

Fall 2019

## Opioid Epidemic

Amy Ford  
aford09@outlook.com

Follow this and additional works at: <https://digitalcommons.murraystate.edu/bis437>

---

### Recommended Citation

Ford, Amy, "Opioid Epidemic" (2019). *Integrated Studies*. 242.  
<https://digitalcommons.murraystate.edu/bis437/242>

This Thesis is brought to you for free and open access by the Center for Adult and Regional Education at Murray State's Digital Commons. It has been accepted for inclusion in Integrated Studies by an authorized administrator of Murray State's Digital Commons. For more information, please contact [msu.digitalcommons@murraystate.edu](mailto:msu.digitalcommons@murraystate.edu).

Running head: OPIOID EPIDEMIC

Opioid Epidemic

Amy L. Ford

BIS 437

## Contents

Abstract.....	4
Introduction.....	5
Overview.....	5
What are Opioids?.....	5
Markers of Opioid Crisis .....	7
The phases of the Opioid Epidemic .....	9
Causes of Opioid Epidemic .....	11
Risk factors to Opioid Epidemic .....	13
Opioid availability .....	13
History of Involvement in Criminal Justice System .....	14
Lack of treatment.....	14
Low Tolerance because of Recent Abstinence .....	14
Combination of Opioids with Psychoactive drugs.....	15
Race, income, and region.....	15
Age and Gender .....	16
Alcohol abuse and Smoking .....	17
Surgery.....	17
History of Depression, Neuropsychiatric Disorders, and Antidepressants Use .....	18
Administration Route.....	19
The number of pills and duration of dosage .....	20
Formulation.....	20
Impacts of Opioid Crisis .....	21
Physiological/ biological/ Medical Impacts .....	21
Societal and Psychological Impacts.....	25
Economic Impact .....	27
Prevention of Opioid Epidemic.....	32
CDC Programs to Prevent Opioid Epidemic .....	32
General strategies for preventing opioid epidemic .....	34

Drug Courts..... 46

Medication-Assisted and Abstinence-based Treatment ..... 47

Education and training of the community ..... 47

Incentivize more Providers of Opioid treatment..... 48

Fight Stigma Related to Substance Use Disorders (SUDs)..... 49

The Global Reality of Opioid..... 50

Conclusion ..... 53

### **Abstract**

Most narcotics and non-synthetic drugs have medicinal values that have helped in treating various conditions in medical practice. Opium is a typical plant that has proved remarkable medicinal values. Opium extracts (opioids) are the most effective analgesics available for tackling pains. Unfortunately, while healthcare and pharmaceuticals exploited the health benefits of the substance, its dirty aspect (addiction) unveiled. As people developed dependence, the pharmaceutical players involved in opioids production increased quantities and enticed medical practitioners to increase prescriptions for the opioid-based painkillers. Consequently, the addiction grew, and healed patients continued the use that has led to widespread overdose and deaths. Currently, the opioid epidemic is a critical healthcare event in America. While the opioid epidemic is a global problem, exploring the subject with a focus on the United States (U.S) provides a clear understanding of the phenomenon. Understanding the opioid epidemics requires covering topics like history, causes, impacts, prevention, and risk factors. A short review of the global status of the pandemic helps diversify the coverage of the epidemic past the U.S.

## Opioid Epidemic

### **Introduction**

#### **Overview**

The United States of America (U.S.A) has had the most prolonged and constant fights against narcotics and drug abuse. The anti-narcotics war has been local and international. With its global drug cartels, Mexico has become a central subject of American drug wars in foreign lands. Besides creating the Drug Enforcement Agency (DEA) to tackle local drug offense, America has gone to the extent of deploying the military to safeguard and eradicate plantations of opioids in foreign countries like Afghanistan. Despite the concerted anti-narcotics efforts, the U.S suffers from an opioid crisis or epidemic. The country has become a victim of widespread deaths of citizens caused by opioid overdose. Opioid epidemic describes the increased hospitalizations and deaths caused by an overdose of opioids accessed as prescription drugs, analogs, and illicit drugs. Understanding the opioid crisis requires the consideration of various issues and subtopics. Among the subtopics to guide the understanding of the crisis includes the history of opioids in the U.S, types of opioid drugs, additive effects, markers of the crisis, resolving the crisis.

#### **What are Opioids?**

Understanding the meaning of opioids and the related drug types are important before exploring the epidemic. John Hopkins Medicine (2019) defines opioids as a category of drugs derived from opium poppy vegetation. Opioids work by relieving pain in the brain of users. Indeed, sedation and pain relief are the main reasons for using opioids. John Hopkins Medicine (2019) clarifies that opioids are retrievable as prescription medications specified as painkillers or street drugs like heroin. Most opioids serve to block the transmission of pain between the body

and the brain and often prescribed for mild to extreme pain. Besides pain control, opioids can make users perceive relaxation, high or happy. Such effects account for the addictiveness of opioids.

John Hopkins Medicine (2019) clarifies that despite opioids relieving pain, they are different from over-the-counter painkillers like Tylenol and aspirin. Opioids exist under different names. The most common name includes prescription opioids that include Vicodin and OxyContin morphine, hydro-morphine, methadone, methadone hydrochloride, hydrocodone bitartrate, and pseudoephedrine-hydrocodone. Fentanyl (synthetic) is also a standard prescription opioid and has 50 to 100 times high potency than morphine. The heroin is the illegal form of opioid.

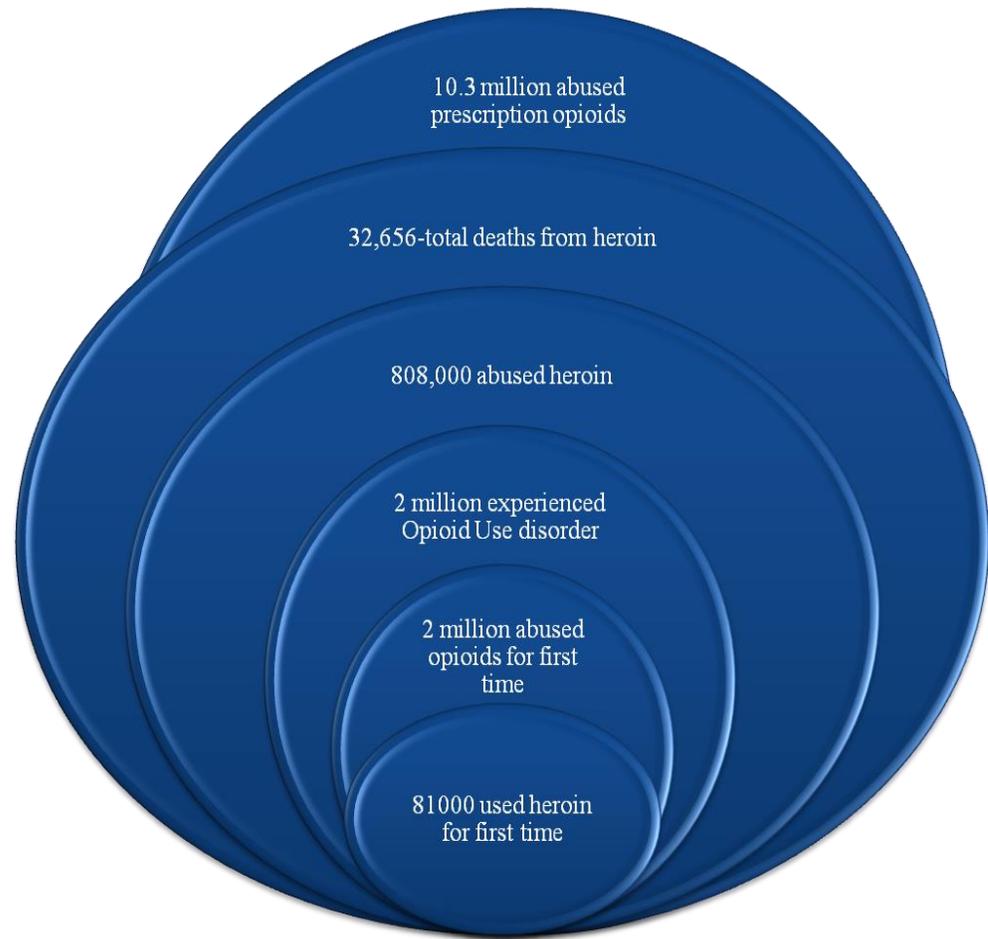
John Hopkins Medicine (2019) warns that opioid consumption is not clear of risks. Regular intake of the substances can cause tolerance and dependence. Consequently, a user will require higher doses taken frequently. Widespread use of the substance can lead to addiction or “opioid use disorder.” John Hopkins Medicine (2019) explains that “opioid use disorder” is the medical state characterized by the inability to abstain from or resist using opioids and behavior related to the substance and that interfere with a healthy life. The disorder manifests through withdrawal signs like sweating and cravings. Additionally, the consumption of high doses can cause breathing problems for the consumer. The danger of respiratory depression increases when taking opioids alongside other medications. John Hopkins Medicine (2019) cautions that the use of opioids to counter diseases should only be an option where alternative medications have failed.

### **Markers of Opioid Crisis**

The opioid epidemic in the United States (U.S) manifests in various ways. Recently, America registered an increasing number of deaths caused by opioid overdose. According to the CDC, deaths from opioid overdose quadrupled throughout the past two decades. The duration lasting from 1999 to 2017, America recorded approximately 400,000 deaths caused by illicit and prescribed opioids. Over 70,000 people died from a drug overdose in 2017, and opioids accounted for 47,600 deaths. Opioid overdose has a direct relationship (leading cause) with injury-related deaths in the U.S. Among the deaths recorded in 2017, 68% were due to illicit or prescribed opioids. CDC explains that the rates of deaths from opioid overdose are highest among people aged between 25 and 54 years. According to the CDC (2019), averagely, America recorded 130 deaths from opioid overdose in 2017.

### **Graph and table**

Health and Human Services Department (2019) reveals shocking statistics attributed to the opioid epidemic in the United States (U.S). According to Health and Human Services Department (2019), about 10.3 million Americans misused prescription opioids in 2018. Approximately 2 million people experienced opioid use disorder in 2018. In the same year, nearly 2 million abused prescription opioids for the first time. Additionally, over 81,000 Americans consumed heroin for the first time (Health and Human Services Department, 2019). More than 808,000 persons abused heroin in 2018. Furthermore, about 15,359 attributed to heroin overdosing occurred during the twelve months ending in February 2019. During the same time, 32,656 people died from overdosing synthetic opioids different from methadone (Health and Human Services Department, 2019).



***Figure 1: Summary of Opioid Tragedy in 2018 in America***

The death rate from opioid overdose varies across the American states. For instance, in 2017, West Virginia had 57.6 per 100,000 deaths caused by opioid misuse (CDC, 2019a). Ohio, Pennsylvania, District of Colombia, and Kentucky recorded 46.3, 44.3, 44.0, and 37.2 per 100,000 deaths, respectively, due to opioid menace. According to the CDC (2019a), the states that registered a significant increase in drug overuse between 2016 and 2017 encompass California, Delaware, Maine, Michigan, Tennessee, and Wisconsin. Additionally, Indiana, Georgia, Florida, Connecticut, Alabama, Arizona, Ohio, North Carolina, South Carolina, and West Virginia also recorded an increase in death rate attributed to a drug overdose during 2016-2017.

### **The phases of the Opioid Epidemic**

CDC (2018) divides the trend of the opioid crisis into three waves. The first wave marked with increased prescription of opioids that started in the 1990s, which escalated overdose deaths associated with prescription opioids. Dasgupta, Beletsky, and Ciccarone (2018) disclose that in 1980, there was a high prevalence of acute pain, and opioids served as the best medications. Propoxyphene was one of the most dispensed drugs in America. In the 1990s, the Institute of Medicine released a report that enumerated various reasons for the increase in the prevalence of chronic pain. One of the bases identified by the (IOM) was the increased survivorship following cancer and injury (Dasgupta, Beletsky & Ciccarone, 2018). The second reason was the increase in the complexity and frequency of surgery. Obesity was the third reason for the prevalence of chronic pain during the 1990s. IOM also castigated the high expectations of patients for pain relief. The last reason was the musculoskeletal disorder of the senior population. After the report, biopharmaceutical manufacturers identified an opportunity to increase the production and marketing of opioids. The association of non-opioid analgesics with cardiovascular complications and the eventual withdrawal from the market encouraged drug manufacturers to produce different versions of opiates. Some manufacturers adopted false marketing and encouraged off-label use of opioids. As of 2000, chronic pain established significant business opportunities for drug manufacturers. Manufacturers also gave kickbacks to physicians and invested in lobbying (Dasgupta, Beletsky & Ciccarone, 2018). Some physicians became unscrupulous and dispensed the drugs with disregard of the medical needs of patients.

The second wave of the epidemic began in 2010 with the sharp surge in overdose demises involving heroin. There was an increase in concern over the combined heroin and opioid analgesic use. Consequently, the death due to heroin overdose started increasing and tripling

over 2010 and 2015 (Dasgupta, Beletsky & Ciccarone, 2018). The transformation was due to an increase in the number of vulnerable people with rising tolerance and dependency. Some individuals who consumed prescription opioids found cheaper and more potent alternatives. This development identified with the reformulation of the OxyContin, which was difficult to temper and crash. Policymakers and clinicians began reassessing the safety and effectiveness of the use of opioid-based analgesics among outpatients.

The third wave of the crisis started in 2013 due to an increase in the overdose of synthetic opioids. The increase in the efficiency of global supply systems and the frequency of interdiction paved the way for the production of less bulky and more potent versions of synthetic opioids. The central synthetic opioids include the illicitly manufactured fentanyl (IMF), whose market changes continuously. The widespread use of the illicit and synthetic versions of opioids worsened over 2013 and 2016 when the national death rate from fentanyl analogs surged by 540% (Dasgupta, Beletsky & Ciccarone, 2018). This rapid increase in the toxicity of the substance inspired its designation as a national health emergency (Dasgupta, Beletsky & Ciccarone, 2018).

Summary of Phases Opioid Epidemic		
Phase	Years	Events
1	1980	Prevalent acute pain Opioid the effective medication
	2000	Manufacturers exploiting pain-relieving opioids (business boom)
2	2010-2015	Deaths from heroin increase OxyContin reformulated Reassessment of opioid analgesics
3	2013	Synthetic opioids overdose
	2016	Use of illicit opioids increased by 540%

### **Causes of Opioid Epidemic**

Many events informed the start of the American opioid epidemic. The severance of pain and worries on its relinquishment to stabilize life laid the foundation for the opioid epidemic. Hagemeyer (2018) elucidates that more Americans suffer from pain than cancer, heart disease, and diabetes combined. Data collected in 2012 showed that about 126.1 million Americans above 18 years suffered from pain. The pain comes from various conditions, events, and diseases. Another data collected in 2016 by the National Center for Health Statistics revealed that 14.9%, 28.4%, and 15.3% of Americans above 18 years suffered severe neck pain, lower back pain, and migraine, respectively, within the previous three months (Hagemeyer, 2018). Additionally, acute back pain affects over 26 million Americans aged 20-64 years (Hagemeyer, 2018). Chronic back pain is also the leading cause of disability among people under 45 years, while the severe headache is responsible for 2.1 million yearly visits to emergency departments (ED). The desire to tackle such severity of pain inspired the exploitation of opioids because of it verified the ability to stabilize patients.

As discussed by the National Institute on Drug Abuse (2019), the outbreak started during the 1990s following the declaration by pharmaceutical companies reassuring the medical fraternity that prescription of opioid-based drugs was safe. For instance, Purdue Pharma initiated aggressive marketing campaigns in 1995 with the assertion that OxyContin was safe from causing addiction. The organization targeted medical practitioners with the highest records of prescribing opioids. The assurance led to increased diversion and abuse of the medication before its addictiveness established. However, Purdue Pharma faced criminal charges for false advertising in 2007 that led to the payment of \$634.5 million in fines to the federal government. The overdose rates of opioids started increasing in 2017 when over 47,000 Americans lost lives

to the menace. National Institute on Drug Abuse (2019) adds that by the end of 2017, 1.7 million U.S citizens suffered from substance abuse disorders linked to pain reliever versions of prescription opioids. As such, prescription opioids are the causes of the opioid epidemic in America. National Institute on Drug Abuse (2019) elucidates that about 6% of the people misusing prescription opioids transition into heroin abuse. Also, approximately 80% of heroin users started by misusing prescription opioids. Indeed, heroin is the main form of opioid that has received the highest consumption. Over several years, the low cost and easy accessibility of heroin that contain fentanyl helped spur addiction and overdose. It is noteworthy that the low cost of heroin than the prescription opioids informed their attractiveness and abuse.

One can also understand the causes of the opioid epidemic by considering the reasons for overdose. The aspect of taking opioids to get high is one of the reasons for overdose (John Hopkins Medicine, 2019). Consuming a drug to attain happiness is seductive, and many such users become addicted. After addiction, individuals develop use disorder that makes people feel abnormal when not using the substance. The desire to take more drugs to attain high and the resistance to the effects lead to overdose, which can be deadly. Also, people overdose opioids by taking prescription opioids frequently or consuming an extra dose. Opioid users may overdose on the substance either accidentally or intentionally. Indeed, some people obtain extra doses from the counter without the knowledge of their physicians. In most accidental scenarios of prescription overdose, physicians increase the dosage to curb a medical condition without realizing that users have become resistant. Another way that opioid overdose occurs is consumption alongside illegal drugs, alcohol, or other medicines. The fatality of an overdose can happen when mixing opioids with anxiety treatment regimens like Valium or Xanax (John Hopkins Medicine, 2019). An overdose can also occur when taking drugs prescribed for another

person. Children are the frequent victims of accidental overdose if they ingest medicines intended for someone else. The risk of opioid overdose also increases if one gets medication-assisted-treatment (MAT). Medication-assisted-treatment is a strategy for treating opioid abuse and addiction. Most of the medications used in MAT are regulated substances, which are subject to misuse or abuse.

### **Risk factors to Opioid Epidemic**

Like other medical conditions, there are precursors or risk factors for opioid overdose and epidemic.

#### **Opioid availability**

Medics and law enforcement agencies link the opioid epidemic to the increased availability of the drug. According to WHO (2013), the reduction in heroin availability and increase in purity have proved effective in reducing overdose. The recent escalation in prescription opioids in America seems to have fostered opioid-related deaths and overdose. Typically, the deaths from overdose increased from 4000 per year in 1999 to over 16000 in 2010 (WHO, 2013).

The effect of opioid availability in increasing the opioid epidemic is clear from the study conducted by Bedene, Lijfering, Niesters, van Velzen, Rosendaal, Bouvy, Dahan, and van Dorp (2019) in the Netherlands. Bedene et al. (2019) conducted the cohort study between 2013 and 2017 to determine the frequency of opioid prescriptions and the associated adverse effects. The study also investigated the risk factors related to opioid prescriptions within the Netherlands. Bedene et al. (2019) found that 4.9% (or 814,211) of the Dutch population received a prescription of opioids. In 2017, 6% or 1,027,019 of the Dutch received one or more opioid prescriptions. The trend means that access to or the availability of opioids in the Netherland

increased between 2013 and 2017. Consequently, the rate of admission to healthcare facilities because of opioid overdose surged from 9.2/100,000 to 13.1/100,000 Dutch in 2013 and 2017, respectively. Subsequently, the researchers observed increased deaths related to opioid overdose from 0.83/100,000 to 1.2/100,000 Dutch in 2013 and 2017, respectively.

### **History of Involvement in Criminal Justice System**

As discussed by Phillips, Ford, and Bonnie (2017), involvement with the criminal justice system predicts the risk of opioid use disorder (OUD). A study conducted in 2006 to analyze data on incarceration, arrests, and heroin intake estimated that about 36% of individuals with OUD attributed to heroin go through the American jails and prisons yearly. Additionally, people recently discharged from prisons and jails face the greatest dangers of opioid overdose than other populations. Factors like social isolation, high relapse rate, and retarded tolerance inform the increase in the vulnerability of ex-convicts to the opioid epidemic.

### **Lack of treatment**

According to WHO (2013), the treatment of opioid addiction with “opioid substitution treatment” lowers the danger of overdose by about 90%. Most countries offer limited access to treatment, which inspires increased resistance and dependence. Some patients also stop opioid disorder treatment prematurely, which is responsible for the return to out-of-treatment overdose risk.

### **Low Tolerance because of Recent Abstinence**

Recent abstinence from opioids, especially when forced, like during incarceration, increases the risk for a fatal overdose of an opioid. WHO (2013) states that substantial evidence has demonstrated that period immediately after discharge from a rehabilitation center and leaving prison associated with elevated risks for overdose. Erroneous judgment and diminished tolerance

among convicts who were formerly dependent on opiates are the leading causes of high overdose mortality among former prisoners.

### **Combination of Opioids with Psychoactive drugs**

In the events of fatal overdose, sedative psychoactive substances like benzodiazepines and alcohol are often present. It is worth noting that sedative psychoactive substances act works on the gamma-aminobutyric acid (GABA) receptors of the brain. Both GABA receptors and opioids involve in respiratory mediation. The combined action of GABA and opioid sedatives leads to a high potency of causing respiratory depression than when either act alone. WHO (2013) reports that a study relating the non-fatal and fatal overdose of opioids in people taking heroin showed that the primary risk issue for deadly overdose was the intake of opioids combined with alcohol and other sedatives. WHO (2013) assert that individuals taking heroin alongside cocaine have a high overdose risk.

### **Race, income, and region**

Zhao, Chen, Feng, Han, and Zhang (2019) report that a recent survey of Africa Americans showed that the demography experience extended acute pains than the non-Hispanic Whites in various situations of critical medicine. Additionally, African Americans are likely to receive nonsteroidal anti-inflammatory drugs (NSAIDs) rather than opioids. A study by Swenson et al. sampled 24,331 female participants that established that the Black race was a substantial risk for persistent opioid intake after hysterectomy. Kuo et al. used analyzed data by the National Medicare collected between 2007 and 2012 and determined that race influenced opioid usage. Maryville University (2019) shares that a study in Washington found that Alaska Native and American Indians exhibited an overdose rate of 2.7 (for opioids) and 4.1 (for heroin) times higher than the Whites. Maryville University (2019) explains that further that the high

vulnerability of Native Americans attributes to elevated rates of concurrent mental disorders and substance abuse. Approximately 8.8% of Native American adults suffered from substance use and mental disorders in 2014 against 3.3% national average. Cauley et al. conducted another study, which suggested that income and region dictated opioid overuse.

According to Zhao et al. (2019), many studies have affirmed that lower socioeconomic conditions promote opioid abuse. For instance, Clarke et al. surveyed 39,140 patients and discovered that individuals from low-income backgrounds required higher opioid doses within 90-days after surgery. Maryville University (2019) refers to a survey conducted in 2017 to assert that 74% of rural farmers are the direct victim of the opioid crisis. The rural population faces an elevated risk of the phenomenon because of low-socioeconomic status.

### **Age and Gender**

As discussed by Zhao et al. (2019), studies have demonstrated that older people (patients) are likely to become persistent opioid users after surgery. According to Zhao et al. (2019), fifty years and above are the riskiest periods for opioid dependence. Swenson et al. investigated the risk determinants for new opioid addiction after hysterectomy and determined age to be an independent risk issue. Nonetheless, studies have shown that young age is a danger for postoperative opioid abuse. For instance, Clarke et al. investigated 39,140 patients over 90 days following surgery and discovered that opioid overdose was higher among the young. Similarly, a study conducted in 2016 showed that 3.6% of youths, mainly between 12 and 17 years, had misused opioids over the past year (Health and Human Services Department, 2019a). Older adolescents and younger adults aged 18-25 years reported a rate double that of younger adolescents. Health and Human Services Department (2019a) clarifies that a majority of the misuse cases were due to prescription opioids rather than heroin. Fortunately, opioid abuse

among youth is decreasing. For example, the past-year abuse of pain medications apart from heroin among high school students dropped from 9.5% to 3.4% in 2004 and 2018, respectively (Health and Human Services Department, 2019a). Similarly, the past year's overuse of Vicodin declined from 10.5% to 1.7% in 2003 and 2018, respectively. Additionally, the rate of OxyContin abuse decreased from 5.5% in 2005 to 2.3 in 2018. Furthermore, twelfth graders believed in 2018 that obtaining opioids was complicated than in the previous years. For instance, in 2010, 54% of twelfth graders in the U.S thought that it was easier to obtain opioids. Conversely, in 2018, only 32.5% of the same demography believed that obtaining opioids was noncomplex. Zhao et al. (2019) contribute that some surveys have proved that women face a greater risk of opioid dependence and overuse than men. However, Zhao et al. (2019), the findings of studies on the impact of gender and age factors vary as far as the increase in preoperative risks of abuse is concerned.

### **Alcohol abuse and Smoking**

Zhao et al. (2019) report that nicotine dependence increases pain sensitivity. Clinical observations data have demonstrated that patients living in an environment with second-hand smoking or have nicotine dependence consumed large quantities of opioids following surgery. Additionally, studies have shown that extended tobacco dependence contributes to increased incidents of preoperative chronic skeletal muscles, peripheral nerves, and back pains. Furthermore, data from many studies have proved that alcoholics face a high risk of opioid overdose after surgery.

### **Surgery**

Zhao et al. (2019) disclose that over 300 million people receive surgical treatments yearly. In most circumstances of operation, opioid is the leading pain-relieving agent used. As

such, pain is the primary reason for opioid prescription and opioid use disorder after surgery. The nature of opioid use problems depends on the type of operations. Sun et al. conducted an extensive retrospective survey that encompassed 641,941 opioid-naïve surgical-patients and 18,011,137 opioid-naïve nonsurgical-patients. The findings showed that apart from cataract surgery, FESS, TURP, and laparoscopic appendectomy, most surgical procedures have increased risks of opioid overuse after an operation. In another survey, Cauley et al. determined that the highest instances of opioid overdose involved pneumonectomy at 1.8/1000 and spinal fusion at 1.2/1000.

Comorbidities and procedures also dictate the chances of an opioid overdose after surgery. For instance, Clarke et al. investigated 39,140 sick people and established that preexisting health conditions like heart failure, lung disease, and diabetes necessitated the prescription of higher doses of opioid over the 90-postoperative days. Soneji et al. conducted a review of 39,140 Canadian senior patients and examined the outcomes on opioid use over 365 days of postoperative follow-up. The findings showed that the number of patients under long-term postoperative opioid use depended on the surgical procedure. The greatest danger of extended opioid intake attributed to thoracic surgery.

### **History of Depression, Neuropsychiatric Disorders, and Antidepressants Use**

An interesting disclosure by Zhao et al. (2019) is that a history of benzodiazepine and psychiatric disorder elevates the risk of opioid overuse. Zhao et al. (2019) cite a study by Clarke et al. that involved a 90-day follow-up of 39,140 postoperative patients, which showed that individuals who used benzodiazepine before surgery exhibited high post-operation opioid use than patients without preoperative benzodiazepine intake. Another study conducted by Sun et al. regarding the use of antidepressants or benzodiazepine before surgery established a positive

correlation with long-term opioid abuse after surgery. Zhao et al. (2019) elucidate that a retrospective study involving 315,428 Americans with private insurance found that concurrent opioid and benzodiazepine intake increased between 2001 and 2013. The increase contributed significantly to the opioid overdose risk. Zhao et al. (2019) also cite a survey by Quinn et al., which established evidence of a positive association between behavioral and psychiatric conditions of patients with commercial insurance and long-term opioid use. Consistently, studies have also shown a definite link between mood disorders, polyneuropathy, and Alzheimer's disease and extended opioid use.

A study conducted in Colorado determined that the history of changing opioid to methadone prescription is a risk factor for opioid abuse (Zhao et al., 2019). The study found the risk of opioids overuse among patients changing from opioid to methadone prescription to be seven times higher than among non-switching colleagues.

### **Administration Route**

Phillips, Ford, and Bonnie (2017) clarify that the route of opioid administration is crucial in determining dependence and overdose that leads to crisis. Many users of opioids use the preparations in a way contrary to prescription and often manipulate the actual pharmaceutical contents. Phillips, Ford, and Bonnie (2017) elucidate that opioid users may crush pills in their mouths, smoke, inject, chew, such, or insufflate. Taking drugs through injection and insufflations places the substance directly into the bloodstream and hastening the crossing of opioids through “the blood-brain barrier” and instigating faster action. As such, the risks of overuse and the development of opioid use disorder (OUD) increase significantly (Phillips, Ford & Bonnie, 2017).

In the bid to avoid overuse and misuse, drug manufacturers innovated techniques and formulations that made crushing and tempering of the pill difficult. Instead of controlling abuse, the abuse-deterrent formulations (ADFs) have inspired addicts to seek other ways of satisfying their cravings. For instance, Albert et al. (2017) conducted a study that revealed that reformulating OxyContin to an ADF prescription drug attributed to the higher-than-expected frequency of heroin. The researchers established that over 80% of cases of heroin use linked to change of formulation. Similarly, studies have associated “ADF Opana ER (oxymorphone ER)” with many injection-related problems. Due to the injected-related problem, FDA (Food and Drug Administration) issued an order in 2017 for the withdrawal and stoppage of Opana ER.

#### **The number of pills and duration of dosage**

According to Phillips, Ford, and Bonnie (2017), recent literature that followed the report of IOM (Institute of Medicine) suggests that the modifiable features of the prescription can cause harm. Extended days of prescription and higher dosages increase the risk of exposure to opioids. Unfortunately, no clarity exists on the number of days when the risk of abuse increases. In recognition of the risk, CDC produced a guideline in 2016 that urges medics to minimize the effective dosage and avoid prescribing higher than needed quantity for an expected time. States like Massachusetts and Maine have passed legislation limiting the supply of opioids for noncancerous pain.

#### **Formulation**

The formulation is another risk factor for opioid use disorder and epidemic. Phillips, Ford, and Bonnie (2017) report that studies have proved that IR (immediate response) and LA/ER formulations have different risk levels. LA/ER increases the risk of a diagnosis of users with fatal and nonfatal overdose as well as with substance abuse disorder. However, few studies

depict that IR medications have nonmedical use and can cause various morbidities. IR medication may expose people to the opioids of first use, considering the routine consumption of the substances after surgical procedures.

### **Impacts of Opioid Crisis**

The opioid epidemic has had deleterious effects on societies. The impacts of opioids crisis vary from the individual, community, to national and global scales. Increased deaths are one of the most apparent effects of the opioid epidemic. The world has been witnessing increasing death rates caused by an overdose of the drug. A lot of information about death trends linked to the opioid epidemic in the United States (U.S) has received adequate focus in the previous topics. As such, it will be redundant to revisit the element of death as an impact of the opioid crisis in detail. Similarly, the aspects of addiction and the related opioid use disorders have received significant coverage in the previous topics.

#### **Physiological/ biological/ Medical Impacts**

Dirks (2018) discusses that the opioid crisis has had negative impacts on pregnant women. Dirks (2018) explains that continued opioid use during pregnancy can affect the unborn fetus. Pregnant women opioid painkiller addiction may decide to ignore the recommended prenatal care to hide their conditions. Such women may fear the repercussions that might follow the discovery of their habit by healthcare providers. Dirks (2018) warns that addicted pregnant women may practice nutritional negligence, which may impact a fetus negatively. Indeed, the number of pregnant women using narcotic pain relievers rose fivefold between 2000 and 2009, and the population continues to rise (Dirks, 2018). The surge in the number of expectant women using opioids has led to the birth of infants with Neonatal Abstinence Syndrome (NAS).

Dirks (2018) clarifies that Neonatal Abstinence Syndrome (NAS) is a condition associated with a congenital disability that manifests through severe withdrawal symptoms exhibited by infants upon birth. Kids born with NAS are likely to experience various withdrawal symptoms, including vomiting, nausea, seizures, and nausea, among others. The symptoms may appear early following birth or latter. Infants with NAS are challenging to feed. Over 50% of women abusing opioids during pregnancy deliver children with NAS. In the United States, the population of children born with NAS is multiplying. Currently, about 6 in 1000, birth in America involve children with NAS.

Besides the withdrawal symptoms, children born to mothers addicted to opioids may experience a long-term delay in development and irreversible learning disabilities. Victim infants may undergo disordered growth of the brain while in the womb. Infants may also exhibit antisocial behaviors. Additionally, NAS infants may exhibit attachment disorder. The fact the condition of most children born with NAS requires special care necessitates the admission of the majority into foster care. Dirks (2018) confirms that the number of children with NAS condition and admitted fostering care increased by 8% between 2012 and 2015. This increment coheres with the escalation in the opioid epidemic.

People injecting drugs face increased harms related to opioids and injection. Specifically, individuals who inject drugs face the risks of ulcers, endocarditis, tissue infection, and abscesses. People sharing syringes among other injection tools face the risk of bloodborne diseases like HIV and hepatitis C virus (HCV). Blood contact is the primary way that HCV spread. It is worth noting that HCV can cause liver cancer and liver scarring. In 2014, the United States (U.S) recorded about 30,500 cases involving infection of acute HCV. In the same year, America had about 3.9 million residents exhibiting chronic HCV. Phillips, Ford, and Bonnie (2017) enumerate

that HCV accounts for approximately 20,000 deaths year. From 2007 to 2012, the cases of HCV infection in Virginia, Tennessee, West Virginia, and Kentucky among people under 30 years increased by 364%. The risk information was present for 265 cases. About 73% of the 265 people with infection reported injection with drugs. According to a study by Zibbel et al. (2015), the same period of 2006 to 2012 defined with an increase in the population of the young (under 30 years) seeking OUD-related treatment in the four states. The findings confirmed that the increase in HCV infection correlated with opioid use disorder. Even the national surveillance produced data that confirm the relationship between increased opioid abuse, especially injectable) and cases of HCV (Phillips, Ford & Bonnie, 2017). The national surveillance showed that 75% of young adults reporting new infection HCV admitted to having injected drugs in the past. Additionally, 75% of the victims of new HCV infected revealed to have abused prescription opioids. As such, there is strong evidence that opioid misuse primarily through injection increase the infection rates of young people with HCV.

The action of HIV involves the suppression of the immune system and increasing vulnerability to cancer, infection, and deaths. Sexual intercourse is the most common way of spreading HIV. However, about 6% (2392) new infections discovered in 2015 in the U.S were due to the use of injection drugs. Phillips, Ford, and Bonnie (2017) report that about 171,000 Americans infected with HIV had injection drugs as the means of infection. The sharing of needles and syringes for drug injection is the leading way that people transfer HIV. Even though the sharing of needles among the Hispanics and Blacks declined between 2008 and 2014, the practice is high among the Whites (Phillips, Ford & Bonnie, 2017). The spread of injectable drugs has caused HIV cases to increase in areas traditionally known as low risk. For instance, southeast Indiana had a standard HIV infection rate of 5 people annually. However, the rate

increased, and by June 2015, there were 169 new cases of HIV infection. The majority of the victims of new diseases were white and young people in rural areas. The infection had a direct link with the new reformulate oxymorphone ER (ADF Opana) for injection. Phillips, Ford, and Bonnie (2017) argue that development caused a significant shift. Since the start of the HIV crisis in the U.S, the majority of people using injectable drugs and infected with the virus were African American men above 35 years living in urban centers. Additionally, the majority of the injections involved street drugs rather than prescription medications.

While opioid epidemic is largely a curse, it has some indirect benefits to the medical field that are worth exploring. Scott, Sayeed, and Christin (2017) narrate that the opioid crisis has had significant implications for transplantation. The most critical barrier to transplantation of organs is the shortage of supply. Scott, Sayeed, and Christin (2017) report that in 2006, approximately 95000 Americans were on the waiting list for organ transplantation. At the same time, 63000 people died because of the inability to find donor organs for transplantation. The opioid crisis is currently changing the situation. Scott, Sayeed, and Christin (2017) refer to a New York article, which highlighted a report by New England Organ Bank that victims of opioid overdose contributed 27% of the area's organ donations in 2016. In 2010, deaths due to opioid overdose contributed only four percent of the total organ donations in New England. The same article reported that drug overdose victims contributed 12% of organ donations nationally in 2016.

While referring to Organ Procurement and Transplantation Network (OPTN), Scott, Sayeed, and Christin (2017) report that the number of donors of organs reached 15070 from 8203 over the past 20 years (about 84% increase). Simultaneously, the population of donors who died because of drug overdose reached 848 from 29 (about 2924% increase). The data by OPTN compiled in 2016 showed that the total yearly donors would exceed the 2015's number. The data

predicted that there would be 1113 additional organ donors by November 30, 2016. Scott, Sayeed, and Christin (2017) clarify that donors dying from drug abuse were likely young with a median age of 31 years. Donors whose deaths occurred due to cardiovascular diseases had a median age of 47 years and stroke (52 years). Furthermore, donors dying due to drug overdose have likely to be free of comorbidities, which would nullify donation. As such, donors whose deaths attributed to substance overdose make excellent sources of organs for transplant.

### **Societal and Psychological Impacts**

The opioid epidemic has a direct relationship to social disorder and instability. According to Dirks (2018), the substance abuse disorder (SUD) exhibited by the majority of opioid users can lead to family fragmentation and social upheaval. Dirks (2018) discusses that approximately eight million kids below 18 years lived in a home with at least one adult suffering from SUD. Such homes are always unstable, and children become vulnerable to various experiences like conflict, violence, fear, loss, and secrecy. Such adverse experiences at home may push the victim children to behavioral, substance abuse, and emotional problems. Dirks (2018) clarifies that substance abuse problems can occur at any age. Moreover, the history of associating or living with somebody who abused is a risk factor for a person to develop substance abuse problems. As such, one can assume that children exposed to parents with opioid addiction problems are like to experience the same later in life.

Dirks (2018) elucidates that parents struggling with “substance use disorder” (SUD) due to opioid abuse are thrice likely to sexually or physically abuse their families. Parents with SUD often have little time to spend with their children. The majority spend the most time looking for drugs or resolving their addiction problems. Such situations make children of parents with SUD to miss crucial parenting opportunities and healthy attachment. Older children of parents with

SUD are also likely to experience role reversal. The kids may face compulsion to take caregiver roles for the younger siblings to fill the gap left by the absent and nonfunctional parents. Dirks (2018) decries that the lack of healthy parenting and attachment increases the vulnerability of children to stress and trauma. Consequently, neglected children may experience problems with anxiety, depression, or related mental disorders.

Hagemeier (2018) cites the findings by Griffin et al. that patients exhibiting opioid use disorder (OUD) depicted the worse mental and physical quality of life than the typical population. Griffin et al. also found that heroin-dependent patients had over 75% prevalence of sleep disturbance problems. This high prevalence of sleep disturbance attributed to increased severity of opioid dependence increased depression and lower quality of life because of retarded physical health. Hagemeier (2018) educates that people with OUD face a higher risk of medical complications attributed to infections like cellulitis, endocarditis, and necrotizing fasciitis. Additionally, individuals exhibiting OUD are more susceptible to transmissible diseases like hepatitis, syphilis, HIV/AIDS, and tuberculosis than the general population. Furthermore, people with OUD face increased the danger of developing diseases related to tobacco smoking like hypertension, coronary artery illness, and obstructive pulmonary disease compared to a typical population. Moreover, opioid overuse exposes users to elevated risks of conditions like gunshot wounds or head trauma caused by criminal activity or intoxication.

The diminishment of the quality of life of people abusing opioids has extended effects that also hurt the family. While referring to the findings of a study by Griffin et al., Hagemeier (2018) reports that caregivers of injecting opioid users admitted bearing mild to heavy burden than families of non-injecting opioid users. In the same study, 100% of the families of samples reported mild to worse financial hardship due to opioid overdose of their members. Additionally,

99% of the families reported that the overdose of opioids by their members caused family disruption. Furthermore, the study found that 85% and 44% of the respondents admitted to having experienced mild to a severe burden on the mental and physical health of members, respectively (Hagemeier, 2018).

### **Economic Impact**

The opioid epidemic has affected the communities where people with opioid use disorder (OUD) live. Hagemeier (2018) elucidates that overdoses of opioids accounted for about 147,654 emergency department (ED) visits in 2014. The medical costs attributed to the visits estimated at \$152.8 million. The public sector has borne over 50% (\$83.7 million) of the total cost. Opioid crisis affects societies through costs related to criminal justice processes, workplaces, and healthcare. Individuals experiencing OUD make more ED visits have more extended inpatient stays, and frequent visits to outpatient physicians than the non-OUD colleagues [without opioid use problems] (Hagemeier, 2018). While citing Meyer et al., Hagemeier (2018) estimates that individuals with OUD account for average healthcare excess costs of between \$14,054 and \$20,546 for private insured and \$5874 to \$15,183 for Medicaid insured. From the findings, it is evident that OUD increases the burden on the healthcare system. The burden manifests through extended wait times and increased overwork of staff, among others.

While referring to Florence et al., Hagemeier (2018) estimates that, the overall cost of the opioid epidemic in 2013 was \$78.5 billion. A report by the Council of Economic Advisers estimated the economic burden of the opioid crisis in 2015 at \$504 billion. Fatality costs from the epidemic account for about 85% of the total burden. Besides the medical and fatality expenses, other economic hardships of the opioid crisis occur as foregone earnings because of noninvolvement in employment and high costs of criminal justice.

Gitis (2018) uses the report of the American Action Forum to reveal and demonstrate the economic impacts of the opioid crisis. According to Gitis (2018), the main economic effects of the opioid crisis relates to a sharp decline in the rate of participation in the labor force by people of employable age. In 2015, about 2 million employable Americans were unemployed because of the opioid crisis. The duration of 1999 to 2015 defined with the loss of 27 billion productive hours because of the opioid epidemic affecting the United States. During the same time, the decline in productive hours slowed the yearly economic expansion at a rate of 0.6%. This rate of economic slowdown translated to the loss of \$1.6 trillion in real economic output. The same timeframe had 1.4% (American men) and 1.8% (American women) of employable age outside the labor force because of opioid dependence.

It is worth noting that the economic impacts of the opioid epidemic, as captured in 2015, vary with states. The States of West Virginia and Arkansas have endured the worst economic effects of opioid menace. Collectively, the two States recorded a 3.8% decline in employment participation by the employable population due to the opioid impacts. The decline in labor force participation translated into a 1.7% slowdown in real economic activities. In Missouri, the opioid epidemic accounted for a 3% negative participation in the labor force. New York and Kentucky recorded 2.9% and 2.8% decline in labor force participation, respectively. Even Georgia registered a 2.9% reduction in the number of participants in the labor force (Gitis, 2018). New York seemingly had the highest number of employable individuals missing from the labor force. About 225,900 New Yorkers did not participate in employment because of opioids. Similarly, Texas had 171,100 residents out of a job because of the adverse effects of opioids.

The reduction in participation in the labor force inspired a significant slowdown in the real economic activities of the individual states. For instance, the fall in labor participation

between 1999 and 2015 saw New York and Texas lose a total of 3.1 billion and 2.2 billion productive hours, respectively. The losses translated into \$128.8 billion (for Texas) and \$179.4 billion (for New York). Additionally, the GDP (gross domestic product) of New York, Kentucky, and Georgia declined by 1.8%, 1.3%, and 1.2%, respectively (Hoevelmann, 2019).

Hoevelmann (2019) narrates that the overall per capita cost of the opioid crisis ranges from more than \$4300 to \$400 in West Virginia and Nebraska, respectively. In 2015, the median overall per capital cost of the epidemic was \$1,672. The economic impact of the opioid calamity in Arkansas State averages to \$33.5 billion (real economic production). Nationally, the opioid crisis bled the economy about \$504 billion in 2015.

Leslie, Ba, Agbese, Xing, and Liu (2019) disclose the overall societal costs of opioid calamity related to opioid use disorder (OUD) reached \$78.5 billion from \$11.8 billion in 2016 and 2001 respectively. People with OUD have higher chances of using medical services like inpatient hospital stays, emergency departments, and physical outpatient services compared to those without addiction. Between 1993 and 2012, the rate of hospitalization for people with OUD increased from 117/100,000 to 296/100,000 patients. A study conducted by the Agency for Healthcare Research and Quality estimated that the number of emergency department visits has grown by 8% annually since 2005. Additionally, the frequency of opioid overdose increased by 200% (2000-2014). The undiagnosed OUD has proved expensive, with an approximate cost equaling 80% of the diagnosed OUD.

Leslie et al. (2019) clarify that beneficiaries of Medicaid face the greatest danger of abusing opioids and developing the use disorder. An estimated 12% of the Medicaid beneficiaries ranging from 18 to 64 years have tested positive for opioid use disorder (OUD). Additionally, Medicaid beneficiaries have between 50% to 100% likelihood of suffering from

substance use disorder (SUD) mental problems than the typical population. In Kentucky, study results proved that 60% of beneficiaries of Medicaid insurance suffering from chronic misused prescription medications and illicit drugs. Furthermore, Medicaid pays over \$18,511 for every OUD-related visit to the emergency department.

Leslie et al. (2019) elucidate that Medicaid covers one-third of people treated for substance use disorder (SUD). Indeed, Medicaid expenditure on SUD increased to 21% in 2009 from 9% in 1986. Leslie et al. (2019) expound that Medicaid accounted for 21% or \$24 billion of the total expenditure by healthcare insurers on SUD treatment in 2009. From 2011 to 2016, the spending of Medicaid on naloxone, naltrexone, and buprenorphine reached \$929.9 million from \$394.2 million (representing 136% change). In 2014, about 14.6% of individuals with OUD benefited from medication therapy. The burden of OUD on Medicare is likely to grow over the years as an opioid epidemic escalates.

Insurance Journal (2019) reveals that the burden of the opioid epidemic on the United States (U.S) between 2015 and 2018 reached \$631 billion. According to the Insurance Journal (2019), the report by the Society of Actuaries' (SOA) projected that the burden of the opioid calamity in the U.S will average at \$188 billion in 2019. Insurance Journal (2019) provides a breakdown of the 2015-2018 economic impact of the opioid crisis. The healthcare sector spends nearly \$205 billion on people exhibiting opioid use disorder (OUD), infants with neonatal opioid withdrawal syndrome, or neonatal abstinence syndrome (NOWS/NAS). The healthcare cost also covered family members of people diagnosed with OUD. The aspect of premature mortality is responsible for 4% or \$253 billion of the total economic cost of the drug. The expenses attributed to premature death include lost earnings by people dying from the crisis or affected by incapacitated by overdose. The burden from the opioid epidemic has also transpired in the form

of criminal justice operations. Such operations include legal adjudication, lost property, correctional facility, and place protection. Overall, the opioid epidemic saw America spend \$39 billion on criminal justice operations throughout four-years (2015-2018). Lost productivity is another measure of the economic impact of the opioid epidemic. According to the Insurance Journal (2019), the burden of lost productivity totaled to \$96 billion over the four-years. The lost productivity measured occurred in the form of incarceration because of opioid-related offenses, payment for workers' compensation to people with OUD, absenteeism, and reduced participation in the labor force. Insurance Journal (2019) reports that the American Government also spent \$39 billion over 2015 to 2018 on programs involving education, family, and child assistance.

The reality of the economic impacts of the opioid epidemic becomes apparent when considering the events following a decline in access to opioids. Gitis (2018) used the findings of the American Action Forum to verify the point. According to Gitis (2018), two states, namely California and New Mexico, experienced the same opioid epidemic and the related effect of declining labor force participation between 1999 and 2015. However, the implementation of the firm national policy against opioids in 2010 saw the two states register encouraging results by 2015. Following the tightened law on opioids in 2010, California reported a 0.1% increase in employee participation in 2015. This change added \$12.9 billion to the economic output of the state and causing a 0.1% surge in annual GDP growth (Gitis, 2018). In New Mexico, the reduced consumption of opioids led to a 0.3% increase in employee participation. This development caused the GDP of New Mexico to increase by 0.1%. Ultimately, there is overall evidence that improvement in opioid consumption (increased epidemic) leads to a slowdown in economic growth while the reverse encourages productivity and growth.

### **Prevention of Opioid Epidemic**

The primary approach to preventing the opioid epidemic is to tackle overdose or abuse. According to the CDC (2019), the American government, through CDC, initiated steps in 2006 to track and discern opioids. The endeavor revealed that prescription opioids were the leading cause of the epidemic. Consequently, the CDC took leadership in addressing the problem by encouraging public health reaction to the menace. In 2019, CDC secured \$475 million dedicated to preventing the opioid crisis and conducting surveillance operations.

#### **CDC Programs to Prevent Opioid Epidemic**

Overall, CDC practices five strategies designed to prevent the opioid epidemic in the America. One of the five strategies by CDC is conducting research and surveillance. CDC believes that timely and high-quality data is crucial in helping public health practitioners and related decision-makers to understand the scope of the crisis. Monitoring and research also help decision-makers to direct resources to the most critical areas. The strategy also facilitates the collection of information for evaluating achievements and supporting evidence-based countermeasures in other regions.

Another strategy employed by CDC in addressing the opioid crisis entails building the capacity of the local, tribal, and state authorities. CDC (2019) executes the procedure in recognition that the regional authorities license healthcare practitioners, monitor prescription drugs, and react to overdose outbreaks. The local authorities also operate public health insurance programs like Workers Compensation and Medicaid and monitor controlled substances. Indeed, CDC has a national reputation of working with community-based bodies through funding and capacity building.

The third strategy employed by CDC (2019) in addressing the opioid epidemic has involved empowering consumers to choose safely. CDC has been running campaigns to create awareness regarding the dangers of misusing prescription opioids. CDC has also conducted “RX Awareness communication campaigns” that feature testimonies of victims of opioid use disorder. The “RX Awareness communication campaign” also features testimonies of people whose family member(s) died from an opioid overdose. The objective of the campaign is educating consumers on the dangers of the prescription version of the drugs. Another aim of the campaign is to emphasize the significance of discussing effective and safer alternatives to managing pain with healthcare practitioners. Additionally, the CDC uses the strategy to promote understanding of the dangers related to non-medical consumption of opioids and risk factors (CDC, 2019).

The fourth technique used by CDC to address the opioid epidemic in the United States (U.S) is a partnership with law enforcement agencies to promote public safety. CDC (2019) has discovered that the outbreak has worsened with increased intake of illicit opioids. Fentanyl (an illicitly manufactured opioid) has up to 100 times higher potency than morphine. As such, the CDC found it reasonable to partner with law enforcement agencies to help tackle the opioid menace. The partnership with law enforcers enhances communication, surveillance, data sharing, and targeting of responses. Through the collaboration, CDC trains emergency or incidence first responders like fire, paramedics, and police on handling cases of synthetic opioids when responding to drug raids, crime scenes, and medical calls.

The last technique adopted by CDC in addressing the opioid crisis in America entails supporting health systems, providers, and payers. CDC appreciates that providers and healthcare facilities they operate are critical in encouraging the safe and valid prescription of opioids for pain eradication (CDC, 2019). As such, CDC provides “Guideline for Prescribing Opioids for

Chronic Pain” to care providers and their healthcare institutions. Additionally, CDC (2019) understands that pharmacy benefit programs and insurers can promote the implementation of the guidelines by CDC via improvement in drug use review, barrier removal, and coverage.

### **General strategies for preventing opioid epidemic**

#### **Clinical strategies**

As earlier indicated, the primary approach to overcoming the opioid epidemic in the United States (U.S) is to address misuse and overdose. Other than the broad preventive strategies by CDC, clinical approaches to addressing overdose or abuse can foster the prevention of the epidemic. Methadone is one of the medicines used to counter opioid addiction. John Hopkins Medicine clarifies that methadone administration occurs alongside counseling and offered in clinical settings. The medication helps in blocking opioid effects and reduces cravings. According to WHO (2013), treatment involving the use of methadone increases opioid tolerance and lowers the problem of additional opioid intake. Methadone lowers the danger of mortality from opioid overdose six-fold.

Buprenorphine is another medicine that helps in tackling opioid cravings by giving lower high than other opioids. Buprenorphine addresses the overdose risk by impeding opioid receptors. WHO (2013) confirms that the rapid adoption of the medical application of buprenorphine helped in the dramatic reduction of opioid overdose in France in the 1990s. Many physicians prescribe the drug as a daily dose dissolved under the tongue. Buprenorphine is also deliverable through injection on a once-a-month basis. The drug is also administrable via thin tubes inserted below the skin biyearly.

John Hopkins Medicine (2019) explains that both methadone and buprenorphine activate opioid receptors in the human body. The activated receptors act by suppressing cravings. The

two drugs are useful for maintenance treatment. The two substances can also serve as taper agents, but some people relapse. John Hopkins Medicine (2019) asserts that patients receiving adequate social support tend to achieve significant milestones in recovery.

Naltrexone is another medicine proved to tackle opioid abuse and dependence that leads to overdose and, ultimately, epidemic. According to WHO (2013), naloxone is a temporary opioid antagonist that attaches tightly to the opioid receptors and replacing other present opioids. WHO (2013) praises that naloxone has a clinical history of treating opioid overdose. The action of naloxone is different from methadone and buprenorphine. Instead of activating the opiate receptor, naltrexone blocks the sedative or euphoric effects of the substance. According to WHO (2013), naltrexone works by countering life-threatening respiratory depression and the CNS (central nervous system). Besides resolving respiratory suppression, naloxone may trigger the emergence of withdrawal symptoms that are last for a short duration. Otherwise, naloxone lacks extreme side effects. An ideal dose of naloxone should not provoke opioid withdrawal but improve respiration. Before the administration of naloxone, it is crucial to perform physical resuscitation to a victim of an overdose. WHO (2013) writes that naloxone acts quickly can restore normal respiration within three to seven minutes of administration. The medicine is administrable orally or injected once-a-month. Spray naloxone has a fast action because of quick absorption into the blood and the respiratory system. Indeed, emergency responders like police officers and firefighters, among others, use the spray naloxone.

### **Preventing Overdose**

Since overdose is the path to the opioid epidemic, avoiding it is one of the strategies for preventing the crisis. One of preventing overdose involves consuming prescription opioids according to the indications by a physician. Patients receiving treatment-involving opioids

should never consume more than the prescribed dosage or increase the frequency of intake than indicated. Opioid patients or users should avoid mixing the drug with other controlled substances, alcohol, and sleeping pills (WHO, 2013). Avoiding accidental ingestion of opioids, especially by children, requires the adoption of safe disposal behaviors of unused medicines. It is also necessary to ensure the safekeeping of opioid medications to avoid the unintended people from accessing them. Tackling overdose may require a patient to train family members about dealing or responding to an overdose.

### **Reducing the supply of opioids**

The widespread availability of opioids encourages overdose and epidemic. One of reducing the overdose crisis is by addressing inappropriate prescription trends and the reckless dispensation by pharmacists without checking the prescription. WHO (2013) cautions that it is noble to reduce the availability of opioids but ensure adequate supply for scientific and medical research in palliative care, cancer pain, acute pain, and addiction treatment.

According to Kansagra and Cohen (2018), the reduction of the flow of opioids among other illicit substances is one of the strategies adopted by North Carolina to fight the opioid epidemic. Law enforcement agents in the state have increased vigilance on drug trafficking. In 2017, North Carolina passed the “Synthetic Opioid and Other Dangerous Drug Control Act” to counter any derivative of fentanyl. The enactment of the law followed a distressing increase in opioid overdose-related deaths promoted by fentanyl analogs that did not meet the criteria for a controlled substance. The passage of the bill legalized all forms of fentanyl.

### **Easing access to Treatment Service for Opioid Disorder**

Kansagra and Cohen (2018) report that while approximately 8% of Americans require treatment for substance abuse, only 1.4% received it. This statement means that access to

treatment services is a problem in America. Prompt treatment services for people with the opioid disorder are an essential aspect of addressing the opioid epidemic. The most effective and proven long-lasting approach to treating opioid overdose among people with heroin dependence and other opioids involves agonist maintenance treatment using buprenorphine or methadone. WHO (2013) reports that various countries have tried naloxone distribution programs into health facilities to tackle the opioid epidemic. WHO (2013) asserts that the distribution program has proved effective in increasing access to treatment of opioid overdose and countering of the related outbreak. A survey conducted in America established that the distribution of about 53,000 kits of naloxone via opioid overdose prevention plans led to 10,000 uses to address overdose cases. Consequently, several American cities reported a significant decline in mortality cases associated with overdose. For instance, New York City started scaling overdose eradication programs in 2005 and witnessed a 22% decline in the overall death rate due to opioid poisoning by 2011. The City also recorded a 27% decline in mortality rate due to unintentional heroin poisoning from 2005 to 2011.

WHO (2013) demonstrates that measures to increase access to opioid treatment services helped in managing death rates related to overdose in Massachusetts. According to WHO (2013), the Massachusetts health department allowed non-governmental organizations to supply and distribute naloxone under the authority of prescribing physicians. Consequently, overdose cases decreased significantly in the areas where bystanders received training to detect overdose and perform breath resuscitation as well as apply naloxone treatment. The achievement in reducing the prevalence of death due to opioid intoxication decreased significantly in the areas with an abundant supply of naloxone than those with limited availability of the medicine.

Easing access to treatment services also means removing administrative restrictions. American Academy of Pediatrics (2019) decries that the prior process of applying for authorization to receive treatment services is complicated and burdensome. The complexities delay access to treatment and life-saving care services. Reducing the bureaucracies can increase the number of eligible patients seeking treatment services. Indeed, private insurers like Anthem, Aetna, United Health Group, and Cigna have eliminated the need for prior authorization to receive medication-assisted treatment (MAT). American Academy of Pediatrics (2019) laments that policies, which interfere with the medical practice, impede access to effective opioid therapies. Such limiting plans include the “federally-mandated opioid prescribing limits and education requirements” (American Academy of Pediatrics, 2019). The federal government should concentrate on initiating collaborative partnerships with providers through multi-stakeholder approaches to improve public education and training of providers. National Institute on Drug Addiction (2018) also recommends the removal of current barriers to accessing treatment for opioid dependence.

The case of North Carolina State demonstrates the relevance and effectiveness of increasing access to treatment in addressing the epidemic. According to Cohan (2018), the North Carolina State formed the North Carolina Harm Reduction Coalition in 2013 to deal with the menace of the opioid epidemic. Within five years of operation, the program facilitated the distribution of 60,000 kits of naloxone. About 10,000 of the kits served in reversing opioid overdose (Cohan, 2018).

### **Monitoring ex-convicts’ drug behavior**

Individuals leaving prisons are among the population most vulnerable to opioid overdose and epidemic. Methadone and buprenorphine administration immediately before and after

discharge from prison is effective in tackling overdose among prisoners, who entered prisons with substance dependence. As stated by WHO (2013), initiating programs that commence buprenorphine or methadone during two weeks before discharge from prison can lower post-release overdose deaths. Another practical approach is to establish community support facilities to treat ex-convicts with drug dependence problems.

### **Enhanced Recovery after Surgery (ERAS)**

According to Zhao et al. (2019), pain is a critical factor in dictating opioid prescriptions and related-use disorder. In that line, enhanced recovery after surgery (ERAS) provides an effective alternative to pain management other than depressants. Zhao et al. (2019) cite a study by Meyer et al. covered 600 patients after gynecological surgery. The results of the survey showed that patients under ERAS exhibited a 72% lower chance of opioid consumption. Additionally, 16% of the ERAS patients were free from opioids since the time of admission and after three days of operation. Indeed, ERAS provides a compelling alternative strategy for pain management and supporting patient rehabilitation.

### **Multimode Intravenous Analgesia**

The multimode intravenous analgesia is a practical method of tackling opioid overdose and epidemic fostered by surgical procedures. Zhao et al. (2019) assert that the use of multimodal analgesia is before the operation is invaluable in preventing post-surgery opioid abuse. Zhao et al. (2019) describe that the combination of dexmedetomidine, weak opioids, and nonsteroidal anti-inflammation (NSAID) can create an adequate analgesic effect without the problems associated with opioids. Nonetheless, physicians must use medicines with caution. The administration of medications like gabapentin to patients receiving caesarian section does not

enhance postoperative analgesia but can cause increased sedation. Zhao et al. (2019) clarify that the application pregabalin and gabapentin in multimodal analgesics is controversial.

### **Regional Block, Acupuncture, and Local Infiltration**

Zhao et al. (2019) observe that local infiltration with anesthetics and regional pain blocks are invaluable in pain control and lowering the risks of the postoperative opioid issue. The value of the techniques in pain control has featured in many studies on surgical procedures that include hepatectomy, colposcopy, endoscopic, lumpectomy, ligamentum arthrodesis, and total knee arthroplasty (TKA). Additionally, the combination of acupuncture and intravenous sedatives has proved useful in producing satisfactory analgesia for postoperative pain management and eliminating the need for opioids.

### **Opioid Agonist**

Opioid agonists or substitutes comprise of elements that can produce similar analgesic effects without causing opioid-related problems like the opioid epidemic. Zhao et al. (2019) report that a recent survey proved the significance and practicality of “kappa opioid receptor (KOR)” agonists in treating cancer-induced pain in mice without interfering with cell proliferation. The discovery means that KOR is promising elements for managing cancer pain. Zhao et al. (2019) reiterate that buprenorphine and methadone are an active agonist for treating opioid use disorders. The two drugs can also help to reduce crime and suicidality and substitute opioids. While referring to a study by Haumann et al., Zhao et al. (2019) report that methadone is superior to fentanyl in treating neuropathic pain among patients who have head-and-neck cancer.

### **Mood control**

Pain that motivates the administration of prescription opioids tends to interfere with emotions. Controlling emotions through acts like relaxation can help in relieving pain and lowering the chances of drug abuse. Zhao et al. (2019) report that in an RCT (randomized controlled trial) that investigated the management of pain during parturition, Smith et al. discovered that music therapy, relaxation, and yoga might help in reducing pain to the satisfaction of patients. Additionally, “acceptance and commitment therapy (ACT) can reduce the struggle against distressing inner experiences like pain. ACT can also foster long-term positive behaviors and lower the risk of exposure to opioid abuse. In that line, encouraging words and mental care can help patients with negative moods and chronic pain to relax and lower exposure to opioid overdose.

### **Controlling Primary Disease**

As reviewed by Zhao et al. (2019), controlling the primary disease may prove helpful in nullifying the intake of opioids for pain relief. Opioids ought not to form the first-line option for treating polyneuropathy or neuropathic pain. Zhao et al. (2019) argue that excessive opioid use informs the development of most cases of mental disorder. While citing Hoonten et al., Zhao et al. (2019) describe that mental health disorders and pain have a bidirectional link. Managing mental health disorders and joint pain may require first-line treatment agents like anticonvulsants, tricyclic antidepressants, and serotonin-norepinephrine reuptake inhibitors. In that perspective, it is safer to prioritize treating primary disease rather than focus on pain among patients whose opioid overdose is due to some illnesses.

### **Training and Education of Health Professions**

Additional to the increasing availability of treatment services, training, and education of the public help address death rates associated with opioid intoxication. Mathis, Hagemeyer,

Hagaman, Dreyzehner, and Pack (2019) assert that healthcare providers play a central role in the problematic opioid epidemic in the United States (U.S). These professionals are the primary prescribers of the drugs and dispense prescriptions in pharmacies. They also involve in the care and management of patients with pain. As discussed by National Institute on Drug Addiction (2018a), over 84% of American citizens interacted with healthcare providers in 2016. In that line, healthcare professionals are in a unique position to facilitate primary prevention of the opioid epidemic. Unfortunately, healthcare professionals have not entirely participated in the prevention program because of the limited training on pain management, timely and safe prescribing and dispensing practices, and substance abuse and dependence. As such, professional and institutional training are necessary to overcome the shortcomings. Nursing, medical, pharmacy school, physician assistant, and residency training, as well as continuing education programs, require tailoring to impart opioid-related health knowledge to learners (Mathis et al., 2019). The training should also focus on improving communication between patients and healthcare practitioners concerning pain management and benefits as well as risks of opioid prescriptions.

The United States launched Project Lazarus to manage an overdose crisis when the opioid epidemic worsened (Cohan, 2018). The program targeted pain patients, their families, and physicians. Under the project, the parties received naloxone and education. Consequently, the rates of fatal overdose declined by 43% from 2008 to 2010 (Cohan, 2018). The training of families and non-physician administrators helped to avert the risk of unsterile injections.

### **Monitoring of Prescription and diversion Control Programs**

Monitoring of prescription and diversion control are secondary programs for preventing the opioid epidemic. Secondary prevention entails early detection of the disease and response to

lower the severity and effects. For opioid abuse, the secondary response can involve identification of non-medical utilization and diversion as the way of stopping progression to dependence and the sequence of untreated reliance. CDC (2017) educates that “prescription drug monitoring programs (PDMPs)” are the most common and useful intervention by states. PDMPs dictate clinical practices, improve prescribing, and protect at-risk patients. Pharmaceutical Boards and health Departments have involved in overseeing the implementation of opioid prescription monitoring and diversion controls in America. The monitoring and diversion control programs have helped in the collection of data on patients and history of drug use, detect potential abuse, identify problematic prescription and dispensing, and detect diversions. Nearly American states have programs for monitoring prescription and controlling deviations of opioids. All states involve the active collection of data from pharmacies and sharing with the necessary users. Evidence shows that sustained monitoring and diversion control efforts could produce desirable outcomes like reduced diversion of opioids, misuse, and overuse that cause deaths. Additionally, continuous monitoring and control can help in improving the prescription and dispensing of opioids. CDC notes that monitoring and control programs are the most productive and promising state-level actions to inform clinical acts, protect at-risk patients, and improve prescription of opioids.

States have also regulated clinics for pain management. Such controls can target improper and high-volume prescriptions and reduce the supply of opioids for non-medical use and diversion. Control of clinics providing pain management services can impose substantial constraints on ownership, prescription/dispensing, operation, and promote oversight and regulatory opportunities. The strategies and investigations undertaken by law enforcement agents to reduce diversions align with the secondary prevention measures. The reaction of Florida

following an increase in cases of opioid pill mills and overdose deaths provided evidence for countering the opioid menace. Between 2010 and 2012, Florida implemented multiple measures targeted at unsound prescribing and pill mills. The state also implemented effective legislations and empowered operations of law enforcement agencies. Overall, the response has produced promising effects like reduction in the diversion of opioids, overdose deaths, and prescription.

According to CDC (2017), some features are crucial in the effectiveness of state-level “prescription drug monitoring programs (PDMPs)” interventions to the opioid epidemic. The first feature is real-time reporting. Once pharmacists dispense the controlled substances, they register the prescriptions into PDMP of specific states. Nonetheless, pharmacists submit the information on varying intervals that include daily, monthly, or instant. Another feature of the PMDPs is active management. States use the data entered into PMDPs to understand the trend of the epidemic and determine as well as assess interventions. PDMPs have also enabled proactive sending of information to authorized stakeholders to protect vulnerable patients from inappropriate prescriptions. Additionally, universal use is an essential feature of PDMPs. The system involves stools that enable healthcare practitioners to trace the history of patients’ prescriptions to make prescriptive decisions. Some states have regulations mandating physicians to check the history of prescription before recommending medications. The ease of use and access also contribute to the vital features of PMDPs. The Health Department already implemented the regulation for integrating electronic health records (EHR) and permitting practitioners to delegate assistants and nurses to access PMDPs.

### **Screening, Brief Intervention, and Referral to Treatment (SBIRT)**

SBIRT is a secondary response to preventing opioid misuse and addiction. As a public health response, SBIRT encompasses risk detection, early intervention, universal screening, and

referral of individuals with substance use disorder to treatment (Mathis et al., 2019). One of the merits of SBIRT is brevity, which reduces the chances of patients withdrawing before the completion of treatment. The second advantage attributes to the ability to target many problematic behaviors. SBIRT demonstrates significant flexibility that makes it useful in multiple settings that include schools and clinics. Evidence affirms that SBIRT is a cost-effective intervention to cases of drug and substance abuse. It has proved useful for screening and intervention in cases of risky alcohol abuse.

Even the National Institute on Drug Addiction (2018) recognizes that programs for identifying and treating opioid-dependent persons are necessary to fight the menace. Programs focused on monitoring drug prescriptions are crucial to help states track individuals shopping for opioids. Additionally, there are continuing programs to encourage physicians and healthcare providers to screen patients for addiction problems.

### **Treatment of infants, mothers, and prevention of second pregnancy**

Neonatal Abstinence Syndrome (NAS) is one of the severe impacts of opioid use disorder. NAS means that children born to addicted mothers are physiologically reliant on opioids and experience withdrawal symptoms (Mathis et al., 2019). Treating mothers and infants is important to tackle the onset of NAS. Medication-assisted treatment (MAT) is an effective way to treat expectant mothers. Clinical guidance is under evaluation for effectiveness in reducing suffering among infants and preventing long-term developmental problems. Non-pharmacological (like breastfeeding) and pharmacological interventions following delivery have proved useful in the management of NAS. It is also essential to avoid unintended conceptions among women with NAS-diagnosed infants. This step is critical in preventing additional NAS through the birth of successive children. Research has established that about 9/10 pregnancies

among female opioid addicts occur unintentionally. This fact affirms the need for prevention of pregnancies among opioid-addicted women. The “voluntary reversible long-acting contraception” (VRLAC) is an effective and safe approach to preventing unintentional pregnancies and reducing NAS cases (Mathis et al., 2019).

### **Drug Courts**

Criminal activity, drug and substance abuse, and involvement with criminal justice have a close connection. According to Mathis et al. (2019), about 50% of convicts (inmates) meet the criteria for diagnosis with drug abuse and addiction. Unfortunately, only a few people meeting the criteria for diagnosis with drug abuse receive treatment. Additionally, drug and substance abuse is prevalent among juveniles in detention. One study established that about 50% of detained juveniles suffer from at least one case of substance use disorder. The close link between substance abuse and criminality is likely to be the reason for the categorization of prisons as having the most significant cases of mental illnesses. The interfacing of the criminal justice and treatment holds substantial opportunity for “breaking the cycle” (Mathis et al., 2019). The approach can lead a long way to help individuals achieve productive lives.

Drug courts have proved an effective strategy for the integration of evidence-based treatment of addiction into correctional programs of criminal justice establishment. The drug courts constitute of multidisciplinary professionals, who design specialized programs for offenders, criminal defendants, parents with unresolved child welfare issues, and offenders. Even though drug courts can vary, a typical drug court design may encompass screening, assessment, monitoring, supervision, judicial interactions, incentives, sanctions, rehabilitation, and treatment. Evidence has proved the effectiveness of drug courts as cost-effective ways to reduce substance misuse among juveniles and adults. Drug courts have also proved useful in curtailing recidivism.

**Medication-Assisted and Abstinence-based Treatment**

Medication-assisted and abstinence-based treatments are tertiary preventive approaches to opioid abuse. Tertiary preventive techniques target decreasing disease complications via treatment and related support. The medication-assisted treatment (MAT) employs pharmacotherapy like naltrexone, methadone, and buprenorphine alongside psychosocial strategies and support to tackle addictions. Various studies have confirmed that the MAT is an efficient, cost-effective, and safe approach to treating opioid addictions. Evidence has shown that MAT can enhance retention of treatment, reduce the use of illicit opioids, reducing mortality, reduce criminal activity, and lower the spread of infectious diseases. The fact that MAT involves psychosocial treatment makes it useful in treating substance use disorders. Furthermore, evidence has proved that involvement in the 12-step Narcotics Anonymous fellowship can encourage recovery. Nonetheless, treatment with methadone and buprenorphine is the most reliable and cost-effective in preventing the opioid epidemic. Additionally, a longitudinal survey on treatment targeting prescription opioids associated MAT with higher chances of abstinence from illegal use of opioids. In reality, on single treatment approach has proved useful for all cases and individuals. As such, it is crucial to consider the setting and tailor programs to meet the needs of individual patients.

**Education and training of the community**

The opioid epidemic is widespread and requires national and community response. Community members can only help to fight the menace if trained on strategies to respond to cases of addiction. According to Mathis et al. (2019), a growing body of evidence has proved that empowering the community members through training on the subject of opioids can help in reversing the epidemic. The training and education target the individual users of the drugs.

Mathis et al. (2019) report that studies have established that education and training are effective in spreading knowledge of overdose, improving response skills, and successful overdose reversals. A pilot study on the overdose management and prevention program in San Francisco involved the training of 24-people, who use injected drugs. The participants received training on the prevention of heroin overdose, naloxone administration, cardiopulmonary resuscitation (CPR), and supply of naloxone kits. Within a 6-months follow-up, the participants reported success in resuscitating twenty cases of overdose, providing CPR in 16 cases, and administering naloxone in 15 cases (Mathis et al., 2019). Moreover, a survey on the institutions that distribute naloxone kits among laypersons established positive overdose reversal implications of training and providing the packages to the community.

Fraser and Plescia (2019) contribute that exploring community-based strategies is vital in tackling the opioid epidemic. Fraser and Plescia (2019) relate that community-based intervention programs have proved effective in dealing with disease outbreaks like Ebola and influenza, among other infectious illnesses. In the same manner, the goal of the governments should include concerted engagement of the community as primary opioid misuse prevention. Fraser and Plescia (2019) reiterate that the primary prevention of the opioid epidemic needs a multidisciplinary approach employing population-based techniques.

### **Incentivize more Providers of Opioid treatment**

Incentivizing opioid providers is one of the effective ways to increase access to treatment of overdose and avoidance of the epidemic. It worth remembering that the development of the crisis followed concerted efforts by manufacturers and marketers of the products to lure and encourage physicians to prescribe opioids. In the same manner, incentivizing healthcare providers is a practical way to countering the menace and increasing the availability of treatment

services for overdose. Incentives will encourage more clinicians to contribute efforts towards treating over 2.1 million victims of untreated opioid use disorder (OUDs). American Academy of Pediatrics (2019) clarifies that incentives can include forgiveness of loans for individuals providing substance misuse and addiction treatment to patients in underserved regions. Additionally, the government can empower healthcare providers with telehealth resources to overcome the stigma hindrances. American Academy of Pediatrics (2019) asserts that the treatment of OUD through telepsychiatry has similar results as in-person care. Furthermore, programs like the Hub and Spoke, Collaborative Care Model, and Project ECHO offer the necessary support for care providers working with individuals “substance use disorder” (SUD). American Academy of Pediatrics (2019) reiterates the need to increase the above programs to expand access to treatment for the underserved and rural areas.

### **Fight Stigma Related to Substance Use Disorders (SUDs)**

Stigma is a severe problem that hampers access to adequate treatment services for opioid overdose. According to Kansagra and Cohen (2018), many addicts shy from seeking medication because of fear of condemnation or reprisal from law enforcers. In the bid to address the impediment, North Carolina initiated the Law Enforcement Assisted Diversion or LEAD program (Kansagra & Cohen, 2018). The purpose of the program is to divert individuals who are low-level offenders because of the influence of disorders related to substance abuse from jail. Instead, the program provides opportunities for treatment. Kansagra and Cohen (2018) add that programs like medication-assisted treatment have proved useful for offenders on parole supervision or probation.

According to the American Academy of Pediatrics (2019), a national prevention approach that addresses stigma is necessary to enhance the fight against SUD and the opioid

crisis in America. The preventive strategies include running public awareness campaigns to enlighten private and public healthcare providers concerning addiction as a brain disease that is treatable. American Academy of Pediatrics (2019) refers to the success of the efforts by the federal government to counter the crisis of hepatitis and HIV through campaigns intended to create public awareness. Since SUDS co-occur with trauma or other mental illnesses, it is critical to ensure that victims of opioid overdose receive trauma-related treatments under least-stigmatized conditions.

### **The Global Reality of Opioid**

For many years, researchers and writers have created a perception that the opioid crisis is a matter limited to America (U.S.A). Consequently, there are large volumes of materials and information on the American opioid crisis. It is undeniable that America has the highest cases of drug abuse and related deaths. Indeed, Leung (2019) affirms, “U.S and Canada are the first and second-largest per capita consumer of opioids in the world, respectively.” Information on the global status of the opioid crisis is scanty. The reality is that the opioid epidemic is a worldwide problem and requiring international attention.

WHO (2018) reports that approximately 275 million people globally (about 5.6% of the global population) aged between 15 and 64 years used opioids at least once in 2016. Among the number, 34 million people consumed opioids while 19 million took opiates. WHO (2018) adds that in 2016, the world has about 27 million people experiencing opioid use disorder. A significant number of people dependent on opioids consumed illicitly manufactured and cultivated versions. Nonetheless, an increasing number of the global population opioid users used prescription versions. In 2015, approximately 450,000 people from drug use. About

160,000 of the deaths occurred because of drug use problems. Nearly 118,000 of the deaths resulted from opioid abuse.

Canada is ailing from the opioid epidemic. Different regions of the country portray different rates or impacts of the opioid epidemic. Western Canada bears the most significant effects of the opioid epidemic. Despite the regional variations of the opioid crisis, Canada witnessed an overall increase in opioid-related deaths between 2016 (January) and 2017 (June). The rates hit highest from July 2017 through March 2019. From January 2016 to March 2019, Canada recorded over 12,800 deaths attributed to opioid use disorder (Government of Canada, 2019). About 3,023 and 4,120 of the deaths happened in 2016 and 2017, respectively. Government of Canada (2019) clarifies that over 4,588 deaths transpired in 2018, which translates into one death every two hours due to opioid misuse. From January to March 2019, Canada registered about 1,082 deaths caused by opioid abuse. From January to March 2019, about 93% of the opioids-related death was accidental or unintentional.

A significant number of the Canadian victims of accidental demise from opioids were males (76%), but the amount varied across provinces. Even though the age group pattern modified with regions, most victims of the tragedies were middle-aged and young adults. Government of Canada (2019) discusses that fentanyl and fentanyl analogs, among other substances, were the main drivers of the epidemic in Canada. Between January and March 2019, 82% of the accidental opioid-related deaths were because of fentanyl analogs or fentanyl abuse. Nonetheless, the pattern varied across the territories. Regardless of suffering from the opioid epidemic, Canada made a step to authorize the creation of supervised sites for opioid consumption.

Leung (2019) reports that Canada has witnessed over 10,000 deaths related to opioid use disorder between 2016 and 2019. British Columbia has suffered the highest cases. In 2018, the province recorded the rate of 30.6/100,000 populations.

As per the American Federation of Teachers (2018), the highest cases of abuse of prescription opioids in Europe occurred in Northern Ireland. Estonia, Denmark, Finland, and Germany also reported substantial opioid abuse proportions. Ireland, Ukraine, Luxemburg, and Iceland reported the highest percentage of death related to opioids in Europe with over 100 drug-related demises per one million adults.

American Federation of Teachers (2018) reveals that Australia has also witnessed increasing incidents of the opioid epidemic. In Australia, opioid abuse is responsible for over two-thirds of drug-related deaths. According to the National Institute on Drug Abuse (2013), Australia registered the highest rates of vulnerability to intentional and nonintentional oxycodone opioids between 2007 and 2011. Exposure to deliberate exposure to oxycodone opioids increased by 86%, while unintentional use escalated by 177% per 100,000 people.

National Institute on Drug Abuse (2013) reveals that Northwest Germany registered a 90%, 40%, and 31% increase in the intentional use of oxycodone, methadone, and buprenorphine between 2007 and 2011. Subsequently, Northwest Germany recorded 475%, 40%, and 0% increases in the unintentional consumption of oxycodone, methadone, and buprenorphine, respectively. In the United States (U.S), the rates of accidental exposures to methadone were 21%, oxycodone-14%, and buprenorphine-115% during the same period. Intentional exposure rates in the U.S increased by 7% methadone, 103% for buprenorphine, and 34% for oxycodone. National Institute on Drug Abuse (2013) adds that Italy had the rate of intentional exposure to methadone increased by 3%, buprenorphine by 65%, and oxycodone by 615% between 2007 and

2011. The rates of unintentional exposure in Italy increased by 11% for methadone, 59% for buprenorphine, and 249% for oxycodone.

### **Conclusion**

Opioids constitute essential drugs because of their pain-relieving medicinal value. However, the abuse of the drug because of its hypnotic and recreational effects is turning a life-saving agent into a killer substance. Frequent opioid use, irrespective of the reasons, increases the chances of addiction. The widespread overdose of opioids has increased deaths related to the elements. The deaths from opioid use crises have been remarkable in the United States of America (U.S.A). Canada has also suffered significantly from the menace. Even though the opioid epidemic seems to concentrate in the U.S, other countries (notably the developed nations) are at high risk of experiencing the tragedy. Globalization has made it easier for events in one country to spread and affect other countries. As such, the international community needs to recognize opioid overdose as a global phenomenon and join in fighting it. Without a worldwide synergy, America may succeed in controlling the prescription and non-prescription opioids, but other countries may become new victims of the problem.

## References

- American Academy of Pediatrics. (2019). *Addressing the Opioid Epidemic*. Retrieved from <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Substance-Use-and-Prevention/Pages/addressing-the-opioid-epidemic.aspx>
- Bedene, A., Lijfering, W., Niesters, M., van Velzen, M., Rosendaal, F., Bouvy, M., Dahan, A., & van Dorp, E. (2019). Opioid Prescription Patterns and Risk Factors Associated with Opioid Use in the Netherlands. *JAMA Network Open*, vol. 2(8): e1910223. doi:10.1001/jamanetworkopen.2019.10223
- CDC. (2017). *What States Need to Know about PDMPs*. Retrieved from <https://www.cdc.gov/drugoverdose/pdmp/states.html>
- CDC. (2019). *CDC's Response to the Opioid Overdose Epidemic: A Public Health Crisis*. Retrieved from <https://www.cdc.gov/opioids/strategy.html>
- CDC. (2019a). *Drug Overdose Deaths*. Retrieved from <https://www.cdc.gov/drugoverdose/data/statedeaths.html>
- Fraser, M. & Plescia, M. (2019). The Opioid Epidemic's Prevention Problem. *American Journal of Public Health*, vol. 109 (2), pp. 215-217.
- Health and Human Services Department. (2019). *What is the U.S. Opioid Epidemic?* Retrieved from <https://www.hhs.gov/opioids/about-the-epidemic/index.html>
- Health and Human Services Department. (2019a). *Opioids and Adolescents*. Retrieved from <https://www.hhs.gov/ash/oah/adolescent-development/substance-use/drugs/opioids/index.html>

- Hoevermann, K. (2019). *The Economic Costs of the Opioid Epidemic*. Retrieved from <https://www.stlouisfed.org/open-vault/2019/september/economic-costs-opioid-epidemic>
- Insurance Journal. (2019). *Actuaries Estimate Four Years of Opioid Crisis Cost Economy \$631 Billion*. Retrieved from <https://www.insurancejournal.com/news/national/2019/10/17/545690.htm>
- Kansagra, S. & Cohen, M. (2018). The Opioid Epidemic in NC Progress, Challenges, and Opportunities. *North Carolina Medical Journal*, vol. 79 (3), pp. 157-162.
- Leslie, D., Ba, D., Agbese, E., Xing, X. & Liu, G. (2019). The Economic Burden of the Opioid Epidemic on States: The Case of Medicaid. *AJMC*. Retrieved from <https://www.ajmc.com/journals/supplement/2019/deaths-dollars-diverted-resources-opioid-epidemic/the-economic-burden-opioid-epidemic-on-states-case-of-medicaid?p=2>
- Maryville University. (2019). *Understanding the Opioid Epidemic: Opioid Abuse in America*. Retrieved from <https://online.maryville.edu/online-masters-degrees/health-administration/understanding-the-opioid-epidemic-opioid-abuse-in-america/>
- Mathis, S., Hagemeyer, N., Hagan, A., Dreyzehner, J. & Pack, R. (2019). A Dissemination and Implementation Science Approach to the Epidemic of Opioid Use Disorder in the United States. *Curr HIV/AIDS Rep.*, vol. 15(5), pp. 359–370.
- National Institute on Drug Abuse. (2019). *Opioid Overdose Crisis*. Retrieved from <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis>

National Institute on Drug Addiction. (2018). *Prescription Opioids and Heroin*. Retrieved from

<https://www.drugabuse.gov/publications/research-reports/relationship-between-prescription-drug-abuse-heroin-use/emphasis-needed-both-prevention-treatment>

National Institute on Drug Addiction. (2018a). *How can prescription drug misuse be prevented?*

Retrieved from <https://www.drugabuse.gov/publications/research-reports/misuse-prescription-drugs/how-can-prescription-drug-misuse-be-prevented>

WHO. (2013). *Opioid overdose: preventing and reducing opioid overdose mortality*. Retrieved

from [https://www.who.int/substance\\_abuse/publications/opioid\\_overdose.pdf?ua=1](https://www.who.int/substance_abuse/publications/opioid_overdose.pdf?ua=1)

Zhao, S., Chen, F., Feng, A., Han, W. & Zhang, Y. (2019). Risk Factors and Prevention

Strategies for Postoperative Opioid Abuse. *Pain Research and Management*

Vo. 2019, Article ID 7490801, 12 pages: <https://doi.org/10.1155/2019/7490801>