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RESEARCH ARTICLE

DOSE OF REALITY: POST MARIJUANA LEGALIZATION IMPACT IN MARIJUANA LEGAL STATES.

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Abstract

Marijuana is one of the most abused drugs in the United States. In recent years, it has become one of the most discussed topics with massive media coverage. The principal reason for its nationwide coverage is a constant debate over its legalization. At present, nine states and Washington, D.C. have legalized recreational marijuana. It has been around six years since marijuana was legalized in Colorado and Washington. Also, medical marijuana is legal in thirty states. However, there is a big divide between people's beliefs on the matter of marijuana legalization. Proponents of marijuana legalization argue that it would allow people to use a relatively safe substance without the threat of arrest, raise new revenue from marijuana sales, and redirect resources to fund new programs. Opponents of marijuana legalization argue that it is too dangerous to use, lacks FDA approval, and has adverse health consequences, and increased societal costs. The goal of this study is to offer an up-to-date overview of the existing information available on the impact of marijuana legalization on the society in marijuana-legal states. An accurate view of this subject would contribute to increased knowledge and improved awareness among people towards marijuana. However, the nationwide effect of legalizing marijuana remains an open question requiring further research and studies.

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Background And Introduction:-

In recent years, marijuana has become of the most hyped drug frequently covered by the media due to the constant debate over its legalization. There are also many discussions regarding the short and long-term impact of its legalization. The nationwide effect of marijuana legalization is still unknown. However, the individual state government takes into account the demand of the majority of the population. Washington and Colorado became the

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first two states to legalize recreational marijuana in 2012. Alaska, Oregon, and Washington, D.C. followed in 2014. Voters in California, Maine, Massachusetts, and Nevada backed legalization in 2016 [1].

Proponents and opponents of marijuana legalization are preparing to fight over ballot measures in a couple of states this year. In November 2018, Michigan voters will decide whether to become the tenth state to legalize recreational marijuana, while the electorate in Missouri and Utah will choose whether to join 30 other states by legalizing marijuana for medical purposes [2]. Legalizing measures are also in motion in North Dakota, Nebraska, Arizona, and Ohio for recreational use marijuana [3].

Nonetheless, there is a great divide between people's beliefs on this matter. The states which have legalized marijuana offer a whole list of benefits. Similarly, the states including the federal government, which have not legalized marijuana are still holding on a list of disadvantages and are analyzing outcomes of marijuana legalization in states.

Is there any particular reason why marijuana should be illegal, or is the federal government just making money from arresting and penalizing people with it? Is there truly a medical use of marijuana, or is it just a gateway drug for kids and adolescents? These are some questions everyone should know the answers to before they can speak in favor of legalizing marijuana. In this review paper, we have mentioned the most common concerns about marijuana legalization here in one place for your edification. We have also discussed the issues that arose after legalizing marijuana in marijuana-legal states.

1. Economic outcome

It is speculated that the marijuana industry would be one of the biggest industries in the United States; sales could reach up to \$24 billion in tax revenues for federal, state, and local governments by 2025 [4]. In 2016, the legal marijuana industry generated \$7.2 billion of revenue across the United States, and it added millions of dollars in federal taxes paid by legitimate marijuana businesses [5]. Colorado state tax collections exceeded \$140 million, and Washington tax revenue reached \$270 million in 2016 [6-7]. If all states legalize and tax marijuana, it can collectively generate between \$5 billion and \$18 billion annually and have a very positive impact on the economy.

However, the harmful effects of marijuana involve an entire society rather than just an individual consuming the drug. The magnitude and cost of the problems resulting from marijuana legalization compared to the cost associated with marijuana sales are called "societal costs." [8]. Due to insufficient data on societal costs from marijuana legalization, and for the sake of understanding how marijuana legalization would harm our economy, we have mentioned annual societal costs of alcohol and tobacco industries. The yearly societal costs from alcohol (\$223.5 billion) and tobacco (\$193 billion) are far higher than the \$24 billion in tax revenues the government raises [9].

2- Consumer Safety vs. Gateway to the drugs

Legalization allows the government to regulate the entire supply of marijuana for consumer safety. People buying marijuana illegally on the street have no way of knowing that the marijuana they are ingesting is safe. It could be covered with mold, fungus, other harmful substances [10]. Once marijuana is legalized, the government can enforce necessary regulations for the consumers. For example, Washington law requires health warnings, quality assurance, and labeling for the concentration of THC for the safety of the consumers [11]. Similarly, California regulations include limitations on the serving sizes for edible marijuana products, seed-to-sale testing and tracking, and 25-hour video surveillance at retail stores [12].

Marijuana legalization would increase its availability and acceptability, and it would create a perception that the consumption of drugs is acceptable. Studies have shown that people who use illicit drugs such as heroin, cocaine, or methamphetamine, started with marijuana and alcohol in their teens [13]. Fiellin LE et al. demonstrated in his study that individuals who used marijuana in the past were 2.5 times more likely to abuse prescription medications than their counterparts without a history of cannabis use [14]. Since the long-term outcome of marijuana use still needs further investigation, the best approach is not to consume it in any form.

3- Black market activity and effects on organized crime since legalization

Licensed and taxed legal marijuana can help to replace the black market sales of marijuana. It can phase out the black markets, take money away from the drug cartels, and it can help to decrease organized crime. Data from the US Border Patrol show that marijuana seizures have demonstrated that domestic legal production is decreasing

demand for marijuana smuggled in from Mexico [15]. According to the American Civil Liberties Union (ACLU), legalization in Colorado and Washington has cost Mexican drug cartels an estimated \$2.7 billion in profits [16]. By the year 2020, Colorado is expecting 90% of its marijuana market to be licensed and taxed, demonstrating that the black market can be replaced by legal, regulated sales [17].

Even though there are more than 500 legal marijuana stores in Colorado state, the black market is still booming. Most of these are being driven by criminal organizations that grow weed in Colorado and smuggle their crop into states where it is still illegal and can be sold for a much higher profit [18]. Moreover, the drug cartels are now trading drugs like heroin and cocaine for marijuana, since marijuana has opened the door to other drugs for people, thus enhancing black market sales and profit. [19].

4- Effects of marijuana on the environment

Commercial cannabis production is hurting our environment in many ways. Forest fragmentation, soil erosion, landslides, and habitat destruction are some of the adverse effects of commercial cannabis production [20]. Water and electricity needed for marijuana crops are another extra burden on the state. A single marijuana plant almost needs double the amount of water per day as compared to the water required to grow grapes and tomatoes [21]. A survey of a marijuana plantation site in Northern California demonstrates 50-100% increase in the number of watershed lands used for marijuana production [20]. Many marijuana farmers draw surface water during the summer season, the plant's growing season, leading to a worsening drought condition in the zone.

Wetland ecosystems play a vital role in the survival of wildlife species, especially birds and fish. Destruction of wetland ecosystems and creation of drought zones can threaten the survival of the wildlife species. A senior fellow, Rosamond Naylor, at Stanford Woods Institute for the Environment said, "Taking water directly from rivers and streams in the summer not only reduces the water available for agriculture but also threatens wildlife species, especially birds and fish, that depend on these wetland ecosystems for survival" [20].

Indoor plantation of marijuana has its repercussions. It requires a significant amount of electricity for lighting, heating, and ventilation of marijuana crops. Legal marijuana growers use the grid for the indoor electricity, and 2/3rd of the electricity from grid comes from fossil fuels. That means to grow 1 pound of indoor marijuana from fossil fuels; it generates 1.95 metric tons of carbon dioxide. It is the same amount of carbon that is sequestered by 1.6 acres of the United forests in a year [22].

Marijuana agricultural industry is still in its infancy, and policy-making is still catching up to legalization and the growth of the marijuana industry. We hope for more studies to evaluate and assess the amount of damage from marijuana production on the environment.

5- Increase in marijuana-related emergency visits

People going to the emergency department after marijuana consumption highlights new challenges associated with its legalization. The common reasons for people going to the emergency room because of marijuana include accidental pediatric ingestion, acute intoxication, cannabis hyperemesis, and butane hash oil burns. In Colorado hospital, the number of teenagers and young adults who visited the emergency department for marijuana-related issues doubled after its legalization. Wang GS et al. in his study observed similar findings. The authors of the study reported that 106 teens and young adults visited Children's emergency room for marijuana-related reasons in 2005, and that number jumped to 631 in 2014 [19].

All of the issues mentioned earlier involve social learning and education. Safety measures for accidental pediatric ingestion of marijuana such as childproof packaging should be considered. People visiting the emergency department with the acute intoxication of marijuana should be educated about marijuana dosing and effects of marijuana before being discharged to avoid future events.

6- Welfare programs vs. Lost productivity

Tax revenues generated in marijuana legal states can help state and local government to provide funding to the police, drug treatment, housing programs, and school programs [23]. In Colorado, \$40 million of marijuana tax revenue was used in public school construction, while \$105 million went to housing programs, mental health programs in jails, and health programs in middle schools in 2016-17 [24-25].

Revenue generated from marijuana legalization can be used in state-level programs for the welfare of the society. However, it is hurting businesses by causing preventable accidents and low productivity. In Colorado, the workplace incidents involving employees under the influence of marijuana increased from 6% to 20% the year after its legalization [19]. An article published in the Journal of Occupational and Environmental Medicine reported a statistical association between illicit drug use (including marijuana) and workplace accidents.

7- Youth marijuana use since the legalization

As more and more states are legalizing marijuana for medical and recreational uses, the stigma associated with its use is declining steeply. Marijuana legal states allow marijuana use in adults ages 21 and over. Recreational marijuana use by children and teenagers is not legitimate in any state. However, statistics have shown that the percentage of teens, aged 12-17 years, using marijuana is much higher in every legal marijuana state than the states where marijuana is not permitted. According to a national survey on drug use and health, 14.11% teens in California, 16.21% of Colorado teens, and 18.86% of teens in Alaska reported marijuana use in 2014-2015, compared to a national average which was 12.29% for the United States overall in 2014-2015 [26].

However, due to the initiation of marijuana awareness campaigns and youth programs in legal marijuana states, different studies have found a drastic decrease in marijuana use in kids ages 12 to 17 years. A study from the Centers for Disease Control (CDC) found that marijuana use in kids ages 12 to 17 years decreased by 2.8% from 15.8% in 2002 to 13.1% in 2014 [27]. Similarly, according to the National Survey on Drug Use and Health, in Colorado, there was nearly a 12% drop in marijuana use just seen in two years after its legalization [28].

Marijuana use can have very harmful effects on brain cells because the human brain is not fully developed until around the early 20s [29-30]. According to Fergusson DM et al., teens who use marijuana are at increased risk of problems with memory and learning, impaired coordination, and difficulty maintaining attention [31]. Moreover, marijuana use has adverse effects on social and school life among its teen users such as a decline in school performance, increased risk of mental health issues, impaired driving and potential for addiction [32-35].

Marijuana use in early age can lead to long-term consequences. Parents and physicians must begin talking about the risks and effects of marijuana use at an early age. Moreover, in legal marijuana states, policies should be made in providing health education to both parents and children about the harmful effects of marijuana use at an early age.

Conclusion:-

Marijuana is one of the most abused drugs in the United States, and its legalization would only increase its use among people. Legalization did lead to an increase in health care visits, workplace accidents, hospital admissions, marijuana-related traffic fatalities, and harmful effects on the environment. However, state-level policies still take time to be effective and alleviate these problems. The legal marijuana impact on the economy included increased jobs, tax revenue, and welfare programs. However, the nationwide effect of legalizing marijuana remains an open question requiring further research and studies.

References:-

1. States where marijuana is legal. (2018). Accessed: June 28: <https://www.businessinsider.com/legal-marijuana-states-2018-1>
2. Recreational weed could be legalized in Michigan: What to know. (2018). Accessed: June 6: <https://www.freep.com/story/news/local/michigan/2018/06/06/recreational-weed-michigan-voters-2018/677531002/>.
3. Which States Will Be Voting on Marijuana in 2018?. (2018). Accessed: May 26: <https://www.fool.com/investing/2018/05/26/which-states-will-be-voting-on-marijuana-in-2018.aspx>.
4. America's marijuana industry headed for \$24 billion by 2025 . (2017). Accessed: Feb 22: <https://www.thecannabist.co/2017/02/22/report-united-states-marijuana-sales-projections-2025/74059/>.
5. Earl Blumenauer, "The Path Forward: Rethinking Federal Policy on Marijuana," blumenauer.house.gov, 2017-2018
6. Lauren Dixon, "How Growing Marijuana Legalization Could Affect the Economy," talenteconomy.io, Dec. 20, 2016
7. RCG Economics and Marijuana Policy Group, "Nevada Adult-Use Marijuana: Economic & Fiscal Benefits Analysis," rcg1.com, July 2016
8. Legalize Pot? You Must Be High . (2014). Accessed: Nov 7: <http://time.com/3573394/legalize-pot-you-must-be-high/>
9. Bouchery EE, Harwood HJ, Sacks JJ, Simon CJ, Brewer RD: Economic costs of excessive alcohol consumption in the U.S., 2006 . *Am J Prev Med.* 2011, 41:516-524. 10.1016/j.amepre.2011.06.045

10. Jay Barmann, "80 Percent of Medical Marijuana Tested at Recent NorCal Conference Is Tainted with Mold, Other Toxins," *sfirst.com*, Aug. 31, 2017
11. Washington State Legislature, "WAC 314-55-105: Packaging and Labeling Requirements," *apps.leg.wa.gov* (accessed Jan. 8, 2018)
12. Brooke Staggs, "Here Are the Rules for Legal Marijuana in California Once Law Goes into Effect Jan. 1," *ocregister.com*, Nov. 16, 2017
13. Nationwide Trends . (2015). Accessed: Jun: <https://www.drugabuse.gov/publications/drugfacts/nationwide-trends>.
14. Fiellin LE, Tetrault JM, Becker WC, Fiellin DA, Hoff RA: Previous Use of Alcohol, Cigarettes, and Marijuana and Subsequent Abuse of Prescription Opioids in Young Adults. *J Adolesc Health*. 2013, 52:158-163. 10.1016/j.jadohealth.2012.06.010
15. United States Border Patrol, "Sector Profile - Fiscal Year 2015 (Oct. 1st through Sept. 30th)," *cbp.gov* (accessed Jan. 8, 2018)
16. 16-American Civil Liberties Union (ACLU), "The War on Marijuana in Black and White," *aclu.org*, June 2013
17. Christopher Ingraham, "Justin Trudeau May Have Made the Best Case for Legal Pot Ever," *washingtonpost.com*, June 10, 2016
18. <https://420intel.com/articles/2018/05/28/why-colorados-black-market-marijuana-booming-4-years-after-legalization>
19. Lessons Learned after 4 Years of Marijuana Legalization. (2016). Accessed: Oct: <https://learnaboutsam.org/wp-content/uploads/2016/11/SAM-report-on-CO-and-WA-issued-31-Oct-2016.pdf>.
20. Marijuana's Environmental Impacts. (2015). Accessed: Jul 10: <https://woods.stanford.edu/news-events/news/marijuanas-environmental-impacts>.
21. Marijuana's hidden price: Environmental impact . (2016). Accessed: Oct 19: <https://www.sciencedaily.com/releases/2016/10/161019173110.htm>
22. Everything you need to know about pot's environmental impact. (2016). Accessed: Apr 19: <https://grist.org/living/everything-you-need-to-know-about-pots-environmental-impact/>
23. Drug Policy Alliance, "So Far, So Good What We Know about Marijuana Legalization in Colorado, Washington, Alaska, Oregon and Washington, D.C.," *drugpolicy.org*, 2016
24. Larson Silbaugh, "Distribution of Marijuana Tax Revenue," *colorado.gov*, July 2016
25. Jennifer Calfas, "How Colorado's Booming Marijuana Industry Is Helping Fight Homelessness and Drug Addiction," *time.com*, June 1, 2017
26. <https://www.samhsa.gov/data/sites/default/files/NSDUHsaeShortTermCHG2015/NSDUHsaeShortTermCHG2015.htm>. (2016). Accessed: Sept 8: <https://www.samhsa.gov/data/sites/default/files/NSDUHsaeShortTermCHG2015/NSDUHsaeShortTermCHG2015.htm>
27. Alejandro Azofeifa, et al., "National Estimates of Marijuana Use and Related Indicators - National Survey on Drug Use and Health, United States, 2002–2014," *cdc.gov*, Sep. 2, 2016
28. Substance Abuse and Mental Health Services Administration, "National Survey on Drug Use and Health: Comparison of 2013-2014 and 2014-2015 Population Percentages," *samhsa.gov* (accessed Jan. 8, 2018)
29. Johnson SB, Blum RW, Giedd JN: Adolescent maturity and the brain: the promise and pitfalls of neuroscience research in adolescent health policy. *J Adolesc Health*. 2009, 45:216-221. 10.1016%2Fj.jadohealth.2009.05.016
30. Rubia K, Overmeyer S, Taylor E et al.: Functional frontalisation with age: mapping neurodevelopmental trajectories with fMRI. *NeurosciBiobehav Rev*. 2000, 24:13-19. 10.1016/S0149-7634(99)00055-X
31. Fergusson DM, Boden JM: Cannabis use and later life outcomes. *Addiction*. 2008 , 103:969-976. 10.1111/j.1360-0443.2008.02221.x
32. Broyd SJ, van Hell HH, Beale C, Yücel M, Solowij N: Acute and Chronic Effects of Cannabinoids on Human Cognition-A Systematic Review. . *Biol Psychiatry*. 2016, 79:557-567. 10.1016/j.biopsych.2015.12.002
33. Copeland J, Rooke S, Swift W: Changes in cannabis use among young people: impact on mental health. *Curr Opin Psychiatry*. 2013, 26:325-329. 10.1097/YCO.0b013e328361eae5
34. Bondallaz P, Favrat B, Chtioui H, Fornari E, Maeder P, Giroud C: Cannabis and its effects on driving skills. *Forensic science international*. *Forensic Sci Int*. 2016, 268:92-102. 10.1016/j.forsciint.2016.09.007
35. Hartman RL, Huestis MA: Cannabis effects on driving skills. *Clin Chem*. 2012, 59:478-492. 10.1373/clinchem.2012.194381