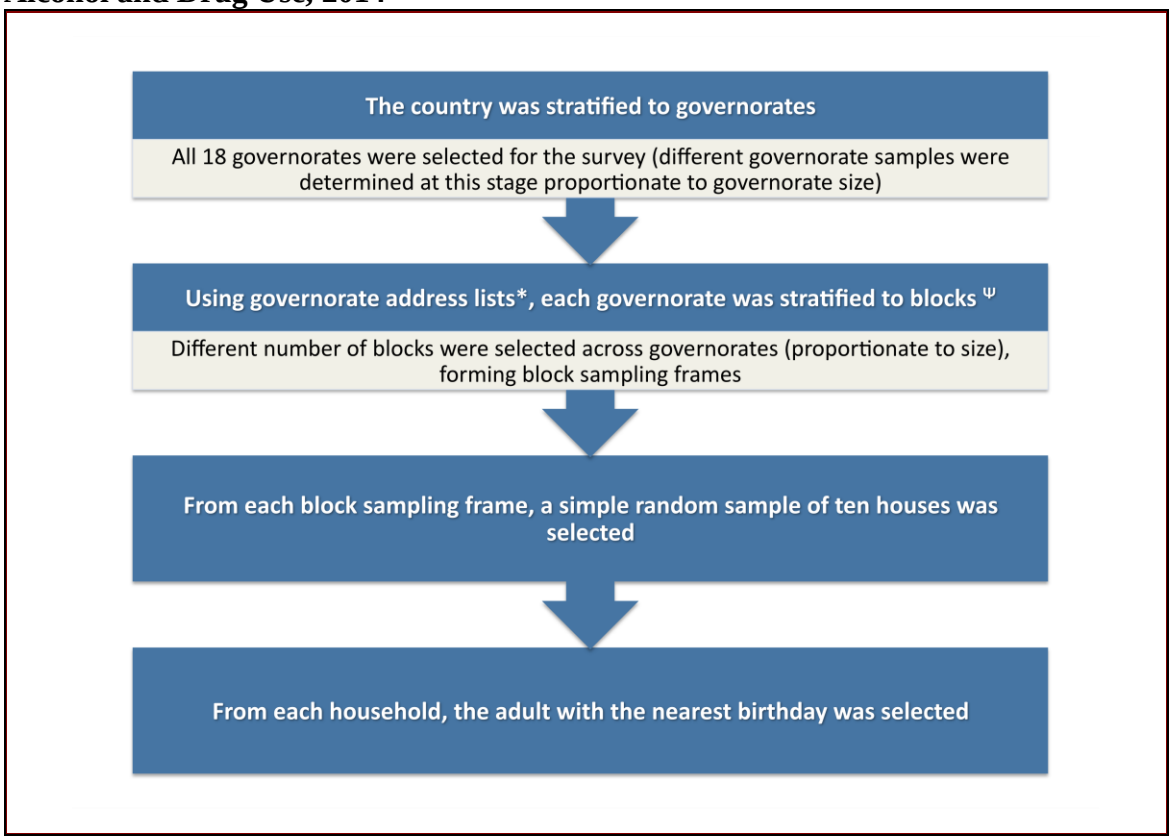
INHSAD Design and Sample Selection

A cross-sectional study design was used for the survey. Persons eligible for the interview included male and female Iraqi citizens, ages 18 years and older and who consented to survey participation.[8] As surveys were administered in either Arabic or Kurdish, it was also necessary that participants could understand at least one of these two languages.[8] Excluded from this survey were Iraqi militants, refugees from other countries and people living in institutionalized settings.[8] The estimated sample size was 3,200. This allowed for the estimation of tobacco use at 18%, with a margin of error or ±0.06 within each governorate, at 95% level of confidence.[8]

The survey used a multistage cluster sampling method [Figure 2.1] to obtain its sample with the Iraqi Ministry of Planning and Development conducting sample selection. In the initial stage, they stratified the country by 18 governorates. Each governorate was then divided into blocks (primary sampling units) representing neighborhoods. From each governate, a different number of blocks were randomly selected proportionate to governorate size. This led to the selection of a total of 320 blocks. Within each selected block, a listing of household addresses was created to serve as the sampling frame. From the sampling frame, the initial plan was to select 10 households randomly (secondary sampling units) for inclusion in the survey. This was intended to complete the sampling of 3,200 households. From within each household, the adult with the nearest birthday to the survey date was selected for survey participation.[8]

Although 3,200 households were finally selected in this survey, ultimately, the proportion of households selected were not equal in each block, as some blocks sampled more than 10 households, and other sampled fewer than 10. This inequality in household selection was adjusted when calculating survey weights, as described in the following section.

Figure 2.1. Multistage cluster sampling used in the Iraqi National Household Survey of Alcohol and Drug Use, 2014



* Address lists and final samples were prepared by the Iraqi Ministry of Planning and Development.
Ψ A block was defined as a group of neighboring houses ranging from 40-70 houses in a governorate.
Source: Al-Hemiary et al., 2017.[8]

Calculating Survey Design Weights

The raw dataset did not include sample weights. Sampling for this study was a complex process that involved stratification, multi-stage cluster sampling and unequal probability sampling.[8] Because this approach introduced unequal probabilities for selecting each participant, the resulting sample is a biased representation of the original population. Thus, it was necessary to create a survey design weight for each respondent that adjusted for this bias. The survey design weight I created was composed of four components: i) block weight; ii) household weight; iii) adult participation weight and iv) gender non-response weight.

i) Block weight (W_B)

In this survey, the definition of a block was a group of neighboring houses ranging from 40-70 within a governorate. The number of households for each governorate was known from population census data. For the purpose of creating this weight, I made the following assumptions:

- The average block size is the same across all governorates in Iraq (55 houses).
- A simple random sampling method was used to select blocks within each governorate. This assumption is consistent with descriptions of the survey methods that were provided to the research team at UCLA.

The formula I used to generate the block weight was as follows:

W_B = 1/ (blocks selected from a governorate / total number of blocks in a governorate) (1)

While the number of blocks in each governorate was not readily available from census data, I used these assumptions to create the block weight (see Table 2.1).

ii) Household weight (W_H)

The raw data set includes an unequal number of households selected from each of the selected blocks. This sampling method created a need to adjust for household selection by creating a household weight (W_H). The formula for household weight was:

W_H = 1 / (number of households selected from a block / total number of houses in a block)

Because I assumed that the total number of houses in each block sampling frame was 55 houses on average, W_H can be rewritten as:

W_H = 1 / (number of households selected from a block / 55) (2)

Table 2.1. Creating a block weight for each governorate

Governorates	Total number of households/ governorate*	Number of blocks selected from each governorate	Estimated total number of blocks in governorate †	Block Weight (W_B)[¥]
Dohouk	152,127	10	152127 / 55 = 2,766	2,766 / 10 = 276.60
Ninevah	425,861	28	425861 / 55= 7,743	7,743 / 28 = 276.54
Al-Sulaimaniya	365,959	16	365959 / 55 = 6,654	6,654 / 16 = 415.88
Kirkuk	234,697	12	234697 / 55 = 4,267	4,267 / 12 = 355.58
Erbil	293,353	14	293353 / 55 = 5,334	5,334 / 14 = 381.00
Diala	202,171	12	202171 / 55 = 3,676	3,676 / 12 = 306.33
Al-Anbar	178,283	13	178283 / 55 = 3,242	3,242 / 13 = 249.38
Baghdad	1,037,189	80	1037189 / 55 = 18,858	18,858 / 80 = 235.73
Babylon	245,682	15	245682 / 55 = 4,467	4,467 / 15 = 297.80
Kerbala	149,408	9	149408 / 55 = 2,717	2,717 / 9 = 301.89
Wasit	152,777	10	152777 / 55 = 2,778	2,778 / 10 = 277.80
Salahuddin	180,542	11	180542 / 55 = 3,283	3,283 / 11 = 298.45
Al-Najaf	177,132	10	177132 / 55 = 3,221	3,221 / 10 = 322.10
Al-Qadisiya	140,848	13	140848 / 55 = 2,561	2,561 / 13 = 197.00
Al-Muthanna	84,603	8	84603 / 55 = 1,538	1,538 / 8 = 192.25
Thi-Qar	214,554	20	214554 / 55 = 3,901	3,901 / 20 = 195.05
Missan	122,847	11	122847 / 55 = 2,234	2,234 / 11 = 203.09
Al-Basrah	338,232	28	338232 / 55 = 6,150	6,150 / 28 = 219.64
Total	4,696,265	320		

* Source: Census Executive Administration. Building, dwelling and establishments census and households listing: Enumeration and listing report series - Report No. 1, July 2011. Available at: http://www.cosit.gov.iq/images/census/listing_and_enumeration/houses%20and%20buildings/rep_1.pdf. Accessed on: Nov 11, 2015.

† Total number of blocks per governorate = total number of households / average households per block; assuming that the average block size was 55 households, total number of blocks per governorate = total number of households in governorate / 55.

¥ W_B = 1 / (number of blocks selected in a governorate / total number of blocks in a governorate).

iii) Adult participation weight (W_A)

From within each household a random adult was selected for an interview. Thus, adults living within households had varying probabilities of selection depending on the size of the house. To adjust for this, an adult participation weight (W_A) was calculated from the inverse probability of an adult being selected from the household as follows:

W_A = 1/ (1 / total number of adults in a household) (3)

iv) Gender non-response weight (W_G)

In the Iraqi population, the proportions of males and females are fairly equal. The study planned on selecting equal proportions of males and females from each block (i.e. 5 males and 5 females from each block). However, the final sample consisted of 7I.55% males and 28.45% females reflecting a bias in sample selection. Unfortunately, the dataset does not include household enumeration information, which could be used to determine the gender distribution in each household. Instead, I could only correct for this bias by using a post-stratification approach. This approach assumes that the distribution of males and females is fixed in all blocks and is equal to the gender distribution in the Iraqi population; male to female proportion ratio is 0.51/0.49 according to the 2010 Iraqi census. For each gender, I created a weight from the inverse probability of a gender being selected from the block. I calculated it as follows for females and males separately:

W_G for females =

1 / (percent of females selected in that block / percent of females in Iraqi population)

W_G for Males =

1 / (percent of males selected in that block / percent of males in Iraqi population) (4)

The product of formulas (1), (2), (3) and (4) generated the survey design weight for the k^{th} observation:

Survey Design Weight (d_k) = $W_{B(k)} * W_{H(k)} * W_{A(k)} * W_{G(k)}$

Additional post-stratification weight adjustment and weight trimming

In order for survey weights to properly adjust for unequal selection probabilities within certain sampling strata, the sum of weights within each stratum in the sample must equal the marginal totals for that same stratum in the target population. To test this, I compared the marginal sum of weights for governorates and gender categories to the marginal totals of governorates and gender categories in the Iraqi census data, respectively. These must be equal if the sample is weighted correctly. Tables 2.2 and 2.3 illustrate that the distributions of the sum of weights in the sample are not equal to the marginal distributions in the Iraqi census, and so, the survey design weights required further adjustment.

Table 2.2. Comparing distribution of adults across governorates in Iraqi population (control population) vs. weighted sample population

Governorates	Total in Weighted Sample	Total Iraqi Adult Population*
Dohouk	1,344,874	**513,033**
Ninevah	1,961,793	**1,714,478**
Al-Sulaimaniya	1,137,410	**821,859**
Kirkuk	623,495	**683,093**
Erbil	750,804	**778,923**
Diala	402,763	**725,699**
Al-Anbar	476,861	**768,613**
Baghdad	3,550,255	**3,802,281**
Babylon	626,613	**914,463**
Kerbala	549,901	**531,362**
Wasit	387,259	**613,088**
Salahuddin	1,136,485	**666,798**
Al-Najaf	868,304	**625,171**
Al-Qadisiya	388,879	**593,984**
Al-Muthanna	428,590	**381,147**
Thi-Qar	698,884	**977,874**
Missan	324,664	**534,565**
Al-Basrah	1,276,959	**1,353,159**
Total	**16,934,793**	**16,999,590**

* Estimates were calculated from the Iraqi population governorate marginal totals in the 2010 Iraqi census data, available at: http://cosit.gov.iq/en/population-manpower-staatistics/life. Accessed on Jan 26, 2016. I assumed that adults in each governorate were 52.95% of the population.

Table 2.3. Comparing weighted sample marginal gender total to population marginal totals for gender

Sex	Weighted Sample Total	Iraqi Adult Population Total*
Male	9,516,267	8,669,791
Female	7,417,526	8,329,799
Total	**16,934,793**	**16,999,590**

* 2010 Iraqi census data, available at: http://cosit.gov.iq/en/population-manpower-staatistics/life. Accessed on Jan 26, 2016. According to the Iraqi census, adults comprise 52.95% of the total population.

Folsom and Sigh describe a method for weight adjustment and calibration in complex design sampling[83] One of the functions of this method is to adjust for the bias that results from unequal sampling of participants within different population strata, through a process called weight raking. In the case of this study, this would mean adjusting the weight so that the sum of weights within gender categories and within governorate categories are equal to the marginal totals for gender and governorate categories in the Iraqi population, respectively.[8] The second function of this method is to recalibrate the weights to reduce variance inflation caused by extreme weight values, a process called weight trimming. These two functions, weight raking and weight trimming, can be simultaneously performed in SAS-Callable SUDAAN using the WTADJUST procedure, resulting in a final weight that is the product of three components: 1) pre-adjusted survey design weight (d_k), 2) an adjustment factor (α_k) and 3) a weight trimming factor (γ_k).[84]

Weight adjustment factor (α_k)

WTADJUST procedure calculates the adjustment factor for the k^{th} observation in the sample, $\alpha_k(\lambda)$, using a generalized exponential model formula described by Folsom and Singh[83]:

$$\alpha_k (\lambda) = [L_k (U_k - C_k) + U_k (C_k - L_k) \exp (A_k x_k`\lambda) ] / [ (U_k - C_k) + (C_k - L_k) \exp (A_k x_k`\lambda)]$$

Where L_k is a specified lower bound for α_k, U_k is the specified upper bound for α_k, C_k is a pre-specified centering constant for the model so that $L_k < C_k < U_k$ is true, x_k is the vector of model predictor variables (these are the raking variables, governorate and sex), A_k is a constant; $A_k = [U_k - L_k] / [(U_k - C_k) (C_k - L_k)]$, and λ is the beta parameter estimate for each of the model predictor variables, that are calculated within the WTADJUST procedure.[84] I used the default values for L_k, U_k and C_k and set $L_k=0$, $U_k=e^{20}$ and $C_k=1$.

Weight-trimming factor (γ_k)

The WTADJUST procedure also requires specifying the final weight's minimum and maximum values to help calculate the weight-trimming factor, a step that is performed simultaneously in the creation of the post-stratification weight. A common trimming approach is to determine cut-off points using the weight inter-quartile range (IQR).[85] In this method, the median survey weight is estimated, and then one specifies a maximum weight value = median + 3*IQR and a minimum weight value = median - 3*IQR.[85] Any weight beyond the maximum value is reduced to that value and any weight below the minimum value is increased to the minimum value. This method of weight trimming was used for the survey.[8]

Final post-stratification adjusted weight

The WTADJUST procedure used the following formula to calculate the final weight for the k^{th} observation:

$$\text{Final weight}_{(k)} = d_{(k)} * \alpha_{(k)} * \gamma_{(k)}$$

Calculating the design effect (DEFF)

The design effect of a survey is the ratio of the variance of a specific estimate assuming a complex sample design to the variance of that same estimate assuming a simple random sample.[86] This is calculated by diving the variance of an estimate using the survey weights by the variance of that same estimate without using the survey weights. The formula for design effect (DEFF) for a proportion estimate is:

$$\text{DEFF} = \frac{\text{Variance of the proportion using complex design}}{\text{Variance of proportion using simple random sample}}$$

Using the same method used in the California Health Interview Survey (CHIS) for calculating an average design effect,[86] I estimated the design effects for proportions for ten dichotomous variables in the data and then calculated an average design effect at the country level and governorate level. The average design effect for the current survey was 2.04 [Table 2.4].

Table 2.4. Average design effect (DEFF) estimates for ten variable proportions* from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Stratum	Average DEFF
Country level	2.04
Baghdad Governorate	1.54
Babylon Governorate	1.18
Kerbala Governorate	0.79
Al-Najaf Governorate	1.34
Al-Qadisiya Governorate	1.31
Al-Muthanna Governorate	1.27
Thi Qar Governorate	1.31
Al-Basrah Governorate	1.72
Missan Governorate	0.59
Wasit Governorate	1.14
Diala Governorate	0.68
Al-Anbar Governorate	2.75
Salahuddin Governorate	0.73
Kirkuk Governorate	0.82
Ninevah Governorate	1.33
Dohouk Governorate	1.20
Erbil Governorate	1.60
Al-Sulaimaniya Governorate	1.06

* The proportions used from ten categorical variables for estimating the average design effect were proportions of ever tobacco use, past month tobacco use, ever alcohol use, past month tobacco use, ever prescription drug use outside doctors prescription, ever illicit drug use, persons employed, persons married and persons who identified as Muslim.

Study Instrument

The survey instrument was adapted from items selected from the National Survey on Drug Use and Health (NSDUH) and the United Nations Office on Drugs and Crime (UNODC) surveys.[60] The survey was developed in a way that facilitated skip patterns. The questionnaire itself was composed of several sections including demographics; tobacco use; alcohol use; cannabis use; amphetamine use; opioid use; inhalants use; and the nonmedical use of prescription drugs (cough syrup, Allermine, codeine, tramadol, Somadril, benzodiazepines, benzhexol, and anabolic steroids).[8]

Questions on drug use were augmented with flashcards that showed pictures of each substance, in order to increase the accuracy of participants' self-reporting. Questions for each substance listed in the survey asked whether survey participants knew people who used the substance, what their lifetime substance use was, their age at first use, their use of the substance during the past 12 months, their recent use during the past 30 days, the number of times they used per day and the feasibility of obtaining the substance.[8]

Data Collection

The field team consisted of 17 surveyors (14 males and three females) who reported to three regional coordinators. Field training took place in the city of Erbil, in January 2014. This included training in human research ethics and questionnaire administration. A pilot study was conducted in March 2014 to test questionnaire clarity and feasibility. No changes were made to the questionnaire tool after the pilot study and records from the pilot study were not included in the analysis of this survey.[8]

Data collection began in April 2014. Following the predetermined address lists provided by the Ministry of Planning and Development, surveyors visited the assigned houses. After providing the household member with detailed information about the study,

surveyors asked to interview the adult with the nearest birthday to the survey date. Face-to-face interviews were conducted, following the exact wording of the questions in the questionnaire. Whenever possible, interviews were conducted in a private room at the house of the participant. In some instances, when a surveyor was to interview a participant from the opposite sex, a family member of the participant was present during the interview in accord with local cultural norms. If there was no initial response when approaching a house, two return attempts were made. If there was still no response, the surveyor moved to another neighboring household. If a family member refused the interview, the surveyor was instructed to interview the next available adult family member with the nearest birthday. Surveyors conducted interviews in the appropriate language of the participant and directly recorded responses on the pages of the questionnaire.[8]

To ensure the safety of surveyors, the Ministry of Health of Iraq provided them with assisted transportation. During the summer of 2014, violence perpetrated by the Islamic State of Iraq and Levant escalated, and as a result all field activities stopped from the end of June 2014 to the beginning of August 2014. When security was stabilized, field activities resumed, and data collection was completed by the end of December 2014.[8]

Data Management

Data entry took place at the Iraqi Society of Addiction Medicine headquarters in the city of Kerbala. Four trained data entry personnel entered data from completed questionnaires creating a digital copy of these quetionnaires using a program called Questionnaire Development System (QDS™; Nova Research Company). This program created electronic versions of questionnaires and helped in minimizing data-entry-error by allowing the identification of skip patterns. Once data were entered into the QDS program, it was securely shared with computer specialists at UCLA Integrated Substance Abuse Programs through

encrypted Internet access. Only data entry personnel in Kerbala and computer specialists at UCLA had access to the QDS. After that, data were securely stored in an encrypted Excel file on a UCLA computer, where data analysis took place. Completed paper questionnaires are currently stored in secure cabinets at the Iraqi Society of Addiction Medicine headquarters, and will be kept for another three years after which they will be properly destroyed.

Ethical Considerations

Participation in this survey was voluntary and interviews were only conducted after obtaining informed verbal consent. The INHSAD was approved by the Ethical Committee at the University of Baghdad, Iraq, and by the Institutional Review Board of UCLA. This survey was funded by the U.S. Department of State, Bureau of International Narcotics and Law Enforcement Affairs.[8]

Collaborators

The first INHSAD was conducted through the collaboration between the Iraqi Society of Addiction Medicine, University of Baghdad College of Medicine, the Center for Human Services, and the UCLA Integrated Substance Abuse Programs.[8]

Chapter 3

Gender-specific Differences in Cigarette and Water-pipe Use in Relation to Age and Educational Attainment in Iraqi Adults

Abstract

Objectives: To examine gender differences in cigarette and water-pipe use in relation to age and educational attainment, in the adult Iraqi population.

Methods: A cross-sectional study was conducted using data from the 2014 Iraqi National Household Survey of Alcohol and Drug Use. The sample included 3,200 non-institutionalized Iraqis ages 18 years and older. Gender-specific prevalence for cigarette use and water-pipe use was estimated. Odds for cigarette use and water-pipe use were compared by sex. Sex-stratified analysis was conducted to examine gender differences in odds for cigarette use and water-pipe use in relation to age (45 years or older vs. younger than 45 years) and educational level (college degree vs. no college degree), controlling for other socio-demographic features. Analyses were weighted for selection probabilities and gender, and controlled for survey design.

Results: Men had greater prevalence of both forms of tobacco use. Among men, having a college degree was associated with lower odds for cigarette use (OR=0.54, 95% CI=0.40, 0.70) and water-pipe use (OR=0.73, 95% CI=0.47, 1.12). Additionally, being 45 years or older was associated with lower odds for water-pipe use (OR=0.36, 95% CI=0.19, 0.70), but not for cigarette use (OR=1.01, 95% CI=0.75, 1.35). Among women, being 45 years or older was associated with greater odds for both cigarette use (OR=5.39, 95% CI=1.91, 15.19), and water-pipe use (OR=2.61, 95% CI=0.51, 13.15). Also, having a college degree was

associated with greater odds for water-pipe use (OR=3.48, 95% CI=44.12), but not for cigarette use (OR=0.94, 95% CI=0.23, 3.81). These findings suggested effect measure modification of sex on the association of tobacco use with age and educational attainment.

Conclusion: Gender differences identified in this study are consistent with tobacco use trends in developing countries. Understanding gender vulnerabilities in tobacco use is important in directing effective tobacco prevention efforts that target appropriate gender-specific high-risk groups.

Background

Tobacco use is considered the "leading cause of preventable death" worldwide and is the main risk factor for a large number of non-communicable diseases.[14,15]. In 2012, tobacco use was responsible for 12% of all deaths among male adults age 30 and older in the EMR and 2% of deaths among similar females.[16] Globally, it accounts for 36% of all respiratory disease deaths, 70% of all lung cancer deaths and 9% of all non-communicable disease deaths.[16] Western trends of smoking over the course of the past century show an evolution in tobacco use behavior among both women and men. At the beginning of the 20th century, women rarely smoked and there were fewer male cigarette smokers compared to pipe-smokers.[87] However, the prevalence of cigarette smoking steadily increased over time, with a sharper increase observed among women.[87] Although tobacco use among both sexes continued to increase towards to the later half of the 20th century, women had consistently shown lower rates of smoking than men, suggesting that women lagged behind men in their use of tobacco.[87]

To this day, the gender gap in tobacco use continues to exist worldwide, but is more pronounced in countries of Eastern Europe, Asia, Sub-Saharan Africa and the Middle East.[88-

[91] For example, estimates from the U.S. show that 26% of men and 15% of women use tobacco.[92] A similar pattern is observed in Western European countries such as Spain, Italy, Germany and the U.K., where smoking rates range from 28% to 35% among men and from 20% to 23% among women.[89] A narrower gap is observed in France, where smoking is reported among 38% of men and 30% of women.[93] However, a much wider gap is observed in several Eastern European countries, where 48% of men are smokers, while only 8% of women are smokers.[94] Even greater gender discrepancies in tobacco use are notable in nations with considerably high male smoking rates, such as China, Malaysia, Vietnam and South Korea, in which tobacco use ranges anywhere from 51% to 60% among men yet it does not exceed 6% among women.[90] Many Arab countries show a comparable gender discrepancy.[89,90,95] For example, while tobacco use among men is reported to be 30% to 52% in Tunisia, Morocco, Egypt and the United Arab Emirates (UAE), tobacco use among women ranges from as low as 0.5% to 6.7%.[89,90,95]

In 1991, Waldorn postulated several factors that could help explain the gender gap in tobacco use.[87] These included social stigmatization of tobacco use in women, differences in gender roles that make men more susceptible to tobacco use, and differences in the perceived health effects of tobacco, where women are considered more health aware than men.[87] In many cultures, tobacco use is linked to masculinity and associated with bravery, having an adventurous spirit, and the willingness to take risks, all of which are characteristics praised in men but are unfavorable in women.[96] Others believe that tobacco use symbolizes independence, emancipation and empowerment of women, which are signs of rebellion in many conservative communities, thus culturally restricting women and discouraging such behavior.[88,97] Indeed, in many developing countries, women's level of independence is closely related to educational attainment, the latter being a well-established factor that predicts tobacco use.[88] Contrary to the universal inverse association between educational

attainment and tobacco use, in these countries, women with high education are more likely to smoke than women with lower levels of education.[88,97]

Not only does education show a different influence on tobacco use between men and women, but so does age.[87,90] In men, the general worldwide trend for tobacco use is that it increases with age, then peaks somewhere between 25 and 35 years in developed countries and around 45 and 50 years in developing countries, followed by a steady decline with aging. [87,90] For women in developed countries, this common trend also applies. [87,90] However, women in the developing world show a steady increase in tobacco use with age throughout their life, with highest rates of tobacco use found in older women, particularly above 45 years of age. [87,90] Therefore, research from developing countries suggests that sex may interact with both age and level of education in predicting tobacco use behavior.

Although most studies find low rates of "cigarette use" among women, higher rates of water-pipe use are reported among women in most Middle Eastern countries.[27] Water-pipe smoking (also known as hookah, nargile and hubble bubble) is more common than cigarette smoking among women in the Middle East because it is less socially stigmatized.[27,97] A water-pipe smoking session lasts longer than the time spent smoking a single cigarette (average water-pipe sessions take 45 minutes), thus prolonging one's exposure to nicotine, carbon monoxide and other carcinogenic products.[98] This is of public health concern as water-pipe smoking is rapidly picking up popularity worldwide, especially among adolescents and young adults.[27,97,99,100]

Recent findings from the Global Youth Tobacco Survey in Middle Eastern countries show that 6 out of 25 countries report past-month water-pipe use among adolescents ages 13 to 15 years at greater than 10%.[101] The highest prevalence for both sexes is reported in Lebanon (37%) followed by the West Bank (33%), Syria (20%) and Jordan (19%).[101] Reports on water-pipe use among university students in Saudi Arabia, Syria, Jordan and Lebanon

show variable estimates. Among female students, it is reported to be as low as 2% in Saudi Arabia and as high as 23% in Lebanon.[102-105] Among male students, the lowest rate is also reported in Saudi Arabia (11.6%) while the highest is reported in Jordan (64%).[102-105]

Results from adult studies in this region show conflicting findings. For example, in Egypt, 6% of men and 0.3% of women report smoking a water-pipe at least once a week.[106] Additionally, the odds for use in both genders is greater among adults above 50 years of age compared to those younger than 30 years, employed adults compared to those unemployed, and adults without a formal elementary education compared to those with higher levels of education.[106] In most Arab countries, men more frequently use water-pipes as compared to women, but the predominant source of tobacco in older adults (ages 40 years and older) is usually cigarettes.[29] In some countries, higher estimates for water-pipe use are reported for females than for males. For example, in Jordan about 13% of women and 8% of men report current water-pipe use.[107] Additionally, the greatest proportions of water-pipe users in both sexes are found among young adults (less than 30 years), people who are highly educated and those who are single.[107] In Kuwait, results from a convenient sample of citizens interviewed at universities, schools, and public places found that 30% of males and 77% of females smoked water-pipes at least once a month.[21]

In Iraq, trends and correlates of cigarette and water-pipe use have not been as heavily explored as in other Arab nations. Available data show that current tobacco use in Iraq ranges from 14.8% to 21.9% in adults, and ranges from 3.2% to 15.3% in adolescents depending on the survey.[27,30-34] Additionally, according to the 2008 Global Youth Tobacco Survey reports, 6.3% of Iraqi adolescents were current water-pipe users, and water-pipes were the most frequent form of tobacco used by this age group (among both girls and boys).[33] On the other hand, another study conducted in 2003 suggests that both boys and girls prefer experimenting with cigarettes compared to water-pipes.[34] The general country trend implies that the odds for

smoking among men are twice that in women, and most studies observe a positive relationship between increasing age and smoking. [27,30-34] However, the association between age and smoking is not consistent in all studies. For example, in the Iraq Family Health Survey, smoking was positively correlated with increasing age for women, but the opposite was observed in men.[31] Most of the Iraqi studies suggest that hookah use is less stigmatized than cigarette smoking among female adolescents.[32-34,108]

The existing literature about tobacco use in Iraq has noteworthy limitations. Most of the studies are conducted using school or university student populations.[32-34,36,108] Although this is an important target group that can guide the development of tobacco use policy, comprehensive monitoring of adult tobacco use is nonexistent. Additionally, even though large sample sizes are used for most of the previous studies, many are restricted to specific cities and regions that are not representative of the entire Iraqi population.[32-34] These sampling effects are reflected in the variability between the estimates reported in these studies. Furthermore, most of the studies only describe differences in gender prevalence of tobacco use, but do not address gender difference in the relationship between different socio-economic factors and tobacco use.

To better understand gender differences in tobacco use in the Iraqi population, I use data from the Iraqi National Household Survey of Alcohol and Drug Use (INHSAD) to examine differences in cigarette and water-pipe use between men and women, in relation to age and education level. The first aim is to estimate the prevalence of both cigarette use and water-pipe use among adult Iraqi males and females. The second aim is to examine difference in odds of each of cigarette use and water-pipe in men compared to women, controlling for other socio-demographic characteristics. The third aim is to examine whether the association of tobacco use (cigarette use and water-pipe use) with each of age and level of education varies with sex. Based on findings from previous research, I hypothesize that: 1) The odds of

cigarette use and odds of water-pipe use, will be greater among men compared to women; 2) the odds for tobacco use will be greater among women with a college degree compared to lower levels of education, but the opposite will be observed among men; and 3) the odds for tobacco use among women 45 years of age or older will be greater than that among women below 45 years of age, but the opposite will be observed in men.[27,89,90,97,109]

Methods

Study design and sample population

The INHSAD was a cross-sectional survey in all 18 governorates of Iraq that was conducted from April 2014 to December 2014. It was mounted through the collaborative efforts of the Iraqi Society of Addiction Medicine, the University of Baghdad College of Medicine, the Center for Human Services, and UCLA. The estimated sample size was 3,200, which was roughly based on sampling approximately 178 participants per governorate (to allow the estimation of tobacco use prevalence at 18% with a margin of error of 0.06, and with 95% level of confidence). The survey sampling strategy was developed by the Iraqi Ministry of Planning and Development, which used a multistage cluster sampling approach. At the first stage, the country was stratified into its 18 governorates, all of which were selected. Next, each governorate was divided into blocks (primary sampling units), and a random number of blocks was selected from each governorate, proportionate to governorate size. This led to the selection of a total of 320 blocks. After that, a sampling frame was created for each block, in the form of household addresses. From these sampling frames, household lists were determined in which 10 households (secondary sampling units) were randomly selected from each block. From each household, the adult with the nearest birthday was selected for participation.[8]

People eligible for the survey had to be adults ages 18 years and older, who resided in Iraq and who spoke either Arabic or Kurdish. Institutionalized and displaced populations were excluded from this study. Surveyors were instructed to approach households on the pre-determined household lists. Once they reached the household, surveyors described the study to the head of the household and asked to interview the adult with the nearest birthday. Participation was voluntary and surveys were administered anonymously. After obtaining informed verbal consent, interviews were conducted one-to-one, when feasible, to ensure comfort and confidentiality. At some households, a male family member accompanied the female participant if a male surveyor interviewed her. If a family member declined participation, the surveyor asked the next family member with the nearest birthday. If there was no response at the door, surveyors paid a second visit to the same home. If there was no response on the second visit, surveyors went to the neighboring house. This survey was approved by the Research Ethical Committee at the University of Baghdad, and by the Institutional Review Board at UCLA.[8]

Study Variables

Tobacco use. For this study, there were 2 main tobacco use measures: current cigarette use, current water-pipe use. I defined current cigarette users as respondents who reported using a cigarette at least once during the past month. Respondents who reported zero cigarettes in the past month were coded as non-cigarette users. The survey assessed water-pipe use by asking "How many days per month do you smoke a water-pipe or use a hookah?" Individuals who reported using water-pipes at least once per month were coded as current water-pipe users. People who reported zero days of using a water-pipe per month were coded as non-users. Secondary measures for tobacco use included the number of cigarettes smoked per day and number of minutes spent on average in a water-pipe smoking session.

Demographic characteristics. The INHSAD measured several individual characteristics. Sex was coded into 2 categories (male and female). Age was measured in years, and was reduced to 4 categories (18-25 years, 26-35 years, 36-49 years, 50 years or older), following the same categories used in National Survey on Drug Use and Health.[60] Level of education was classified into 5 categories: less than elementary (did not complete a formal elementary education), elementary (completed elementary education but did not complete middle school), middle school (completed nine years of school education but did not complete high school), high school graduate (completed high school education but not college), college graduate or more (completed college education or more). In addition, I created binary age and education level variables. Age was dichotomized to two groups using 45 years as a cutoff point. I also dichotomized the variable education to two levels (completed a college education or more and completed high school education or less). These cutoff points were selected based on previous research suggesting important differences in sex-specific trends of tobacco use at these levels.[88-90,97] Marital status was coded into 3 categories (never married, married, and widowed, divorced or separated). I divided employment status into 4 categories (employed, student, retired, and unemployed). Although family income was not directly measured in the survey, I used household crowding index, defined as the number of people in a household divided by the number of rooms, as a proxy measure for income. Previous research suggests that household crowding is positively correlated with low income.[110] Finally, the INHSAD also measured respondent's religion and ethnicity. I coded religion as Muslim vs. other, and coded ethnicity as Kurdish vs. Arab.

Design variables. Design variables included blocks (PSU), governorate (strata) and the weight variable. Because this was a multi-stage design survey, not every adult in the Iraqi population had an equal probability of being selected. Additionally, more men participated in the survey than women. In order to compensate for this, survey weights were created. A

description of methods used for calculating survey weights has been published.[8] Briefly, the initial survey weight was composed of the product of (1) the inverse probability of selecting the block from the block sampling-frame, (2) the inverse probability of selecting the household from the block, (3) the inverse probability of selecting the adult from the household, and (4) the inverse probability of gender selection. After that, post-stratification adjustments to the weights were applied so that the marginal totals for governorates and sex in the weighted sample were equal to those in the overall Iraqi population. Finally, weights were trimmed to avoid extreme variation among weights.[8]

Statistical Analysis

Analyses for this study were conducted using SAS-Callable SUDAAN® Release 11.0.1 (Research Triangle Institute, Research Triangle Park, NC). I used design information (PSU, strata) and a weight to control for clustering effects and selection probabilities of the geographic regions, for all analyses. I performed descriptive analyses for demographic characteristics of the sample, for which I reported weighted percentages and standard errors (SE). I also estimated prevalence and 95% confidence intervals (CI) for categorical outcomes (current cigarette use, current water-pipe use, and current co-use), for both men and women. Additionally, I estimated means and 95% confidence intervals (CIs) for number of cigarettes smoked per day and number of minutes spent on average on a water-pipe session.

In order to compare cigarette and water-pipe use between men and women, I conducted two multivariate logistic regression analyses, where binary tobacco use outcomes (current cigarette use and current water-pipe use) were dependent variables, and sex and the other measured socio-demographic features were independent variables. The socio-demographic covariates included in these models were based on previous literature that suggests their possible confounding effects on predicting tobacco use.[10,18,19,22,23,34,111-116]

Because previous research suggests that the association of tobacco use with age and level of education varies with sex,[88-90,97] I examined this by testing for effect measure modification of sex on the association of tobacco use with each of age and education level. I used the stratified regression approach[117] by conducting sex-specific logistic regression analyses for each binary tobacco use outcome (current cigarette use and current water-pipe use) controlling for binary age (0=less than 45 years, 1=45 years or older), binary education level (0=less than college, 1=college degree or more), and other socio-demographic characteristics that may act as confounders. Differences between the stratum-specific odds ratios in men and women would suggest effect measure modification by sex. For example, if the odds ratios for cigarette use comparing people 45 years and older to people less than 45 years of age were different between men and women, that would suggest effect measure modification of sex on the association between cigarette use and binary age. To further emphasize the importance of stratified analysis in understanding differences in sex-specific trends of tobacco use, I compare stratified results to results conducted on total adults (men and women together).

Data were explored for missing values and weighted estimating equation method was used to correct for missing values.[118] This method is preferred for analysis of missing data of complex design samples.[118] In this method, for every variable with missing values, a binary indicator for observing that variable was coded (V_i=1 if the variable is observed, V_i=0 if the variable is not observed). Next, a logistic regression model was created using "V_i" as the dependent variable and all covariates of interest in the study as independent variables, in order to estimate the probability of V_i given the covariates. Then, a weight "W_i" was created from the inverse probability of V_i.[118] This was repeated for all variables of interest with missing values. After that, all the W_i's were multiplied by the survey weight to create a new weight that corrected for missing values. This new weight was then used to conduct analyses

only on observations with complete data. Results correcting for missing values were compared to results from complete case analysis.

Power analysis

The average design effect for this survey was 2.04. This implied that the effective sample size was 1,568. Assuming the proportion of smoking was 2.9% among females and 26.5% among males, based on the results from the population-based Iraqi Family Health Survey (IFHS 2006-2007), and assuming equal proportion weights for males and females, using this effective sample size yielded power greater than 0.999 [Appendix I].

Results

Characteristics of survey respondents

Of the 3,495 houses visited by surveyors, 295 households refused participation in the survey, resulting in a crude response rate of 91.6%, where approximately 90% of refusals were from females. The majority of participants were men [Table 3.1]. Most survey participants were interviewed by a male surveyor, which included 86% of men (SE=0.71) and 83% of women (SE=1.29). Of all women, 18.4% (SE=1.77) were interviewed in the presence of a male family member, 17.4% (SE=1.89) were interviewed in the presence of a female family member and the rest (64.3%, SE=2.41) were interviewed alone. On the other hand, only 3.6% (SE=0.52) of men had a male family member present and 2.7% (SE=0.51) had a female family member present, while the rest were interviewed alone. Although the distribution of age, marital status, religion and ethnicity were similar between men and women in the sample, there are notable differences in the distribution of employment status and education levels [Table 3.1]. For example, the proportion of adults without a formal elementary education was greater among women, while the proportion of participants who

had at least a college education was greater among men. Also, the majority of women in this sample were unemployed, while the majority of men were employed.

Table 3.1. Descriptive characteristics of Iraqi adults from the Iraqi National Household Survey of Alcohol and Drug Use, 2014, by sex

Characteristic	Men n = 2,289 % (SE)	Women n = 911 % (SE)
Age group		
18-25	31.5 % (1.31)	21.5 % (1.81)
26-35	29.0 % (1.22)	27.9 % (1.85)
36-49	22.9 % (1.17)	30.9 % (2.26)
50+	16.6 % (0.92)	19.7 % (1.84)
Highest education level achieved		
Less than elementary	8.1 % (0.88)	20.2 % (1.77)
Elementary	23.9 % (1.37)	26.6 % (1.86)
Middle School	22.4 % (1.16)	20.6 % (1.84)
High school graduate	20.1 % (1.27)	12.2 % (1.47)
College graduate or more	25.5 % (1.32)	20.4 % (1.87)
Marital Status		
Married	64.8 % (1.47)	66.4 % (2.58)
Widowed, Divorced/Separated	2.3 % (0.47)	11.2 % (1.60)
Single	33.0 % (1.46)	22.5 % (1.99)
Employment status		
Employed	65.8 % (1.57)	21.4 % (1.80)
Student	13.8 % (1.18)	6.9 % (1.11)
Retired	6.1 % (0.65)	1.5 % (0.47)
Unemployed	14.3 % (1.14)	70.2 % (2.13)
Ethnicity		
Arab	91.7 % (0.77)	91.9 % (1.00)
Kurdish	8.3 % (0.77)	8.1 % (1.00)
Religion		
Muslim	99.6 % (0.16)	99.0 % (0.34)
Christian	0.2 % (0.09)	0.8 % (0.30)
Other	0.2 % (0.09)	0.2 % (0.15)

Note: Percentages and standard errors (SE) presented in this table were weighted and adjusted for survey design elements (strata, PSU). Participants categorized as "students" included middle school students (2.3%, SE=1.92), high-school students (14.1%, SE=2.93), undergraduate students (55.9%, SE=4.55) and graduate level students (25.7%, SE=3.67). Other religions included Sabiah and Yazidi.

Gender differences in cigarette use

About 22% (95% CI=20.18, 23.92) of participants reported cigarette use in the past month, where smokers smoked an average of 26 cigarettes a day (95% CI=24.75, 27.21). As anticipated, the prevalence of cigarette use was much higher in men compared to women, and

the odds for cigarette use in the past month among men was about 35 times that in women (AOR=34.57, 95% CI=19.99, 59.79) [Table 3.2]. However, this later estimate should be interpreted with caution as it has a very wide confidence interval.

Gender differences in water-pipe use

Overall, 6.4% (95% CI=5.45, 7.60) of participants reported smoking a water-pipe at least once a month, where an average water-pipe session lasted about 43 minutes (95% CI=36.00, 49.49). Surprisingly, fewer women reported water-pipe use than cigarette use in this survey [Table 3.2]. Like with cigarette use, the prevalence of water-pipe use was greater among men than women, the difference in odds of water-pipe use was similar to that of cigarette use, however, with a wider confidence interval, thus an even less reliable estimate (AOR=33.5, 95% CI=7.79, 144.15) [Table 3.2].

Gender differences in cigarette and water-pipe use in relation to survey setting

The extremely wide gender gap in both cigarette and water-pipe use in this survey prompted further exploration of differences in self-reported tobacco use in relation to survey setting. Stratifying prevalence estimates of cigarette use and water-pipe use by sex of the surveyor, presence of a family member, and sex of the family member, did not yield differences in stratum-specific estimates within each sex group. Nevertheless, logistic regression analyses were repeated after controlling for sex of the surveyor, and presence of a family member during the interview. Adding "sex of the surveyor" and "presence of a family member" as covariates to the logistic regression models did not yield odds ratio estimates different from those reported in Table 3.2.

Table 3.2. Weighted prevalence and adjusted odds ratios for cigarette and water-pipe use by sex and other characteristics, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

	Current Cigarette Use				Current Water-pipe Use			
Population Subgroup	%	(95% CI)	AOR	(95% CI)	%	(95% CI)	AOR	(95% CI)
Sex								
Men	40.4 %	(37.55, 43.24)	34.57	(19.99, 59.79)	12.3 %	(10.48, 14.47)	33.52	(7.79, 144.15)
Women	2.9 %	(1.77, 4.64)	1		0.4 %	(0.10, 1.24)	1	
Age group								
18-25	20.5 %	(17.24, 24.09)	0.66	(0.43, 1.03)	10.0 %	(7.62, 12.90)	3.14	(1.30, 7.58)
26-35	23.8 %	(20.69, 27.26)	0.87	(0.59, 1.29)	8.4 %	(6.28, 11.25)	3.72	(1.63, 8.50)
36-49	21.2 %	(17.91, 24.88)	0.96	(0.65, 1.42)	4.1 %	(2.93, 5.57)	2.63	(1.09, 6.32)
50+	23.1 %	(19.11, 27.66)	1		1.8 %	(1.00, 3.34)	1	
Highest education level achieved								
Less than elementary	20.0 %	(15.06, 26.01)	2.77	(1.64, 4.68)	4.5 %	(2.41, 8.35)	1.88	(0.82, 4.32)
Elementary	24.5 %	(20.66, 28.82)	2.14	(1.52, 3.00)	5.4 %	(3.64, 7.80)	1.16	(0.65, 2.07)
Middle School	25.1 %	(21.32, 29.20)	1.92	(1.39, 2.65)	8.6 %	(6.18, 11.79)	1.60	(0.93, 2.75)
High school graduate	20.9 %	(16.73, 25.68)	1.28	(0.89, 1.83)	7.1 %	(4.98, 10.07)	0.95	(0.55, 1.64)
College graduate or more	18.5 %	(15.53, 21.82)	1		6.4 %	(4.52, 8.87)	1	
Marital Status								
Married	22.4 %	(20.40, 24.56)	1		4.4 %	(3.47, 5.58)	1	
Widowed, Divorced/Separated	19.4 %	(21.15, 29.40)	3.52	(1.71, 7.22)	3.1 %	(1.36, 6.91)	2.03	(0.68, 6.03)
Single	21.7 %	(18.40, 25.38)	1.02	(0.73, 1.43)	12.1 %	(9.43, 15.26)	2.25	(1.37, 3.71)
Employment status								
Employed	35.0 %	(31.83, 38.23)	1		10.2 %	(8.26, 12.51)	1	
Student	15.1 %	(10.98, 20.38)	0.51	(0.31, 0.86)	9.1 %	(5.87, 13.95)	0.69	(0.34, 1.39)
Retired	25.4 %	(17.98, 34.63)	0.43	(0.25, 0.75)	1.6 %	(0.65, 4.05)	0.45	(0.14, 1.44)
Unemployed	9.7 %	(7.58, 12.26)	0.77	(0.51, 1.15)	2.0 %	(1.24, 3.27)	0.73	(0.37, 1.47)
Religion								
Muslim	22.1 %	(20.27, 24.04)	1		6.5 %	(5.47, 7.63)	1	
Other	11.1 %	(5.30, 21.76)	0.37	(0.13, 1.05)	4.4 %	(1.36, 13.53)	0.50	(0.11, 2.30)
Ethnicity								
Arab	21.0 %	(19.13, 23.04)	1		6.1 %	(5.08, 7.32)	1	
Kurdish	31.9 %	(24.71, 40.13)	2.38	(1.41, 4.02)	9.9 %	(6.55, 14.79)	1.39	(0.80, 2.41)

Note: Percentages in this table represented weighted stratum specific prevalence of tobacco use, by tobacco product. Current cigarette use was defined as using at least one cigarette in the past month. Current water-pipe use was defined as smoking a water-pipe at least once a month. AOR=adjusted odds ratio. CI=confidence interval. Odds ratio estimates were results of two separate logistic regression analyses, one for each tobacco product. Both models controlled for all the covariates present in the table in addition to household crowding index (a proxy measure for income). All analyses were weighted and adjusted for survey design elements (strata and PSU). Other religion groups included Christians, Sabiah and Yazidi.

Cigarette and water-pipe use in relation to other socio-demographic characteristics

With respect to other socio-demographic characteristics, past-month cigarette smoking seemed to be most frequent among adults who were married, employed, Muslim and who were of Kurdish ethnicity [Table 3.2]. Interestingly, the odds for past-month cigarette use were greater among people with lower educational levels compared to college graduates, suggesting a negative association between cigarette smoking and having a college education or more [Table 3.2]. Additionally, past-month cigarette use seemed to be positively associated with employment [Table 3.2]. Although the data suggested that there was no difference in the odds of cigarette use comparing singles to married adults, adults who were widowed, divorced or separated had greater odds for using cigarettes in the past month, compared to married adults [Table 3.2]. Another noteworthy finding was that the odds for reporting past-month cigarette smoking among Kurdish adults was twice that among Arab adults [Table 3.2].

Water-pipe use was also most frequent among the employed, Muslims and Arabs [Table 3.2]. However, unlike cigarette use, water-pipe use was most frequent among the youngest age group (adults 25 years or younger) and among singles [Table 3.1]. Interestingly, the odds for water-pipe use was smaller among adults aged 50 years and older, compared to other age groups and single individuals had greater odds for reporting water-pipe use compared to married adults [Table 3.2]. Although not statistically significant, but similar to cigarette use, water-pipe use was negatively associated with having a college education, and was positively associated with being employed [Table 3.2]. However, there was no evidence to suggest difference in the odds of water-pipe use between adults with a high school education level and college graduates; the odds ratio approximates 1 [Table 3.2].

Effect Measure Modification by sex on the associations of age and level of education with tobacco use

Stratifying logistic regression analysis by sex provided different conclusions about the association of age and education level with tobacco use, in men and women [Table 3.3]. Results pertaining to men suggested a negative association between level of education and cigarette use, but there was no evidence for difference in the odds of cigarette use between men ages 45 years and older compared to men younger than 45 years. They also suggested that being 45 years or older and having a college degree were associated with a reduced odds for smoking water-pipes in men. In women, on the other hand, the directions of associations were flipped. In women ages 45 years and older, there was greater odds for both cigarette use and water-pipe use, compared to women younger than 45 years, and having a college degree was associated with an increased odds for smoking water-pipes. However, it is important to note the degree of uncertainty in the estimates for women, reflected by the wide confidence intervals. These could be related to the low frequency of both cigarette and water-pipe use among women. Nevertheless, the differences in sex-specific odds ratio estimates in this study suggested that sex was an effect measure modifier for the association of age and level of education with tobacco use. Ignoring stratified analysis by sex masked the different gender trends in tobacco use with respect to age and level of education [Table 3.3].

Missing Data Exploration

Overall, missing values for any variable in this study did not exceed 1%. Additionally, there were no missing values for any of the survey design variables (weights, strata or PSU). Results that adjusted for missing values did not differ from results for complete case analysis. Thus, only results for complete case analyses were reported.

Table 3.3. Comparing Sex-specific differences in the association of tobacco use with age and education level, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Subgroup	Current Cigarette Use				Current Water-pipe Use			
	%	(95% CI)	AOR	(95% CI)	%	(95% CI)	AOR	(95% CI)
Men								
Age								
45 years of age and more	41.3 %	(36.51, 46.31)	1.01	(0.75, 1.35)	4.2 %	(2.55, 6.81)	0.36	(0.19, 0.70)
Less than 45 years of age	40.5 %	(37.25, 43.85)	1		14.9 %	(12.61, 17.56)	1	
Education Level								
College graduate or more	31.2 %	(26.75, 35.98)	0.54	(0.41, 0.70)	10.4 %	(7.46, 14.18)	0.73	(0.47, 1.12)
Less than college	43.6 %	(40.19, 47.00)	1		13.0 %	(10.82, 15.62)	1	
Women								
Age								
45 years of age and more	6.9 %	(3.89, 11.94)	5.39	(1.91, 15.19)	0.4 %	(0.09, 1.64)	2.61	(0.52, 13.15)
Less than 45 years of age	1.2 %	(0.53, 2.68)	1		0.4 %	(0.06, 1.93)	1	
Education Level								
College graduate or more	2.0 %	(0.62, 6.23)	0.94	(0.23, 3.81)	1.2 %	(0.23, 6.36)	3.48	(0.27, 44.12)
Less than college	3.1 %	(1.83, 5.19)	1		0.1 %	(0.03, 0.59)	1	
Total (men and women together)								
Age								
45 years of age and more	22.3 %	(19.18, 25.82)	1.29	(0.96, 1.74)	2.1 %	(1.31, 3.29)	0.41	(0.23, 0.76)
Less than 45 years of age	22.0 %	(19.83, 24.34)	1		8.0 %	(6.74, 9.55)	1	
Education Level								
College graduate or more	18.5 %	(15.53, 21.82)	0.55	(0.42, 0.73)	6.4 %	(4.52, 8.87)	0.80	(0.51, 1.24)
Less than college	23.1 %	(20.88, 25.41)	1		6.5 %	(5.34, 7.83)	1	

Note: Percentages represent weighted stratum specific prevalence of tobacco use. AOR=adjusted odds ratio. CI=confidence interval. Current cigarette use was defined as smoking at least one cigarette in the past month. Current water-pipe use was defined as smoking a water-pipe at least once during the month. For each tobacco product, three separate logistic regression analyses were performed (one for men, one for women, and one for the total). All models controlled for binary age, binary education level, marital status, employment status, religion, ethnicity and household crowding index (a proxy measure for income). The total models also controlled for sex as a covariate. All analyses were weighted and adjusted for survey design variables (strata and PSU).

Discussion

Evidence of a gender gap in tobacco use has been well established in the literature and is markedly wide in the Middle East.[88-91,119] Many studies from developing countries suggest that socio-demographic factors, and most importantly age and educational attainment, relate differently to tobacco use in men and women[89,90,97] However, these differences are not clear in the Arab world. This study examined gender differences in cigarette and water-pipe use in Iraqi adults, focusing on differences related to age and educational attainment. Understanding gender differences in tobacco use is essential for planning and developing effective tobacco control policies.[92]

Results from this survey suggest the existence of a very large gender gap in both cigarette and water-pipe use in this population, which is consistent with other studies from the Arab world.[89,90,95,101] In this study, men showed a considerably high past-month prevalence of cigarette use (40.4%), but water-pipe use was not as popular (12.3%). Among women, overall past-month cigarette use was low and the observed prevalence was in agreement with estimates from neighboring countries.[89] However, past-month prevalence of water-pipe use (0.4%) was much lower than cigarette use (2.9%) in this female Iraqi population. This finding is unexpected as many regional studies suggest that when it comes to smoking, Arab women favor water-pipes over cigarettes.[97] Although social desirability may have played a role in possible female under-reporting, it would be expected to be less so for a behavior that is less socially stigmatized such as water-pipe use.[27,97] Water-pipe use is a practice that is deeply embedded in the Arabian culture and it does not cause shame or embarrassment for women to report this behavior in most of these societies.[27] Thus, it is difficult to find an explanation for this lower rate of water-pipe use compared to cigarette use among women. Studies on Iraqi adolescents show conflicting findings on female preference of tobacco product.[33,34] With respect to adults, an Iraqi study reports extremely low current

water-pipe use (2%), but no estimates are differentiated by sex.[30] Perhaps cigarettes may be the preferred method of tobacco use among both men and women in this population.

Another important finding is the possible effect measure modification of sex on the association of tobacco use with age and educational attainment. Consistent with the trend reported in developing countries, findings from the current study suggest that being 45 years of age or older was associated with increased odds of cigarette smoking in women. [87-90,97] This also comes in agreement with previous Iraqi research that report highest tobacco use among men between the ages of 25 to 50 years and among women ages 50 years and older.[31] However, there was no evidence to suggest a difference in odds of cigarette smoking by this age classification in men. On the other hand, cigarette smoking was negatively associated with having a college degree among men, but there was no evidence to suggest a difference in odds of cigarette use among women, contrary to previous research suggesting a positive association between tobacco use and higher education among women.[87-90,97]

Findings from the current study also imply that both being 45 years or older and having a college degree are positively associated with water-pipe use by women, but negatively associated with its use among men, although it should be noted that female estimates are relatively unstable. These findings have different policy implications for tobacco control efforts targeted at men and women, because they highlight different gender vulnerabilities to tobacco use.[92] In addition to focusing efforts on preventing tobacco use among Iraqi adolescents, tobacco prevention needs to be directed to possible high-risk-adult groups in both genders, namely older and well educated women, and younger and less educated men. This also emphasizes the importance of conducting gender-specific analysis in future regional tobacco use research.

Strengths and limitations

A noteworthy strength to this study is that it provided previously unreported differences in tobacco use trends between Iraqi men and women. It was also conducted on a large adult population-based sample, while most previous Iraqi studies were conducted on adolescents or university students.[32-34,36,108] However, this study had its limitations. First, it did not show the expected Arab trend, namely that women prefer water-pipe use to cigarettes. This could be related to female under-reporting of tobacco use in general in this survey, which may have under-estimated cigarette use and water-pipe use in this population. It could have also over-estimated the odds for tobacco use in males compared to females. Under-reporting in women could have been related to being interviewed by a male surveyor or having a family member present during the survey. However, controlling for these two features in the analysis did not change odds ratio estimates. The low prevalence of tobacco use in women in this study may have led to unstable odds ratio estimates.

Second, the survey weights corrected for survey selection by sex and geographic distributions in the Iraqi population but did not correct for selection by other socio-demographic factors. This could have introduced selection bias to the estimates.

Third, income was not directly measured in the survey, yet household crowding index was used as a proxy measure for income in logistic regression analyses. This may have caused residual confounding by income, which may have under-estimated or over-estimated the odds ratios in this study. Fourth, the associations examined in this study do not imply causation, as the study design was cross-sectional. Despite these limitations, the study provided much needed information about tobacco use differences between men and women that will help direct future national and regional tobacco control policy.

Conclusion

Addressing gender disparities in tobacco use is crucial for implementing effective tobacco control policies.[92] The current study suggests that Iraq shares the general Arab trend of higher cigarette and water-pipe use among men compared to women.[89,90,95,101] However, unlike what is commonly known about female tobacco use in the Arab world, the preferred form of tobacco used among Iraqi women could be cigarettes.[27,97]

This study also suggests that age and educational attainment might relate differently to tobacco use in men and women. Global tobacco research has routinely linked women's vulnerability to tobacco use to youth and socio-economic disadvantage.[88,120] However, this does not seem to fit the picture identified among Iraqi women, where tobacco use is practiced by older, more educated women. Further qualitative and quantitative research is warranted to understand the different social and psychological constructs that shape gender-specific attitudes and practices towards tobacco use in Iraq. Although men may be disproportionately more vulnerable to tobacco use in this population, potential vulnerable female groups should not be neglected. These gender differences need to be considered when developing national and regional tobacco prevention strategies in which efforts would be best directed at targeting gender-specific at-risk profiles unique to these societies[88]

Chapter 4

Unhealthy Alcohol Consumption Patterns in Iraqi Adults: Prevalence and Associated Characteristics

Abstract

Objectives: There is a perception that alcohol use is relatively uncommon in Iraq. However, unhealthy alcohol consumption may represent an unrecognized public health need in this region. Using data from the Iraqi National Household Survey of Alcohol and Drug Use (INHSAD), I estimated prevalence and patterns of unhealthy alcohol use in the adult Iraqi population. Additionally, I investigated the association between unhealthy alcohol use and a variety of socio-demographic features among men.

Methods: Using a multi-stage cluster sampling method, the INHSAD interviewed 3200 adult Iraqi citizens. The instrument assessed tobacco use, alcohol use frequency and pattern, and different socio-demographic features. Using weights that adjusted for unequal selection probabilities, I estimated the prevalence of alcohol use indicators (lifetime use, and past month low-risk drinking, at-risk drinking, and binge drinking) for both men (n=2289) and women (n=911). For male participants, I also conducted weighted logistic regression analyses while controlling for cigarette smoking and socio-demographic characteristics.

Results: More men reported lifetime alcohol consumption, and past-month at-risk drinking and binge drinking as compared to women. Although most men reported abstinence in the past month, the majority of past-month drinkers were at-risk and binge drinkers. Compared to men who were 50 years of age and older, being between the ages of 36 and 49 was associated with a greater odds for both at-risk and binge drinking. Among men in this survey, having a

low level of formal education (elementary, middle school or high school education) was associated with greater odds for at-risk drinking and binge drinking compared to having a college degree. Additionally, among men, smoking an extra pack of cigarettes a day was associated with about a 3-fold increase in the odds for at-risk drinking and binge drinking.

Conclusion: Although alcohol consumption in Iraq is relatively infrequent, under-reporting due to cultural and religious constraints, especially for women, may have suppressed reported rates. Despite the low prevalence of alcohol consumption in this population, unhealthy alcohol consumption (at-risk drinking and binge drinking) seemed to be prevalent among those who do consume alcohol. Further research is needed to investigate alcohol-related morbidity and mortality among men in Iraq.

Background

The benefits of moderate alcohol consumption on reducing the risk for cardiovascular disease have been extensively addressed in the literature.[121,122] The U.S. National Institute on Alcohol Abuse and Alcoholism (NIAAA) defines moderate drinking as not exceeding 1 drink per day for women and not exceeding 2 drinks per day for men, where a standard drink is measured as containing 14g or 0.6 fl oz of pure alcohol.[123] However, both consuming alcohol beyond these limits and engaging in unhealthy drinking patterns have been linked to an increased risk for a variety of medical, psychiatric, and social complications.[122]

Unhealthy alcohol consumption encompasses a spectrum of drinking patterns that range from at-risk drinking to those practices that meet the criteria for an alcohol use disorder.[122] At-risk drinking is defined for women as consuming more than 3 drinks per drinking occasion or more than 7 drinks a week. For men, it is defined as consuming more than 4 drinks per drinking occasion or more than 14 drinks a week.[124] Another unhealthy

pattern of alcohol consumption is binge drinking. The U.S. Department of Agriculture 2010 Dietary Guidelines characterizes binge drinking as consuming more than 5 drinks on at least one occasion in men, and more than 4 drinks on at least one occasion in women, in the past 30 days.[44] Alcohol use disorder, on the other hand, is characterized by maladaptive alcohol use behavior that causes significant functional and psychological distress and meets criteria for a psychiatric diagnosis from the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-V).[125] This paper discusses both at-risk drinking and binge drinking, but alcohol use disorder will not be addressed because the study instrument did not assess psychiatric criteria.

Research has documented that at-risk drinking is associated with an increased risk for hypertension, depression and sleep disorders.[126] Binge drinking is also associated with several health complications such as neurovascular and cardiovascular disease, hypertension, injuries and liver disease.[33] In the United States, approximately 28% of the adult population report at-risk drinking.[40] This is close to the adult at-risk drinking rates reported in Canada (31%) and in Australia (20%).[127,128] Worldwide, approximately 8% of adults ages 15 years and older report binge drinking.[38] Latest reports from the Centers for Disease Control and Prevention indicate that about 17% of U.S. adults report past-month binge drinking.[129] Estimates for adult binge drinking vary in other western and European countries, with low estimates reported in Spain (6.3%) and Canada (7.4%), and higher estimates reported in the U.K. (15%) and Ireland (18%).[130-133]

Little is known about the prevalence of at-risk and binge drinking in the Middle East. The overall prevalence of binge drinking in countries of the Eastern Mediterranean Region (EMR) is reported at 0.1% in people ages 15 years and older.[38] A review conducted by Ghandour and colleagues showed that past-month binge drinking in Arab countries ranges

from 0.3% to 7%.[133] However, a somewhat dated Israeli study (that sampled both Arab and Jewish participants) reported that 9% of the adults were past-month binge drinkers.[134]

Numerous studies have explored predictors and correlates of unhealthy alcohol consumption patterns. Sex, age, level of income, employment status, and level of educational attainment appear to be important predictors for at-risk drinking and binge drinking.[62,134-137] Worldwide, men predominantly consume more alcohol as compared to women and so are more likely to consume at higher levels and engage in binge drinking.[134,138,139] In Western studies, young adults of both sexes are believed to be most vulnerable to risky drinking behavior.[134,140] Thus, both at-risk drinking and binge drinking are thought to decrease over the lifespan.[136,137,140] For example, binge drinking seems to peak between the ages of 18 and 29 years, and then decreases with increasing age.[136,139]

Studies also suggest that individuals with low income and low educational attainment are more likely to practice at-risk drinking and binge drinking, and are at greater risk for alcohol-related morbidity, compared to people with higher income and education levels.[140-142] Other studies report conflicting findings, where a positive relationship is suggested between one's level of income and education, and unhealthy drinking patterns.[62,135,143] However, the association between unemployment and risky alcohol use behavior is more consistent in the literature. In the U.S. for example, unemployment is associated with an increased odds for heavy alcohol consumption and binge drinking, across all races, genders and age groups.[62] Retirement may be an exception to this phenomenon, where it was reported that level of alcohol consumption declines with retirement.[144] Marriage is also thought to be a protective factor against unsafe alcohol use.[140] Additionally, research shows that the use of alcohol and tobacco almost go hand-in-hand.[145] Smoking increases one's chance of drinking and the two behaviors exhibit a "dose-related" association.[124,145] This is problematic because of the

growing body of evidence suggesting combined effects of alcohol and tobacco use in increasing the risk for cardiovascular disease, liver disease and numerous types of cancers.[124]

Research on alcohol use in the countries of the Arab World is lacking and socio-demographic correlates for unhealthy alcohol use have yet to be fully determined.[38,146] Unhealthy alcohol consumption may represent an unrecognized public health problem in this region. Previous research suggests that exposure to natural disasters or terrorism may be linked to an increase in the level of alcohol consumption and alcohol use disorders at the population level.[147] Given the current series of violence and war in Iraq, one may expect an increase in risky behavioral practices, such as unhealthy alcohol consumption. Between 2008 and 2010, the average yearly per capita alcohol consumption in Iraq reported by World Health Organization (WHO) was quite small; approximately 0.5 liters. This was lower than the Eastern Mediterranean Region (EMR) average at that time, which was 0.7 liters per year.[38] Nevertheless, previously reported low frequency of alcohol use in Iraq does not dismiss the need for updated research assessing prevalence of alcohol consumption at the national level.

As of 2014, the only source for recent alcohol use indicators in Iraq came from the estimates reported in the World Health Organization Global Status Report on Alcohol and Health estimates.[38,80] These summaries report that past-year alcohol use in Iraq in 2010, which was 5.4% (7.2% in males and 3.6% in females).[80] The Iraqi Mental Health Survey conducted between 2006 and 2007, estimated lifetime prevalence of alcohol use was 6.8% among adult males and 0.6% among adult females.[54] The study also reported a lifetime prevalence of alcohol dependence of 0.2% (0.3% in males and 0.1% in females).[54,148] Additionally, prevalence of binge drinking was 0.4% (0.5% in males and 0.2% females).[54] These estimates are similar to the regional average for binge drinking in the EMR (0.1%).[1] However, other patterns of unhealthy alcohol consumption are not reported in these surveys.

In order to understand the patterns of unhealthy alcohol consumption among Iraqi adults, I use information from the 2014 Iraqi National Household Survey of Alcohol and Drug Use (INHSAD) to estimate the prevalence of different levels and patterns of alcohol use (lifetime use, abstinence, low-risk drinking, at-risk drinking and binge drinking), and to examine the association of unhealthy consumption patterns (at-risk drinking and binge drinking) with a variety of socio-demographic characteristics. Consistent with previous research, I hypothesize that the odds for unhealthy alcohol consumption will be higher in males than females. I further hypothesize that the odds of at-risk drinking will be smaller among college graduates compared to people who completed lower levels of education, and among employed participants compared to the unemployed. Because the literature suggests that young adults practice binge drinking at highest rates,[38,136,137] I also hypothesize that the odds for binge drinking in this study will be greater among adults of the youngest age group as compared to older participants.

Methods

Survey design and sample selection

The INHSAD was a collaborative project involving the Iraqi Society of Addiction Medicine, University of Baghdad College of Medicine, the Center for Human Services and the University of California Los Angeles Integrated Substance Abuse Programs. It was funded by the U.S. Department of State Bureau of International Narcotics and Law Enforcement. The estimated sample size for the survey was 3,200. The survey was cross-sectional in design and used a multi-stage cluster sampling approach, in which study participants had unequal probabilities of being selected.[8]

Eligible survey participants included non-displaced and non-institutionalized adult Iraqi citizens (both Kurdish and Arab), ages 18 years and older. After obtaining informed

verbal consent, surveys were administered by trained surveyors, via face-to-face interviews. The survey questionnaire assessed tobacco use, alcohol use, non-medical use of prescription drugs or illegal drugs, as well as respondent socio-demographic characteristics. Data collection took place between April 2014 and December 2014. The survey was approved by the University of California Los Angeles Institutional Review Board, and by the Research Ethics Committee at Baghdad University, College of Medicine.[8]

Study Variables

Alcohol use. Using existing survey items, I created six alcohol use measures for prevalence estimation. These were: 1) any reported lifetime alcohol use, 2) any past month alcohol use, 3) past month abstinence from alcohol use, 4) past month low risk drinking, 5) past month at-risk drinking, and 6) past month binge drinking. Lifetime alcohol use was measured in the INHSAD by asking the following question: "Have you ever used alcohol yourself?". Individuals who responded "yes" were coded as ever drinkers and individuals who responded "no" were coded as never drinkers. Frequency of alcohol use per month was measured by asking: "During the last 30 days, on how many days have you had a drink of alcohol?" From this response, I created the variable for any past month alcohol use. If a person reported drinking at least once during the past month, then that person was coded as "any past month alcohol user". Otherwise, the person was coded as "not past month alcohol user". Number of alcohol drinks consumed per day was measured by asking: "On a day when you use alcohol, what was the average number of drinks you consume?", where the standard drink was defined as a can or regular size bottle of beer; a wine cooler or a glass of wine, champagne, or sherry; a shot of liquor (approximately 45 ml); or a mixed drink or cocktail. A liter bottle of beer was counted as 3 drinks. From that question, I created a variable for past month alcohol drinking level that included three categories: 1) past month abstinence, 2) past

month low-risk drinking and 3) past month at-risk drinking. These categories are based on the NIAAA definition for low-risk drinking[149] and the U.S. Department of Agriculture 2010 Dietary Guidelines' definition for at-risk drinking.[44] Participants who reported zero drinks per day in the past month were coded as abstainers. Women who reported drinking between 1-3 drinks per day in the past month, and men who reported drinking between 1-4 drinks per day in the past month were coded as low-risk drinkers. Women who reported drinking more than 3 drinks per day and men who report drinking more than 4 drinks per day, were considered at-risk drinkers. Additionally, I created a dichotomous variable for at-risk drinking, using these cutoff points (more than 3 drinks a day in women and more than 4 drinks a day in men). Binge drinking was assessed in the survey by asking: "On a day when you use alcohol, what is the maximum number of drinks you consume?". From this question, a dichotomous variable for binge drinking was created with different cutoff points for men and women. A binge-drinking event was coded as present in men who reported consuming a maximum of 5 or more drinks, and women who reported consuming a maximum of 4 or more drinks.

Socio-demographic characteristics. The INHSAD measured a number of individual characteristics that I used to investigate their associations with alcohol use. These included age, sex, marital status, employment status, education level, religion (Muslim, other), ethnicity (Kurdish, Arab) and household crowding index (HCI, number of people in household per room). Age was categorized to four groups (18-25 years, 26-35 years, 36-49 years, and 50 years and older), following the same classification used in the National Survey on Drug Use and Health.[60] Employment status was coded into one of four categories (employed, student, retired and unemployed). Education level was classified according to the highest level of education completed. These included less than elementary school education, completed elementary school education, completed middle school education, completed high

school education, and completed college or university education. HCI was used as a proxy measure for income as income was not assessed in the interview

Cigarette use. Frequency of cigarette use in the survey was assessed by asking "On a day when you smoke cigarettes, about how many cigarettes do you smoke?" From this item, I created a variable capturing number of packs smoked per day, by dividing the number of cigarettes smoked per day by 20. Current cigarette use (smoking cigarettes at least once in the past 30 days) was also measured in the survey and was used as a dichotomous variable for past month cigarette smoking.

Design and geographic variables. The Survey also includes information on design variables (sampled blocks (PSU) within governorates (strata)) and a weight variable. The stratum variable consisted of 18 categories, corresponding to each of the Iraqi governorates; Dohouk, Erbil, Sulaimaniyah, Kerkouk, Ninawa, Baghdad, Babylon, Kerbala, Najaf, Al-Qadisiyah, Wasit, Diala, Al-Anbar, Salahuddin, Al-Muthanna, Thi-Qar, Al-Basrah and Maysan. The weight variable represented the inverse probability of being selected for the survey and adjusted for gender non-response.[8]

Using these survey weights, the average design effect for the survey was 2.04. Thus, the effective sample size was 1,568. Assuming the proportion of lifetime alcohol use was 0.6% among females and 6.8% among males, based on reported lifetime prevalence from the Iraqi Mental Health Survey,[54] and assuming equal proportion weights for males and females, the effective sample size provided power greater than 0.999 for the current study [Appendix II].

Statistical Analysis

Analyses were conducted through SAS-Callable SUDAAN® Release 11.0.1 (Research Triangle Institute, Research Triangle Park, NC), and adjusted for survey design

and unequal selection probabilities using survey weights and survey design elements (strata, PSU). To describe the sample, I first conducted univariate analysis for each socio-demographic group, for which I present weighted percentages and standard errors (SE). For each of the alcohol use variables (lifetime alcohol use, past month abstinence from alcohol use, any past month alcohol use, past month low-risk drinking, past month at-risk drinking, and past month binge drinking), I estimated prevalence and 95% confidence intervals (CI) by socio-demographic characteristics.

To examine the association of at-risk drinking with each of education level and employment, I conducted multivariate logistic regression analyses, using at-risk drinking as the dependent variable, and education level and employment status as independent variables. This model also controlled for number of packs smoked per day and other measured socio-demographic characteristics, because of their possible confounding effects in predicting level of alcohol consumption.[38,42,141,142,150-152] To examine the association between binge drinking and age, I conducted a multivariate logistic regression analysis, using binge drinking as the dependent variable and age category as the independent variable, and controlled for number of packs smoked per day and other measured socio-demographic characteristics.

Dealing with missing data

Data were explored for missing values. If missing values were detected, weighted estimating equation method for dealing with missing values in complex survey data was used.[118] This method is preferred for analysis of missing data of complex design samples.[118] In this method, every observation with complete data is weighted by the inverse probability of being completely observed.[118] First, for every variable that has missing data, a binary variable is created for completeness. Let z_i be the variable that is missing. A binary variable R_i is coded so that $R_i = 1$ if z_i is observed, and $R_i = 0$ if z_i is missing. Then, a logistic

regression model is built to estimate the probability of observing z_i given the outcomes of interest (in this study that would be ever using alcohol, at-risk drinking and binge drinking) and controlling for other measured variables (demographic characteristics, tobacco use, and sex of the surveyor). This probability (π_i) is calculated for every observation with complete data and is then used to create an additional weight ($1/\pi_i$). After that, for every observation with complete data, $1/\pi_i$ is multiplied by the previously created survey weight, yielding a new survey weight adjusting for missing data. Finally, data analyses are repeated only on observations with complete data using this new survey weight. I used this procedure for every variable with missing data in the survey and then compared results that adjusted for missing data to results from complete case analysis.

Results

Socio-demographic characteristics of the INHSAD sample

Overall, the response rate for the INHSAD was 91.6%, where most of the non-respondents were females. The number of sampled men was more than twice the number of women [Table 4.1]. A greater proportion of men had at least a college degree compared to women, and more men were employed compared to women [Table 4.1]. Additionally, the majority of both male and female participants were married, Muslim, and of Arab ethnicity [Table 4.1].

In this survey, 86% of men (SE=0.71) and 83% of women (SE=1.29) were interviewed by a male surveyor. As a result, and in accord to cultural norms, a greater proportion of women were interviewed in the presence of a family member (35.8%, SE=2.41), compared to men (6.3%, SE=0.76). Of the women interviewed by a male surveyor, 20% (SE=2.01) had a male family member present, 14.6% (SE=1.89) had a female family member present, and 65.4% (SE=2.54) were interviewed alone. On the other hand, among

men interviewed by a female surveyor (13.8%, SE=0.71), only 3.3% (SE=1.20) had a male family member present, 13.4% (SE=2.82) had a female family member present, and 83.2% (SE=3.26) were interviewed alone.

Table 4.1. Descriptive characteristics of Iraqi adults from the Iraqi National Household Survey of Alcohol and Drug Use, 2014, by sex

Characteristic	Men n = 2,289 % (SE)	Women n = 911 % (SE)
Age group		
18-25	31.5 % (1.31)	21.5 % (1.81)
26-35	29.0 % (1.22)	27.9 % (1.85)
36-49	22.9 % (1.17)	30.9 % (2.26)
50+	16.6 % (0.92)	19.7 % (1.84)
Highest education level achieved		
Less than elementary	8.1 % (0.88)	20.2 % (1.77)
Elementary	23.9 % (1.37)	26.6 % (1.86)
Middle School	22.4 % (1.16)	20.6 % (1.84)
High school graduate	20.1 % (1.27)	12.2 % (1.47)
College graduate or more	25.5 % (1.32)	20.4 % (1.87)
Marital Status		
Married	64.8 % (1.47)	66.4 % (2.58)
Widowed, Divorced/Separated	2.3 % (0.47)	11.2 % (1.60)
Single	33.0 % (1.46)	22.5 % (1.99)
Employment status		
Employed	65.8 % (1.57)	21.4 % (1.80)
Student	13.8 % (1.18)	6.9 % (1.11)
Retired	6.1 % (0.65)	1.5 % (0.47)
Unemployed	14.3 % (1.14)	70.2 % (2.13)
Ethnicity		
Arab	91.7 % (0.77)	91.9 % (1.00)
Kurdish	8.3 % (0.77)	8.1 % (1.00)
Religion		
Muslim	99.6 % (0.16)	99.0 % (0.34)
Christian	0.2 % (0.09)	0.8 % (0.30)
Other	0.2 % (0.09)	0.2 % (0.15)

Note: Percentages and standard errors (SE) presented in this table were weighted and adjusted for survey design elements (strata, PSU). Participants categorized as "students" included middle school students (2.3%, SE=1.92), high-school students (14.1%, SE=2.93), undergraduate students (55.9%, SE=4.55) and graduate level students (25.7%, SE=3.67). Other religions included Sabiah and Yazidi.

Overall alcohol consumption prevalence

Overall, only 8.1% of participants (95% CI=6.92, 9.40) reported ever drinking alcohol, and 3.2% (95% CI=2.58, 3.93) reported any alcohol drinking in the past month. The

majority of participants reported abstinence in the past month (97%, 95% CI=96.28, 97.61), 1% were low-risk drinkers (95% CI=0.71, 1.40), and 2% were at-risk drinkers (95% CI=1.50, 2.62). Binge drinking was reported among 2.2% of all participants (95% CI=1.96, 2.86) [Table 4.2].

Gender differences in alcohol consumption

Lifetime alcohol use was higher among men as compared to women, where 14.8% of men reported ever drinking alcohol (95% CI=12.91, 16.63), and only 1.2% of women reported ever drinking alcohol (95% CI=0.46, 3.01) [Table 4.2]. Among these very few women who reported ever drinking alcohol, 69.5% were employed (95% CI=28.09, 93.01), 53.2% were married (95% CI=15.03, 88.00), 69.5% had at least a college degree (95% CI=28.09, 93.01), and 53.5% of them were between the ages of 18 and 25 years (95% CI=15.35, 87.91). Surprisingly, only 24.1% (95% CI=4.42, 58.46) of these women were cigarette smokers. Additionally, 77.5% (95% CI=36.80, 95.32) of the women reporting ever drinking alcohol were of Arab ethnicity and Muslim.

Because the majority of females in this survey were either interviewed by a male surveyor or in the presence of a family member, I further explored how these two situations might be related to self-reported lifetime alcohol use among women. It appeared that of all the women interviewed by a male surveyor, 1% (95% CI=0.43, 2.48) reported ever drinking alcohol, while 2.6% (95% CI=0.38, 16.32) of women interviewed by a female surveyor reported ever drinking alcohol. Interestingly, 2.9% (95% CI=0.52, 14.16) of women interviewed in the presence of a male family member reported ever drinking alcohol, while 1% (95% CI=0.39, 2.73) of women interviewed alone reported ever drinking alcohol, and none of the women interviewed in the presence of a "female member" reported ever drinking alcohol.

A greater proportion of men reported using any alcohol in the past month as compared to women. Approximately, 6.1% of men (95% CI=4.95, 7.51) reported drinking any alcohol in the past month, while only one female (0.16%, 95% CI=0.02, 1.13) reported drinking any alcohol in the past month. This female also reported at-risk drinking and binge drinking in the past month [Table 4.2]. The total proportions of at-risk drinkers and binge drinkers were low among male participants [Table 4.2]. However, among men who reported any past month alcohol consumption, 65.7% (95% CI=55.48, 74.62) were at-risk drinkers, and 72.8% (95% CI=62.06, 81.43) reported binge drinking. Because only one female reported past month drinking, the remainder of analyses for unhealthy alcohol consumption patterns were restricted to males.

Table 4.2. Prevalence of alcohol use by gender, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

		Past Month Alcohol Use			
	Lifetime Use	**Abstainers**	**Low risk drinking**	**At-risk drinking**	**Binge Drinking**
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Male	14.7% (12.91, 16.63)	94.3% (92.87, 95.43)	2.0% (1.40, 2.75)	3.8% (2.84, 4.96)	4.2% (3.19, 5.44)
Female	1.2% (0.46, 3.01)	99.8% (98.87, 99.98)	0.0%	0.16% (0.02, 1.13)	0.16% (0.02, 1.13)
Total	8.1% (6.92, 9.40)	97.0% (96.28, 97.61)	1.0% (0.71, 1.40)	2.0% (1.50, 2.62)	2.2% (1.96, 2.86)

Notes: Prevalence is presented as weighted percentages and 95% confidence intervals within each gender subgroup. Low-risk drinking=drinking 1-4 drinks per day among men and drinking 1-3 drinks per day among women, in the past month. At-risk drinking= drinking more than 4 drinks a day among men and more than 3 drinks a day among women, during the past month. Binge drinking=consuming a maximum of 5 or more drinks on one occasion in men, and consuming a maximum of 4 or more drinks on one occasion in women.

Association between at-risk drinking and socio-demographic characteristics in men

At-risk drinking was lowest among men ages 50 years and older (1.5%, 95% CI=0.69, 3.22), as compared to other age groups [Table 4.3]. Men with a middle school education level reported highest at-risk drinking prevalence (7.5%, 95% CI=4.49, 12.23) as compared to men with other levels of education [Table 4.3]. Men who were widowed, divorced or separated reported higher prevalence of at-risk drinking (14.8%, 95% CI=5.69, 33.24) as compared to married and single men [Table 4.3]. Employed and unemployed men reported similar prevalence of at-risk drinking [Table 4.3]. Prevalence of at-risk drinking was greater among Kurdish men as compared to Arab men, and among men from other religions compared to Muslim men [Table 4.3]. Furthermore, 9.1% of past month cigarette smokers (95% CI=6.87, 11.99) reported at-risk drinking, while only 0.2% of non-smokers (95% CI=0.07, 0.54) reported at-risk drinking.

Men between the ages of 36 and 49 years had approximately 5 times the odds for reporting at-risk drinking, compared to men ages 50 years and older (AOR=4.52, 95% CI=1.02, 20.08) [Table 4.3]. As anticipated, compared to men who completed a college education, the odds for at-risk drinking was about 3 times as much in men with an elementary education level (AOR=2.98, 95% CI=0.95, 9.32), and was about 5 times as much in men with a middle school education level (AOR=5.14, 95% CI=1.65, 16.04), in the past month [Table 4.3]. These estimates provided large confidence intervals with lower bonds that were close to 1, so they must be interpreted with caution.

Although not statistically significant, men without formal elementary education were at lower odds to report at-risk drinking as compared to men who completed a college education (AOR=0.26, 95% CI=0.03, 2.01) [Table 4.3]. There was not enough evidence to suggest a difference in the odds of past-month at-risk drinking between unemployed and employed men (AOR=1.02, 95% CI=0.36, 2.88) [Table 4.3]. Interestingly, the odds for

reporting at-risk drinking among men who were widowed, divorced or separated were approximately 9 times that among married men (AOR=8.55, 95% CI=2.43, 30.04) [Table 4.3]. Men affiliated with other religious groups had about 8 times greater odds to report past-month at-risk drinking compared to Muslim men (AOR=8.32, 95% CI=1.26, 54.74). However, these two later estimates provided extremely wide confidence intervals, and thus should be interpreted with caution. Among men in this survey, every extra cigarette smoked would increase the odds for reporting at-risk drinking by approximately 3 fold (AOR=2.83, 95% CI=2.11, 3.80) [Table 4.3].

Association between binge drinking and socio-demographic characteristics in men

Prevalence of binge drinking was consistent with prevalence of at-risk drinking [Table 4.3]. Men ages 50 years and older reported the lowest prevalence of past month binge drinking as compared to other age groups [Table 4.3]. Men with middle school education level reported the highest prevalence of binge drinking as compared to men with other education levels, and men who were widowed, divorced or separated more frequently reported binge drinking compared married and single men [Table 4.3]. Men who were Kurdish and from other religion groups reported more binge drinking compared to men who were Arab, and Muslim, respectively [Table 4.3]. Additionally, employed men reported more binge drinking than students, retired or unemployed men [Table 4.3].

The odds for reporting past-month binge drinking among men from the youngest age group (18-25 years of age) was twice that among men ages 50 years and older (AOR=2.09, 95% CI=0.52, 8.47) [Table 4.3]. Consistent with results for past-month at-risk drinking, men between the ages of 36 and 49 years were at approximately 4 times the odds for reporting past-month binge drinking compared to men ages 50 years and older (AOR=3.63, 95% CI=1.12, 11.78) [Table 4.3].

Table 4.3. Prevalence and adjusted odds ratios for at-risk drinking and binge drinking, by socio-demographic characteristics and past-month cigarette use, among male participants from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

	At-risk Drinking				Binge Drinking			
Characteristic	**%**	**(95% CI)**	**AOR**	**(95% CI)**	**%**	**(95% CI)**	**AOR**	**(95% CI)**
Age								
18-25	2.4%	(1.11, 4.93)	2.50	(0.43, 14.36)	2.7%	(1.37, 5.28)	2.09	(0.52, 8.47)
26-35	5.3%	(3.00, 9.19)	4.28	(0.78, 23.35)	5.6%	(3.27, 9.44)	3.50	(0.92, 13.25)
36-49	5.5%	(3.78, 7.98)	4.52	(1.02, 20.08)	5.9%	(4.13, 8.48)	3.63	(1.12, 11.78)
50+	1.5%	(0.69, 3.22)	1		2.2%	(1.19, 4.18)	1	
Highest education level completed								
Less than elementary	0.9%	(0.24, 3.02)	0.26	(0.03, 2.01)	1.2%	(0.41, 3.40)	0.46	(0.08, 2.66)
Elementary	4.8%	(2.65, 8.39)	2.98	(0.95, 9.32)	5.4%	(3.16, 9.08)	3.98	(1.59, 9.98)
Middle School	7.5%	(4.49, 12.23)	5.14	(1.65, 16.04)	8.4%	(5.31, 13.12)	6.71	(2.63, 17.12)
High school graduate	2.8%	(1.40, 5.59)	2.72	(0.79, 9.36)	3.0%	(1.58, 5.76)	3.27	(1.15, 9.31)
College graduate or more	1.3%	(0.54, 2.87)	1		1.2%	(0.61, 2.26)	1	
Marital Status								
Married	3.2%	(2.24, 4.57)	1		3.8%	(2.74, 5.16)	1	
Widowed, Divorced/Separated	14.8%	(5.69, 33.24)	8.55	(2.43, 30.04)	14.8%	(5.69, 33.24)	6.77	(2.06, 22.22)
Single	4.1%	(2.31, 7.21)	1.82	(0.82, 4.01)	4.3%	(2.43, 7.38)	1.60	(0.74, 3.45)
Employment status								
Employed	4.7%	(3.42, 6.31)	1		5.2%	(3.90, 6.87)	1	
Student	0.5%	(0.07, 3.26)	0.13	(0.01, 1.37)	1.0%	(0.25, 4.04)	0.30	(0.05, 1.81)
Retired	0.5%	(0.12, 1.96)	0.41	(0.06, 2.98)	2.0%	(0.56, 6.68)	1.36	(0.29, 6.38)
Unemployed	4.4%	(1.91, 9.77)	0.79	(0.28, 2.26)	3.7%	(1.49, 8.76)	0.54	(0.19, 1.50)
Ethnicity								
Arab	3.3%	(2.40, 4.58)	1		3.8%	(2.74, 5.06)	1	
Kurdish	6.6%	(3.77, 11.39)	1.46	(0.63, 3.37)	7.2%	(4.20, 12.08)	1.48	(0.67, 3.30)
Religion								
Muslim	3.7%	(2.79, 4.94)	1		4.1%	(3.15, 5.42)	1	
Other	8.9%	(2.04, 31.23)	8.32	(1.26, 54.74)	9.2%	(2.09, 32.52)	7.39	(1.25, 43.74)
Cigarette use in the past month								
Every extra pack smoked per day		--	2.83	(2.11, 3.80)		--	2.92	(2.20, 3.87)

Notes: At-risk drinking = more than 4 drinks a day during the past month. Binge drinking = a maximum of 5 or more drinks on one day. Percentages are weighted prevalence within the demographic subgroup. CI=confidence interval. AOR=adjusted odds ratio. Two logistic regression analyses were conducted, one for each of the alcohol use variables. Models were fitted using weighted analysis that also adjusted for survey design (strata and psu). Models controlled for all characteristics presented in this table in addition to household crowding index (a proxy for income). A pack of cigarettes was measured as 20 cigarettes. Approximately 40.4% (37.55, 43.24) of men in this survey were past-month cigarette smokers, who smoked an average of 1.3 (1.26, 1.38) packs of cigarettes per day. Among all past month cigarette smokers 9.1% (6.87, 11.99) were at risk drinkers, and 9.8% (7.48, 12.83) reported binge drinking in the past month.

With the exception of men who did not complete any formal education, compared to men with a college degree, men who attained lower levels of education were at greater odds to report binge drinking in the past month [Table 4.3]. Interestingly, and although not statistically significant, men who were retired were at 36% greater odds to report past-month binge drinking compared to employed men (AOR=1.36, 95% CI=0.29, 6.38) [Table 4.3].

The odds for reporting binge drinking in men who were separated, widowed or divorced were about 7 times the odds in married men (AOR=6.77, 95% CI=2.06, 22.22). Additionally, compared to Muslim men, the odds for reporting past-month binge drinking among men affiliated to other religious groups were about 7 fold (AOR=7.39, 95% CI=1.25, 43.74) [Table 4.3]. However, as with at-risk drinking odds ratio estimates, these estimates yielded wide confidence intervals and so should be interpreted with caution. Furthermore, every extra pack of cigarettes smoked per day would increase the odds for reporting binge drinking by about 3 fold (AOR=2.92, 95% CI=2.20, 3.87) [Table 4.3].

Missing data exploration

Missingness for alcohol use variables and socio-demographic variables used in this report was less than 2%. For survey design variables (strata and psu) no observations were missing. The resulting weights created using the weighted estimation equation method did not differ much from the original weights, and so repeating analyses on the complete data using the new weights that adjusted for missing data yielded prevalence and odds ratio estimates similar to what was generated from complete case analysis. For that reason, I only report results from complete case analysis.

Discussion

Key findings from this study can be summarized in four points. First, a notably greater proportion of men report lifetime alcohol use and past month at-risk drinking and binge drinking as compared to women. Second, men between the ages of 36 and 49 years of age are at greater odds to report at-risk drinking and binge drinking in the past month, as compared to men ages 50 years and greater. Third, men with lower educational attainment, with the exception of men who did not complete a formal education (did not complete elementary education), are more at greater odds to report unhealthy drinking patterns (at-risk or binge drinking) as compared to men with a college degree. Fourth, every extra pack of cigarettes smoked per day is associated with a 3-fold increase in the odds of engaging in unhealthy drinking patterns.

Although the overall prevalence of self-reported lifetime alcohol use is relatively low in this study, it is considerably higher than what was reported in the Iraqi Mental Health Survey in 2009 (6.8%), and by the WHO in 2010 (5.4%).[54,80] However, it still remains within the range of estimates from most national studies in conservative Arab countries.[38,49,146]

In a less conservative country such as Lebanon, on the other hand, alcohol is consumed by more than half of the population.[146] An Israeli study that sampled 1200 Palestinians reported that 20.9% of participants consumed alcohol in the past month.[77] Both the Lebanese and Israeli studies sampled a greater proportion of Christians compared to the INHSAD, which could explain their higher estimates for alcohol use as compared to the current study.[77,146] However, available national Arab surveys do not provide estimates for unhealthy patterns of alcohol consumption such as at-risk drinking or binge drinking, to which the INHSAD estimates can be compared.

The low prevalence of alcohol consumption in Iraq does not come as a surprise. Even though alcohol consumption is not officially illegal in Iraq, it is definitely considered a social

taboo, as it is in other Arab nations.[48,146,153] Although few men reported consuming alcohol, more than half of the men who did consume alcohol in the past month were at-risk drinkers and about 3/4 of them were binge drinkers. This is alarming because it even exceeds worldwide estimates where 16% of current alcohol users ages 15 years and older report binge drinking, and only 1.6% of current drinkers from EMRO report binge drinking.[38] Furthermore, in the U.S. where more than half of the population consumes alcohol, 48% of alcohol consumers report past-month binge drinking.[154] However, consuming alcohol beyond healthy limits is believed to be the case in many current drinkers of Muslim-majority countries, where when people choose to drink, they do so without moderation.[153]

Reports from Arab countries' alcoholic beverage imports, exports and taxation suggest higher overall alcohol consumption than what is reported by national studies, suggesting that estimates from studies in these countries do not reflect the true picture of alcohol use in the region.[146] The complexity of addressing alcohol use in this region has definitely had an impact on limiting research related to alcohol use and alcohol related harm in the region.[48,146] In addition to the poor research infrastructure in this region, cultural and religious norms can alter regional policy makers' decision to invest in research on this sensitive topic.[146,153]

It is important to address the large gender gap present in the current study. It is generally believed that across the globe more men consume alcohol than women.[38,42,141,142,155,156] In some Western countries, particularly countries with a great degree of gender equality, women's drinking patterns closely resemble those of men.[38,157] However, the gap still remains large in countries with a large Muslim majority.[38,146] One explanation for this provided in the literature is that people of all cultures may associate alcohol consumption with masculinity, making it a less favorable behavior for women.[155] A feature particular to the Arab world is that although alcohol consumption is forbidden in Islamic

religion, it is still, in some Arab societies, culturally more tolerable for men to do so than for women.[146]

Another reason for the gender discrepancy could be associated with female under reporting.[146] In this survey, most of the women were interviewed by male surveyors, and shyness and social desirability may have prevented them from disclosing details of their alcohol consumption. Unfortunately, there was not a large enough number of women who reported alcohol consumption in this study, which made it impossible to properly examine the association of female self-report with different socio-demographic features and interview setting. However, exploration of the data suggests that the majority of women who reported ever-drinking alcohol were interviewed by a female surveyor. Future researchers are advised to look for methods that may help overcome this barrier for studying alcohol use in the Arab region, such as matching the sex of the interviewer and the participant, or even using computer assisted survey administration that does not allow the interviewer to view the participant's responses.

In this study, adult men ages 36 to 49 years were at greater odds to engage in at-risk drinking and binge drinking as compared to men ages 50 years and older. This finding is consistent with studies that report a decreasing frequency of alcohol consumption with age.[158,159] Some of the explanations provided for this phenomenon are related to elderly health problems, use of medications in which alcohol consumption is contraindicated, and the reduced number of social occasions in which an elderly person drinks.[160] Future Iraqi research that examines longitudinal changes in amount of alcohol consumption over the lifespan could be helpful to better understand the age trend of alcohol consumption in this population.

Although western studies report conflicting evidence about the relationship between education and alcohol consumption,[62,135,140-143] a negative association between unhealthy

alcohol use and educational attainment is suggested among Iraqi men in this study. In less developed countries risky alcohol consumption patterns are more likely practiced among the portion of the population that is poor, less educated, have employment instability, and that is divorced or separated.[137,150,161] Results from this study align with these patterns, with the exception of the association between employment and unhealthy alcohol use. There was not enough evidence to suggest that unemployed men were at greater odds to engage in unhealthy drinking behaviors, compared to employed men. If anything, prevalence estimates suggest that a greater proportion of employed men consume alcohol at higher volumes and engage in binge drinking compared to unemployed men.

A little over 9% of men who smoked cigarettes in the past month also engaged in unhealthy alcohol drinking. Additionally, the results suggest that smoking an extra pack of cigarette a day is associated with a threefold increase in the odds for unhealthy alcohol drinking in this Iraqi population. These findings come in agreement with literature reports that highlight the heavy existing correlation between alcohol and tobacco use.[124,162,163] The concordant use of these two substances must be taken into consideration in regional planning and development of both screening and cessation programs for substance use[161].

Strengths and limitations

A noteworthy strength for this study is that it provided previously unavailable information about alcohol consumption patterns in Iraq. The data were collected from a large sample that was population-based. To our knowledge, none of the previous national surveys conducted in the region attempted to measure patterns of unhealthy alcohol consumption in the general Iraqi population. Results from this survey can be used as a baseline for future studies about unhealthy alcohol consumption in Iraq, enabling substance use experts to monitor changes in alcohol consumption patterns and trends over time.

Several limitations to this study should be noted. In this survey, one expects under-reporting of alcohol consumption, more so in females than males, due to cultural and religious attitudes discussed previously. Therefore, I expect the current prevalence estimates to be an underestimation of the true levels of alcohol consumption in the adult Iraqi population.

Another point of note is that the amount and frequency of alcohol consumption in the survey was based on participant recall. Because it is difficult for a person to recall the exact number of drinks per day consumed during the whole past month, this creates an opportunity for recall bias that can cause measurement error in alcohol consumption levels. This may have overestimated or underestimated the true alcohol use associations.

The survey did not record the type of alcohol consumed, which is important to identify the actual concentration of alcohol consumed within a drink. In Iraq, in particular, there is a distinction between "recorded alcohol" and "unrecorded alcohol." Recorded alcohol is the type produced and distributed through formal legal channels, which is part of the globally recognizable alcohol brands that are consumed as a beverage.[38,153] Unrecorded alcohol, on the other hand, is a locally manufactured type of alcohol that is illegally produced and distributed without public health regulations.[38] WHO reports indicate that unrecorded alcohol is used in high proportions in the Middle East, where it is known as "Arak".[38] The use of unrecorded alcohol is of public health concern because its manufacturing is not guided under national regulations and may contain unsafe levels of ethanol concentration.[38] Thus, it is necessary that future regional substance use surveys also record the "type" of alcohol consumed in order to help monitor trends of daily alcohol concentration consumption.

It is important to note that this study oversampled Muslim participants, which may have resulted in data that under-estimated the true proportion of alcohol consumers in the Iraqi population. Furthermore, sampling only 1% of participants from other religions made it

difficult to estimate the association between alcohol use and religion with more precision. Thus, our estimates for the associations of at-risk drinking and binge drinking with religion are likely not reliable and should be interpreted with caution. However, the smaller odds of unhealthy alcohol consumption among Muslim men compared to other religious groups reported in this study seems to be consistent with the overall trend in previous Arab studies.[77,146] In one study, for example, Christians were at 44 times greater odds to consume alcohol in the past year compared to Muslims.[77] Another study found that the odds for ever-drinking alcohol among Christian participants were 10 times that among Muslims.[146]

In addition to the limitations mentioned above, the models used to measure associations of alcohol use in this study controlled for all possible confounding characteristics that were measured in the survey. However, I cannot rule out the possibility of residual confounding by unmeasured characteristics. This survey did not ask about family history of an alcohol use disorder or history of mental health problems, both of which are associated with alcohol use behavior.[164-166] Many people with mental health disorders may sometimes resolve to drinking as a form of symptom relief, putting them at greater risk for unsafe alcohol consumption.[166] Despite the study limitations and given the limited methodological capabilities and the politically unstable circumstances under which this survey was conducted, findings from this study are important to inform national and regional alcohol use policy.

Conclusion

Results from this study suggest that unhealthy alcohol consumption (in the form of at-risk drinking and binge drinking) is overall at low prevalence in the Iraqi population, and is more prevalent among men as compared to women. However, most of the men who reported past month alcohol consumption also reported at-risk drinking and binge drinking. This

means that despite the low overall prevalence of alcohol consumption, alcohol consumption in Iraq is likely accompanied by higher rates of harmful health consequences. Thus there is continuing need for further research to inform and direct unsafe alcohol use control policy in this region.

There is also need for national and regional research that measures unsafe alcohol consumption and alcohol dependence using formally validated instruments, such as the widely used Alcohol Use Disorder Identification Test.[43,167] Studying the association between alcohol use and related physical injury, disease risk and mortality is also needed. Despite the complexities and sensitivities of discussing alcohol use in the conservative Muslim culture, researchers should seek different methods to promote an open discussion about the harms of alcohol consumption in these populations as an important step towards better education and prevention.[153]

Chapter 5

Drug Use among Iraqi Men and its Relation to Conflict-affected Zones

Abstract

Background: Recent escalation in violence and conflict in Iraq has raised local and regional public health concerns about the extent of drug use in the general Iraqi population.

Objectives: This study investigated the prevalence and odds of drug use in Iraqi men, in relation to residing in governorates exposed to Islamic State of Iraq and Levant (ISIL) related violence, and other socio-demographic features.

Methods: This cross-sectional study used data from the Iraqi National Household Survey of Alcohol and Drug use (INHSAD). The survey sampled non-institutionalized Muslim Iraqi men, ages 18 years and older. Weighted prevalence and 95% confidence intervals (CI) were estimated for any past-year prescription drugs misuse and illicit drug use, stratified by residence in ISIL-attacked governorates and socio-demographic characteristics. Adjusted-weighted odds ratios (AOR) and 95% CIs for past-year prescription drugs misuse were also estimated.

Results: About 3.59% of men residing in governorates not attacked by ISIL (95% CI=1.18, 3.16) reported prescription drug misuse, while only 0.81% reported illicit drug use (95% CI=0.35, 1.89), in the past year. Only 0.67% (95% CI=0.14, 3.11) of men residing in ISIL-attacked governorates reported past-year prescription drug misuse, while none reported any illicit drug use. Both forms of drug use were most frequently reported among men younger

than 29 years, who were without a college degree, unmarried, and Kurdish. The odds for past-year prescription drug misuse was greater for men older than 50 as compared to men younger than 29 years (AOR=1.64, 95% CI=0.10, 27.57), men with an elementary education as compared to college educated men (AOR=7.99, 95% CI=1.44, 44.31), unemployed men as compared to employed men (AOR=3.97, 95% CI=0.85, 18.42), and men who were not married as compared to married men (AOR=1.15, 95% CI=0.35, 3.71).

Conclusion: This study finds that prescription drug misuse is more common than illicit drug use in the general, non-institutionalized, Muslim, male Iraqi population. Although prevalence of reported drug use was lower in ISIL-targeted governorates, underreporting out of fear for personal safety is highly expected, particularly in these areas. Local drug control efforts would be better geared towards monitoring the prescription and dispensary of controlled medications, in order to limit their misuse and availability in the general public.

Background

Exposure to war and terrorism has devastating effects on the community.[168,169] Stunting economic development, deterioration of infrastructure, and loss of the country's resources are only a few of many deleterious consequences of war that have serious health impacts on the population affected.[170] Not only does exposure to violence increase the risk for a series of medical and mental illnesses, but it also impairs healthcare delivery and accessibility even long after the war subsides, a factor that has been proven to increase disease-specific mortality.[168,170,171] In addition, continuous political and economic instability creates an environment susceptible to socially destructive behaviors such as looting, gender-based violence and harmful substance use.[170,172] Furthermore, regulatory dynamic changes associated with conflict and war can loosen the country's border control, making drug

smuggling easier and altering illegal drug supply and demand; this helps drug black markets to flourish and hampers any local or regional drug control efforts[173,174]

Several studies report a positive correlation between exposure to conflict or terrorism, and the risk for drug use behavior[172,174-176] Others suggest an association between exposure to war and increased drug use-related morbidity and mortality.[171,177] Not only does conflict increase the chances of civilians using drugs, but it is also thought to increase drug availability and accessibility to the general population.[178] In the Balkan region, researchers observed an increase in substance use disorders among communities exposed to war-related traumatic events (in the form of combat, shelling or sexual assault).[177] A meta-analysis conducted on 17 studies assessing substance use post-terrorism events found that the prevalence of any drug use (illicit drugs or prescription drugs) in these populations was quite high (16.3%).[179]

Most of the literature shows that males (particularly between 18 and 29 years of age), people who are not married, and individuals with a low level of education and low income are the groups most vulnerable to illicit drug use in countries exposed to war and conflict.[170,171,177,180] The Afghanistan National Urban Drug Study conducted between 2010 and 2012 found that 11% of men and 4% of women tested positive for at least one drug (opioids, cannabis, amphetamines, sedatives, tranquilizers or prescription pain-killers), and that opioids were the most commonly used drugs.[181] A study conducted on a group of school students (ages 13 to 17 years) in Israel found that exposure to the 2006 Lebanon war was associated with an increased likelihood for both cannabis and ecstasy use in these adolescents.[175] The odds for use were greater among boys than girls, for both of these drugs.[175] In Egypt, where cannabis is the illicit substance of choice, drug use is most common among males who are in their twenties, but surprisingly, a greater proportion of well-educated and employed individuals use illicit drugs compared to their counterparts.[178] A

survey of Manhattan residents, 5 to 8 months after September 11th attacks, reported an increase in marijuana use (in addition to cigarette and alcohol use), with the use of marijuana most frequently found among adults under 25 years of age, and individuals who were not married.[176] Although some commonalities in substance use patterns can be noted between post-conflict nations, evidence from one country cannot be easily transferred to another, as the uniqueness of each society warrants a separate examination of its own experience[182]

In Iraq, a country that has been exposed to almost three decades of on and off wars, there is limited information about the extent of harmful drug use in the general population.[81] Most of the literature about the impacts of war on drug use in Iraq comes from studies of military personnel or refugees and displaced individuals residing in other countries.[183-188] Although these vulnerable groups deserve public health attention, non-displaced civilians residing in regions affected by war and terrorism should not be neglected, for they are also at increased risk for drug use.[176,179,189]

Local substance use experts suggest that illegal drug use was rather sparse in Iraq during the Saddam era, due to the heavy sanctions on illegal drug use (users were penalized by death) and the rigorous "Faith Campaign" that preached to conservative social norms, scrutinizing the use of illegal drugs, with prescription drug misuse not receiving the same level of scrutiny.[178] Prescription drug misuse refers to "taking a medication in a manner or dose other than prescribed, taking someone else's prescription or taking a medication to feel euphoria".[190] Many law enforcement officials believe that at the time of the Saddam regime, muscle relaxants and sedatives misuse were the main drug-related problems facing Iraq. [178]

After the invasion of Iraq in 2003, law enforcement lost its control on drug trafficking and many hospitals were destroyed which helped to supply drug users with many different pharmaceuticals, increasing public accessibility to both controlled medication and illegal substances. [82,178] Most of the controlled medication in Iraq is locally manufactured, while

illegal drugs such as heroin and cannabis are more likely smuggled into the country through the Iranian border.[178] In January 2014, Iraq experienced a sudden turn of events. The so-called Islamic State of Iraq and Levant (ISIL) gradually gained power after invading and executing a series of violent attacks in Al-Anbar governorate, located in the western part of the country.[191] Violence continued to escalate to include Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin governorates, and reached its peak in June 2014, which was considered "the deadliest month of 2014" in Iraq.[191,192] This created a politically volatile environment in Iraq that continues to this day, making any local or regional drug control measure quite challenging.

Before 2014, published population-based estimates for substance use in Iraq came from the 2006 Iraqi Mental Health Survey and the World Health Organization (WHO) reports.[54,148] Results from the Iraqi Mental Health Survey reported that lifetime prevalence of any drug use disorder was 1.29% for males and 0.25% for females.[54,148] In 2004, WHO estimates suggested that the 12-month prevalence for any drug use disorder in Iraq was 0.66% among males and 0.24% among females.[80] Thus, available population-based data gives estimates for "drug use disorder", a psychiatric disorder that is diagnosed on availability of certain criteria and requires medical treatment,[125] but no estimates are provided for drug use per se in the general population. Furthermore, with the exception of gender differences, socio-demographic variations in drug use in Iraq are not clear.

Other information about drug use in Iraq is obtained from studies on small-convenience-based samples, narratives of psychiatrists or government officials, and seizure reports.[81,82,148,178,193] A small study conducted in the capital city Baghdad reported the lifetime prevalence of any illicit drug use at 7%.[81] Reports from a drug treatment center in Baghdad suggest that tramadol was the primary drug used by most patients seeking treatment at their facility.[81] In general, local psychiatrists believe that prescription drug misuse is the drug

problem of most concern in Iraq. They also note that benzhexol (muscle relaxant), benzodiazepines and codeine, are the most misused drugs in the country.[148] In 2006, Iraqi law-enforcement officials roughly estimated that the number of illegal drug consumers increased from 1,500 to 5,000 in two years.[178] Some substance use specialists believe that areas close to the Iraq-Iran border have widespread opium use.[82]

Seizure reports indicate that prior to 2009, cannabis was the drug most commonly confiscated by authorities in Iraq.[81] Opium accounted for 15% of the total drugs seized in 2010, but this was reduced to 5% of all drugs seized in 2011.[81] The most commonly seized product of amphetamine-type stimulant (ATS) drugs is Captagon, generically known as fenethylline.[81,194] This is a psychoactive stimulant that is similar to amphetamine in its psychological effects.[195] Captagon is an internationally illegal drug with no documented medical uses. Although this drug is mostly manufactured in Syria, some reports suggest existing production laboratories in Lebanon and Turkey[64,196] Because of its heavy availability and use among militants in regions of terrorism and conflict, it has recently attracted the concerns of regional law enforcement and substance use policymakers.[64,195,197]

In 2014, The Iraqi National Household Survey of Alcohol and Drug Use (INHSAD) was conducted in order to fill the knowledge gap in drug use in Iraq. Preliminary results showed that in the past year, 1.9% of men and 1% of women reported using legal medication (controlled or over-the-counter) outside of doctors' orders. Additionally, 0.4% of men reported using an illegal drug during the past year, while no women reported any illegal drug use.[8] These findings warranted further examination of drug use in Iraqi men. Thus, this study used data from that survey to examine past-year drug use in Iraqi men and its variation with regional exposure to ISIL-related conflict.

The aims of this study are: 1) to estimate the prevalence of past-year drug use (prescription drug misuse and illicit drug use) in relation to different socio-demographic

characteristics in men; 2) to estimate prevalence of past-year drug use in relation to governorates targeted by ISIL-related violence; 3) to examine the odds of past-year drug use in relation to governorates targeted by ISIL-related-violence, and different socio-demographic features. I hypothesize that: 1) the odds for past-year drug use will be higher among men in the youngest age group (18 - 29 years of age) as compared to other age groups, and among men with lower levels of education, as compared to college educated men; 2) because previous research suggests that drug use increases in the presence of ongoing conflict,[170,171,177,180] I hypothesize that the odds for past-year drug use will be greater in regions targeted by ISIL attacks compared to regions not targeted. In this study, the term "illicit drugs" is used for illegal substances including ATS, cannabis, non-prescription opioids, and inhalants. The term "prescription drugs" is used to refer to drugs that have documented medical uses, and includes cough syrup, Tramadol, Somadril, benzhexol, benzodiazepines, Allermine, codeine and anabolic steroids. Although cough syrup and Allermine are considered over-the-counter medications in Iraq, for ease they are categorized as prescription drugs to make the distinction from illicit drugs.[8]

Methods

Study design and sample population

The INHSAD was a cross-sectional survey that sampled 3,200 Iraqi adults from all 18 governorates of Iraq. A full description of the multi-stage cluster sampling method used in the INHSAD has been previously presented.[8] Participants included in the current study were non-institutionalized and non-displaced Iraqi adult males (ages 18 years and older), residing in Iraq. The INHSAD had a high response rate (91.6%), and the majority of participants were men (71.5%).[8] No women reported ever using illicit drugs in the survey.[8] For this reason, women were excluded from this current study. The INHSAD only sampled a small

proportion of non-Muslim citizens (0.9 %).[8] Because this small sample of participants from other religions would prevent deriving an accurate estimate of drug use in this group, they were also excluded from this current study. Thus, the final sample for this study included 2,265 Muslim men.

Details about survey weight calculation have been previously published.[8] Briefly, the weights were calculated from the inverse probability of selection into the survey, and then post-stratification adjustment was performed to ensure final adjusted weights that were representative of the Iraqi population's governorate and gender distribution.[8] The average design effect (DEFF) for the INHSAD was estimated as 2.04. This implied that the effective sample size (n/DEFF) in terms of statistical power was 1,132. In order to estimate a proportion of past-year drug use in Iraqi men of 0.98% based on previous reported proportions' average,[54,80] and assuming the estimated proportion would not be equal to the previously reported female proportion (0.25%), using the effective sample size yielded 86% power [Appendix III].

The INHSAD questionnaire was adapted from previous tools used in the U.S. National Survey on Drug Use and Health, and by the United Nations Office on Drugs and Crime.[8] The survey asked about the prevalence and frequency of use of several substances including tobacco, alcohol and illicit substances, in addition to using any legal medications outside of a doctor's instructions. Surveys were administered in the household by face-to-face interviews, after obtaining informed verbal consent. Data collection took place from April 2014 to December 2014. The INHSAD was approved by the Research Ethical Committee at the University of Baghdad, and by the Intuitional Review Board at the University of California, Los Angeles.[8]

Study Variables

Prescription drug misuse in the past year. Prescription drugs inquired about in the survey included cough syrup, tramadol, benzodiazepines, benzhexol (muscle relaxant), Somadril (muscle relaxant), Allermine (an antihistamine), codeine and anabolic steroids. For each drug, the survey assessed past-year use by asking: " During the last 12 months have you used "the drug" to relax or have fun, or used larger doses than are recommended for medicinal treatment at least once during the past 12 months, outside of the doctor's orders?" From that question a binary variable for prescription drug misuse was created. People who responded "yes" to this question for any of the prescription drugs were coded as "1" for prescription drug misuse, and people who responded "no" for all prescription drugs were coded as "0".

Use of illicit drugs in the past year. Illicit drugs inquired about in the survey included cannabis, ATS (amphetamine, methamphetamine or Captagon), opioids (heroin, teryak or opium), and inhalants. For each drug, the survey assessed past-year use by asking: "During the past 12 months, have you used the drug?" People who reported using any of these drugs during the past year were coded as "past-year any illicit drug user." A binary variable for illicit drug use was created from this question. People who responded "yes" for any one of the illicit drugs were coded as "1" for past-year illicit drug use, and people who responded "no" for all of these illicit drugs were coded as "0".

ISIL-targeted governorates in the past year. Reports from the United Nations Assistance Mission for Iraq indicate that from January 2014 and throughout the survey study period, the governorates of Al-Anbar, Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin were all targeted by ISIL attacks[185,198] [Figure 5.1]. From this information, a binary variable for "ISIL-targeted governorates" was created, where these seven governorates were coded as *targeted* and the rest of the governorates in Iraq (Dohouk, Erbil, Al-

Sulaimaniya, Kerbala, Al-Najaf, Al-Qadisiya, Wasit, Al-Muthanna, Thi-Qar, Missan, Al-Basrah) were coded as *not targeted*.

Figure 5.1. Governorates in Iraq targeted by ISIL during the study period of the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Note: the governorates highlighted in this figure represent areas that were targeted by ISIL attacks from January 2014 and through the end of the study period, December 2014.[185,198]

Demographic characteristics. Age was collapsed into 3 categories (18-29 years, 30-49 years, 50 years or older). Marital status was coded into married and not married (including never married and divorced, widowed or separated). Employment status was divided into employed, retired and unemployed (unemployed group also included individuals coded as

students in the survey). Level of education was classified into 4 categories: less than primary (did not complete a formal elementary education), primary (completed elementary education at most), secondary (completed middle school or high school at most), and college or more (at least completed any form of college education). Ethnicity included 2 categories (Arab and Kurdish). Household crowding index (HCI) was used as a proxy measure for income in multivariate analyses.

Other covariates. For the purpose of this study, tobacco use was measured as number of cigarettes smoked per day and was used as an interval variable in multivariate analyses. Alcohol use in the past year was defined as drinking any alcohol (the standard drink was defined as a can or regular size bottle of beer; a wine cooler or a glass of wine, champagne, or sherry; a shot of liquor approximately 45 ml; or a mixed drink or cocktail) during the past 12 months. Past-year alcohol use was used as a binary variable in multivariate analyses.

Design and weight variables. Design variables included sampled blocks (PSU) and governorates (strata). The weight variable, which adjusted for unequal selection probabilities and gender non-response, was also used in this study.

Statistical Analysis

Data were analyzed using the design information (PSU, strata) and weights to adjust variances appropriately for the complex sampling design and unequal selection probabilities. First, weighted descriptive analysis was performed to describe participant characteristics, for which I present percentages and standard errors (SE). After that, weighted prevalence and 95% confidence intervals for past-year prescription drugs misuse and past-year illicit drug use were estimated, stratified by demographic characteristics, and ISIL-targeted governorates. I also estimated weighted prevalence and 95% confidence intervals of individual drug use in the past year, by drug type, stratified by ISIL-targeted governorates.

To assess the difference in odds for drug use by ISIL-targeted areas and demographic features, multivariate logistic regression analysis was conducted using "past-year prescription drug misuse" as dependent variables, while ISIL-targeted governorates and the measured demographic characteristics were treated as independent variables. I also included number of cigarettes used per day and past-year alcohol use as covariates in models. These variables (demographic characteristics, cigarette use and alcohol use) were included because of their possible confounding effects in predicting drug use.[60,62,72,75,170,171,199] Because very few men reported using an illicit drug in the past year, it was not feasible to conduct logistic regression analysis to estimate the odds for past-year illicit drug use (the number of participants who reported past year illicit drug use were fewer than the number of model parameters). Thus, only the odds for past-year prescription drug misuse was estimated in this study.

Finally, I investigated the dataset for the effects of missing values. Weighted estimation equation was used to correct for missing values.[118] In this method, for every variable with missing values, a "weight for completeness" is created from the inverse probability of observing that variable. These weights are then multiplied by the survey weight, to create a new weight; a weight correcting for missing values. After that, analyses are repeated only on observations with complete values, using the weight correcting for missing values.[118] Results from analyses correcting for missing values were compared to results from complete case analyses. Because these two analytical methods provided similar results, the complete case analyses results are presented. All analyses in this study were performed using SAS-Callable SUDAAN® Release 11.0.1.

Results

Characteristics of selected study participants

The majority of men in this study were between 18 and 29 years of age, employed, married, of Arab ethnicity, and had a secondary education level [Table 5.1]. The survey sampled a slightly greater proportion of men from ISIL-targeted governorates (56.5%, SE=1.33) than from governorates not targeted by ISIL (43.5%, SE=1.33) [Table 5.1].

Self-reported prevalence of past-year prescription drug misuse

Overall, 1.9% of men in this study (95% CI=1.18, 3.16) reported misusing any prescription drugs in the past year. As expected, past year prescription drug misuse was most frequently reported by men younger than 29 years, who had a secondary education level, who were unemployed and who were not married [Table 5.2]. Interestingly, the self-reported prevalence of past-year prescription drug misuse among Kurdish men (8.21%, 95% CI=3.30, 19.00) was almost 6 times what was reported by Arab men (1.40%, 95% CI=0.79, 2.47). Surprisingly, more men residing in governorates not attacked by ISIL reported misusing prescription drugs in the past year (3.59%, 95% CI=2.25, 5.68), compared to men who resided in attacked governorates (0.67%, 95% CI=0.14, 3.11).

Table 5.1. Characteristics of adult Iraqi men from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Characteristic	n=2,265 weighted %	(SE)
Age		
18 - 29	43.4 %	(1.37)
30 – 49	39.9 %	(1.35)
50 +	16.7 %	(0.94)
Education level		
Less than primary	8.1 %	(0.89)
Primary	24.0 %	(1.38)
Secondary	42.3 %	(1.42)
College or more	25.6 %	(1.33)
Employment status		
Employed	66.0 %	(1.55)
Unemployed	27.9 %	(1.51)
Retired	6.1 %	(0.66)
Marital Status		
Married	65.0 %	(1.49)
Ethnicity		
Arab	91.8 %	(0.78)
Area of residence		
ISIL-targeted governorate	56.5 %	(1.33)

Note: SE=standard error. Percentages represent weighted column percents. All particiapnts in this study were Muslim. Less than primary included individuals who did not complete a formal elementary education. Primary included people whose higher degree was an elementary education. Secondary included people who completed middle school or high school education but did not complete college. College or more included anyone who completed a college education. Unemployed group included both people who were coded as unemployed and people coded as students in the survey. People who were not married included individuals who were single, widowed, divorced or separated. The other ethnicity was Kurdish. ISIL-targeted governorates during the study period included Al-Anbar, Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin. All other governorates were considered "not targeted" by ISIL.

Self-reported prevalence of past-year use illicit drug use

Less than 1% of all men in this study reported using any illicit drugs in the past year (0.35%, 95% CI=0.15, 0.82). The use of these drugs was most frequently reported by men younger than 29 years of age, men without a formal elementary education, men who were employed, and men who were not married [Table 5.2]. As seen with prescription drug use, more Kurdish men (1.48%, 95% CI=0.34, 6.16) reported using any illicit drug in the past year as compared to Arab men (0.26%, 95% CI=0.09, 0.72). None of the men who resided in governorates targeted by ISIL reported any illicit drug use in the past year [Table 5.2].

Self-reported prevalence of past-year drug use of individual drugs in relation to ISIL-targeted governorates

There are notable differences in self-reported drug use between men who resided in ISIL-targeted governorates and men who resided in un-targeted governorates [Table 5.3]. In governorates targeted by ISIL, hardly any men reported past-year prescription drug misuse [Table 5.3]. The only drugs this group reported misusing were cough syrup, tramadol, benzodiazepines and anabolic steroids. On the other hand, and although at very low prevalence, men who resided in un-targeted governorates reported misusing all of the prescription drugs, with benzodiazepines and benzhexol being the most frequently reported drugs of misuse in the past year [Table 5.3]. Interestingly, opioids were the most reported illicit drugs used in the past year among men residing in un-targeted governorates (0.36%, 95% CI=0.11, 1.19). None of the men in this study reported sniffing inhalants in the past year [Table 5.3].

Table 5.2. Past-year prevalence of any illicit drugs use and prescription drug misuse Iraqi men, by personal characteristics, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Characteristic	Prescription Drug Misuse in the Past Year		Use of Any Illicit Drugs in the Past Year	
	Prevalence	95% confidence interval	Prevalence	95% confidence interval
Age				
18 - 29	2.46 %	(1.21, 4.97)	0.53 %	(0.18, 1.57)
30 - 49	1.53 %	(0.70, 3.31)	0.32 %	(0.08, 1.21)
50 +	1.63 %	(0.45, 5.77)	0.00%	--
Level of education				
Less than primary	1.20 %	(0.40, 3.56)	0.73 %	(0.23, 2.32)
Primary	2.28 %	(0.98, 5.20)	0.50 %	(0.12, 2.06)
Secondary	2.82 %	(1.42, 5.52)	0.39 %	(0.10, 1.57)
College or more	0.41 %	(0.14, 1.23)	0.03 %	(0.00, 0.23)
Employment Status				
Employed	1.46 %	(0.76, 2.79)	0.40 %	(0.15, 1.08)
Unemployed	3.40 %	(1.54, 7.30)	0.32 %	(0.06, 1.79)
Retired	0.73 %	(0.20, 2.66)	0.00%	--
Marital status				
Married	1.22%	(0.60, 2.47)	0.30 %	(0.09, 1.03)
Not married	3.29 %	(1.66, 6.38)	0.46 %	(0.15, 1.40)
Ethnicity				
Arab	1.40 %	(0.79, 2.47)	0.26 %	(0.09, 0.72)
Kurdish	8.21 %	(3.30, 19.00)	1.48 %	(0.34, 6.16)
Residence in ISIL-targeted governorates				
Yes	0.67 %	(0.14, 3.11)	0.00%	--
No	3.59 %	(2.25, 5.68)	0.81 %	(0.35, 1.89)

Note: Prevalence estimates were based on self-report. All estimates were weighted and adjusted for complex survey design. Prescription drug misuse included misusing any of cough syrup, allermine, tramadol, somadril, benzhexol, benzodiazepines, codeine or anabolic steroids. Using any illicit drugs meant using any of cannabis, ATS, non-prescription opioids or inhalants. Less than primary included individuals who did not complete a formal elementary education. Primary included people whose higher degree was an elementary education. Secondary included people who completed middle school or high school education but did not complete college. College or more included anyone who completed a college education. Unemployed group included both people who were coded as unemployed and people coded as students in the survey. Not married included individuals who were single, widowed, divorced or separated. ISIL-targeted governorates during the study period included Al-Anbar, Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin. All other governorates were considered "not targeted" by ISIL.

Odds for past-year prescription drug misuse

Contrary to what was hypothesized, men ages 50 years and older had 64% greater odds for reporting past-year prescription drug misuse compared to men younger than 29 years of age (AOR=1.64, 95% CI=0.10, 27.75). As anticipated, as compared to men with a college degree, men with lower levels of education had greater odds for misusing prescription drugs in the past year [Table 5.4]. However, these odds ratio estimates (for age and education level) should be interpreted with caution, as they are unstable due to their wide confidence intervals. As expected, men who were unemployed had greater odds for reporting past-year prescription drug misuse as compared to employed men (AOR=3.97, 95% CI=0.85, 18.42), yet this too was also an unstable estimate with a wide confidence interval.

Men who were not married had 15% greater odds of reporting past year prescription drug misuse (AOR=1.15, 95% CI=0.35, 3.71) as compared to married men, and Arab men had lower odds of reporting past-year prescription drug misuse as compared to Kurdish men (AOR=0.45, 95% CI=0.09, 2.24). Furthermore, and contrary to what was hypothesized, men residing in governorates targeted by ISIL had 77% lower odds of reporting past-year prescription drug misuse as compared to men residing in untargeted governorates (AOR=0.23, 95% CI=0.02, 2.32).

Table 5.3. Past-year prevalence of men using individual drugs, by drug type and residence in ISIL-targeted governorates, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

	Self-reported Past-year Drug Use			
	Residing in Governorates Targeted by ISIL		Residing in Governorates not Targeted by ISIL	
Drug Type	Prevalence	95% confidence interval	Prevalence	95% confidence interval
Prescription Drugs				
Cough syrup	0.11 %	(0.02, 0.78)	0.28 %	(0.07, 1.14)
Allermine	0.00 %	--	0.33 %	(0.12, 0.91)
Codeine	0.00 %	--	0.23 %	(0.04, 1.32)
Tramadol	0.51 %	(0.07, 3.60)	0.12 %	(0.03, 0.53)
Somadril	0.00 %	--	0.13 %	(0.03, 0.51)
Benzhexol	0.00 %	--	1.43 %	(0.67, 3.03)
Benzodiazepines	0.15 %	(0.03, 0.68)	1.81 %	(0.83, 3.90)
Anabolic Steroids	0.01 %	(0.00, 0.08)	0.86 %	(0.40, 1.84)
Illicit Drugs				
Cannabis	0.00 %	--	0.24 %	(0.05, 1.14)
ATS	0.00 %	--	0.29 %	(0.07, 1.17)
Opioids	0.00 %	--	0.36 %	(0.11, 1.19)
Inhalants	0.00 %	--	0.00 %	--

Note: Prevalence estimates were weighted and adjusted for complex survey design. Governorates targeted by ISIL included Al-Anbar, Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin. ATS included amphetamine, methamphetamine or Captagon. Opioids included opium, teryak or heroin.

Table 5.4. Adjusted odds ratios for prescription drug misuse in the past year, by personal characteristics, from the Iraqi National Household Survey of Alcohol and Drug Use, 2014

Characteristic	Prescription Drug Misuse in the Past Year	
	AOR	95% confidence interval
Age		
18 - 29	1	
30 - 49	0.80	(0.27, 2.23)
50 +	1.64	(0.10, 27.57)
Level of education		
Less than primary	3.24	(0.41, 25.75)
Primary	7.99	(1.44, 44.31)
Secondary	5.08	(1.06, 24.42)
College or more	1	
Employment Status		
Employed	1	
Unemployed	3.97	(0.85, 18.42)
Retired	0.84	(0.08, 9.36)
Marital status		
Married	1	
Not married	1.15	(0.35, 3.71)
Ethnicity		
Arab	0.45	(0.09, 2.24)
Kurdish	1	
Residence in ISIL-targeted governorates		
Yes	0.23	(0.02, 2.32)
No	1	

Note: AOR=Adjusted odds ratio. Logistic regression analysis was weighted and adjusted for complex survey design (PSU, strata). The model controlled for household crowding index, past-year alcohol use, and number of cigarettes smoked per day, in addition to all the characteristics in this table. Prescription drug misuse included misusing any of cough syrup, allermine, tramadol, somadril, benzhexol, benzodiazepines, codeine or anabolic steroids. Less than primary included individuals who did not complete a formal elementary education. Primary included people whose higher degree was an elementary education. Secondary included people who completed middle school or high school education but did not complete college. College or more included anyone who completed a college education. Unemployed group included both people who were coded as unemployed and people coded as students in the survey. Not married included individuals who were single, widowed, divorced or separated. ISIL-targeted governorates during the study period included Al-Anbar, Baghdad, Babylon, Ninevah, Diala, Kirkuk and Salahuddin. All other governorates were considered "not targeted" by ISIL.

Discussion

A body of evidence suggests links between exposure to conflict and war and developing risky behaviors such as drug use in the general population.[172,174-176] With the escalation of acts of violence and terrorism in Iraq, there has been growing public health concern about the availability and use of controlled medications and illicit drugs in the general Iraqi population.[8,82,178,191,192] However, population-based substance use estimates were outdated, until the INHSAD was conducted in 2014.[8] This study presented recent data on the misuse of prescription drugs and the use of illicit drugs in non-institutionalized, Muslim, Iraqi men to help inform drug control policy focused on specific demographic groups and conflict-affected zones that might be vulnerable to illegal drug use in the country.

In this study, past-year self reported misuse of prescription drugs was greater than reported use of illicit drugs, the latter not exceeding 0.35%. In addition, benzodiazepines and benzhexol were the two most frequently reported drugs. These findings align with previous law-enforcement and psychiatrists' notions that muscle relaxants and sedatives are the drugs predominantly misused in the country.[82,148,178] Seizure reports suggest that illegal drugs are not readily available to the general public but are rather smuggled from neighboring countries, unlike the various controlled prescription medications that are locally manufactured.[178] Interestingly though, reported prevalence of codeine use was very low in this study. This is inconsistent with the worldwide trend of which prescription opioids are the most frequent drugs used outside of a doctor's orders.[200]

In this study, the demographic profile of adult Iraqi males who misuse prescription drugs is one of being unmarried, younger than 29 years of age, not holding a college degree, and being unemployed. This is consistent with previous studies that determined socio-demographic characteristics of drug users.[170,171,177,180] Although men who reported past-year illicit drug use shared similar features with men who reported past-year prescription drug

misuse, more men who were employed reported illicit drug use, as compared to unemployed men, a finding that resembles the case in Egypt.[178] Some experts suggest that due to the difficulty in obtaining illicit substances, which are usually costly and require many connections, illicit drugs could be far out of reach of an unemployed man who may not be able to secure the finances for such a product.[178]

Although the frequency of reported past-year prescription drug misuse was greatest among men younger than 29 years of age, the data suggest that men who were 50 years and older have greater odds of reporting past-past year nonmedical prescription drug use as compared to men younger than 29 years. However, this is an unreliable estimate due to the large confidence interval. Although many older men may have access to different medications such as prescription painkillers and sedatives, most research suggests that using prescription drugs outside purposes for which they are prescribed is less common in older than in younger adults.[200]

An interesting finding was that self-reported past-year drug use (both prescription misuse and illicit drug use) was greater among Kurdish men as compared to Arab men. This contradicts the local perception that drug use is better controlled in the Kurdistan region.[178] On the other hand, seizure reports suggest that Iraq's northern border is an important gateway for drug trafficking.[81,178] The fact that the Kurdistan-governed region lies in the northern part of the country (governorates of Erbil, Dohouk and Al-Sulaimaniya) could provide some explanation to the suggested higher rate of use among Kurdish men.

Surprisingly, the use of ATS, of which Captagon is the most common type consumed in the region, was hardly reported in this study (0.29%). Although drug seizure reports point to the abundance of Captagon in the country,[81,178,194] most research on Captagon suggests its use by militia, combatants, and imprisoned individuals, while its use in the general population remains unknown.[178,195,201,202] The current household survey, however, did not

include any militant or institutionalized groups, which could provide some explanation as to why the ATS use estimate was so low in the current study. This suggests that the use of Captagon and other ATS in the Iraqi population might not have shifted outside these high-risk groups.

Limitations to this study should be noted. Most of the odds ratio estimates in this study were unstable with low precision. This could have resulted from a number of factors. One reason could be that the sample size was not large enough for estimating a rare behavior such as drug use in the general population with greater accuracy. Another could be that the models only controlled for demographic features that were asked by the survey, but did not control for important factors that may impact drug use such as diagnosed substance use disorder or presence of any mental health problems,[203] and which could have introduced residual confounding. The presence of confounding may have under-estimated or over-estimated drug use in this study while also increasing the level of uncertainty.

This survey was based on self-report and was administered through interviews. Therefore, it is sensible to expect under-reporting of a socially undesirable behavior such as drug use in this population. One reason for this is that Iraq is a Muslim society in which illegal drug use is not only penalized but also is religiously forbidden.[82,178] Additionally, participants may have feared breaches in confidentiality, which would have placed them at risk for persecution for the illegal act of drug use.[204] This may have especially been the case in governorates targeted by ISIL violence, in which prescription drug misuse was reported at extremely low rates, and where no illicit drug use was reported at all. Baghdad, for example, has been previously considered one of the highest governorates with illicit drug use in the country,[178] and lies in a region heavily targeted by ISIL, yet in this study no participants from that region reported any illicit drug use in the past year. Thus, the absence of illicit drug use in governorates targeted by ISIL as suggested by the survey findings is not convincing. It is

reasonable to assume that many participants in the areas that were targeted with violence were most likely less inclined to disclose their drug use history out of fear of risking personal safety.

Under-reporting is quite common in surveys that collect sensitive behavioral data.[203] However, globally both prescription drug misuse and illicit drug use are more concentrated in specific high risk groups such as prisoners, military or security personnel, and adolescents, all of whom are seldom sampled in household surveys. Thus, household surveys usually result in low estimates for drug use.[203] Because none of these special population groups were sampled in the current study, drug use in other groups of the general Iraqi population could possibly indeed be low. Despite the study limitations, the usefulness and importance of this study in updating knowledge about prescription and illicit drug use in Iraqi men outweigh the shortcomings.

Conclusion

Results from this study reinforce the locally perceived notion that sedatives and muscle relaxants are the drugs of greatest concern when it comes to drug abuse prevention and control in Iraq.[148,178] They also suggest that young, unemployed, low educated and unmarried men might be the most frequent misusers of prescription drugs in Iraq. Drug control efforts would be best directed towards limiting unauthorized manufacturing and accessibility of controlled medication. Local pharmacists could apply more stringent measures when providing controlled medication, and only process orders with valid prescriptions. Additionally, it would be beneficial not to limit future drug use research to general non-institutionalized groups, but to also target groups that could be at high risk for drug use, most importantly adolescents, displaced populations, military personnel and

imprisoned individuals.[82,178] Furthermore, surveillance of drug use in the Iraqi population should continue in order to monitor changes in trends.

Chapter 6

Public Health Implications of the Current Trends of Substance Use in Iraq

Introduction

This dissertation provides a recent analysis of the use of tobacco, alcohol and drugs in the Iraqi population. Findings from the dissertation can be summarized into three key points. First, the prevalence of tobacco use is considerably high among Iraqi men, where a very large gender gap in use is observed. The data also suggest gender differences in age and educational level profiles for tobacco users. Second, although the overall use of alcohol is low in this Muslim-majority community (and women hardly reported any alcohol consumption), most of the men who report drinking in the past month are at-risk and binge drinkers. Third, among Iraqi men, the non-medical use of prescription drugs is more frequently reported than illicit drugs, with sedatives and muscle relaxants being the most commonly reported substances used. These results have important public health considerations for Iraqi substance use control policy. The next sections will summarize the important policy implications that can be derived from this dissertation as well as recommendations for future local and regional substance use research.

Tobacco: the substance of public health concern in Iraq

Data from the Iraqi National Household Survey of Alcohol and Drug Use (INHSAD) demonstrates that recently reported tobacco use in Iraqi men is higher than previously reported, and raises the same regional concerns about the growing rate of tobacco use among Arab men.[109,205] Part of the reason for this phenomenon could be attributed to the loose tobacco control policies in the region.

The World Health Organization's (WHO) Framework Convention on Tobacco Control has developed guidelines to help countries in the fight against the tobacco epidemic.[206] Although all Arab nations agreed to adopt this framework and implement it in their countries, most have failed in application.[109] In this region of the world, tobacco taxation is negligible, smoking in public venues is widespread, tobacco sales to minors are hardly regulated, and non-compliance with legislation is lightly penalized.[109,207]

Iraq is no exception. In 2012, new tobacco control legislation was developed by the Iraqi Ministry of Health that included a list of regulations entailing 1) protecting the rights of others from second-hand smoking by banning tobacco use in public places; 2) allowing designated smoking areas in certain buildings; 3) promoting public health education and awareness about the harms of tobacco, starting with school students; 4) restricting tobacco sales to adults; 5) banning the advertisement of any tobacco products and mandatory pictorial and written health warnings on these products.[208] However, when policy implementation was subsequently monitored, the degree of compliance with these regulations was generally low.[109,209,210] For example, WHO data suggest that smoke-free legislation is not implemented in governmental, educational or health institutions. Additionally, although tobacco sales were regulated by age, there is no regulation for the sale of tobacco products through vending machines, or any regulations for selling electronic cigarettes.[210] Furthermore, the affordability of a pack of cigarettes completely dismisses the most important global measure for preventing tobacco use, increasing tobacco taxation. [206]Currently, a pack of cigarettes in Iraq can be purchased for as low as $0.3 for the cheapest brand, or for $3 at most for the imported American brands.[210] Unfortunately, this is a common feature in other neighboring Arab countries.[207] Without strengthening local and regional compliance with available tobacco control policy, tobacco use will continue to rise.

Female tobacco use in Iraq: Vulnerable groups and female under-reporting

Although the prevalence of tobacco use is obviously lower in Iraqi women compared to men, findings from this dissertation show interesting gender differences in terms of tobacco use trends. Tobacco use among Iraqi men is associated with low education and being young, a common trend for tobacco use worldwide.[89] Among women, however, older women are at greater odds for reporting cigarette smoking as compared to young women, and the prevalence of water-pipe smoking is greater among women who are college graduates as compared to women without a college education.

A body of evidence shows that women's tobacco use is associated with their sense of independence and empowerment.[211] Although "empowerment and independence" were not assessed in this dissertation, previous research suggests that a woman's sense of liberation from cultural norms may be positively correlated with her level of education.[97] Indeed, in many countries with low gender-equality and strict gender norms, only the privileged-well-educated elite or older women are the females who dare to defy society and take up smoking.[97,211] This is very disappointing because associating unhealthy behaviors with female empowerment does not help women. Unfortunately, many tobacco companies take advantage of this misleading notion in their advertising strategies compounding the association between female tobacco use and liberation.[88]

This can be seen elsewhere in the Arab world.[212] Lebanon, for example, is considered the most liberal Arab nation that recognizes gender rights and incidentally is also the country with most frequent female tobacco users in the Middle East.[109] Thus, it appears that in Iraq and the rest of the Arab world, it might be helpful to focus female tobacco use prevention on

dispelling the false connection between tobacco use and female empowerment in these communities.

Another important group that needs to be targeted for tobacco use prevention and that was unfortunately not studied in this dissertation is female adolescents. Most of the Arabic research indicates a narrowing in the gender gap for tobacco use among adolescents.[108] Whether this group rebels against cultural norms, or if its behavior is merely caused by peer pressure and the urge for experimentation, there is no doubt that at present, Arab female youth are an important and vulnerable target for many tobacco companies.[88,108]

This is very concerning because of the alluring nature of the new variety of tobacco products available to the young, ranging from flavored water-pipe tobacco to flavored electronic cigarettes, all of which are being advertized as "modern," "hip" and "fashionable," and that may act as gateways for future tobacco addiction.[25,88,109,213] It is therefore important to allocate some portion of tobacco use research to studying how adolescents in the Arab region use these emerging tobacco products.

Although the wide gender gap in tobacco use in Iraq could in most part be related to cultural gender norms that prevent women from taking up tobacco smoking, there is no doubt that women in this region, like in other conservative societies, under-report tobacco use out of social desirability and fear of scrutiny.[108] In order to better tackle the issue of tobacco use in women, future researchers should look for practical survey methods that reduce female underreporting.

Alcohol: when consumed, it is not consumed in moderation

It is well known that most Muslims worldwide abstain from alcohol consumption, abiding by their religion's strict prohibition against alcohol.[48,153] However, the reality is that many Muslims do drink alcohol. A commonly observed worldwide phenomenon is that

Muslim men, although few in number of consumers, are the heaviest drinkers compared to all other religion groups, whether they reside in Muslim-majority countries or not.[214-217] And so it was not surprising to find this similar pattern in Iraqi men interviewed in the INHSAD.

Although no clear explanation can be provided for this phenomenon, some researchers have postulated a few possible reasons. First, throughout history, and with the exception of some members of the ruling elite, alcohol consumption was never considered a social behavior in any Muslim society, and the sole purpose of consumption was to reach intoxication.[215] Second, the strict ruling of Islamic traditions does not provide a normative level for alcohol consumption, but rather the only normative or acceptable level is complete abstinence.[218] Third, because alcohol prevalence is low and considered nonexistent in most Muslim societies, there are no available health campaigns for education about harmful drinking habits in these communities.[218]

These factors may predispose public health decision makers to disregard harmful alcohol consumption as an issue that requires widespread public health education.[48,153,218] It is important to note that consumption of alcohol is not currently banned in Iraq, and until October 2016, sales and manufacturing of alcohol were allowed.[56] However, enforcing sanctions alone on the sales and production of alcohol in the country cannot solve the problem of heavy alcohol consumption among regular drinkers. Given that this is a region that is heavily driven by religious norms, it is necessary for local policy makers to unite with religious leaders in educating the community about the globally recognized harmful levels of alcohol consumption and their associated health complications. This can help shift the public opinion from regarding harmful alcohol consumption simply as religious sin, to acknowledging it as an actual mental health problem that requires treatment and prevention.[153,219]

Controlling the non-medical use of prescription drugs in Iraq

Data from the INHSAD show a low prevalence of self-reported use of illicit drugs and misuse of prescription drugs. However, these estimates may not reflect the true scope of drug use in Iraq, and self-reporting of sensitive data is always subject to under-reporting.[48,220,221] Prescription drug misuse remains a growing global public health concern, and the low estimates for self-reported prescription drug misuse in the INHSAD should not be a sign of reassurance.[58,221] Controlling the misuse of prescription drugs in Arab countries is quite complex as it remains understudied in this part of the world.[48,222] Additionally, with the new restrictions on alcohol sales and manufacturing in Iraq, local public health professionals can anticipate a possible shift towards prescription drug misuse when accessibility to alcohol becomes limited.[56]

Prescription drug misuse is multifaceted. First, motivations for prescription drug misuse are not clear-cut.[200] Unlike with illicit substances, people may seek prescription drugs for reasons other than experiencing euphoria, such as relieving underlying biological symptoms including anxiousness, low affect, insomnia, or pain.[200] Second, many of the misusers obtain these drugs through valid prescriptions, and it may not be clear to them the point at which one crosses the level of "appropriate" use to "misuse", making them in denial of misuse.[220] Third, even when aware of their nonmedical drug use, many prescription drug misusers resort to self-treatment rather than seek professional help.[200]

Finally, the burden for prescription drug misuse control lies with different community stakeholders. Physicians need to be trained in safe drug prescription practices to limit unnecessary prescriptions.[223] Patients prescribed controlled drugs need to be educated about proper dosage and complications of excessive use.[223] Additionally, public health professionals need to raise community awareness about the seriousness of prescription drug

misuse and available treatment resources. Further, it would be beneficial to periodically undertake drug use behavior surveys similar to the INHSAD to monitor drug use patterns in the community as well as evaluating progress toward public health goals.

Recommendations for future research

There is no doubt that the INHSAD is a successful research capacity building block for the future of substance use research in Iraq. However, many pressing issues still require further exploration in Iraq and the rest of the Arab world. Thus, I provide the following recommendations for future local and regional substance use researchers:

1. **Adopting methods that help to overcome under-reporting of substance use**

   This can be implemented in various ways. First, evidence shows that people are less inclined to conceal stigmatized behavior when asked about the use over a long period of time,[224] so when inquiring about substance use, it may be more helpful to ask about "past-year" use instead of "past-week" or "past-month" use. Second, self-administered questionnaires are more reliable than those administered through face-to-face interview when asking about socially unacceptable behaviors.[225,226] Using audio computer-assisted interviews have also proven helpful in self-reporting harmful substance use behaviors.[226] Third, tailoring survey settings to cultural Arab norms by designating surveyors to participants of their corresponding sex may prove more effective.[220] Additionally, it may be helpful to ensure complete privacy of participants, by avoiding the presence of any other people during survey administration.[204] Finally, data on substance use can be indirectly obtained by collecting collateral information about participant's behavior from friends or family members, or by monitoring local substance use treatment data.[227,228] Another indirect

method for collecting information on sensitive topics such as substance use is the randomized response technique.[204] In this technique the researcher uses statistical methods to calculate the prevalence of sensitive behavior in a group of participants, without ever actually knowing their individual responses to the sensitive question.[229] Although this method is thought to reduce socially desirable answers, it is rather complex to implement and difficult to explain to participants.[203] Furthermore, previous research suggests that surveys using this method have lower response rates compared to conventional surveys.[203]

2. **Sampling population groups with higher risk for substance use**

   Most of the population-based surveys under-sample important high-risk groups for substance use.[200,220] These include adolescents, people residing in prisons and military personnel.[200] Sampling these vulnerable groups will increase the chances of detecting people who use substances and when used with data collected from the general population can better inform substance use control policy. [200,220]

3. **Evaluation of available regional substance use control strategies**

   Cost-effective research suggests that evaluation of substance use prevention programs is essential to produce optimum outcomes in reducing harmful substance use in societies.[230] It is important to identify the most effective strategy and target groups to focus on in substance use prevention because targeting different population groups produces different results.[230] For example, evidence shows that prevention efforts that target the general public are most effective for tobacco use prevention, but not so much for more stigmatized behaviors such as alcohol or drug use.[230] On the other hand, targeting high-risk groups is most effective for reducing the prevalence and

harms of drug abuse in the society.[230] Therefore, there is need for Arab nations to collaborate and share experiences in evaluating their substance use control strategies and future research could be directed towards tackling the impacts of regional substance use prevention programs. For example, how effective are the available prevention programs in reducing substance use in the Arab world? What are the impacts of targeting the general population vs. targeting specific high-risk groups in this part of the world? What is the reduction in the costs of substance use related harm in relation to available substance use prevention program in each country? These are only a few examples of the many questions that need to be assessed.

4. **The need for conducting regional longitudinal studies for evaluating substance use**

   Although difficult to conduct, longitudinal studies in substance use are needed to understand the natural history of experimenting with substances, the important risk factors and preventive factors for using substances, and the different stages in life that are important for applying prevention strategies.[228] Unfortunately, this type of research is absent in the Arab world, and this level of detail about substance use behavior remains unclear in this part of the world. Thus, it may be helpful to put longitudinal substance use studies on the list of priorities for regional substance use researchers.

Conclusion

In conclusion, substance use is an important public health problem that deserves proper allocation of resources for its assessment in Iraq and the rest of the Arab world. Although examining substance use in Iraq has many challenges, different sampling and

survey implementation methods can be adopted in the future to optimize data quality and continue monitoring population trends. Conducting population surveys like the INHSAD is a good start to help for planning local substance use prevention strategies. Neighboring Arab countries can learn from Iraq's experience and adopt their own periodic substance use surveys to help inform regional policy.

Appendix I

Power Analysis for The Study Titled: " Gender-specific Differences in Cigarette and Water-pipe Use in Relation to Age and Educational Attainment in Iraqi Adults"

Assumptions

- Design effect: 2.04
- Sample size: 3,200
- Effective sample size: 1,568
- Current tobacco use proportions: 2.9% in females and 26.5% in males
- Equal group weights for males and females

Procedure

```
proc power;
twosamplefreq test=pchi
dist=normal
method=normal
alpha=0.05
sides=2
groupproportions = (0.029, 0.265)
power = .
ntotal = 1568
groupweight = (1 1);
run;
```

Deign effect	Effective Sample Size	Power
2.04	1,568	> 0.999

Appendix II

Power Analysis for The Study Titled: "Unhealthy Alcohol Consumption Patterns in Iraqi Adults: Prevalence and Associated Characteristics"

Assumptions

- Design effect: 2.04
- Sample size: 3,200
- Effective sample size: 1,568
- Current alcohol use proportions: 0.6% in females and 6.5% in males
- Equal group weights for males and females

Procedure

```
proc power;
twosamplefreq test=pchi
dist=normal
method=normal
alpha=0.05
sides=2
groupproportions = (0.006, 0.065)
power = .
ntotal = 1568
groupweight = (1 1);
run;
```

Deign effect	Effective Sample Size	Power
2.04	1,568	> 0.999

Appendix III

Power analysis for the Study Titled: "Drug Use among Iraqi Men and its Relation to Conflict Affected Zones"

Assumptions

- Design effect: 2.04
- Sample size: 2,265
- Effective sample size: 1,132
- Current drug use proportion in men: 0.98%
- H_0: p=0.25% (the prevalence of drug use in men will be equal to what was previously reported in Iraqi women)
- H_a: p≠ 0.25%

Procedure

```
proc power;
onesamplefreq test
sides=2
alpha=0.05
nullproportion=0.0025
proportion=0.0098
power = .
ntotal = 1,132
run;
```

Deign effect	Effective Sample Size	Power
2.04	1,132	0.864

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