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Cannabis Use and Its Health Consequences in Afghanistan: Implication for Intervention and Prevention

by

Doctor Mohammad Ajmal Yasin

M.D., Kandahar University

A Capstone Submitted to the Graduate Faculty

of Georgia State University in Partial Fulfillment
of the Requirements for the Degree
MASTER OF PUBLIC HEALTH
ATLANTA, GEORGIA
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Acknowledgements

My master degree would not have been possible without support of Fulbright program and Institute of International Education (IIE). I deeply appreciate Fulbright program that believed in me and provided me the opportunity to study in one of the best US universities. I also thank Professor Bruce Perry and Carrie F. Whitney, whose guidance and support helped me to complete my thesis. I would like to thank Professor Michael Eriksen, Sc.D, my academic adviser for the mentorship and supervision during my entire academic carrier in School of Public Health, Georgia State University. I would also like to thank students and staff of the School of Public Health for their hospitality and Kindness during my program in Georgia State University.

Dedication

To my parents, whose prayers and supports bestowed me the will to achieve my goals.

To my wife, whose patience and endurance invigorated me to complete my program.

Approval Page

Cannabis Use and Its Health Consequences in Afghanistan: Implication for Intervention and Prevention

by

Doctor Mohammad Ajmal Yasin

Approved:

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Committee Chair

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Committee Member

___07/02/2013_____
Date

Abstract

Cannabis is the most widely used illicit drug, worldwide and also in Afghanistan. According to United Nation Office for Drug and crime (UNODC) Afghanistan Cannabis survey (2009), more than half of all drug users interviewed in Afghanistan had used cannabis in their life time. In this survey around 630,000 people, mostly men, were documented as cannabis users. On the other hand, cannabis life time use amongst regular female drug user was 40%. The annual prevalence of cannabis use was 8.1 percent in male and 0.2 percent in female populations (UNODC Afghanistan Cannabis survey 2009). In Afghanistan cannabis is most commonly used amongst various groups of individuals, including public transport and truck drivers, and law enforcement personnel, such as Afghan National Police and Afghan National Army recruits. According to a Government Accountability Report for the United States Congress in March 2010, the percentage of Afghan Police recruits who tested positive for drug use, (i.e., marijuana, hashish and opiates) was 12-40% (Nordland & Wafa, 2010). Cannabis use has been linked to a myriad of adverse health outcome included but not limited to, increased risk of schizophrenia, impairment of cognitive functioning, deterioration of motor skills, weakening of driving skills, adverse pregnancy outcome and increased risk of cardiovascular and respiratory diseases (Kalant, 2004). The aim of this paper is to highlight cannabis production, use and adverse health outcomes in Afghanistan and to propose recommendations for cannabis control and reversal of its negative health outcomes.

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Chapter I

1.1 Introduction

According to the first-ever United Nation Office for Drug and Crime (UNODC) report, cannabis production is overtaking opium in Afghanistan (Afghanistan Cannabis Survey 2009). This fact earmarks Afghanistan as a country with the largest production of cannabis. According to the UNODC Afghanistan Cannabis survey (2009), more than half of all drug users interviewed in Afghanistan had used cannabis in their life time. In this survey around 630,000 people, mostly men, were documented as cannabis users. On the other hand, cannabis life time use amongst regular female drug user was 40%. The annual prevalence of cannabis use was 8.1 percent in male and 0.2 percent in female population (UNODC Afghanistan Cannabis survey 2009). In Afghanistan, Cannabis is most commonly used amongst various groups of individuals, including public transport drivers, and law enforcement personnel including Afghan National Police and Afghan National Army recruits. Based on a Government Accountability Report for the United States Congress, the upper range of Afghan Police recruits who tested positive for drug use (i.e., marijuana, hashish and opiates) was 40 % (Nordland & Wafa, 2010)

This widely used drug is not insipid; studies have indicated the epidemiologic link between cannabis use and risk of schizophrenia. Various studies have documented the adverse effect of cannabis use and driving skills impairment (Kalant, 2004). Cannabis smokers have showed increased risk of chronic airway inflammation and airway cancer. Numerous studies have found the risk of physical and psychological dependency in a significant portion of cannabis users. Early cannabis use, especially, weekly or daily use

predicts future dependence. It is documented that around 7-10 percent of regular cannabis users were both physical and psychological cannabis dependent. The impact of cannabis use on cognitive included permanent impacts on recall, information processing, and major brain tasks in fetus of pregnant cannabis female users (Kalant, 2004).

1.2 Forms of Cannabis

Cannabis is used in various forms: herbal cannabis, this form is used as desiccated leaves and flowering tops, also known as "ganja, or weed" or "cannabis resin"; the second form is the squeezed secretion of the herb, known as hashish or in local language known as 'charas'; and the third form is the oil cannabis which is a blend made from concentration or extraction of active constituent of the herb (UNODC Afghan Drug Survey Executive Summary 2009).

Cannabis is the largest produced illicit drug globally and is seen nearly in every country worldwide. Almost one fourth of all the worlds' cannabis is produced in Africa, particularly in Morocco, South Africa, Lesotho, Swaziland, Malawi, Nigeria, Ghana, Senegal, Gambia, Kenya and Tanzania. In addition, North and South America produce less than half of global cannabis demands (UNODC Afghan Drug Survey Executive Summary 2009).

In term of quantity and geography, cannabis herb is the most widely smuggled illicit drug worldwide. Around 70 % of world's cannabis is seized in North America, especially, in Mexico and United States, followed by 11 % and 10% in Africa and in South America, respectively. Cannabis resin is the second most trafficked drugs worldwide. Afghanistan has started recently to exceed Morocco in cannabis production.

Afghanistan's cannabis has also been a major alternative for opium crops. Due to less laborious work, low irrigation needs, high yields and lucrative markets, cannabis is substituting opium in Afghanistan (UNODC Afghan Drug Survey Executive Summary 2009).

1.3 Prevalence of Cannabis Use Worldwide

Cannabis use is estimated to be between 125 million and 203 million people worldwide (UNODC, World Drug Report, 2010). In 2009 the estimate of cannabis use in population aged between 15 and 64 years was 2.8 to 4.5 percent worldwide. Cannabis use in North America has remained unchanged; but has increased slightly over the past four years in the United States (UNODC, World Drug Report, 2010). Annual prevalence of cannabis use in North America is around 10.7 percent amongst people age 15-64; however, cannabis use prevalence amongst youth has been increased over the past four years (cannabis review). According to UNODC Afghanistan Cannabis survey (2009), Afghanistan's cannabis use prevalence in 2009 was 8.1 percent in male and 0.2 percent in female population. According to this report around 60 percent of all drug users interviewed in Afghanistan had the history of cannabis use in their life time whereas 40 percent of women drug users had the history of cannabis use in the past. In addition, this survey had documented approximately 630,000 people, mostly men, as cannabis users.

1.4 Afghanistan overview

Afghanistan is a land locked country about the size of Texas, is located in south Asia and sometimes being described as located in the heart of Asia linking South and East Asia with Central and Western Asia. Afghanistan borders Uzbekistan, Tajikistan,

and Turkmenistan on the north, China on the northeast, Pakistan on the south and east and Iran on the west (Afghanistan Overview). Afghanistan covers 652,230 sq km of area. The estimated population will be 31,108,077 by July 2013 (CIA - The World Factbook). Afghanistan is divided into 34 provinces and 397 Districts (Afghanistan Overview).

Afghanistan is world's 41st biggest country in size. Kabul is the capital of Afghanistan, which is located in the central part of Afghanistan in Kabul province. Due to its strategic location at the crossroads of the major trade routes, Afghanistan has been the place for commerce and thus attractive to invaders since the sixth century BC.

Afghanistan is divided by Hindokush Mountains into three main regions: 1) central highlands that account for roughly 60% of the country's area, 2) the southwestern region, which include 25% of the land; 3) and the minor northern grasslands areas, which covers the country's most productive land. Average life expectancy at birth for total population is 50.11 years, male: 48.81 years, and female: 51.47 years. Afghanistan natural resources include "natural gas, petroleum, coal, copper, chromite, talc, barites, sulfur, lead, zinc, iron ore, salt, precious and semiprecious stones" (CIA - The World Fact book). Due to four decades of war and turmoil in the country, these resources have not been properly explored and utilized.

1.5 Economy

Afghanistan's main economy is dependent on agriculture which generates two thirds of national income and employs almost 85 percent of the country's population. Most land cultivation is carried out in oases and valleys, and the characteristic of live-stock breeding is in a semi-nomadic form. Main branch of agriculture is relied on

livestock breeding; it represents almost one third of agricultural production. The country's crop production is dependent on irrigated lands. Half of these lands are still faced with shortage of water. Current irrigation systems of Afghanistan was established after 1945 (Afghanistan Overview). Afghanistan's main crop is wheat, corn and rice, but due to continuing war and economic constrain these crops have been replaced by opium and cannabis, especially, in northern and southern regions.

Afghanistan's map

The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations or ReliefWeb. These maps may be freely distributed. If more current information is available, please update the maps and return them to ReliefWeb for posting.

Source: - http://www.173rdairborne.net/images/afg_ad1.gif

1.6 Geography of Cannabis Production and Use in Afghanistan

According to the Ministry of counter narcotic and the United Nation Office for Drug and Crime "MCNUNODC" cannabis survey (2011), 23 provinces in Afghanistan were identified as high risk areas for cannabis cultivation. Ground information from 11 other provinces indicated that cannabis cultivation either did not exist or was negligible-limited to kitchen garden or other form of small-scale – cultivation.

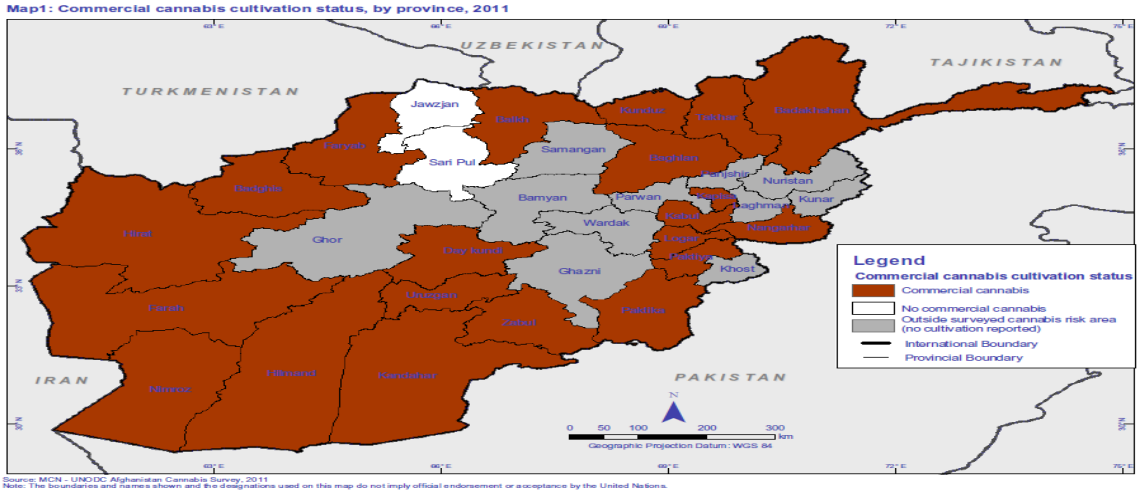
The survey was conducted between July and September 2011 in 1,500 villages where farmers and headmen were interviewed, and was substantiated by yield studies and satellite image interpretations. The yield observation study was undertaken in December 2011-January 2012, when the processing of cannabis resin production took place and this study was preceded by headmen and farmers interview during the villages' surveys. The overall cannabis area estimate was based on the interpretation of 155 very high-resolution satellites images and village survey (Afghanistan Cannabis Survey 2011)

The cannabis cultivated areas in 2011 were estimated to be 12,000 hectares (8,000 – 17,000 ha). This result was slightly lower compared to 2010 estimate which was 9,000-29,000 ha. The covered areas that were included in estimation were due to large scale mono-crop cannabis cultivation and "commercial" production. Small-scale cultivation, "such as in kitchen gardens, flower pots, along the walls of compounds, along the boundaries of fields, "wild cannabis" or cannabis intercropped with other crops in the same field at the same time, is not part of the area estimates of this survey" (Afghanistan Cannabis Survey 2011). Cannabis was found to be cultivated in 21 provinces out of 23

high risk provinces for cannabis cultivation. Out of 21 provinces where cannabis was found to be cultivated, 14 provinces were substantiated by satellite images and 7 provinces were covered by the villages' surveys only. In these surveys more than one third of cannabis was cultivated in the southern region. This difference by region was due to opium cultivation; however, cannabis cultivation was also found in several poppy free provinces, but, there was an explicit geographic association between cannabis and opium cultivation in provincial level (Afghanistan Cannabis Survey 2011).

Most commercial Cannabis cultivation in 2011, similar to 2009 and 2010, was in the southern region, where most of opium (78%) was also cultivated. Daykundi, Helmand, Kandahar, Urozgan and Zabul provinces were the main southern provinces where cannabis was cultivated. There was a clear geographical association between opium and cannabis cultivation at the provincial level. Similar association existed at a household level with almost two thirds of cannabis-growing households (58%) also reported poppy cultivation in the preceding season (Afghanistan Cannabis Survey 2011).

Commercial Cannabis Cultivation Status, by Province, 2011



Source: - MCN-UNODC Afghanistan Cannabis Survey, 2011

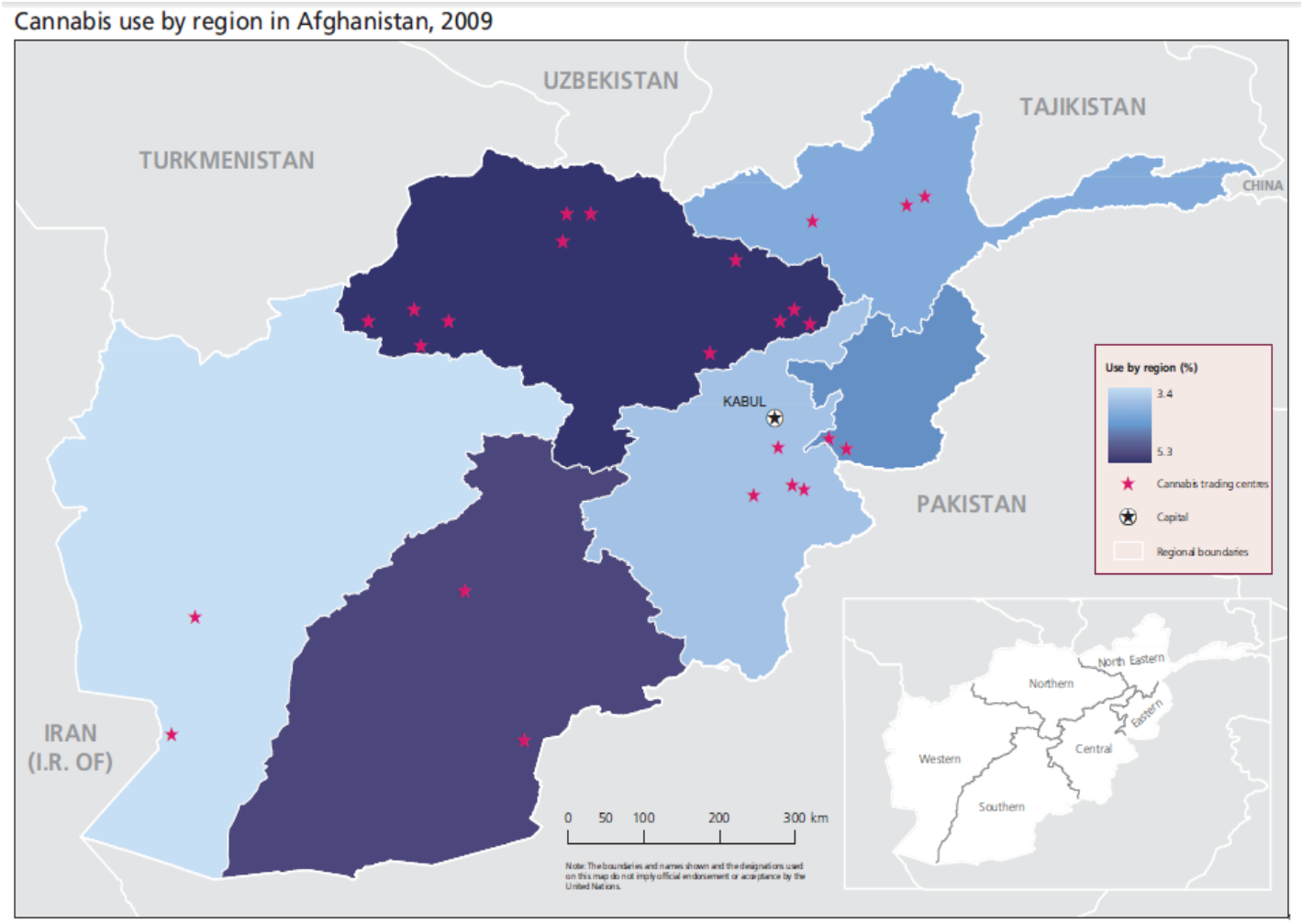
1.7 Cannabis Use

Similar to regional differences, northern and southern parts of Afghanistan have the highest prevalence of cannabis use and these areas are also the major producers of cannabis in Afghanistan (Afghan-Drug-Survey-2009-Executive). Men are the major cannabis users in Afghanistan; in 2009, 8.1 percent of men were documented as cannabis users. The prevalence has been stable for the last four years; in 2005 the prevalence of cannabis use was 8 percent and only 0.1 percent increment has been observed over the course of past four years. Around 70 percent of these cannabis users reported regular daily cannabis use while 25 percent reported 2 to 4 days in a week in the past month. In contrast, the number of women cannabis users was much smaller than men cannabis users; the prevalence of women cannabis users was 0.2 percent, which has doubled since 2005. Twenty five percent of women who used cannabis reported daily cannabis use, 50 percent 2 to 4 days a week and the remaining 25 percent reported 1 day a week of cannabis use, (Afghan-Drug-Survey-2009-Executive).

The rate of cannabis dependency was higher in men cannabis users than in women cannabis users. The rate of cannabis dependency was three times more common in men than in women cannabis users. The use of cannabis, in comparison to other illicit drugs, started at early age around 18-19 years, whereas the mean age for heroin use was 24 years of age. Most cannabis users were educated, 50 percent of cannabis users in Afghanistan reported having primary education and around 30 percent had secondary education. In contrast, other drug users, such as opium and heroin users, were mainly uneducated and illiterate. Similarly, cannabis users had fewer psychosocial problems

than opium and heroin users in Afghanistan. However, cannabis users still face some kinds of physical, psychological and relationship problems due to cannabis use (Afghan-Drug-Survey-2009-Executive).

Cannabis Use by region in Afghanistan, 2009



Source:- Afghan Drug Survey Executive Report 2009

Chapter II

2.1 Review of Literature

Cannabis use has been linked to myriad negative health outcomes; studies have shown the epidemiologic link between cannabis use and schizophrenia (Kalant, 2004). In several studies the negative impacts of cannabis use and impairment of driving and motor skills have been highlighted. In various studies the risk of chronic airway inflammation and cancer due to Cannabis smoking has also been stressed. Numerous studies have showed the risk of physical and psychological dependency in a significant portion of cannabis users. Early cannabis use, especially, weekly or daily use has predicted future dependence. It has been documented that around 7-10 percent of regular cannabis users have been both physical and psychological cannabis dependent. Cognitive impairment included permanent recall issues, processing of information and major function of fetus brain of pregnant cannabis users (Kalant, 2004).

2.2 Cannabis Use and Risk of Schizophrenia

Psychosis is defined as mental state characterized by the following features: delusions, which are false beliefs; hallucinations, which are sensation of things in the absence of true environmental stimulation, such as hearing voices and seeing objects without true stimuli; and gross disorganization of speech and/or behavior which does not make sense (American Psychiatric Association 2000).

Discrete psychotic disorders that can be experienced at any time in life should not be considered as psychotic disorder; such indications may be clinically insignificant,

especially, when they are transitory and brief. However, when these symptoms are severe, numerous in number and occurring simultaneously and persist for longer period of time, then such psychotic disorder can be diagnosed as schizophrenia. To diagnosis schizophrenia the following conditions should exists. (a) In addition to 'negative symptoms', which include a number of symptoms such as emotional instability, mutism (lack of speech), and/or absence of motivation; presence of two or more distinguishing symptoms "(delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior)", for a considerable period of time in a month; (b) loss of function in social or occupational settings; and (c) persistence of these signs constantly for at least six months (American Psychiatric Association, 2000)

Increasing use of cannabis has been seen amongst schizophrenic patients. in recent assessment of more than 50 treatment studies, amongst patient with psychosis, prevalence of cannabis use was 29.3 percent compared to 4 percent in the general US population (B. Green, Young, & Kavanagh, 2005). In addition, cannabis use has been shown to be linked with two time increase in odds ratio of developing schizophrenia and associated disorders in prospective studies (Arseneault, Cannon, Witton, & Murray, 2004). In addition, the link between cannabis sue and acceleration of schizophrenia onset has been noticed in retrospective studies (Hambrecht & Häfner, 2000). Despite the ambiguous mechanism of psychosis, these studies suggest the important role of cannabis use in psychosis causation. In one study, the likelihood of cannabis use and stable neurological changes in schizophrenic patient was not found; however, the transient adverse outcome of neurochemical effects was found which was prominent in people with genetically vulnerability to psychosis (Foti, Kotov, Guey, & Bromet, 2010).

The relationship of cannabis use and schizophrenia and/or psychotic symptoms has been noticed for some time. In a study conducted by Hambrecht and Hafner (2000) the relationship of cannabis use and psychotic symptoms was found in bunch of analysis in early psychosis patients. Several potential types of correlation between cannabis use and psychotic symptoms and/ or schizophrenia were proposed by them. The use of cannabis was proposed to reduce the vulnerability threshold of schizophrenia and enhance the susceptibility to psychosis in people without known genetic liability to schizophrenia. The dose response association between quantity of cannabis used in adolescence and the following risk of emerging schizophrenia was studied by Andreasson et al (1987). In more recent studies that controlled for other drug use such as amphetamine and personality trait, it was concluded that 13% of schizophrenia might be prevented if cannabis could be removed from the 'schizophrenia equation' (Cohen, Solowij, & Carr, 2008).

Van Os et al (2002) in a balanced prospective study found that in people, who were free from psychotic symptoms, the length of lifetime exposure to cannabis was a significant risk factor for the developing of psychosis. In people with no genetic liability to psychosis, cannabis use was linked in up to 50 percent of cases to develop psychosis. In another study done by Arsenault et al. (2003) it was found that use of cannabis increased the risk of developing schizophrenic symptoms after controlling for symptoms of pre-existing psychosis and it was also noted that the commencement of cannabis use at early age (prior age 15) could pose great risk for developing schizophrenia (Arseneault et al., 2002). Cohen and his colleague mention that one reason for this can be the neurodevelopmental process in which the cognitive, developmental, emotional, and

behavioral measures shift to adulthood and can easily be affected by cannabis use, specifically, frontal and limbic systems would be more sensitive to these changes (Cohen et al., 2008).

In many cohort studies the association between cannabis use and psychosis/schizophrenia, over the past several years, has engrossed substantial consideration in the research, media and the community (David M Fergusson, Boden, & Horwood, 2006). Cannabis use is causally related to psychotic disorders such as schizophrenia and often has been interpreted as causative factor in these studies (Smit, Bolier, & Cuijpers, 2004). The contributory part of cannabis use in psychosis has been indicated in many reviews or the links between such relationship have often not been excluded (Moore et al., 2007).

However, some uncertainties that whether cannabis use contributes to psychotic disorders emergence, due to some mythological limitations, are controversial. At the same time as few published cohort studies have evaluated the strengths and weaknesses of these methodologically diverse cohort studies, the comparative qualities and weaknesses might impact the interpreted relationship of cannabis use and psychosis (McLaren, Silins, Hutchinson, Mattick, & Hall, 2010).

For the evidence to demonstrate that a particular association is casual, these need to be shown:

1. Strength of correlation.
2. Consistency
3. Temporality

4. Biological gradient
5. Coherence.
6. Specificity
7. Plausibility
8. Analogy

(McLaren et al., 2010).

2.3 Swedish Conscript Study

The development of psychosis was found in the first cohort study which predicted cannabis use and subsequent psychosis in a sample male Swedish Conscript. These conscripts who were evaluated for substance use and psychiatric diagnosis at age 18 were tracked for more than 10-year period inpatient admission for schizophrenia (Andréasson, Allebeck, Engström, & Rydberg, 1987). At age 33 those who used cannabis 50 times or more had six times more rate of hospitalization for schizophrenia than those who did not use cannabis. In addition, the rate of hospitalization for schizophrenia was three times more in those who had used cannabis between 10 and 50 times. However, when some confounders such as, "social and family background, and other substance use were controlled, the rate of hospitalization for schizophrenia amongst those who had used cannabis less than 10 times was reduced to 2.3 (95% CI: 1.0–5.3) and was no longer statistically significant. The adjusted odds ratio for those who had used cannabis more than 50 times was not reported" (McLaren et al., 2010)

Cannabis use 1-10 times (relative risk: 1.5, 95% CI: 0.6–3.3) was less significant as variable than others which best predicted schizophrenia. Psychiatric diagnosis at the

baseline and separated parents were the variables that best predicted schizophrenia. The duration of cannabis use was not covered in this study; however, during the follow-up period at conscription study cannabis use was strongly linked with later treatment for cannabis and other substance use (McLaren et al., 2010).

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Pre-existing psychotic or other psychiatric signs at baseline were not measured in the study and it is difficult to decide whether cannabis use predict psychotic symptoms or not. It is also challenging to account premorbid personality traits for both cannabis use and development of schizophrenia. Other potential confounding that were serious psychogenic substances such as amphetamine was also not controlled for (McLaren et al., 2010).

Another study with relatively longer follow-up period was undertaken as re-analysis, in which stimulants and other substance use including alcohol were controlled; cannabis persisted as predictive factor for schizophrenia in a dose-dependent manner. The rate of hospitalization, because of schizophrenia, was three times more for those who had used cannabis 50 times or more at age 18 than those who did not use cannabis (Zammit, Allebeck, Andreasson, Lundberg, & Lewis, 2002). An inclusive extent of premorbid social integration, which did not impact the association between cannabis use and schizophrenia, was included in this study (McLaren et al., 2010).

A multi-site survey of population was launched in the United States between 1980 and 1984 in which the presence of psychotic disorders were measured through the Diagnostic Interview Schedule (DIS) (Tien & Anthony, 1990). This survey, which measured substance use, social and demographic characteristics, was launched at the

baseline and at one year follow-up. For the evaluation of cannabis use and the risk of psychotic symptoms, participants with one or two symptoms at baseline were disqualified and ‘cases’ (subjects with at least single psychotic symptom at follow-up year) were compared with controls (i.e., those without psychotic experiences at follow-up). After controlling for social and demographic factors (e.g., sex, education, marital status, and occupation), baseline substance use (regular cocaine and alcohol use) and psychiatric disorders, overall, 477 cases were matched with 1818 controls whose age range was between 18 and 49. This survey showed cannabis use to be linked with two-fold risk of psychotic symptoms one year later (McLaren et al., 2010).

The Netherlands Mental Health Survey and Incidence Study (NEMESIS) found in population cohort of cannabis users at baseline whose age range was between 18 and 64 years, the experience of mild psychotic symptoms at follow-up (three years later, OR: 2.11, 95% CI: 0.78–5.71, not significant). More significantly, after controlling for age, sex, socioeconomic status, and other drug use, 17 times more clinically significant psychotic symptoms were reported by them three years later (OR: 16.93, 95% CI: 3.33–86.13); and they were over 10 times more likely to need care for psychotic symptoms than those who did not use cannabis (van Os et al., 2002).

In addition, the link between cannabis use and psychosis was dose dependent. Notably, those who were included in the NEMESIS sample, all of them were psychotic symptoms free at the baseline. Those who had psychotic symptoms at the baseline were studied separately and they showed stronger psychotic symptoms following cannabis use than those who did not use cannabis. The author concludes that the acute impact cannot predict the link between cannabis use and psychotic symptoms and adds that the

relationship between cannabis use and risk of psychotic symptoms is based on long-term cannabis use (McLaren et al., 2010).

Cannabis use, at age 11, 15 and 18, and preceded Psychotic symptoms along with schizophrenic symptoms and diagnosis of schizophreniform disorder at age 26, were studied in a study known as "The Dunedin Multidisciplinary Health and Development Study" that has been running in New Zealand since the 1970 as the birth cohort study. In this study, 759 males and females born between 1972 and 1973 were studied for mentioned psychotic symptoms. Schezophreniform and schizophrenia are alike in terms of symptoms but the duration of symptoms differ; the duration of symptoms for schizophrenia is at least six months whereas the duration for schizophreniform symptoms is one month and it does not necessarily lead to occupational and socials issues (American Psychiatric Association, 2000). In this study, subjects who had started cannabis use at age 15, even after controlling for other drug use and childhood psychotic symptoms, had more symptoms of schizophrenia at age 26 than those who did not use cannabis. In addition, the link between schizophriniform diagnosis and cannabis use at age 15, but not 18, was noticed; however this association was weaker after controlling for childhood psychotic symptoms in the analysis (Arseneault et al., 2002).

Another cohort study, known as the Dunedin birth cohort, proposed that genetic predisposition could lessen cannabis effects on psychosis risk. Those who had functional polymorphism of a gene (catechol-O-methyltransferase, or COMT), which involved in the dopamine system (the neurotransmitter system implicated in schizophrenia), were 10 times more at the risk of developing schizophriniform disorders by age 26 than those who did not possess this gene (Caspi et al., 2005). The author reasoned that the environmental

risk factor, such as in this case adolescent cannabis use, was a prerequisite for development of psychosis amongst those who had the particular polymorphism. Increased risk of schizophriniform was not increased in participants who were Val/Val allele and did not use cannabis (McLaren et al., 2010). This result has been failed to be replicated in a large case–control study by Zammit et al. (2007).

It should be noted that psychotic patients can also use cannabis for the alleviation of some of their psychotic symptoms. However, self-medication hypothesis has not been shown in studies as the most plausible explanation for the relationship between cannabis use and psychosis. In a recent study in Australia the bidirectional relationship between psychotic patient and cannabis use was found. In this study relapse of psychotic symptoms was predicted with cannabis usage, and cannabis consumption relapse was predicted with psychotic relapse, regardless of medication and other drug use (Hides, Dawe, Kavanagh, & Young, 2006)

2.4 The Effect of Cannabis Use on Vehicle Crashes

Tetrahydrocanabinol (THC), an active ingredient found in cannabis, results in impairment of driving skills and this has been traditionally established in experimental and epidemiologic studies. The impairment of cognition, psychomotor function and actual driving performance in a dose related manner after cannabis use and concentration of THC has been repeatedly shown in experimental studies. These impairments were dose related; for instance, 300g/kg of THC had the same effect as of blood alcohol concentration (BAC) ≥0.05 g/dl, which in most European countries is the legitimate limit for driving under the influence. Higher doses of THC, i.e., >300 g/kg, which has not been systemically studied, may have stronger effect on driving impairment. THC had greater

impact on highly automated behaviors, such as road tracking control, than on complex driving skills that needed conscious control. The finding of epidemiological studies and experimental studies on the effect of cannabis (THC) on vehicle crashes is different. The findings of experimental studies have been reinforced by case-control studies, but capability studies have shown little proof about the link between cannabis use and vehicle motor crash. However, after determination of presence of an inactive metabolite of THC in the blood and urine of crashed drivers several days after smoking cannabis, most culpability surveys established link between previous cannabis use and vehicle crashes. In surveys which documented recent cannabis use by measuring THC in the blood of crashed drivers; the THC presence in the blood of crashed drivers, especially, at greater concentration, was linked to three to seven times more crashes than those who did not have THC concentration in their blood or did not use cannabis or alcohol. Recent cannabis use may increase the likelihood of crashes but old cannabis use does not, these findings have been suggested in these epidemiological studies. The findings of epidemiological studies and experimental research are the same concerning the effect of combined alcohol and cannabis use in traffic. The effects of combined use of alcohol and cannabis are greater than the individual use of either drug. They both, when used jointly, produced severe impairment of intellectual, psychomotor, and actual driving performance in experimental studies and heightened accident risk in epidemiologic analyses (Ramaekers, Berghaus, van Laar, & Drummer, 2004).

The prevalence of cannabis use, THC concentration in the blood of drivers who had vehicle crash, has been reported to be between 4 and 14 percent. These findings are reported from the surveys in different localities (Ramaekers et al., 2004). However,

higher concentration of THC has been reported in young males in larger American cities post vehicle crashes (Williams, Peat, Crouch, Wells, & Finkle, 1985).

The likelihood of crashes after the combined use of cannabis and alcohol are greater than the use of either drug alone. However, Lack of an appropriate control group further limits the findings in these studies. These studies only show the presence of these substances in the blood of drivers post (fatally) crashes. the absence of a control group, which can yield comparable data from general driving population, does not validate the prevalence measure of THC or other substances in causing traffic crashes (Ramaekers et al., 2004).

Despite showing the link between combined substance use, (i.e., alcohol and cannabis use and motor vehicle accident), culpability surveys do not show the increase rates of crashes after use of cannabis alone. However, culpability surveys show the association between cannabis use and crashes after finding higher concentrations of THC (Terhune et al., 1992). For instance, in two studies by Hunter et al., (1998) and Drummer et al., (2003), recent cannabis use was confirmed by THC concentration in the blood drivers post crashes. Both studies showed the link between higher concentration of THC and increase likelihood of crashes (Ramaekers et al., 2004).

Similarly, case-control studies show a positive relationship between cannabis use and crashes. In a case-control study done by Mura et al. (2003), THC was compared among injured drivers and control subjects, who were recruited from emergency departments in six French hospitals. In this study, sample of 1,800 drivers, 900 cases and 900 controls were studied. The cases were the drivers who entered the emergency department due to non-fatal accident and the controls were visitors of the same

emergency department due to non-traumatic reasons. Cases and controls were controlled for age and sex and when averaged overall all age groups, 10 percent of cases and 5 percent of controls had THC >1 ng/ml, no other drug including alcohol was found in their blood. Fifteen percent of the cases and 6.7% of the controls had THC in their blood when they were considered for age 27 and younger and the odds ratio of 2.5 and a 95% CI ranging from 1.5 to 4.2 was noted. In cases that had both THC and alcohol (BAC > 0.05 g/dl) the OR was doubled (95% CI: 2.0–10.7) (Mura et al., 2003).

In summary, dose related THC has been linked to the impairment of psychomotor function, and actual driving performance. THC at doses of up to 300 g/kg was comparable to the impairing effects of an alcohol level a BAC ≥ 0.05g/dl, which is the legal limit for driving under the influence in most European countries. The relationship of recent cannabis use and vehicles crashes has been documented, especially, at higher doses; however, there is no finding concerning past cannabis use and motor vehicle accidents. Adverse effects of THC are more prominent in highly automated driving behavior, as compared to more complex driving tasks that require conscious control (Ramaekers et al., 2004).

2.5 Cannabis as a Gateway Drug

Gateway sequence can be an independent risk factor for substance use; for instance, one who is already on a drug is at greater risk for the subsequent use of another substance and this subsequent use can be explained by the sequence that one has entered rather than by opportunity for use (Kandel & Faust, 1975). Two types of evidence can support the gateway theory: the noted time order between uses; for instance, in most

cases prior cannabis use precedes the use of other illicit drugs (OID); and the strength of the relationship between cannabis use and other illicit drug use (Lessem et al., 2006).

To propose that cannabis use can lead to the development of other illicit drugs in naturalistic studies is difficult, because randomization of subjects to the experimental conditions is often problematic. However, quite a few research studies have been launched to explore cannabis use as the cause of initiation of other illicit drugs in epidemiological samples.

Shrout (1998) proposed that association, isolation, and direction are the conditions that establish causation. Therefore, indication of cannabis use, which links to the progression of other illicit drug use, even after controlling for other confounders, validate the condition of association and isolation; however, they cannot eliminate other unmeasured variables to be the causal factors. In addition, longitudinal studies owing to the temporal sequence of events (i.e. that cannabis use precedes other illicit drug use) can fulfill the condition for direction (Lessem et al., 2006).

In a study by Yamaguchi and Kandel, (1984), despite controlling for other covariates, it was found that cannabis use was associated with use of other illicit drugs. Likewise, Fergusson and Horwood, (2000) explored the prediction of cannabis use and subsequent other illicit drug use after controlling for family, social, educational, and behavioral background. They found that other illicit drug use was 59.2 times more likely in cannabis users, (who reported using cannabis on more than 50 occasions) than in non-cannabis users.

In another study by Lessem and his colleagues (2006), it was found that young cannabis users were twice as likely to use illicit drugs that non-cannabis users. They

mentioned that shared environmental factors mediated much of the relationship between adolescent cannabis use and young adult drug users. In this study, the finding was stable even after controlling for familial environmental and other measured factors. Mayet and his colleagues, (2012) found that cannabis use could tremendously increase the risk of initiation of other illicit drugs (OID). In their study they found that the risk of starting other illicit drugs amongst cannabis experimenter was 21 times, and amongst daily cannabis users was 124 times higher than in non-cannabis users. They mentioned "the results of this study provide a confirmation of a stage process in drug use, mediated by cannabis and liable to lead to OID experiment. This is compatible with the literature on the gateway theory, but goes further by modeling the entire sequence of use. OID experiment could be a consequence of initial opportunity to use the more accessible illicit drug, cannabis." (Mayet et al., 2012)

2.6 Cannabis Use and Crime

Several studies have indicated the link between cannabis use and a range of adverse social outcomes, such as poor educational attainment, unemployment, personal relationship issues, and reduced life satisfaction. However, some studies find inconsistencies in these outcomes and other studies question these findings. Due to large mythological challenges and differences in study design (i.e., cross sectional studies and even in population based studies), it is hard to mitigate contributing confounding in this domain (Pedersen & Skardhamar, 2010). Nonetheless, the evolving idea in some studies indicates that the effects of cannabis use can be more pervasive than it was thought previously. During the last two decades, some attentions have been directed to cannabis

use and crime. The sophisticated link of cannabis use and crime has been addressed in a number of studies. In some studies conduct problems have been indicated as a risk factor for subsequent cannabis use while other studies have linked cannabis use with increased delinquent activity and crime (Pedersen & Skardhamar, 2010).

Pedersen and Skardhamar, (2010) found the strong relationship between cannabis use and later registered criminal charges in young adulthood. They mention that this finding was noted even after controlling for the following confounding varaibles, such as socio-economic background of family, support and monitoring role of parents, career and educational achievement, past criminal charges, conduct problems and history of living together and marriage. They further report similar findings after adjusting for alcohol and other illicit drug use. However, they reported insignificant findings of a link between cannabis use and criminal charges after eliminating all drug specific charges in their model. They conclude that "cannabis use in adolescence and early adulthood may be associated with subsequent involvement in criminal activity. However, the bulk of this involvement seems to be related to various types of drug-specific crime. Thus, the association seems to rest on the fact that use, possession and distribution of drugs such as cannabis is illegal. The study strengthens concerns about the laws relating to the use, possession and distribution of cannabis" (Pedersen & Skardhamar, 2010).

In another study by Green and his colleagues (2010) the interaction of heavy adolescent cannabis users and non-users with in the justice system were compared. They found that heavy cannabis users had about two times an increased record of arrest than non-users. On average, the mean and median of arrest in heavy adolescent cannabis users

were 6.5, and 4 respectively, while the mean and median of arrest in light/non-users were 4.5 and 3, accordingly. In addition, the likelihood of arrest at a younger age for heavy cannabis users was more than for light/non-cannabis users. The mean age of first arrest for heavy users was 21.4 years compared to 22.5 years for light/non-users. They noted 2 to 3 times more rates of arrest for three different kinds of crimes including violent, property, and drugs in heavy cannabis users than in light/non-users.

They add that the rate of arrest for violent crime in heavy cannabis users was 31.5 percent, almost two times higher than light/non-users (17.8%). Similarly, the rate of arrest for property crime in heavy cannabis users was 40.5%, two times more than that of light/non-users (21.3 %). The rate of arrest was two times higher (28.7%) for drug related crime in heavy cannabis users than in light/non-users (10.3%). They found similar patterns in self-reported crime; they established that around 60 percent of heavy cannabis users reported being involved in violent crime compared to 45 percent of light/non-users. Approximately, 70 percent of heavy cannabis users were involved in property crime compared to 47 percent of light/non-users. They also found that the involvement of heavy cannabis users in drug dealing was around 30 percent compared to approximately 12.3 percent of light/non-users. Likewise, they determined that around 42 percent of heavy cannabis users had a record of incarceration compared to 16.6 percent of light/non-users (K. M. Green et al., 2010).

2.7 Cannabis Use and Education Attainment

The use of cannabis and its association with educational attainment has been studied. Many studies have explored the importance of the relationship of cannabis use and the scope of educational attainment. The link of cannabis use and low educational

performance including lower grade point average, low school satisfaction, negative attitudes to school, increased rates of school absenteeism and poor school performance, have been observed in majority of these cross sectional studies (Lynskey & Hall, 2000). The association of cannabis use and poor educational performance cannot be validated based on these studies because most of these studies were cross sectional. However, the relationship of cannabis use and poor educational performance has also been found in many prospective longitudinal studies. Several prospective longitudinal studies have indicated the link between cannabis use and poor educational performance including early school dropout. Even after controlling for several confounding, this link has remained stable. Several possible mechanisms have been postulated by experts for cannabis use and poor educational attainment. One of these mechanisms can be "motivational syndrome" or other cognitive and memory problems, which is caused by cannabis use. However, there is little evidence to support these hypotheses. Another reason for cannabis use and poor educational attainment can be that of the social context within which cannabis is used. For instance, cannabis use can be linked with an anti-conventional life-style characterized by bonding with criminal and substance users peers which subsequently leads to early school leaving, run away from parental home and early parenthood (Lynskey & Hall, 2000).

In another study by Fergusson and his colleagues (2003) cannabis use was associated with premature school withdrawal without being able to graduate, inability to get into university and getting university degree. They reported that this association was stable even after controlling for confounding factors. "When due allowance was made for pre-existing levels of cannabis use there was no evidence to suggest the presence of

reverse causal pathways in which lower educational achievement led to increased cannabis use" (Fergusson et al., 2003). They concluded that their finding support the view of cannabis use and low educational attainment, especially, in young people. They propose that this effect may likely be due to social context within which cannabis used rather than the direct effect of cannabis on memory and cognitive ability (David M Fergusson et al., 2003).

Chapter III

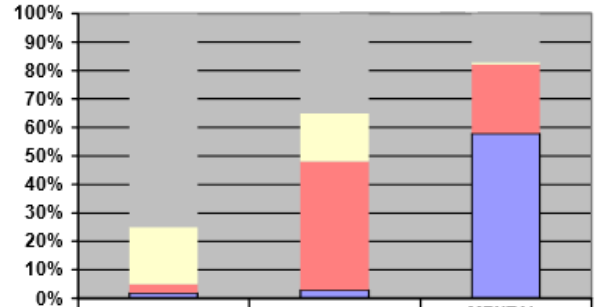
3.1 Discussion, Analysis, Intervention, Prevention and Recommendation

As mentioned above cannabis use can be linked to various negative health outcomes, including but not limited to, increased risk of schizophrenia, psychosis, impaired motor control, risk of increased impairment of driving skills - with consequent vehicle crashes; negative education attainment, and increased rate of crime. However, there are few studies available to relate these outcomes to cannabis use in Afghanistan. Nonetheless, we can extrapolate the negative outcome of cannabis use in Afghanistan from the following facts:

According to UNODC cannabis survey (2009) the prevalence of cannabis use in 2009 in Afghanistan was 8.1 % and 0.2 % in male and female, respectively. Likewise, it is estimated that over two million people are suffering from schizophrenia, depression, and bipolar disorder in Afghanistan (WHO 2009-2013). Schizophrenia and substance use are the most diagnosed disorders in mental hospitals in Afghanistan (WHO 2004). In 5 community-based psychiatric inpatient units available in the country, schizophrenia composed 45 % of patients and mood disorders 21% of patients with unknown admission length (Afghanistan WHO AIMS Report).

"The distribution of diagnoses varied across facilities: in outpatients facilities neurotic disorders and other disorders were most prevalent, within inpatient units' schizophrenia and substance abuse were most frequent diagnose in mental hospitals (Afghanistan WHO AIMS Report).

GRAPH 2.5 - PATIENTS TREATED IN MENTAL HEALTH FACILITIES BY DIAGNOSIS



	OUTPATIENT FAC.	INPATIENT UNITS	MENTAL HOSPITALS
OTHERS	75%	35%	17%
PERSONALITY DIS.	0%	0%	0%
NEUROTIC DIS.	20%	17%	1%
SCHIZOPHRENIA	3%	45%	24%
SUBSTANCE ABUSE	2%	3%	58%

Source:- (Afghanistan WHO AIMS Report)

Due to the scarcity of data and research, it is difficult to quantify cannabis use as a cause for schizophrenia and other mental problems in Afghanistan; however, we can deduce from prevalence of cannabis use and increased prevalence of diagnosis of schizophrenia in Afghanistan that cannabis use has may likely be linked with increased risk of mental illness such as schizophrenia. The better measures can be drawn from subsequent changes in cannabis use and the estimate of schizophrenia in this country.

Arseneault and his colleague (2004) indicate that prospective studies find that cannabis use is linked with two times an increase in the odds of developing schizophrenia and associated disorders. Considering this finding, cannabis use may likely create a major mental health problem for the armed forces of Afghanistan, because according to a Government Accountability Office report for the United States Congress in March 2010 the prevalence of cannabis and opiate use in Afghan Police recruits was 12 to 41 percent

(Nordland & Wafa, 2010). It is a major concern for the Afghan defense and interior ministries, because it shows that cannabis use is five time more common in Afghan police than in general population. It has been shown that cannabis use can result in brief psychotic experiences, such as hallucinations and paranoia, even in healthy individuals (A Complex Link Between Marijuana and Schizophrenia - TIME). In view of this phenomenon, the health consequences of cannabis use in armed forces would be significant risk factor for irregular behavior.

During the last several years, evidence has shown the increasing incidence rate of attacks, also known as "green on blue attacks" or "insider attacks", of Afghan security forces including Afghan National Army and Afghan National Police on US and NATO forces in Afghanistan. From 2007 to 2012, there have been 71 documented "green-on-blue" attacks. "It is difficult to draw definitive conclusions about the principal causes of these attacks given the small total number of incidents, but there are discernible trends" (Afghanistan: Green-on-Blue Attacks in Context, Institute for the Study of War). Few studies have been done so far to explore the cause of these attacks, however, the use of cannabis and consequent psychotic symptoms such as hallucination and paranoia, have not been excluded.

In addition, increased cannabis production and easy availability, even its handiness in grocery shops in most part of the country, has increased in the number of cannabis users, especially, amongst drivers. According to some unofficial surveys, more than 70 percent of drivers (i.e., public transport, private taxi, and truck drivers) are addicted to cannabis. Studies have shown that dose related cannabis use has been linked to the impairment of psychomotor function, actual driving performance, and vehicle

crashes. Similarly, Afghanistan vehicle crashes claim several hundred lives annually, which is a significant cause of death following the ongoing war in this country. From July 2012 to June 2013 around 214 people have been killed and around 218 people have been injured due to vehicle crashes in Afghanistan (Afghanistan Accident - Crash Reports). There are insufficient studies to show the link between cannabis and vehicle crashes and subsequent mortality and morbidity in Afghanistan. However, considering the highest prevalence of cannabis use amongst drivers and the significant impacts of cannabis use on driving skills, the likelihood of a link between cannabis use and vehicle crashes in Afghanistan cannot be ruled out. Research is needed to explore the link between cannabis and vehicle crashes and related mortality and morbidity in Afghanistan.

Likewise, the association between cannabis use and crime and educational attainment is also not fully explored in Afghanistan. However, evidence suggests that there are links between cannabis use and increased crime rates. Due to ongoing turmoil in Afghanistan, cannabis use may likely have significant impacts on increasing the crime rate and low education attainment, especially, amongst 20 to 28 years old individuals.

The Afghanistan population literacy rate is 28.1%. The male literacy rate is 43.1% and the female literacy rate is 12.6 (CIA - The World Factbook). This means that more than two third of Afghans are illiterate and cannabis use might likely have had its contribution in this process which has been unmapped. This is very important to measure the impact of cannabis use on educational attainment in Afghanistan. Moreover, Studies are needed to measure the increased rate of crime and low education attainment amongst young adult in connection with cannabis use.

3.2 Recommendation

In order to mitigate cannabis production, use, and its health consequences in Afghanistan, multi-approach strategies need to be adopted by various governmental and non-governmental entities, including the ministry of counternarcotic, ministry of health and ministry of defense. This multi-approach process can be applied through the following recommendations:-

1. Public education programs can play an important role in the control of illicit drugs, especially, in the control of cannabis. As 2/3 of the population in Afghanistan are illiterate and are unable to appreciate the adverse outcome of cannabis use; therefore, they are health professionals, public health workers, religious scholars, such as Imams (Mullahs) and tribal elders, who can increase awareness concerning the negative health outcomes of cannabis.
2. Health workers can present evidence based ill effects of cannabis on health and they may change the common view concerning cannabis use and the disadvantages, and thus playing a positive role in cannabis harm reduction.
3. Most people, especially, in remote districts, do not consider cannabis as harmful substance and even educated people have little information about the relationship of cannabis use and mental illnesses, such as psychosis, depression and anxiety. In order to educate people concerning the adverse outcomes of cannabis use; media need to be involved in this process and need to spread the message. This approach can be implemented in cities through print and digital media while in remote district where such facilities are not available, radio, religious scholar such as Imams (Mullahs) and local heads of the areas can be included as role players in propagation of the message.

4. Spreading of messages through prominent figures, such as tribal elders and Imams (Mullah), can be effective for reducing cannabis production and use. In a cannabis survey in Afghanistan by UNODC (2011) the majority of farmers, who had ceased cannabis cultivation, were convinced that cannabis cultivation was Haram (taboo) in Islam. Twenty one percent of farmers, who ceased cannabis cultivation in 2011, were convinced that its cultivation was harm (banned in Islam), 19 % left cannabis cultivation due to government ban while 7% quit cannabis farming due to tribal elders encouragement (UNODC 2011). So, if Imams are employed in this process and provided with a monthly regular salary, it would significantly reduce the production and use of cannabis in Afghanistan. The salary of these Imams would be a trivial amount in comparison for the fund spent each year in campaigns for counternarcotic efforts in Afghanistan. At the same time tribal elders and Afghan government ban on the illicit drug can also help to mitigate cannabis and narcotics production and use in Afghanistan.
5. Drug screen regulation should be enacted both for the new recruits to arm forces of Afghanistan and for drivers prior to issuing them driving license. This screening should include urine and blood tests for narcotics and illicit drugs. In addition, drug and psychiatric history should also be included in these screenings. Those who test positive should not be employed or issued a driving license. They need to be treated properly before recruitment and referred for proper counseling.
6. Teachers and parents can also play a positive role in cannabis use reduction, especially, in teenagers. First teachers and parents need to be educated by health professionals and public health workers about the negative health consequences of cannabis use. Based on this awareness teachers can monitor students' performance in schools and they can work

to gather with parents for the evaluation of students' poor performance. If necessary they can seek help from health professions. Parents can also play a major role in control or prevention of cannabis use in their children. Parents need to establish a constructive relationship with their children and need to discuss the issues of cannabis and smoking with their children. They also need to monitor their children peers and their habits and activities.

3.3 Summary and Conclusion

Afghanistan will become worlds the major cannabis producing country (UNODC, Afghanistan Cannabis survey 2009). The prevalence of cannabis use in Afghanistan is 8.1 in male and 0.2 present in female (UNODC, Afghanistan Cannabis survey 2009). Cannabis is widely used amongst police and army recruits as well as amongst public transport drivers. According to Nordland & Wafa, (2010), 12-40 percent of Afghan Police recruits tested positive for drug use which included marijuana, hashish and opiates. Based on unofficial surveys, more than 70 percent of public transports drivers who are driving on major highways are addicted to cannabis and other illicit drugs. Cannabis use can be linked to various negative health outcomes, including but not limited to, increased risk of schizophrenia, psychosis (hallucination and paranoia), impaired motor control and consequent impairment of driving skills, negative educational attainment, and increased crime rate; however, there are few studies available to measure the health consequences of cannabis in Afghanistan. Despite data unavailability, observations indicate the highest use of cannabis amongst drivers and increased rate of incidence of vehicle crashes, increased use of cannabis and hostility in Afghan soldiers and their attacks on the their local and international counter parts, and poor education attainment amongst students and

security issues in cannabis plagued areas. There is a dire need for studies and research in this domain for the evaluation of cannabis use and its health consequences in Afghanistan.

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