

**THE SOCIETAL COSTS OF METHAMPHETAMINE USE IN THE
WESTERN CAPE PROVINCE**

BY

ARNALDA VANESSA DARSAMO

DRSARN001

SUBMITTED TO THE UNIVERSITY OF CAPE TOWN

In partial fulfilment of the requirements for the degree

Masters in Commerce (Development Economics)

Faculty of Commerce

UNIVERSITY OF CAPE TOWN

February 2016

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

SUPERVISORS

PROF. CORNÉ VAN WALBEEK

Professor of Economics,

University of Cape Town

PROF. HANA ROSS

Professor of Economics,

University of Cape Town

DEDICATION

To Maria Olivia Dourado Darsamo

In loving memory of Arnaldo Meia Darsamo

ACKNOWLEDGEMENTS

My profound gratitude goes first and foremost to God Almighty. I thank the Graça Machel Trust for making this Degree possible.

I extend my sincere appreciation and gratitude to my supervisors, Professor Corné Van Walbeek, and Professor Hana Ross, for their dedication, support, guidance and patience towards me. I thank the staff at SACENDU for their support, with special thanks to Nadine Harker Burnhams who was always willing to help. I extend my gratitude to Dr. Mike West for his insight.

I extend my heartfelt gratitude to my family who supported me through this journey and a very special thanks to Fatima, Cristina and Delio Darsamo for endless encouragement and always believing in me. Lastly, but by no means least, I extend my immense appreciation to Dino Dlamini for all the support he has given.

ABSTRACT

Objectives: Methamphetamine (meth) use results in various costs accruing to the meth user, society, and government. Internal and external costs of the pandemic are widespread, affecting the healthcare and social welfare systems, policing, private security, and the judicial and corrective services system. This study quantifies these costs for the Western Cape; identifying the magnitude of the cost of illness and additional social costs by category and determines which interventions are likely to reduce these overall costs.

Methods: This study used a combination of a top-down and a bottom-up approach for the costing of various categories. The meth prevalence rate used was derived from the number of primary meth users who sought meth treatment in 2013 as reported to SACENDU. Additional data on expenditure and costs were obtained from government annual reports, personal interviews and data from previous studies.

Results: Meth use costs the Western Cape up to approximately R5.7 billion per year, equivalent to 1.11% of the Western Cape GDP. These costs account merely for the costs associated with primary meth users, thus excluding all other meth users who sought drug treatment but for whom meth was not the primary drug of choice. The cost of illness is estimated to be R136.9 million per year. While this cost seems relatively low, it is estimated that the costs presented in this study only account for approximately 1% of the meth users in the province. Meth-attributable crime accounts for 36%, when the costs of the consequences of crime are considered, meth-related crime cost accounts for up to 63% of the total costs. Thus, interventions aimed at curbing meth-attributable crime are therefore likely to significantly cut the social costs associated with meth use and free up more resources for non-drug-related crimes.

Conclusion: The meth pandemic is pervasive in parts of the Western Cape. Stricter laws need to be enforced on the trafficking of meth precursor chemicals to reduce the potency of locally produced meth. Research aimed at producing drugs that accurately mimic the effects of ephedrine and pseudoephedrine with fewer side effects is required to curb the meth pandemic in the long run. This will necessitate a joint effort across multiple levels of government.

KEY WORDS

Amphetamine Type Stimulants: “A group of substances called amphetamines, most of which are composed of synthetic stimulants that have a stimulating effect on the central nervous system. Examples include amphetamines, methamphetamines, methylphenidates and ecstasy. (United Nations Office on Drugs and Crime, 2003: 67).

Costs: Also known as opportunity cost, this refers to the value of the best opportunity forgone as a result of engaging resources in an activity. Costs can be incurred in the absence of the exchange of money. Costs extend beyond the cost to the health service and may include costs to other associated services. The patient, the patient’s family, society and/or government may incur these costs (National Institutes of Health, 2014).

Cost of illness: “All the costs of a particular disease, including the direct, indirect, and intangibles. The output, expressed in monetary terms, is an estimate of the total burden of a particular disease to society” (Byford et al. 2000: 1335).

Direct costs: These refer to costs of diagnosis, treatment and the healthcare associated with a disease, illness or disability. Examples include hospitalization costs, laboratory services costs, supplies and equipment costs of rendering a health service, cost of medicine/drugs, etc. (Bloom et al., 2011:15).

External costs: The costs and consequences of one’s decisions that fall on others and are ignored by the decision makers in making their decisions (Single et al., 2003: 61).

Indirect or productivity costs: These refer to costs to patients (or their families) that are associated with lost productive capacity and income arising from illness, disabilities and premature mortality (Bloom et al., 2011:15 and Drummond et al., 2007:24).

Illicit drugs: Drugs that it is unlawful to possess or use (Single et al., 2003: 61).

Internal costs: The costs taken into account by the decisions taken by individuals, such as the costs paid for by meth users (and their families) as a result of consuming meth (Single et al., 2003: 61).

Intangible costs: These costs are associated with pain and suffering. Intangible costs cannot be easily measured in monetary terms (Drummond et al. 2007: 24 and Single et al. 2003: 63)

Methamphetamine: Methamphetamine (also called meth or 'tik') is an extremely addictive stimulant drug. It takes the form of a white, odourless, bitter-tasting crystalline powder derived from ephedrine and pseudoephedrine. It can be smoked, snorted, orally ingested, taken rectally or injected (Plüddemann, 2010: 2 and United Nations Office on Drugs and Crime, 2003:46).

Meth user: "An individual whose meth use adversely affects his/her health" (Single et al., 2003: 63).

Precursor Chemicals: Chemicals that are used in the manufacture of drugs. These are scientifically defined as "chemical substances that become incorporated, at the molecular level, into a narcotic drug or psychotropic substance during the manufacturing process" (UNODC, 2014: 55).

Private costs: Costs that accrue only to the meth user (Single et al., 2001: 15).

Primary meth user: An individual whose meth use affects his/her health and for whom meth is the primary drug of choice (Single et al., 2003: 63).

Social costs: These refer to private costs, those that accrue only to the meth user plus the external costs or externalities (Single et al., 2001: 15).

TABLE OF CONTENTS

LIST OF ABBREVIATIONS	xiv
------------------------------------	-----

CHAPTER 1: INTRODUCTION

1.1 What is Methamphetamine?	1
1.2 History of meth.....	3
1.3 What do Costing Studies Entail?	5
1.4 Justification of the Study.....	7
1.5 The Objectives of the Study.....	8
1.6 Outline of the Study	8

CHAPTER 2: LITERATURE REVIEW

2.1 Costs of Meth, Illicit Drugs and Alcohol	10
2.2 Productivity loss.....	14
2.3 Healthcare and Treatment.....	16
2.4 Sexual Risk Behaviour and HIV/AIDS Risk	17
2.5 Crime	20

CHAPTER 3: METHODOLOGY

3.1 Productivity Loss.....	27
3.2 Treatment Costs	30
3.3 Meth-Attributable Crime.....	34
3.4 Transfers.....	54
3.5 Cost of Private Security	56
3.6 Cost of Gang-related Productivity Loss	58
3.7 Treatment of Gang-related Attempted Murders.....	60
3.8 Intangible Costs: Cost of Insecurity	62
3.9 Other Costs Considered: Social Protection Costs	66
3.10 Other Costs Not Included.....	67

CHAPTER 4: RESULTS

4.1	Estimated Cost of Productivity Loss	68
4.2	Estimated Costs of Meth Treatment	69
4.3	Estimated Meth-Attributable Crime Costs.....	73
4.4	Estimated Meth-Attributable Transfer Costs.....	77
4.5	Estimated Meth-Attributable Costs of Private Security	78
4.6	Estimated Cost of Gang-related Productivity Loss	79
4.7	Estimated Cost of Treatment of Gang-related Attempted Murders	79
4.8	Intangible Costs: Estimated Cost of Insecurity	80
4.9	Other Costs: Estimated Meth-Attributable Social Protection Costs	81
4.10	Summary of Estimated Costs	81

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1	Summary of Findings.....	86
5.2	Research Limitations	89
5.3	Recommendations for Policy	93
5.4	Future Research	95
5.5	Concluding Remarks	96

LIST OF REFERENCES.....	97
--------------------------------	-----------

APPENDIX.....	109
----------------------	------------

LIST OF TABLES

3.1	Estimate of Crime Institutional Costs by Alda and Cuesta (2011).....	35
3.2	Estimated Meth-Attributable Crime 2013/2014.....	47
3.3	Estimates of Transfer Costs of Crime: 2007 & 2014 (Alda & Cuesta, 2011).....	55
4.1	Estimated Cost of Meth-Attributable Productivity Loss among Primary Meth Abuse Treatment Patients in 2010.....	68
4.2	Estimated Meth-Treatment Costs, 2014.....	70
4.3	Estimated Meth-Attributable Crime Costs, 2014.....	72
4.4	Estimated Meth-Attributable Crime Costs, 2014.....	73
4.5	Estimated Meth-Attributable Crime Costs of Justice, 2014.....	75
4.6	Estimated Meth- Attributable Crime Institutional Costs, 2014.....	76
4.7	Estimated Meth-Attributable Transfer Costs, 2014.....	78
4.8	Summary of the Estimated Societal Costs of Meth Use in the Western Cape, 2014.....	82
4.9	Comparisons of the Best Cost Estimates for the United States, 2005 and the Western Cape, 2014.....	82
A1	DALYs Lost to Amphetamine Use Through Mental and Behavioural Disorders for South Africa, 2010.....	109
A2	Treatment Costs by Type of Facility.....	110
A3	Estimated Meth Inpatient and Outpatient Treatment Costs.....	109
A4	Crime Services Experts' Perceptions on Resources Intensity by Crime Category.....	111
A5	Western Cape Mid Year Population by Age Group.....	112

LIST OF FIGURES

Figure 1: Meth Trend in the Western Cape and South Africa Based on Patients Who Sought Meth Treatment, 2003-2013.....	4
---	---

LIST OF ABBREVIATIONS

ADRM	Alternative Dispute Resolution Mechanism
ADHD	Attention Deficit Hyperactivity Disorder
AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Treatment
ARV	Anti-Retroviral
ATS	Amphetamine Type Stimulants
AUD	Australian Dollar
CDA	Central Drug Authority
CERAC	Conflict Analysis Research Center
CPI	Consumer Price Index
COI	Cost of Illness
DALYs	Disability Adjusted Life Years
GBD	Global Burden of Disease
GDP	Gross Domestic Product
HIV	Human Immune Deficiency Virus
IHME	Institute for Health Metrics and Evaluation
IMF	International Monetary Fund
MRC	Medical Research Council
NCD	Non-Communicable Diseases
NPA	National Prosecuting Authority
OI	Opportunistic Infection
RUB	Russian Rouble
SACENDU	South African Community Epidemiology Network on Drug Use
SAPS	South African Police Service
SARB	South African Reserve Bank
SARS	South African Revenue Service
SRH	Sexual Reproductive Health
STI	Sexually Transmitted Infections

UNODC	United Nations Office on Drugs and Crime
UNDCCP	United Nations Office on Drug Control and Crime Preventions
USD	United States Dollar
WC	Western Cape
WHO	World Health Organisation
ZAR	South African Rand

CHAPTER 1

INTRODUCTION

1.1 What is Methamphetamine?

Methamphetamine, meth or tik, as it is locally known, is a central nervous system stimulant used purely for recreational purposes (Buxton and Dove, 2008: 1537, Kish, 2008: 1679 and Pietsch et al., 2013: 51). It is a type of amphetamine and like methcathinone and ecstasy, is an amphetamine-type stimulant which speeds up messages travelling between the brain and the body (Australian Drug Foundation, 2015, National Institute on Drug Abuse, 2014 and World Health Organisation, 2015). It is a synthetic drug derived mostly from ephedrine and pseudoephedrine (Plüddemann, 2010a: 2). It is produced by a combination of paint thinner, rock salt, battery acid, lantern fuel, and medicines containing pseudoephedrine (Padilla and Ritter, 2008:108).

Meth can be taken orally, smoked, injected, snorted or taken rectally (Buxton and Dove, 2008: 1537 Plüddemann, 2010: 2). In South Africa, it is mostly smoked in crystalline form (Plüddemann, 2010a: 2). Crystal meth is more addictive than the other forms of meth (liquid, powder and tablet) (Buxton and Dove, 2008: 1537).

Meth increases levels of dopamine, a neurotransmitter involved in motion, pleasure and motor function, by up to 1500% (National Institute on Drug Abuse, 2014 and Milan, 2012) almost four times as high as the effect of cocaine on dopamine (Milan, 2012). Methamphetamine is used for increasing alertness, suppressing appetite, boosting energy, enhancing concentration, euphoria and libido (Pietsch et al., 2013: 51 and National Institutes of Health 2013). A meth user may stay awake for 10 consecutive days, often with little food or drink (Buxton and Dove, 2008: 1537).

Prolonged use causes acute and chronic effects on the brain as well as myocardial infarction, stroke, seizures, hyperthermia, cardiomyopathy, psychosis and death (Plüddemann, 2010a: 4 and National Institute on Drug Abuse, 2014).

Long-term use of meth results in increased tolerance to the drug, which in turn causes the user to consume larger and more frequent doses (Buxton and Dove, 2008: 1537). Long-term use also results in irritability and psychosis known as "tweaking", which causes the user to pick at his/her skin in an effort to rid it of imaginary bugs (Buxton and Dove, 2008: 1537 and Plüddemann, 2010a: 3). In the United Kingdom, a meth user was reported to have gouged out his eyeballs and swallowed them while high on meth (Willis, 2015).

Other long-term effects of meth use include severe tooth decay, insomnia, anxiety, paranoia, hallucinations, hypertension, uncontrollable anger, increased glucose metabolism, reduction of the capacity of the cortex white matter, etc. (National Institutes of Health, 2013 and McCann and Ricaurte, 2004 in Plüddemann, 2010a: 4).

The effects of meth use extend beyond the user. Meth use by pregnant women affects the rate of the unborn child's growth and causes premature birth and developmental disorders (Anglin et al., 2000; Eriksson & Zetterstrom, 1994 in Plüddemann, 2010a: 5). Parental meth addiction in the Western Cape resulted in children dropping out of pre-school, child neglect, child abuse and children being exposed to danger (Makoae et al., 2008:25 and Miles, undated: 20). In South Africa, the meth pandemic is also associated with gang violence, resulting in the destruction of property, feelings of insecurity in gang-prone neighbourhoods, the temporary closure of schools, and civilian deaths (Underhill, 2013).

Meth use is also linked to indirect effects such as increased risky sexual behaviour, which in turn increases the chances of acquiring HIV/AIDS and Sexually Transmitted Infections (STIs) (National Institute of Health, 2013). Meth use can increase the chance of male homosexual HIV infections by up to 400% (Milan, 2012). There is evidence of a significant impact of meth use on HIV infection risk even among heterosexual meth users in South Africa. Qualitative studies have revealed that meth users engage in risky sexual behaviours including the exchange of sex for meth (Gouse, 2012, and Meade et al., 2012: 232, 235 and Watt et al., 2015: 4).

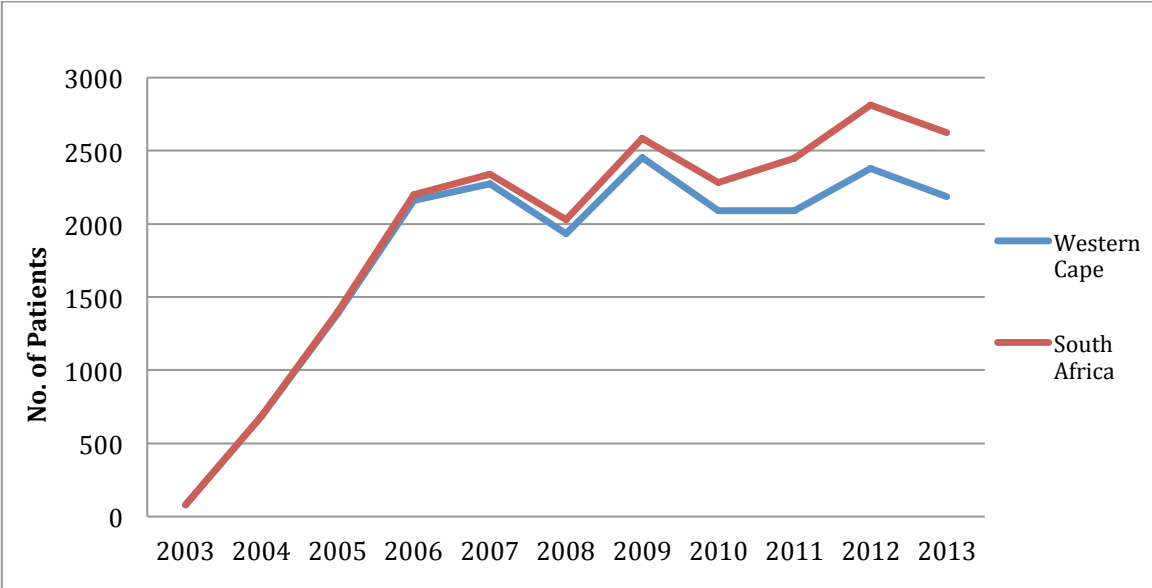
1.2 History of meth

Meth was first synthesized in 1919 in Japan (Plüddemann, 2010a: 2) and became commercially available in the 1930s (Pietsch et al., 2013: 51). Meth labs emerged in California in the 1960s and the crystal form of meth was developed in the 1980s (Buxton and Dove, 2008: 1537).

The first documented meth laboratory in South Africa was discovered in 1998 by the South African police (Plüddemann, 2010a: 3). However, meth seizures were relatively low until 2001, when significant meth seizures began to be made in South Africa (Plüddemann, 2010a: 3). In the 2014/2015 financial year, the South African Revenue Service (SARS) reported meth seizures valued at approximately R160 million (SARS, 2015). The South African Police Service (SAPS) reported meth seizures totalling 598,743 kilograms (SAPS, 2015b: 134). South Africa is one of the world's largest importers of illicit ephedrine and pseudoephedrine, which are precursor chemicals in methamphetamine production (National Drug Master Plan, undated: 42).

Methamphetamine is a common drug of choice in the Western Cape among patients who seek treatment for substance abuse (South African Community Epidemiology Network on Drug Use, SACENDU, 2014: 6). The Western Cape province has one of the highest levels of methamphetamine use in the world (Plüddemann and Parry 2012: 1). The meth pandemic has increased rapidly in South Africa since the early 21st century, particularly (among the youth) in the Western Cape. This is evident from the total number of patients seeking meth treatment, which rose from 78 in 2003 to 2,626 in 2013. Approximately 83% of these are based in the Western Cape (SACENDU, 2014: 6-7). Figure 1 illustrates the trend in meth use during the 10-year period from 2003 to 2013.

Figure1: Meth Trend in the Western Cape and South Africa Based on Patients Who Sought Meth Treatment, 2003-2013



Source: SACENDU 2006-2014.

The prevalence rate of meth use in the Western Cape population is estimated to be approximately 4.87% for people aged 15 and above (Statistics South Africa, 2014a: 3, 16 and Degenhardt et al., 2013: 382).

The prevalence of meth use in the United States (U.S.) is low, at an annual prevalence rate of 0.5% (Nicosia, 2009: 1). Despite this low prevalence, it is estimated that meth use cost the U.S. an estimated total of USD6.75 billion (R42.9 billion) in 2005 based on 'best' cost estimates (Nicosia et al., 2009:103). The cost per meth-user in 2005 in the U.S. was USD26,872 and the cost per meth-dependent user was USD74,408 for the same calendar year (Nicosia et al., 2009: 104). SARS estimated the direct cost of illicit drug use in 2005 in South Africa to have been roughly R101 billion (Central Drug Authority, undated: 43).

Although the externalities of meth use are conspicuous, particularly in the Western Cape, there are no published papers on the societal costs of meth in South Africa. This study aims to estimate the societal costs associated with meth use in the Western Cape.

1.3 What do Costing Studies Entail?

Costing studies are carried out to estimate the costs of various decisions that affect economies. Costs of illness studies estimate the costs of a particular disease. The direct, indirect and intangible costs are included in cost of illness studies (Byford et al. 2000: 1355). "The output, expressed in monetary terms, is an estimate of the total burden of a particular disease to society" (Byford et al. 2000: 1355).

Drummond et al. (2007: 24) define direct costs as the resources consumed in relation to an illness, disease or disability and include the patients' or other statutory agencies' and voluntary bodies' expenses. These include hospitalization costs, laboratory services costs, supplies and equipment costs of rendering a health service, cost of medicine/drugs, etc. Indirect or product costs are defined in terms of the patients' (or their families') time consumed by the illness (Drummond et al. 2007: 24). In the case of meth, this would entail the time lost by patients or their families to

meth use through morbidity or premature mortality. This includes lost productive capacity and income (Bloom et al., 2011:15).

Other costs included in costing studies are intangible costs. These costs are associated with pain and suffering. Intangible costs cannot be easily measured in monetary terms (Drummond et al. 2007: 24 and Single et al. 2003: 63). A willingness-to-pay approach, which identifies how much people are willing to pay to end or avert the problem, is often used to value these costs (Drummond et al. 2007: 24).

Costs of illness are estimated using either prevalence- or incidence-based approaches. The prevalence-based approach estimates the total cost of a disease or disorder prevalent in the population at a given point in time (Byford et al. 2000: 1335 and Single et al. 2003: 25). The incidence-based approach involves calculating the lifetime costs of new cases diagnosed in a particular year (Rice 1994 in Byford et al., 2000: 1335).

The direct costs can be obtained using either a bottom-up or a top-down approach. A bottom-up approach identifies all of the inputs used to provide a service and assigns a value to each of these. These values are summed to derive the total cost of each unit of activity involved in providing the service (Centre for Social Impact Bonds, 2013). A top-down approach entails dividing the total expenditure on a service, or policy by total units of activity (e.g. patients served) to derive a unit cost of each activity involved in the service provision or policy (Centre for Social Impact Bonds, 2013).

Studies on the indirect costs of productivity loss due to morbidity or premature mortality use either the human capital approach or the demographic approach. The human capital approach estimates the present and future production costs of abuse-induced deaths occurring in a given year (Collins and Lapsley, 2008: 6). Alternatively, the demographic approach compares the actual population size and structure with a

hypothetical healthy population with no disease or disorder (Collins and Lapsley, 1991 in Single et al. 2003: 59-60).

Some costing studies opt for the friction cost method to estimate productivity loss for those in the labour market. Koopmanchap et al. (1993: 176) describe this method in terms of how long it takes an organisation to recover production lost as a result of disease or disorders. This method, therefore, excludes the short-term absences that can be recuperated when the employee returns to work or productivity loss that can be recovered by the input of a temporary worker. Some studies consider the value of lost productivity from household production.

Costing studies are primarily concerned with identifying the amount of costs as well as who the bearer of the costs is or on whom the costs fall. Costs are often disaggregated as internal or external costs. Internal costs are the costs paid by the (meth) user or his/her family as a result of meth use (Single et al. 2003: 6). External costs, on the other hand, extend beyond the meth user. These costs are not factored into the decision-making of the meth-users and the consequences of their meth use are borne by non-users (Single et al. 2003: 61).

1.4 Justification of the Study

The Western Cape has the highest meth use rates in South Africa and one of the highest in the world (Plüddemann and Parry 2012: 1). However, there are no evaluations that document the overall burden of meth in South Africa. Studies have revealed the problems associated with meth use, yet none of these reflect the quantified value of these problems. Meth imposes large costs on society. It is crucial to have reasonable social cost estimates of the impact of meth use on society and government.

Policy makers will have a better understanding of the size of these costs if they are quantified. Once the costs have been quantified, policy-makers should be able to direct resources better to alleviate some of the costs associated with meth use.

1.5 The Objectives of the Study

1. To estimate the direct costs of illness associated with meth use in the Western Cape.
2. In addition to the costs of illness, to provide estimates of other existing internal and external costs associated with meth use in the Western Cape, broken down by category.
3. To determine which interventions are more likely to reduce the overall costs associated with meth.

1.6 Outline of the Study

This thesis addresses the internal, external and intangible costs associated with meth use. Chapter 2 reviews literature on the costs of illicit drugs, illustrating the internal, external and intangible costs associated with drug use, aiming specifically to address the externalities of meth use. Chapter 2 also reviews the literature on the societal costs of meth use, and discusses the externalities associated with meth use, costs to the user, costs to the government and costs to society, all of which have been addressed in previous studies.

Chapter 3 discusses the methods used for the estimation of the meth-attributable costs, with a special emphasis on the study's objectives. The chapter addresses the

estimated costs of illness and other meth-induced costs. All the methods used to estimate meth-attributable costs are also discussed.

Chapter 4 presents the cost findings by cost category and presents a summary of the estimated total costs associated with meth use in the Western Cape. The last section of the chapter provides a comparison between cost estimates for the Western Cape and cost estimates from a study of meth costs in the United States. Chapter 5 concludes the study with a discussion of the research findings, the research limitations and recommendations for policy and future research.

CHAPTER 2

LITERATURE REVIEW

There is a substantial literature on alcohol and tobacco use, detailing the problems associated with and/or induced by these substances. However, fewer studies have focused specifically on the costs associated with drug use, and, in particular, methamphetamine use. There is a paucity of literature on meth costs pertaining specifically to South Africa, and therefore this literature review is limited to a few sources. This chapter is focused on a review of available literature on the costs of substance abuse, meth in particular, and studies on the societal harms associated with meth use. Summaries of studies on the societal harms and costs associated with alcohol, illicit drugs (and more specifically meth use) are presented in this chapter, in specified sub-sections.

2.1 Costs of Meth, Illicit Drugs and Alcohol

The World Health Organisation (WHO) (Single et al., 2003) provides an international guideline for costing substance abuse. The guideline does not focus specifically on costing methamphetamine but describes different approaches to economic costing, provides a general framework for developing cost estimates for substance abuse, and suggestions for the case of data limitations.

In Russia, Potapchik and Popvich (2014) used the cost of illness method to analyse the costs of substance abuse. This incorporates the tangible and intangible costs (costs with a market price) of illness. The study summarised costing studies on alcohol and illicit drugs for Russia. The costs included in the study are direct medical

costs, direct non-medical costs, the costs of law enforcement and criminal justice, research, public education and prevention, fires, road accidents, and social welfare, and indirect costs such as productivity losses arising from premature mortality and short-term disabilities. The study's findings revealed that the social cost of illicit drugs was RUB 211.6 billion (USD7.2 billion or R67.7 billion) and RUB 571.2 billion (USD 19.4 billion or R182.8 billion), respectively, for the friction and human capital methods.

Collins and Lapsley (2008) evaluated the costs of alcohol, tobacco and illicit drug use in Australia in 2004/2005. The study aimed to address the causal interactions between drugs and the costs and benefits of drugs. The illicit drugs included in this study are: cannabis, opiates, cocaine, amphetamines, psych-stimulants, other psychotropics, hallucinogens and anabolic steroids. Illicit drugs accounted for approximately AUD7 billion (R32.8 billion), which was equivalent to 0.88% of the Australian GDP in 2004/2005. (Collins et al., 2008: 64).

Although studies focused specifically on methamphetamine costs in South Africa are scarce, there are a few studies on the costs of alcohol and illicit drugs that can be used as a guide to cost methamphetamine use in South Africa, particularly with regard to external costs.

In 1998, the Medical Research Council (MRC) conducted a study on substance abuse among the youth in South Africa (Parry: 1998). The study focused on the social demographics of drug prevalence in South Africa. This study discusses the problems associated with substance abuse in South Africa, illustrating the impact of drug use. However, it does not address the quantified costs associated with drug use.

Budlender (2009) estimated the direct costs incurred by the provincial and national governments because of alcohol abuse in South Africa. The estimates were derived from government budget-related documents, research reports and interviews. This study counteracted the paucity of data by allocating weights for each indicator based on previous provincial alcohol costing studies. The proportion of time and resources spent by the various national and provincial government departments on alcohol control measures were used to estimate the cost of alcohol abuse that was borne by the government. While this study provides clarity on the direct cost of alcohol use by illustrating the magnitude of the alcohol-attributable costs to government, based on budget allocations, these costs only account for a fraction of the external costs of alcohol to the economy. The component of the external costs that fall on society (but not the government) was excluded from this study, consequently shrinking the cost of alcohol use to the economy. Moreover, this study excluded the costs of premature mortality and morbidity attributed to alcohol misuse.

Matzopoulos et al. (2014) studied the costs of harmful alcohol use in South Africa. The costs used in this study were derived from previous studies on alcohol and crime in South Africa, including the study by Budlender (2009). This study improved on Budlender's findings and included the social costs associated with alcohol use. The costs were disaggregated by tangible costs and intangible costs. The costs included were: healthcare, labour costs, crime costs and non-financial welfare costs (Matzopoulos et al. 2014:128-131). Where data for South Africa were unavailable, the study drew from findings in countries with similar contexts. Results of this study reveal that harmful alcohol use cost society and the government between R245.9 billion and R280.7 billion in 2009, 11.12% to 12.69% of the 2009 GDP (Matzopoulos et al., 2014:130).

These studies did not focus specifically on methamphetamine. However, they do provide crucial information on the external costs attributable to illicit drugs and

harmful alcohol use, which may be applicable to meth use. The studies also provide insight on how to counteract data scarcity for the estimation of some of the costs.

Studies have been conducted in South Africa on the societal harms associated with meth use. These studies did not evaluate the monetary cost of meth but they do provide an illustration of the effects of meth on society. Watt et al. (2014) studied the impact of meth on a peri-urban community in Cape Town. The study looked at problems associated with meth use beyond the user and incorporated problems at the interpersonal and community levels. These include violence, social stigma, and isolation, among others. The study used qualitative data obtained from 12 alcohol-serving venues in Delft. Despite meth users in the Western Cape being predominantly male, the sample in Watt et al.'s study included 55 women and 35 men. Respondents perceived meth use to be ubiquitous in the Coloured community in Delft (Watt et al., 2014: 221). Meth cost between R20 and R30 per packet (enough for a single high) and individuals often smoked several packets a day (Watt et al., 2014: 221).

Meth use was found to have physical effects on users. Heightened energy, sleeplessness, loss of appetite, weight loss, poor hygiene, ulcers, contraction of HIV and TB were some of the impacts of meth use at an individual level. Other impacts of meth use included: decreasing users' future opportunities, meth users' children suffering from neglect which could lead to abuse, and users engaging in higher-risk sexual behaviour because of the increased sexual desire when high and the practice of exchanging sex for meth (Watt et al., 2014: 2211-222). The greatest impact in the study appeared to occur at the household level, where aggression arising from the effects of meth use resulted in negative consequences in household relationships including intimate partner violence (Watt et al., 2014: 221-223).

This study lists a wide range of social ills attributed to meth use but does not quantify these in monetary terms. Nonetheless, the study provides an illustration of the negative externalities of meth use on society. This enables one to understand which externalities associated with meth use should be quantified in monetary terms.

2.2 Productivity loss

The relationship between substance use and unemployment is not clear. It is uncertain whether it is drug use that leads to unemployment or unemployment that fosters drug use or relapse and whether other factors, such as educational attainment, play a larger contributing role to the probability of unemployment than drug use (Badel and Greany 2013: 1 and Mullahy and Sindelar, 1993: 515).

Alcohol abuse is said to reduce income by 31% (Mullahy and Sindelar, 1993: 515). However, the effect of alcohol abuse on income is reduced from 31% to 17% when other variables like schooling and marital status are considered (Mullahy and Sindelar, 1993: 515). Thus controlling for such variables affects the magnitude of the effects of alcohol abuse on earnings. However, other studies have found that by controlling for confounds, substance abuse has substantial negative effects on the labour market (Henkel, 2011: 11). Since meth is an illicit drug, meth users do not pay taxes for meth use, unlike alcohol use. Thus, meth use effects on income are most likely not identical to the effect abusive alcohol consumption has on income. However, since illicit substances have no formal data collection, this study's findings may be used to gauge the potential effects meth use could have on income, bearing in mind that alcohol taxes add to the reduction in income associated with alcohol abuse.

There have been some conflicting studies concerning substance misuse, earnings and productivity (Mullahy and Sindelar, 1993: 515). For example, Mullahy and Sindelar (1993: 515) concluded that alcoholism and income depend critically on the age groups under study and that the greatest impact is on the likelihood of working rather than income earned. Alcohol use in Europe, Australia and the United States was found to be higher in unemployed adolescents and young adults than those employed (Henkel, 2011: 5). In the United States, substance abuse is known to diminish productivity through delayed initiation into the labour force, reduced probability of employment and increased absenteeism (Gill and Michaels 1992 and Register and Williams; 1992 in Nicosia et al., 2009: 44).

Alcohol use affects productivity through increased absenteeism, work-related injuries, high employee turnover, lower productivity, unemployment, early retirement, and premature mortality and morbidity (Matzopoulos et al., 2014: 130). It is assumed that harmful alcohol use accounts for 4%-6% of absenteeism (Møller and Matic, 2010 in Matzopoulos et al., 2014: 130).

A study on 7,000 employees from 60 firms revealed that on average, absentee rates range between 2.3% to 1.3% per month for all workers earning between R1000 or less to R15,000 per month (Matzopoulos et al., 2014: 130). The Alcohol-attributable absenteeism cost was found to range between R140.6 million to R447.7 million annually (Matzopoulos et al., 2014: 130).

The cost of alcohol-attributable premature mortality, based on the 2009 GDP and the mid-year population, was R21,632 per death in South Africa (Matzopoulos et al., 2014: 130). These costs on society are said to be higher when intangible costs, such as emotional trauma, are included. The total productivity lost to alcohol use in South Africa in 2009 was estimated to range from R208 billion to R243 billion, 9.4% to 11% of the 2009 GDP (Matzopoulos et al., 2014: 130).

In Australia, illicit drug use accounted for a net loss of AUD1.6 billion (R7.5 billion) in 2004/2005, through a reduction in workforce, absenteeism, premature death and sickness (Collins and Lapsley, 2008:64). This accounted for 23.8% of the total costs and 0.3% of the Australian GDP in 2005 (Collins and Lapsley, 2008:64 and World Bank, 2015).

In the United States, with an annual meth prevalence rate of 0.5%, meth-attributable productivity loss in 2005 amounted to a 'best' cost estimate of USD687 million (approximately R4.4 billion), 2.9% of the total 'best' cost estimate, 0.01% of the United States GDP in 2005 (Nicosia et al., 2009: 43, World Bank, 2015). These costs were attributed to incarceration, productivity lost from time spent in meth treatment, employer costs, drug testing by the employer, higher healthcare and benefits, and absenteeism caused by meth use (Nicosia et al., 2009: 43).

2.3 Healthcare and Treatment

Meth use results in long-term and short-term non-communicable diseases (NCDs) such as mental health and behavioural problems, severe tooth decay, paranoia, aggressiveness, and so on (National Institutes of Health, 2013). Plüddemann et al. (2010b) examined the relationship between meth use and mental health aggression in 1,561 adolescent students in Cape Town. They found that meth use was associated with aggression and poor mental health (Plüddemann et al., 2010: 16). Students who had tried meth also had higher scores for 'borderline depression' to 'severe depression'.

In the United States, meth users were less likely to be insured than non-meth users and meth users' healthcare costs were up to 9% higher compared to that of non-users (Swanson et al, 2007 in Watt et al., 2014: 220). The meth-attributable cost of healthcare: attempted suicides, NCDs, premature mortality, administration, emergency department cost, etc., excluding drug addiction treatment, cost USD351.3 million (R2.2 billion) in 2005, 1.5% of the total 'best' cost estimates (Nicosia et al., 2009: 103). In South Africa, the alcohol-attributable cost of healthcare in 2009 was R11.7 billion, approximately 4.7% of the estimated total costs. (Matzopoulos et al., 2014:130).

Data from animals reveal that meth use in high doses results in dopamine nerve ending damages (Ricaurte et al., 1984 in Kish, 2008: 1681). It is likely that the same effects occur in humans (Mozszczynska et al., 2004 and Ricaurte et al., 2005 in Kish, 2008: 1681). Chronic meth exposure in humans could lead to Parkinsonism due to nigrostriatal dopamine neuron damage (Kish 2008: 1681). Treatment of meth addiction is also difficult. Studies conducted in Canada showed that as of 2008 no drugs had been approved in Canada for the treatment of meth addiction (Kish 2008: 1681) and no medication had been demonstrated to be effective in treating meth addiction (Buxton and Dove, 2008: 1538).

2.4 Sexual Risk Behaviour and HIV/AIDS Risk

Substance use is hypothesized to increase the risk of HIV infections (Rotheram-Borus et al., 1991 in Koopman et al., 1994: 95). A significant number of studies have analysed the relationship between alcohol and drug use and dangerous sexual behaviour. Fewer studies have focused on the effect of meth use on sexual behaviour. Nonetheless, studies on narcotics and stimulants illustrate the extent to which these affect sexual risk behaviour by users, which can be applicable to the case of meth users.

Koopman et al. (1994) studied the relationship between alcohol, drug use and the risk of HIV infections among runaways in New York City. Among the runaways (aged 11 to 19), more than half (63%) were sexually active with only half of these reporting condom use (Koopman et al., 1994: 100). The study also revealed a positive relationship between the frequency of substance use and the number of opposite-sex partners. For male runaways, there was an inverse relationship between the frequency of substance use and condom use; the higher the frequency of substance use, the lower the frequency of condoms use (Koopman et al., 1994: 93).

One of the short-term effects of meth use is a heightened sexual desire (Pietsch et al., 2013: 51 and Plüddemann, 2010a: 3), which leads to risky sexual practices (Watt et al., 2015: 4-5). A study of 139 HIV-negative, heterosexual meth users revealed that study participants, using meth on an average of 32.6 times per month, consuming 7.9 grams during this period, had on average 9.4 sexual partners over 2 months (Semple et al., 2004: 807-808). The average number of unprotected vaginal sex encounters was 21.5, 6.3 for unprotected anal sex and 41.7 for oral sex over the 2-month period (Semple et al., 2004: 807). Twenty-nine per cent of the respondents reported one or more sexually transmitted diseases in the past two months (Semple et al., 2004: 808).

Non-injecting meth-using gay, bisexual and heterosexual men and women in a study conducted in California were found to have more sexual partners than non-meth users (Molitor et al, 1998: 95). Heterosexual meth users were more likely to participate in anal intercourse than heterosexual non-meth users. Meth use was inversely related to condom use even during sex with known injection drug users (Molitor et al, 1998: 95). Meth users were also more likely to have had a sexually transmitted disease than non-meth users and to have traded money or drugs for sex (Molitor et al, 1998: 95).

These studies reveal that meth users' risk of HIV infection is heightened primarily because of their risky sexual behaviours and multiple partners. South Africa is no exception to this. Meth use in South Africa has been reported to result in increased sexual risk behaviour arising from the heightened sexual desire and the exchange of sex for meth (Watt et al, 2014: 222 and Meade et al., 2012: 232, 235).

Watt et al. (2015) studied sex trading, which entails trading sex for goods, money, services, and meth, in Cape Town. Participants would exchange sex for meth to the value of as little as R20 (Watt et al., 2015: 4). Some women also reported incidences of sexual violence. Sex trading increased HIV infection risk through multiple partners and unprotected sex. While participants were aware of condoms, condom use depended on the desperation for meth (Watt et al., 2015: 4).

Meade et al. (2012) studied the association between meth users and HIV risk behaviour. Female meth users in this study were most likely to report unprotected sex. Male meth users were more likely than non-users to report an HIV positive status (Meade et al., 2012: 235).

These studies provide insight into the association between meth use and increased sexual risk behaviour, illustrating a link between meth use and HIV/AIDS and Sexually Transmitted Infections (STIs). The extent to which meth use contributes to HIV infections and STIs should be explored. Further research would be necessary to establish the direct cause for HIV infections and STIs and the degree to which meth use increases the risk of HIV infection and STIs. This would make it possible to estimate the cost of HIV/AIDS risk and treatment attributable to meth use.

Tagar et al. (2014) evaluated the treatment costs of HIV/AIDS per patient year for South Africa, Zambia, Malawi, Ethiopia and Rwanda. The cost of HIV/AIDS treatment

per patient year (PPY) for South Africa was estimated to range from USD682 (R7,883) (simple mean; calculated across facilities in the sample) and USD595 (R6,877) (weighted mean: weighted by patient years by facility) (Tagar et al., 2014: 3). This treatment cost includes all costs after the initiation of anti-retroviral therapy (ART). Costs included are the costs of anti-retroviral drugs (ARVs), costs of opportunistic infections (OIs) drugs, lab costs, nutritional support, direct and indirect personnel, equipment, clinical and non-clinical supplies, facility-level training, building maintenance and other administrative support (Tagar et al., 2014: 2).

Tagar et al.'s study did not consider the causes of the HIV infection but does provide an estimate of the per unit annual cost of HIV treatment, excluding the cost of pre-ART initiation. In-depth research is lacking on the cause of HIV/AIDS infection and meth-attributable risk of HIV infection necessary to cost accurately the HIV/AIDS risk and treatment associated with meth use in South Africa, particularly in the Western Cape.

2.5 Crime

Crime is one of the external costs associated with illicit drug use. There is an extensive literature focused on alcohol and/or drug use and crime. Studies have revealed a positive relationship between criminal behaviour and alcohol and drug abuse (Dawkins, 1997: 395). In Queensland a significant number of meth users in a survey had been engaged in violent and property crimes. Meth use, or the need for money to purchase meth, was often cited as the cause for the crimes (Lynch et al., in Nicosia et al., 2009: 67). In the *Victims of Crime Survey 2013/14*, 75% of households in South Africa (85.2% in the Western Cape) believed that criminals were motivated by drug-related needs (Statistics South Africa, 20014b: 2).

Drug use is associated with crime through altering the user's behaviour, for example, inducing users to be more violent, motivating users to commit property crimes in an attempt to obtain money for drugs (Corman and Mocan, 1996: 2). Drug use also indirectly affects non-drug crimes by taking criminal justice resources, such as human capital, away from non-drug crimes to drug-related crimes. This could reduce the probability of arrests of criminals who commit non-drug crimes (Corman and Mocan, 1996: 2).

Some of the literature on amphetamine use and crime provided conflicting findings, mostly attributable to the samples analysed. Samples involving respondents with substantial previous criminal records were more likely to reveal a drug-crime relationship than samples of respondents with no criminal records (Bennett et al., 2008: 108).

Parry et al. (2004) analysed the drug-crime link in a study conducted in 2000 in Cape Town, Durban and Johannesburg among 1,050 arrestees. The drugs included in this study were cannabis, methaqualone, opiates, cocaine, amphetamines and benzodiazepines. The amphetamines analysed were not specified and the numbers were very low. The crimes included were violent offences, property offences, drug or alcohol related offences and miscellaneous offences, such as illegal immigration, prostitution, public indecency, reckless driving, etc. The study revealed an association between drug use and crimes in South Africa; 45% of arrestees tested positive for at least one drug. (Parry et al., 2004:173).

A study conducted in the Dresden region of Germany revealed an explicit augmentation in methamphetamine-related crime and fatalities between 2005 and 2011 (Pietsch et al., 2013: 54). Methamphetamine was present in 54% to 83% of all cases of individuals who tested positive for driving under the influence of drugs between 2005 and 2011 (Pietsch et al., 2013: 52) and methamphetamine use caused

or contributed directly to eight fatalities during the seven-year period. (Pietsch et al., 2013: 53).

Alda and Cuesta (2011) examined the costs of crime in South Africa. The study involved healthcare costs, including emotional, institutional, private security, economic and transfer costs. The transfer costs capture the value of material losses to victims of crime through theft, robberies or burglaries (Alda and Cuesta, 2011: 929). The transfers included were: lost property from housebreaking, vehicle theft, robberies, personal theft, firms' property and theft of cattle. The total estimated cost of crime for South Africa in 2007 was USD22 billion, equivalent to R149 billion. The most significant cost categories were healthcare costs and transfer costs, which accounted for 2.6% and 1.21% of the South African GDP, respectively, in 2007 (Alda and Cuesta, 2011: 931).

Budlender (2009) evaluated provincial government spending associated with alcohol use. The study estimated the provincial government expenditure on alcohol-attributable crimes. The study concluded that the Western Cape spent R111 million on alcohol-related crime prevention and support in 2009/2010 (Budlender, 2009: 11).

Nicosia et al. (2009) in the RAND study of the *Economic Costs of Methamphetamine Use in the United States* estimated the meth-attributable costs of meth possession offenses, sales offenses, community correction, violations, and property and violent offences. The study excluded some costs, such as the consequences of meth-related convictions, for example the denial of welfare benefits (Nicosia et al., 2009: 57). The study estimated that the cost of meth-attributable crime and criminal justice ranged from a low of USD2.6 billion (R16.5 billion) to a high of USD15.7 billion in 2005 (R99.9 billion), with a 'best' estimate of USD 4.2 billion (R26.7 billion), 18% of the total 'best' cost estimate (Nicosia et al., 2009: 58). This cost category accounted for

approximately 0.03% of the United States GDP in 2005 (Nicosia et al., 2009: 103 and World Bank 2015).

Studies on the costs of meth-attributable crime in South Africa are unavailable. However, costing studies on alcohol offer an insight on the magnitude of costs that narcotics and stimulants have on the economy. Matzopoulos et al. (2014) focused on three cost categories of crime in South Africa: crime response, crime consequence and crime anticipation. In addition to these three cost categories, the study also estimated the cost of alcohol-attributable road traffic accidents. The estimated alcohol-attributable crime cost across all four categories, including road traffic accidents, in 2009 was R25.8 billion, 1.2% of the GDP in 2009 (Matzopoulos et al., 2014:130 and World Bank 2015). The highest alcohol-attributable crime cost category was crime response at R9.7 billion (3.4% to 3.9% of the total costs) and the lowest was crime anticipation at R3.8 billion (1.3% to 1.5% of the total cost).

Meth use results in violent and aggressive behaviour (Willis, 2015 and Watt et al., 2014: 222). Hobkirk et al. (2015) studied the impact of interpersonal violence and meth use among 360 meth users in Cape Town. The study findings revealed that the majority of respondents (87%) reported at least one incident of interpersonal violence. Interpersonal violence was significantly associated with addiction severity. The relationship was likely cyclical, revealing that interpersonal violence increases the risk of substance use as a coping mechanism and substance use, in turn, increased substance users' risk of exposure to violence (Hobkirk et al., 2015: 169).

The meth pandemic in the Western Cape is associated with gang violence and the use of firearms (Parliament of the Republic of South Africa 2014: 2 and SAPS, 2014c: 20). Allard and Burch (2005: 529) estimated the cost of serious abdominal firearm-related injuries on 21 patients in G. F. Jooste Hospital in Cape Town. The costs included operating theatre times, therapy such as pharmaceuticals and blood

products, duration of hospital stay, laboratory services and diagnostic imaging. The study concluded that it cost approximately R10,300 (excluding labour costs) in 2003 to treat abdominal gunshot wounds in South Africa.

Norberg et al. (2009) improved on Allard and Burch's study. Their study was conducted at the Tygerberg tertiary teaching public hospital in Cape Town over three months in 2006 on 203 gunshot victims. The average length of stay of the 128 admitted patients was 5.8 days. The distribution of the gunshots was as follows: 16% in the head, 26% in the arms, 59% in the abdominal region, and 60% in the legs. Some individuals were wounded in more than one region. The total (average) cost in this study was USD2,230 (R15,521) with the highest patient cost being USD19,600 (R136,416) and the lowest USD200 (R1,392). These estimates present the average cost per procedure and not the total cost to the hospital. These estimates excluded pharmaceutical costs, lab services costs and staff salaries, shrinking the costs presented in the study.

In addition to the cost of treatment attributed to violence, there is the cost of lost years of life. The Geneva Declaration (2008) estimated that in the absence of violent deaths, South Africa could have gained 0.8 and 0.4 years in life expectancy, for males and females respectively, in 2004. As a result, South Africa ranked ninth in a list for 2004 of fifteen countries that would potentially increase average life expectancy if violent deaths were absent (Geneva Declaration, 2008: 103). The study further estimated the cost of violence in South Africa through lost productivity. The estimated aggregate lost product attributable to violent deaths in South Africa in 2004 ranged between USD1.9 billion (R10.8 billion) and USD4.4 billion (R25.1 billion), at 10% and 3% discount rates respectively, while the total economic loss as a result of armed conflict cost South Africa USD283 billion (R1,615.4 billion) (Oxfam-GB, 2007, Small Arms survey and Conflict Analysis Research Center (CERAC) calculations in Geneva Declaration, 2008: 94-102).

The estimated global cost of insecurity per person per year, based on contingent valuation or willingness-to-pay approach, in 2004 equated to USD70 (R474) per person. This estimate was based on the percentage (8%) of annual consumption that individuals living in conflict-prone areas were willing to give up in order to feel secure in 2004 (Geneva Declaration, 2008: 95).

While these estimated costs are not directly associated with meth use, meth use in the Western Cape has been associated with gang violence directly, through violence over meth supply turfs, and indirectly, through the financing of gang violence from meth sales (Parliament of the Republic of South Africa 2014:2 and Roloff, 2014:9). According to the SAPS (2014:20), gang-related murders and attempted murders jointly accounted for 24% of the numbers reported in the province in 2013/2014.

A bulk of the literature reviewed does not specifically apply to meth. However, the literature does guide and provide insight on the effects and costs of drug use, which are applicable to meth use.

CHAPTER 3

METHODOLOGY

This study uses a prevalence-based approach as opposed to the data-intensive alternative incidence approach, as there is insufficient data to carry out an incidence-based analysis. The prevalence-based approach, as mentioned previously, “estimates the number of deaths and hospitalisations attributed to meth use in a given year and the costs that arise from these deaths and hospitalisations” (Single et al., 2003:13).

The study estimates are based on how widespread meth use is in that segment of the population that sought treatment in 2013. Costs are based on inpatient treatment costs, even though some patients who sought meth treatment were outpatients. Inpatient treatment costs were used as these are not subsidised and more accurately reflect the cost of treating meth use.

The human capital approach was applied to estimate the cost of premature mortality caused by meth use in the Western Cape. The Western Cape figures were distilled from national data. The human capital approach analyses the present and future production costs of abuse-induced deaths which occurred in the present year (Collins and Lapsley, 2008: 6).

The study used a combination of a bottom-up and a top-down costing approach to estimate the costs associated with meth use both from an individual perspective and from that of a public provider. A bottom-up approach, as mentioned previously, identifies all of the inputs used to provide a service and assigns a value to each of these. These values are summed to derive the total cost of each unit of activity

involved in providing the service (Centre for Social Impact Bonds, 2013). A top-down approach entails dividing the total expenditure on a service, or policy by total units of activity (e.g. patients served) to derive a unit cost of each activity involved in the service provision or policy (Centre for Social Impact Bonds, 2013).

The study focused on the most recent year for which data are available. Data from the phase 35 report on *Monitoring Alcohol, Tobacco and Drug Abuse Treatment in South Africa* by the South African Community Epidemiology Network on Drug Use (SACENDU, 2014) were used to obtain the number of meth patients who sought treatment in 2013 from 24 treatment centres in the Western Cape. All prices presented reflect 2014 South African Rand (ZAR) prices, adjusted using the Consumer Price Index (CPI) obtained from Statistics South Africa (2015a). The individual costs that were evaluated are discussed in detail in the next sections.

3.1 Productivity Loss

This study used data from the 2010 Global Burden of Disease (GBD) study which reviewed the epidemiology of drug dependence, and analysed results in *The Global Burden of Diseases, Injuries, and Risk Factors Study 2010* (GBD, 2010), led by the Institute for Health Metrics and Evaluation (IHME). The GBD study used the Bayesian meta-regression technique (DisMod-MR) to estimate the population-level prevalence of drug dependence and use. Community and internet surveys were used by the GBD 2010 study to calculate new disability weights which were used to extrapolate the Disability Adjusted Life Years (DALYs) lost to drug use (IHME: 2013).

The estimated number of amphetamine cases for southern Africa: Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe, in the GBD study, was 188,000 (Degenhardt et al., 2013: 1566). Based on the proportion of the DALYs lost in South Africa to amphetamine use associated with mental and behavioural

disorders (20,965 DALYs lost to amphetamine use), relative to the region (28,949 DALYs lost), it is estimated that 72.42% of all cases of amphetamine use in southern Africa were found in South Africa. Thus, South Africa accounted for an estimated 136,150 cases of amphetamine use disorder. These 136,150 cases were associated with mental and behavioural disorders.

Given that the life expectancy in South Africa in 2010 was 58.2 years and 61.2 in 2014 (Statistics South Africa, 2014a: 6), this study assumes that the economically active in the Western Cape are aged 15 to 64 years. This age group accounted for an estimated 129,633 cases of amphetamine disorders in South Africa according to the GBD 2010 study. This estimate was derived from the percentage of DALYs lost to amphetamine use for the ages 15 to 64 compared to DALYs lost to amphetamine use for all ages ($19,961.42_{15-64} / 20,964.87_{\text{all ages}} \approx 95.21\%$), multiplied by the estimated cases of amphetamine use in the country ($95.21\% * 136,150 \approx 129,633_{15-64}$ cases).

In order to determine what proportion of DALYs lost to amphetamine disorders in South Africa are lost specifically to methamphetamine disorders, this study assumes that the distribution of the different amphetamines involved in the 2010 GDB study reflects a similar distribution of the amphetamines used by the patients who sought drug treatment in 2010 in South Africa.

The number of patients who sought drug treatment in 2010 was obtained from SACENDU phase 17-35 reports (Plüddemann et al., 2005-2010, Dada et al., 2012-2014). According to the SACENDU reports, the amphetamines used by patients who sought treatment in 2010 in South Africa were ecstasy, methamphetamine and methcathinone. Over-the-counter drugs or prescription drugs were not specified by drug type in the SACENDU reports and, therefore, were excluded from the analysis of total amphetamines reported by patients who sought treatment in 2010. According to the SACENDU reports, 90.85% of all amphetamine users aged 15 and above who

sought treatment in 2010 were primary meth users. This study, therefore, assumes that 90.85% of all DALYs lost to amphetamine use in the 2010 GBD study were attributed to meth use.

The DALYs lost to amphetamine use disorders provided by the 2010 GBD study only account for a fraction of the total DALYs lost to amphetamine use disorders. The GDB 2010 study presents DALYs lost to amphetamine use disorders for mental and behavioural cases but excludes other conditions known to be associated with meth and amphetamine use such as cardiovascular disease, cerebrovascular disease, lung disease, liver or kidney disease, suicides associated with meth use, etc. (Nicosia et al., 2009: 20, 28). Thus, this study only estimates productivity loss associated with mental and behavioural disorders caused by meth use for 2010 extrapolated to 2013, based on the number of patients who sought meth treatment in 2013.

This study further assumes that meth users stop being productive at age 64. This is based on the life expectancy for South Africa in 2010, which was 58.2 years and 61.2 in 2014 (Statistics South Africa, 2014a: 6). However, since approximately 1% of meth users who sought treatment in 2013 were in the age group 60-64, the cut off was set at 64 years. For meth users in the Western Cape, 67% were unemployed during the time they sought treatment and only 28% worked full-time (Dada et al., 2012-2014). While most meth users are not employed, they might be employed if not using meth or they could otherwise contribute to the household production function and thus their activities have an opportunity cost. Hence, the minimum wage for domestic workers was used to estimate the productivity loss from all primary meth users between the ages of 15 and 64.

The costs of the total estimated productivity loss for South Africa were computed using equation one:

$PL_{SA} = [MAF_{SA (15-64)} * DALY_{(15-64)} * (Min. wage)] \dots \dots \dots [1]$

Where:

PL_{SA} is the productivity loss for South Africa.

$MAF_{SA(15-64)}$ reflects the meth-attributable fraction of all amphetamines used by primary amphetamine users aged 15 and above* who sought treatment in 2010 in South Africa.

$DALY_{(15-64)}$ reflects the years lived in disability and the years of life lost through mental and behavioural disorders attributed to amphetamine use for those aged 15 to 64 for South Africa in 2010.

Min. Wage Minimum wages in South Africa for 2010.

(GBD, 2010)

According to the SACENDU reports, 92% of primary meth users who sought treatment in 2010 were in the Western Cape. Therefore, this study used 92% to disaggregate meth-attributable productivity loss costs in South Africa for the Western Cape. Productivity loss was estimated using the mean value and upper and lower bounds (at 95% CI) of total DALYs estimated to be attributable to methamphetamine. A 5% discount rate was used to convert future productivity loss costs to present costs as recommended by the World Health Organisation (Single et al. 2003:20).

3.2 Treatment Costs

Treatment costs may be defined as internal or external costs, depending on who bears the cost. Since the government in the Western Cape subsidizes some cases of treatment, these costs are treated as external in this study. The cost of illness related to meth in this study is discussed with regard to the meth treatment and the healthcare needs arising from meth use.

(i) Meth Treatment Costs

As a result of limitations in time and resources, this study uses the market value of treatment costs to estimate the unit cost of meth treatment. Information on the duration and cost of meth treatment was obtained from the treatment centres telephonically and by means of personal interviews and email. For most of the outpatient centres, treatment costs are subsidized. The subsidized cost charged to patients is based on family income and is therefore an underestimate of the economic cost of treatment.

This study aims to capture all resources involved in meth treatment. To achieve this, the estimated treatment costs seek to capture the cost of supplies involved in treatment, equipment, human capital, utilities, lab tests, transport costs by patients, and productivity loss during treatment. In sum, the treatment cost in this study aims to reflect accurately the opportunity cost of treatment.

The estimates for costs of treatment for this study were obtained from four private clinics. These are the Stepping Stones, Kenilworth, Claro and Crescent clinics. The unit costs of treatment for these four clinics, for a period of three weeks of rehabilitation, ranges from R37,000 to R73,030 per patient (Alberts, 2015, Claro, 2015, Kenilworth, 2015 and Robbins: personal communication, 2015, February 25). This includes a medical assessment by the doctor upon admission, detoxification where applicable and treatment group counselling over three to four weeks (Alberts: 2015).

The treatment costs exclude extras such as additional medication, additional consultations with the doctor, psychologist and psychiatrist, pathology, laundry and transport costs. Thus, estimates reflected in the study are an underestimate of the total costs paid by some meth patients who incur extra costs. Owing to the paucity of data on the full economic cost of treatment for outpatient clinics, inpatient costs from

the four private clinics mentioned earlier were used to estimate meth treatment costs. These are presented in chapter 4.

For the cost of treatment, three possible costs were estimated: a lower bound, a higher bound and the 'best' estimate. The upper and lower estimates are based on the highest and lowest costs of treatment from each of the four clinics. The 'best' estimate for the unit cost of treatment was estimated using the average of the four treatment costs charged at the clinics considered.

The estimate of total treatment costs is based on the treatment of the 2,189 patients who sought meth treatment in the Western Cape in 2013 (Dada et al., 2014:7). This study estimated the cost of treatment for primary meth users. The figure of 2,189 accounts for only primary meth users who sought treatment in 2013 and excludes patients who may occasionally use meth, but for whom meth was not the primary drug of choice.

Table A3 in the appendix presents an estimate of the outpatient (and inpatient) costs of treatment, based on data from SACENDU on the type of patient care (outpatient or inpatient) and expenditure by the Department of Social Development on substance abuse). However, these treatment cost estimates exclude the additional costs paid by patients or their families.

(ii) Healthcare Costs

Meth use is associated with short-term and long-term health effects. Some of these include Non-Communicable Diseases (NCDs) such as hypertension, cardiovascular disease, severe tooth decay, amongst others (Plüddemann, 2010: 5-6). The Medical Research Council (MRC) recorded NCDs reported by patients who sought drug treatment in the Western Cape in 2014. A total of 471 primary meth-users among

patients seeking meth treatment presented with at least one case of diabetes or cardiovascular, respiratory, mental health, liver, hypertension and/or gastro-intestinal tract diseases, which have been reported to be long-term effects of meth use, depending on how meth is consumed (Buxton and Dove, 2008: 1537, Kish, 2008: 1681 and Plüddemann, 2010: 5-6). This thesis uses data based on these 471 primary-meth patients to estimate the costs of meth-attributable healthcare.

While most of these diseases tend to present themselves years after the initiation of meth use, the present study uses the numbers reported to the MRC to estimate the meth-attributable cost of healthcare for these NCDs in an aim to estimate the meth-related cost of illness. These numbers may be an underestimate of the long-term NCDs that patients are likely to present in the future. However, given that these data were collected for the first time in 2014 and there are no better data available, the present study uses these numbers.

To estimate the annual cost of treatment of the diseases listed above, the use of medical aid pay-offs for each NCD was used to gauge the minimum cost of treatment. These costs ranged from a high of R38,200 to a low of R4,860. These cost estimates were obtained from Momentum, FedHealth, Medihelp, Resolution Health, Med Shield, Oxygen and Bonitas.

Three costs of treatment were estimated for each NCD: the upper bound, lower bound and 'best' estimate. The upper bound and lower bound estimates are based on the highest and the lowest possible medical aid pay-offs from each of the medical aid schemes. The 'best' cost estimate is the average of all possible pay-offs for each NCD.

3.3 Meth-Attributable Crime

Meth use is associated with numerous property-related and violent crimes (Nicosia et al., 2009: 67). This study estimated the meth-attributable fractions of murders and attempted murders, drug-related crimes, driving under the influence of alcohol and drugs, property crimes, robberies and theft in the Western Cape. These data were obtained from the South African Police Service (SAPS) 2013/2014 annual reports (SAPS, 2014b and 2014c: 159-161).

A top-down approach was used with these external costs. Three cost estimates, an upper bound, a lower bound and a 'best' estimate, were computed. For the lower bound estimate, the expenditure by the SAPS, as reported in the 2013/2014 annual report was used to estimate meth-attributable public order and safety (policing) costs. The expenditures considered for this estimate were: expenditure on administration, visible policing, detective services and crime intelligence (SAPS, 2014a: 250-252).

Additionally, an estimated meth-attributable fraction of the expenditure by the Western Cape Department of Social Development on crime prevention and support and the expenditure by the Western Cape Department of Community Safety were used for the upper bound estimate of policing costs (Community Safety, 2014:12, SAPS, 2014c: 68 and Western Cape department of Social Development, 2014: 71). The lower bound estimate uses findings from a study by Alda and Cuesta (2011: 931) on the cost of crime in South Africa and its implications. Alda and Cuesta's cost findings in 2007 are presented in table 3.1. The 'best' cost estimate was an average of the upper bound and lower bound estimates.

Table 3.1: Estimates of Crime Institutional Costs in South Africa by Alda and Cuesta (2011)

Institution	Alda and Cuesta's Estimated Costs (USD millions, 2007)	Estimated 2014 value in R million
Correction Service	1 524	158 80
Police, public security	4 613	43 386
Justice	1 032	10 759

Sources: Alda and Cuesta (2011: 931), Statistics South Africa (2015), Oanda (2015a).

For justice costs, the expenditure by the South African Department of Justice and Constitutional Development (lower courts services) and the National Prosecuting Authority (NPA) were used to estimate the lower bound meth-attributable crime costs. For the upper bound, the estimates derived from Alda and Cuesta's (2011: 931) analysis of the institutional costs of crime, adjusted into 2014 prices, were used. The 'best' cost estimate is the average of the upper and lower bound estimates.

Correctional Services expenditure (2014) was also used for the estimation of the meth-attributable crimes upper bound estimate. The findings by Alda and Cuesta (2011: 931) on correctional service costs were used for the lower bound estimate. The average of the upper and lower bound estimates was used for the 'best' cost estimate.

The estimates, per crime cost category, were derived as follows:

3.3.1 Policing Services Costs

A top-down approach was used to estimate crime costs attributed to meth use. This entails estimating how much the government spent on crimes attributed to meth use.

The 2013 budget, which allocated R389 million to public order and safety (Western Cape Provincial Treasury, 2013:59), and the R144 million spent on crime prevention and support by the Western Cape Department of Social Development (Western Cape Department of Social Development, 2014: 71) were used for the upper bound estimate of policing costs. Additionally, R66.8 billion derived from the SAPS 2013/2014 expenditure report was used to estimate the meth-attributable cost of policing expenditure. This study estimates that 23% of the national policing expenditure was allocated to administration, visible policing, detective services and crime intelligence in the Western Cape, where total recorded crimes accounted for 23% of the national totals (SAPS 2014a and SAPS 2014c: 159-161). This weight was applied to counteract the lack of data in the Western Cape SAPS annual report on expenditure on personnel costs.

The lower bound estimate was derived from findings of a previous study, by Alda and Cuesta (2011) on the costs of crime in South Africa. Alda and Cuesta used a top-down approach, which entailed the use of institutional costs obtained from government agencies involved in combating crime (Alda and Cuesta, 2011: 929). Alda and Cuesta's (2011) study findings were converted to 2014 prices using the CPI provided by Statistics South Africa (2015a), see table 3.1. The 'best' cost estimate was the average of the upper bound and lower bound cost estimates.

Given the lack of certainty about the actual number of Amphetamine-Type Stimulants (ATS) produced and ATS-attributable drug-related crimes, the meth prevalence rate (30.42%) among patients treated for drug use in the Western Cape in 2013 was used to estimate the proportion of drug-related crimes attributable to methamphetamine,

Data on the number of crimes committed and reported in the Western Cape in 2013/2014 were obtained from the SAPS annual reports (2014a). The estimation of the meth-attributable fraction and the meth-attributable costs of each of these crimes are discussed below.

(a) Murder and Attempted Murder

Gang-related crimes are associated with meth use: directly through gang conflicts over meth supply turfs and indirectly through financing these conflicts from meth sales (Parliament of the Republic of South Africa 2014:2 and Roloff, 2014:9). Hence, it is crucial that these crime costs be quantified to establish the opportunity cost of meth-attributable murders and attempted murders. However, there is a paucity of data on the precise number of gang-related murders and attempted murders. According to the *Victims of Crime Survey 2014*, only 89% of murders were reported to the South African police (Statistics South Africa, 2014c: 43). Thus estimates presented in this study account for only a fraction of the gang-related murders.

According to the SAPS (2014b: 20), gang-related murders and attempted murders, jointly account for 24% of the numbers reported in the province, that is, 24% of 2,909 murders and of 3,363 attempted murders reported in 2013/2014 (SAPS, 2014b). The Western Cape provincial police commissioner, Arno Lamoer, reported that 18% of murders in the Western Cape are gang-related (South African Press Association, 2014).

Using these numbers, the gang-related murders and attempted murders were computed as follows:

1. The sum of the reported murders and attempted murders in 2013/2014 equates to: $2,909 + 3,363 = 6,272$ (SAPS, 2014b).

2. Twenty-four per cent, which accounts for gang-related murders and attempted murders equates to: $24\% \times 6\,272 = 1,505$ (SAPS, 2014b).
3. Eighteen per cent of the reported murders (2,909) in 2013/2014 were gang-related murders, which equates to $18\% \times 2,909 = 524$ (South African Press Association, 2014 and SAPS, 2014b).
4. The estimate of gang-related attempted murders was given by the estimated sum of gang-related murders and attempted murders 1,505 (see 2 above), minus the estimated gang-related murders (see 3 above): $1,505 - 524 = 981$.
5. The estimated gang-related attempted murders, 981 equates to 29% ($981/3,363 = 0.29$) of the reported attempted murders.

The percentage of patients who sought meth treatment to total patients who sought drug treatment in 2013 (30.42%) was used to estimate the proportion of gang-related murders and attempted murders attributable to the meth pandemic. The estimated number of meth-attributable murders and attempted murders is summarised in equations 3 and 4 below:

*Total reported murders (2013/2014) * % of gang-related murders (18%) * Meth-attributable fraction given by the percentage of meth patients who sought treatment in 2013 (30.42%) = Meth-attributable murders.....[3]*

*Total reported attempted murders (2013 2014) * % of gang-related attempted murders (29%) * Meth-attributable fraction given by the percentage of meth patients who sought treatment in 2013 (30.42%) = Meth-attributable attempted murders.....[4]*

It is estimated that meth use accounted for 5% of all murders and 9% of all attempted murders reported in the province. Thus, for the upper bound estimate, 5% and 9% of the estimated budget allocated to murders and attempted murders, respectively, is attributed to meth use. This allocated estimate includes the costs of forensic science, which investigates all non-natural deaths (SAPS, 2015a). This was included in the

estimation of resource-intensity of the crime categories by the five crime experts, as discussed previously.

For the lower bound estimate of meth-attributable murder and attempted murder, the police and public security costs estimated by Alda and Cuesta (2011) were used. The percentage of estimated meth-attributable murders and meth-attributable attempted murders in the Western Cape to all reported murders and attempted murders in South Africa was used to calculate police and public security costs attributable to meth use. These are summarised in equations 5 and 6 below.

$$\frac{\text{Estimated meth-attributable murders}_{WC}}{\text{total murders reported}_{SA2013/2014}} * \text{Police \& public security expenditure}_{SA2007} * \text{ExR}_{USD \text{ to } ZAR} * \text{CPI}_{\left(\frac{2014}{2007}\right)} * \% \text{ of budget allocated to crime category} \dots \dots \dots [5]$$

$$\frac{\text{Estimated meth-attributable att.murders}_{WC}}{\text{total att.murder reported}_{SA2013/2014}} * \text{Police \& public security expenditure}_{SA2007} * \text{ExR}_{USD \text{ to } ZAR} * \text{CPI}_{\left(\frac{2014}{2007}\right)} * \% \text{ of budget allocated to crime category} \dots \dots \dots [6]$$

The public and police security costs were obtained from Alda and Cuesta's estimates (see table 3.1).
 ExR refers to the exchange rate of the USD to the ZAR (\$1=R6.75)
 The percentage of the budget allocated to the crime category was estimated based on resource-intensity per crime category obtained through personal interviews with five crime services experts on their perception of the level of resource-intensity of the 29 crime categories (see equation 2.1).

The 'best' cost estimate for meth-attributable murder and attempted murder was the average of the upper and lower bound estimates.

(b) Property Crimes, Robberies and Theft

A study on the impact of meth use in Cape Town revealed that meth use was responsible for various crimes in the community (Watt et al. 2014: 222). According to the *Victims Crime Survey 2013/2014* conducted by Statistics South Africa, 85.2% of households in the Western Cape perceived property crimes to be motivated by drug needs (Statistics South Africa, 2014c: 18). This is consistent with a report by GroundUp that stated that SAPS data revealed that approximately 80% of crime in the Western Cape was related to substance abuse (Nwabisa, 2013).

The present study used this public perception and the percentage of patients who sought meth treatment to estimate meth-attributable property crimes, robberies and theft. This was done to estimate the cost of crimes arising from the need to obtain money for meth purchases. Robberies and theft include common robbery, robbery with aggravating circumstances, robbery in non-residential and residential premises, theft, shoplifting, car-jacking and truck-jacking.

The upper bound estimates were computed as follows:

<p><i>Total reported property, robbery & theft crimes (2013/2014)* 85.2% (public perception that drug use is the motive for the crime)* Meth-attributable fraction given by the percentage of meth patients who sought treatment in 2013 (30.42%) = Estimated meth-attributable property, robbery and theft crimes.....7</i></p>
--

The percentage of meth-attributable property, robbery and theft crimes to all other crimes reported in the Western Cape in 2013/2014 was then multiplied by the estimated policing budget allocated to this crime category to obtain the upper bound cost estimate for meth-attributable property, robbery and theft crimes. This is summarised in equation 8, which was used for the estimation of property, robbery and theft crime costs.



$$\frac{[\text{Estimated meth-attributable property Crime} * 100]}{\text{Total crimes reported}_{WC2013/2014}} * \text{estimated crime category budget}_{WC2013/2014} \dots \dots \dots [8]$$

The percentage of the budget allocated to the crime category was estimated based on resource-intensity per crime category obtained through personal interviews with five crime services experts on their perception of the level of resource-intensity of the 29 crime categories (see equations 2.1 and 2.2).

The budget allocation was obtained from the allocation by the Western Cape provincial government to public order and safety, the allocation by the Department of Social Development to crime prevention and support and the estimated expenditure by the Western Cape SAPS.

For the estimation of the lower bound cost estimate, the percentage of the estimated meth-attributable property, robbery and theft crimes to the total property, robbery and theft crimes reported in South Africa (2013/2014) was multiplied by the estimated crime category budget allocated to the categories, based on police and public security costs estimated by Alda and Cuesta (2011: 931) converted to 2014 prices (presented in table 3.1).

Equation 9 summarises this computational procedure, which was used for the estimation of property crimes and robbery and theft crimes.

$$\frac{\text{Estimated meth-attributable property crime}_{WC}}{\text{Total property crimes reported}_{SA2013/2014}} * \% \text{budget allocated to crime category} * \text{budget}_{SA2007} * \text{ExR} * \text{CPI} \dots [9]$$

The budget was obtained from Alda and Cuesta's estimates (see table 3.1).

ExR refers to the exchange rate of the USD to the ZAR (\$1=R6.75).

The percentage of the budget allocated to the crime category was estimated based on resource-intensity per crime category obtained through personal interviews with five crime services experts on their perception of the level of resource-intensity of the 29 crime categories (see equation 2.1).

The 'best' cost estimate for meth-attributable property crime was obtained using the average of the upper and lower bound estimates.

(c) Drug-Related Crimes and Driving Under The Influence of Alcohol and Drugs

Drug-related crimes refer to crimes associated with the possession and trafficking of drugs. For the estimation of the fraction of this crime category attributable to meth use, the percentage of meth patients who sought treatment in 2013 was used. This is a similar approach to that used by the RAND study to estimate meth-related crimes in 2005 for the United States (Nicosia et al., 2009: 58).

It was estimated that 30.42% of these types of drug-related crimes are attributable to meth use, resulting in an estimated 25,995 cases. Consequently, for the upper bound estimate, this study estimated that 30.42% of the estimated budget allocated to drug-related crimes was spent on meth-attributable drug-related crimes.

A similar approach was used for the estimation of the meth-attributable fraction of driving under the influence of alcohol and drugs. It is estimated that meth contributed to 4,133 of the cases, equivalent to 30.42% of all cases in this category, derived from the proportion of patients who sought meth treatment in 2013. The weight 30.42% was used to estimate the meth-attributable cases of driving under the influence of drugs. These computational procedures are summarised below.

Upper-Bound Estimate of Drug-related Crimes:

Cases of drug-related crimes in the WC percentage of patients who sought meth treatment in WC = Estimated meth cases of drug-related crimes.*

$$85,463 * 30.42\% \approx 25,995$$

Estimation of Costs:

$$30.42\% * \% \text{ of budget allocated to drug crimes} * \text{Estimated crime expenditure}_{WC2013/2014}$$

Upper-Bound Estimate of Driving under the influence:

Cases of driving under the influence in the WC percentage of patients who sought meth treatment in WC = Estimated meth cases of driving under the influence*

$$13,588 * 30.42\% \approx 4,133$$

Estimation of Costs:

$$30.42\% * \% \text{ of budget allocated to drug crime} * \text{Estimated crime expenditure}_{WC2013/2014}$$

The percentage of the budget allocated to the crime category was estimated based on resource-intensity per crime category obtained through personal interviews with five crime services experts on their perception of the level of resource-intensity of the 29 crime categories (see equation 2.1).

(SAPS 2014a and 2014c: 161).

NOTE: Due to rounding, numbers may not sum precisely

For the lower bound estimate, the percentage of the estimated meth-attributable drug-related crimes in the Western Cape (25,995) to the cases reported in South Africa (260,732), 10%, was used to allocate the drug-related crime budget to meth-attributable crimes in the province. The budget was derived from Alda and Cuesta's (2011: 931) estimates, adjusted for 2014 prices (see the computational procedure below). The amount estimated to be allocated to drug-related crimes was derived from the average score for the resource-intensity of the drug-related crime category as rated by five crime services experts from SAPS.

A similar approach was used for the estimation of meth-attributable costs of driving under the influence of alcohol and drugs. The computational procedure is summarised below.

Lower-Bound Estimate of Drug-related Crimes:

*[Estimated cases of meth-related crimes in WC/ reported cases of drug related crimes in SA]*100*

$$\frac{25,995}{260,732} * 100 \approx 10\%$$

Estimated Cost:

$$10\% * \% \text{ of budget allocated to drug crimes} * \text{budget}_{SA2007} * ExR * CPI$$

Lower-Bound Estimate of Driving Under the Influence:

Estimated meth-attributable cases of driving under the influence in WC /total cases reported in South Africa= Estimated meth-attributable percentage of driving under the influence to total cases reported in South Africa.

$$4,133 / 69,757 * 100 \approx 5.9\%$$

Estimated Cost:

$$5.9\% * \% \text{ of budget allocated to driving under the influence} * \text{budget}_{SA2007} * ExR * CPI$$

The percentage of the budget allocated to the crime category was estimated based on resource-intensity per crime category obtained through personal interviews with five crime services experts on their perception of the level of resource-intensity of the 29 crime categories (see equation 2.1).

The budget was obtained from Alda and Cuesta's estimates (see table 3.1). (SAPS 2014a and 2014c: 161).

NOTE: Due to rounding, numbers may not sum precisely

The 'best' cost estimate was the average of the estimated upper and lower bound estimates.

(d) Possession of Illegal Firearms

Some of the illegal firearms confiscated in the Western Cape are weapons used in gang conflicts. The Western Cape SAPS reported that 497 of the confiscated firearms in 2013/2014 were gang related, equivalent to approximately 18% of all cases reported in the province (SAPS, 2014c: 20).

The present study used the meth prevalence rate among patients who sought drug treatment in 2013, 30.42%, to estimate the fraction of illegal firearms indirectly associated with the meth pandemic. This equates to 151 firearms (see table 3.2).

The upper bound estimate was derived by allocating the meth-attributable fraction to the estimated crime category budget allocation based on the resource-intensity of confiscating illegal firearms, as perceived by five crimes services experts, the budget allocated to crime prevention and support, public order and safety, and the estimated expenditure by the Western Cape SAPS. The meth-attributable fraction was derived from the product of the percentage of gang-related firearms and meth prevalence among patients who sought drug treatment (18%*30.42%). This is equivalent to 5.48%. Thus, this study estimated that 5.48% of the estimated budget allocated to the 'possession of illegal firearms' crime category is linked to the meth pandemic.

The same approach was used for the lower bound, but here the budget was derived from Alda and Cuesta's estimates of policing and public security costs converted to South African Rands (ZAR) and adjusted for 2014 prices. The percentage of meth-attributable illegal firearms confiscated in the Western Cape to total firearms confiscated nationally was used to derive the estimated meth-attributable policing

costs of confiscating illegal firearms. The 'best' cost estimate was the average of the upper and lower bound cost estimates.

Table 3.2 summarises the reported crimes and the estimated meth-attributable crimes.

Table 3.2 Estimated Meth-Attributable Crime in the Western Cape and South Africa 2013/2014

Crime	Total Reported in SA	Total Reported in WC ¹	Estimated meth-attributable crime (WC ¹)	% Of estimated meth crimes to total crimes in WC ¹	% Of estimated meth crimes to reported crimes in SA
1	2	3	4	5	6
Murder	17 068	2 909	159	5.48	0.93
Attempted Murder	17 110	3 363	299	8.89	1.75
Property Crimes	562 768	117 107	30 349	25.92	5.39
Drug-related Crimes	260 732	85 463	25 995	30.42	9.97
Driving under the influence	69 757	13 588	4 133	30.42	5.92
Theft, shoplifting, other	593 269	142 159	36 841	25.92	6.21
Trio crime**	49 120	5 035	1 305	25.92	2.66
Possession of Illegal fire arms	15 420	2 810	151	5.37	0.98
Total crimes reported	2 169 927*	491 954*	99 978	20.17*	4.57

Source: SAPS 2014a, SAPS 2014: b: SAPS 2014c: 159-161).

¹ Western Cape

*Includes all other crime categories reported but not associated with meth use thus not listed in table 3.2

**Trio crimes include car and truck jacking, business and house robberies.

NOTE: Due to rounding, numbers may not sum precisely.

3.3.2 Justice Costs

In order to estimate the costs of meth-attributable trials, data from the annual reports from the Department of Justice and Constitutional Development (2014: 110-111) and the National Prosecuting Authorities (NPA, 2015: 28, 27) were used.

Crimes are tried in lower courts. Lower courts are disaggregated into district courts and regional courts. District courts try both civil cases and less serious criminal cases. The regional courts, on the other hand, only deal with criminal cases and try more serious cases like murder, rape, armed robbery and serious assaults (Department of Justice and Constitutional Development, 2015).

For the cost estimates of meth-attributable legal services, three assumptions were made:

1. That the perpetrators of the estimated meth-attributable crimes for 2013/2014 were tried (and convicted if applicable) in 2013/2014.
2. That the proportion of meth-attributable criminal cases tried is proportional to the total cases tried (504,316) relative to total crimes reported nationally (2,169,927), equivalent to 23%. Thus, it is estimated that 23% of all meth crime cases reported were tried (NPA, 2014: 35-36 and SAPS, 2014a: 159-161).
3. That the expenditure by the state on court criminal cases is a factor of the time or duration of each trial. That is, expenditure by the state on criminal trials is proportional to the number court days per crime case.

Assumption 3 is based on the report by the National Prosecuting Authority (NPA), which reported on the average number of court days per case in the lower court. For the NPA cost estimates, the cost of prosecuting, support services and witness protection were considered. These latter categories were included in this study due to the broad nature of meth-attributable crimes, including violence and cases where witnesses may prefer anonymity, such as in attempted murder and murder cases,

drug-related crimes, etc.

According to the NPA, the district courts tried each case over 0.36 days (NPA, 2014: 35-36; Department of Justice and Constitutional Development, 2015). This includes all criminal cases addressed by the district courts, including cases resolved through the Alternative Dispute Resolution Mechanism (ADRM). ADRM refers to “resolving criminal matters outside the formal trial process, settling admissions of guilt for minor offences and considering dockets brought by the police where persons have not been charged” (NPA, 2014: 35).

According to the NPA, each case in the regional court took two days for trial (NPA, 2014:35-36). Based on this, serious crimes: murder, attempted murder, robberies and car jacking were allocated 83% of the NPA expenditure. The figure of 83% was derived from the duration of trials in the regional courts, and equates to 2 days out of a total of 2.36 days for both district and regional court trials. Cases tried in the regional courts, estimated at 83% of the NPA expenditure, cost R2.7 billion.

District court cases were reported to take 0.36 days to try. Based on the workload of the NPA in lower courts, it is estimated that the district court cases contribute 17% of the NPA lower court workload (NPA, 2014:35-36). Seventeen per cent of the NPA expenditure works out to R547.8 million. It is therefore estimated that R547.8 million was spent by the NPA on cases tried in the district courts.

For the estimation of the meth-attributable costs, the percentage of estimated meth crimes to total crimes reported in South Africa (column 6 of table 3.2) was multiplied by 23% (the percentage of crimes tried to total crimes reported nationally in 2013/2014). The resulting product, 1.2%, for all serious crimes, murder, attempted

murder and trio crimes, was multiplied by the estimated regional court expenditure of R2.7 billion.

For other meth crimes, tried in the district courts, the fraction of meth crimes to total crimes reported nationally (see column 6 of table 3.2) was multiplied by 23% (the proportion of reported crime cases tried in 2013/2014), which was 9% for the remaining crime categories. The resulting 9% was multiplied by the district court estimated expenditure of R547.8 million.

For the estimation of meth-attributable lower court services (which unlike the NPA, only deals with crime) civil cases tried in the district courts must be considered. Data on the number of civil cases tried in the district courts in 2013/2014 is unavailable. Thus, the percentage of criminal cases tried in the district courts to the total cases tried is not known.

Because there is not a better resource allocation estimate for lower court services, Budlender's estimate of the alcohol-attributable cost of crime to lower courts was used (Budlender, 2009, 19). Budlender attributes 10% of the lower courts' expenditure to alcohol-attributable crimes in South Africa. According to SACENDU, patients who sought alcohol addiction treatment in 2013 accounted for 27% of the total patients seeking addiction treatment in 2013 nationally. The number of patients who sought meth treatment was only half the number of those who sought treatment for alcohol addiction, at 13% of the total patients seeking addiction treatment in South Africa.

Owing to the lack of a better estimate of the lower court services attributed to meth crimes, half of the fraction Budlender used for alcohol-attributable crimes, 5%, was used to estimate the lower courts services costs attributed to meth use. This 5% was

applied to the lower courts expenditure to estimate the meth-attributable cost of services rendered by the lower courts for meth-attributable trials. For the lower bound estimate, the meth-attributable cost of justice was derived from the sum of 5% of the lower courts' expenditure, 1.2% of the NPA expenditure estimated to be allocated to regional court cases and 9% of the expenditure estimated to be allocated to the district court cases.

For the upper bound estimate, the weight of 4.6%, reflecting the estimated proportion of meth-attributable crimes reported in 2013/2014 to total crimes reported nationally (see table 3.2), was applied to Alda and Cuesta's (2011: 931) estimates of the crime costs for justice (see table 3.1). The 'best' cost estimate is the average of the upper and lower cost estimates.

3.3.3 Correctional Services Costs

While meth is not scientifically considered a narcotic, various reports tend to classify psychoactive stimulants under narcotics. For example, the International Narcotics Control Board reports on both narcotics and psychoactive stimulants in the "narcotics" report (International Narcotics Control Board, 2014:44). SARS (2015) also reports meth seizures as suspected narcotics.

According to the Department of Correctional Services annual report (2013/2014:27-28), 3% (2,996) of sentenced offenders were sentenced for narcotics crimes in 2013/2014. Each offender was placed under only one crime category, regardless of the number of offences committed and sentenced for. Thus, costs presented in this study are an underestimate of the number of meth-attributable offenders who were sentenced for multiple offences (which could include meth-related offences) and registered for only one offence (which may not have been meth-related).

The categories of crimes reported by the Department of Correctional Services are: aggressive, economic, sexual, narcotics and other (Department of Correctional Services, 2014: 27-28). It is not possible to estimate the proportion of inmates sentenced for crimes such as murder, gang-related violence, serious assault, etc. Thus, crimes indirectly linked to meth use such as murders, attempted murders, robberies, serious assault, and so on are difficult to cost from the available data.

Meth-attributable correctional services costs involved offenders sentenced in 2013/2014 as well as offenders sentenced prior to 2013/2014 and still serving their time in 2013/2014. The 3% of sentenced offenders mentioned earlier relates to offenders sentenced during 2013/2014 and thus excludes total offenders serving their sentence in 2013/2014 who were convicted prior to 2013/2014. In order to capture the costs of all meth offenders serving sentences during 2013/2014, this study assumes that the total number of narcotics offenders already serving in 2013/2014 (152,553) is proportional to the 3% for the total narcotics offenders (2,996) sentenced during 2013/2014 (Department of Correctional Services, 2014: 27-28). Thus, it is estimated that 4,577 of the inmates were sentenced for narcotics crimes and were serving their sentences in 2013/2014. This estimate includes both offenders sentenced in 2013/2014 and those sentenced prior to 2013/2014 but still serving their sentences during this period.

This assumption allows for the costing of estimated inmates whose crimes were meth-attributable, sentenced in 2013/2014, and those sentenced prior to 2013/2014 but still serving during that financial year and thus costing the state administration, incarceration, rehabilitation, care and social reintegration costs during the year in question (Department of Correctional Services 2013/2014: 104).

According to the data from the SAPS annual reports (2014a and 2014b: 160), the Western Cape accounted for 32.8% (85,463) of all reported drug-related crimes in South Africa (260,723). This study therefore estimated that 32.8% of the narcotics detainees, equivalent to 1,500 narcotic offences, pertain to the Western Cape. This is given by:

$$3\%_{\text{narcotic offences}} * 152,553_{\text{total inmates}} * 32.8\%_{\text{ratio of drug-related crimes in the WC to the rest of SA}} = 1,500$$

NOTE: Due to rounding, numbers may not sum precisely.

The ratio of meth patients (30.42%) to other drug patients who sought treatment in 2013 in the Western Cape was used to disaggregate the estimated meth offences from the other narcotics offences, resulting in an estimated 456 meth-attributable offences.

$$1,500 * 30.42\% \approx 456$$

Using a top-down approach to estimate the meth-attributable expenditure on correctional services, this study estimated that for the upper bound cost, 0.3% (based on the percentage of estimated meth-attributable inmates to total inmates (456/152,553 ≈ 0.3%)) of the R18.7 billion expenditure for correctional services was accounted for by the meth pandemic.

A similar approach was used for the lower bound estimate. However, instead of using the R18.7 billion correctional services expenditure, R15.9 billion, derived from Alda and Cuesta's estimates (2011:391) was used (see table 3.1). The 'best' cost estimate was the average of the upper and lower cost estimates.

This study does not capture the costs of productivity lost during incarceration owing to the lack of data on the duration of sentences, as well as time and resource constraints.

The correctional services meth-attributable costs only captured crimes reported as drug-related crimes (possession and trafficking of meth). Crimes associated with meth use such as murder, attempted murder, robberies and theft were not included owing to lack of data. Based on the proportion of estimated possession and trafficking of meth to total estimated crimes caused by meth, the correctional services costs estimated only account for approximately 26% of the total correctional services costs if all meth-attributable crimes, such as murders, attempted murders, robberies, etc., were considered.

3.4 Transfers

Meth use is associated with crimes perceived to be committed to obtain money for meth purchases. Victims of crime incur internal costs through material losses from robberies, theft, and burglaries. This study draws on the cost findings by Alda and Cuesta (2011: 931) for the estimation of material losses by victims of crimes perceived to have been committed for meth-related needs.

The percentage of estimated meth-attributable property crime, robbery and theft to total reported property, robbery and theft crimes in South Africa was used to estimate the meth-attributable transfer costs of crime. The resulting figure of 5.6% was used for the lower bound estimate of transfer costs attributable to meth (see table 3.3).

For want of a better upper bound estimate, the percentage of the individual transfer costs to the 2007 Gross Domestic Product (GDP) were multiplied by the 2014 GDP, USD349.8 billion (R3,697 billion), to estimate the magnitude of these costs relative to the 2014 GDP (World Bank 2015). The transfer items and costs included in this study are summarised in table 3.3 below.

**Table 3.3 Estimates of Transfer Costs of Crime in South Africa, 2007 and 2014
(Alda and Cuesta, 2011)**

Transfers	Alda and Cuesta estimates (2007) USD million	R million (2014)	%GDP (2007)	Estimated Cost based on 2014 GDP R million (Column 4*GDP2014)
1	2	3	4	5
Residential property	404.14	4 155.86	0.14	5 175.75
Vehicle theft	464.11	4 772.56	0.16	5 915.15
Robbery	5.57	57.28	0.002	73.94
Weapons	39.72	408.45	0.014	517.58
Personal theft	54.82	563.73	0.02	739.39
Firm's property, merchandise	2,295.98	23,610.15	0.75	27,727.25
Theft of cattle	162.08	1,666.71	0.06	2,218.18
Total	3,426.42	35,234.76	1.21	42,367.23

Sources: Alda and Cuesta (2011:931), Statistics South Africa (2015), Oanda (2015) and World Bank, 2015.

The upper bound estimate of the total material losses estimated to be attributable to meth was derived from the estimated cost using the 2014 GDP (column 5) multiplied by the meth-attributable fraction of property, robbery and theft crimes, 5.6%. Similarly, the lower bound estimate was based on the product of the meth-attributable fraction (5.6%) and the transfer costs estimated by Alda and Cuesta relative to the 2007 GDP (column 3 of table 3.3 multiplied by 5.6%). The 'best' estimate was the average of the upper and lower bound estimates. Cost findings by Alda and Cuesta (2011: 931) were converted to 2014 prices in South African Rands (see column 3 of table 3.3).

3.5 Cost of Private Security

The meth pandemic indirectly influences private security expenditure through meth-attributable crimes and the gang-related violence which is fuelled by the meth pandemic. Society embarks on security measures to protect themselves from these crimes and violence.

Alda and Cuesta (2011: 931) estimated the cost of crime in relation to private security in South Africa in 2007 to have been USD98.59 million (R657.1 million) for households in 2007. This estimate was based on data from the violence-specific model of the 2007 *National Household Survey* conducted by Statistics South Africa (Alda and Cuesta, 2011: 929). The costs are based on the total costs required to enhance home security, such as alarm systems, fencing, neighbourhood watch, etc. (Alda and Cuesta, 2011: 929).

A portion of these private security costs is indirectly associated with the impact of meth use on society, particularly in the Western Cape. This study draws on findings by Alda and Cuesta (2011) for the lower bound estimate of private security costs incurred by households due to, among other things, the impact of the meth pandemic through meth-attributable robberies, theft and burglaries. For the upper bound estimate, data from the financial consumption expenditure on security services by households, reported by the South African Reserve Bank (2015: 93) were used. The 'best' estimate is the average of the upper and lower bound estimates.

The meth-attributable fraction of these estimated private security costs was derived from the public perception for motives for crime as reported in the *Victims of Crime Survey 2013/2014* report and the number of patients who sought meth treatment in

2013 as reported by the SACENDU (Statistics South Africa, 2014c and Dada et al., 2014:3-7).

Statistics South Africa (2015b: 168) reported that 1,292 of the sampled households in the Western Cape, involved in the *General Household Survey 2014* had a security service. This accounted for 15.1% of the total reported households with a security service in South Africa. In the Western Cape, 85.2% of households in the *Victims of Crime Survey 2013/14* believed that criminals were motivated by drug needs in committing property crimes, which include, among others, residential burglaries.

Residential burglary, also known as housebreaking, was defined as “...The unlawful and intentional breaking into a building by entering with the whole body, part of a body, or an instrument with the intention of committing a crime on the premises” (Steyle, 2015).

Thus, the present study assumes that 85.2% of the 15.1% of households in the Western Cape with security services were motivated to acquire these services due to the drug pandemic. This accounts for 12.87% of all households in South Africa, the number being derived as follows:

$$85.2\% * 15.1\% / 100 \approx 12.87\%$$

The meth-attributable fraction of the 12.87% was derived by using the percentage of primary meth patients to all other drug patients who sought treatment in the Western Cape in 2013. According to the SACENDU (Dada et al., 2014: 7) 30.42% of patients who sought treatment in 2013 were primary meth users. Thus, 30.42% of 12.87% was used as the meth-attributable fraction of the cost of private security incurred by households in the Western Cape due to the meth pandemic. This equates to 3.9% of the total cost of private security in South Africa being attributable to the meth

pandemic in the Western Cape. The study excluded additional security expenditures outside of the households such as alarm systems on vehicles, or vehicle insurance against theft.

The lower bound estimate was therefore set at 3.9% of the 2014 value of household expenditure on security estimated by Alda and Cuesta, converted to 2014 prices, and equivalent to R1.01 billion. Likewise, 3.9% of the R9.3 billion spent on security services, reported by the South African Reserve Bank (2015), was used for the upper bound estimate of meth-attributable costs of household security in 2014. The 'best' cost estimate is the average of these two costs, as mentioned earlier.

3.6 Cost of Gang-related Productivity Loss

Gang conflicts in the Western Cape are related to a number of causes, such as disputes over drug supply turfs, revenge, and disputes over new territory. These conflicts are directly and indirectly associated with the meth pandemic. Some of the conflicts arise from disputes between gangs over meth supply turfs, and are therefore directly associated with the meth pandemic. Meth contributes indirectly to these conflicts as the gangs finance themselves from meth supply sales (Parliament of the Republic of South Africa 2014: 2 and Roloff, 2014:9). These wars, as mentioned previously, result in civilian deaths and consequently, productivity loss from premature mortality. Unfortunately, the lack of data on the reasons behind some of these conflicts inhibits the estimation of the proportion of these costs that are directly or indirectly attributable to the meth pandemic.

Productivity loss captured in section 3.1 accounts for deaths directly associated with meth use. Gang-related productivity loss seeks to estimate productivity loss arising from gang conflicts that result in civilian deaths. The policing, justice and correctional

services cost include an estimate for meth-attributable murders but do not include the lost product from these murders.

It is estimated that South Africa lost between USD1.9 billion (R10.8 billion) and USD4.4 billion (R25.1 billion) at 10% and 3% discount rates, respectively, through violent deaths in 2004 (Small Arms survey and CERAC calculations in Geneva Declaration, 2008: 102). The estimates were derived from the computations by CERAC for the *Geneva Declaration on the Global Burden of Armed Violence (2008)*. These estimates were derived from the per capita GDP from 1980-2004 obtained from the International Monetary Fund (IMF), expressed in 2004 US Dollar values, the number of homicides and the life expectancy at birth (Aguirre et al., 2008: 68).

Given that it was reported that 18% of murders in the Western Cape are gang-related (Lamoer in South African Press Association, 2014), gang-related murders contribute to the overall national productivity loss to violent deaths. The Western Cape accounted for 17% of all murders in South Africa in 2013/2014 (SAPS, 2014:159c and SAPS 2014a). Thus, this study used the estimates on productivity loss attributed to violent deaths by the Geneva Declaration, the proportion of gang-related deaths in Western Cape (18%) 2013/2014, the distribution of murders in South Africa (17% for the Western Cape) and the distribution of meth patients who sought treatment in 2013 to estimate the cost of productivity loss from violent deaths attributed to meth use. This is summarised in equation 17.

$PLVD_{2004} * CPI_{2014} / CPI_{2004} * ExR_{USD \text{ to } ZAR \ 2004} * 17\% * 18\% * 30.42\% \dots [17]$ <p>Where:</p> <p>PLVD₂₀₀₄ represents the product loss as a result of violent deaths in 2004 (Small Arms Survey and CERAC in Geneva Declaration 2008: 102).</p> <p>CPI₂₀₁₄ and CPI₂₀₀₄ represent the Consumer Price Index for 2014 and 2004, respectively (Statistics South Africa, 2015a).</p>

ExR_{USD to ZAR2004} reflects the exchange rate of US Dollars to South African Rands (USD1=5.65 ZAR) in 2004 (Oanda, 2014).

17% reflects the percentage of all murders that took place in the Western Cape to all murders in the rest of South Africa (SAPS, 2014c: 159).

18% reflects the percentage of gang-related murders to total murders in the Western Cape (Lamoer in South African Press Association, 2014).

30.42% reflects the percentage of meth patients to all drug patients who sought drug treatment in 2013 (SACENDU, 2014).

The upper bound cost estimate used the 3% discount rate cost used by the Geneva Declaration on Armed Violence (2008; 102), the best cost estimate used the 4% discount rate, and the lower bound estimate used the 5% discount rate of the estimates derived by the Small Arms survey and CERAC calculations in Geneva Declaration (2008: 102).

Gang conflicts may also result in destruction of property, permanent disabilities, reduced quality of life, and productivity loss arising from fear of being caught in the crossfire during conflicts, resulting in civilians missing work. Owing to the paucity of data on these costs and the meth-attributable fraction of the damages, these costs were excluded from the analysis, resulting in an underestimate of the costs of gang violence associated with meth use in the Western Cape.

3.7 Treatment of Gang-related Attempted Murders

As previously alluded to, gang conflicts in the Western Cape often result in violent deaths. In addition to the policing, justice and correctional services costs of meth-attributable attempted murders, costs are incurred for treating the gunshot wounds. Information regarding whether the victims of gang-related murders are themselves

drug dealers or not is not available. Thus, it is impossible to identify whether these costs are internal or external.

Because there is so little data on the placing and severity of gunshot wounds in gang-related attempted murders, it is impossible to estimate accurately the cost of treatment for these wounds. These costs were considered, but the cost estimates are inevitably not very reliable.

The present thesis draws on findings in Norberg et al.'s 2009 study on the costs of treatment for gunshot wounds for 203 patients in Cape Town. The total unit cost in this study was USD2,230 (R15,521) with the highest per patient cost being USD19,600 (R136,416) and the lowest USD196 (R1,364) (Norberg et al., 2009: 443). Converting these estimated costs to 2014 Rand prices, the estimated costs were R25,634 for the average cost, with R225,303 per patient for the highest cost and R2,253 for the lowest cost (Oanda, 2015 and Statistics South Africa, 2015a). These cost estimates were used for the estimated meth-attributable attempted murders (see table 3.2).

The costs of the treatment of gunshot wounds are relevant, as firearms are the weapons of choice in essentially all gang-related murders in the Western Cape (SAPS, 2014c: 20). However, the exact location of the gunshot wounds on the body and the number of murder cases that underwent gunshot treatment (thus incurring treatment costs), but subsequently reported as murder because medical treatment was unsuccessful, are also unknown. These costs have been considered but caution must be taken when interpreting the results as vital data such as wound location, duration of treatment, cases that required treatment, and cases that were later recorded as murders, all of which would make the cost estimates more reliable, are lacking. Cases that underwent gunshot treatment, but were later recorded as

murders were excluded from this study as a result of sufficient data on the number of murder cases that underwent treatment.

3.8 Intangible Costs: Cost of Insecurity

Street gangs in the Western Cape are financed primarily through the drug trade (Roloff, 2014:9). These street gangs are known to be responsible for drive-by shootings that have resulted in civilian deaths (Roloff, 2014:11). Roloff (2014: 9-10) describes street gangs as consisting of 15 to 200 members and street syndicates, which arose out of street gangs, as consisting of 500 or more members. The Research Unit of the Parliament of the Republic of South Africa (2012:1) stated that as many as 100,000 people in the Cape Peninsula belong to gangs, spread across 137 gangs.

Collier and Hoeffler (2004: 3) in the Geneva Declaration on the *Global Burden of Armed Violence*, describe killing in armed conflict as “killing ...committed by more or less cohesive groups of up to several hundred members.” Given this definition, conflicts between gang members in the Western Cape, which involve several hundreds of these members, may be classified as armed conflict if weapons are used in the conflicts.

Gang conflicts in the Western Cape result in the loss of human life, lost productivity, fear of living in certain neighbourhoods notorious for street gangs, reduced quality of life, increased policing expenditures, and other negative externalities. According to the *Victims of Crime Survey* (Statistics South Africa, 2014c: 13), the Western Cape had the highest percentage of households prevented from engaging in daily activities as a result of crimes. The activities mostly affected for households in the Western Cape were allowing children to play in the area (44.8%), walking to work or town

(22.2%), allowing children to walk to school (36.9%) and using public transport (24.2%) (Statistic South Africa, 2014b: 13).

In the absence of a national estimate of the cost of the feeling of insecurity, this study adopts the global cost of insecurity from a previous study rather than exclude this cost entirely, as suggested by Single et al. in the *International Guidelines for Estimating the Costs of Substance Abuse* (2003:49). This cost aims to capture the cost of feeling insecure in certain neighbourhoods and includes insecurity when outside of the household. Thus, this cost is not captured by the cost of private security that households embark on to secure their households.

The Geneva Declaration on the *Global Burden of Armed Violence* estimated that the global cost of insecurity generated by conflict based on contingent valuation amounted to USD70 (R474) per person in 2003 (Hess: 2003 in Geneva Declaration, 2008: 89). This estimate is based on contingent valuation in conflict-prone countries. Respondents were willing to give up 8% of their annual consumption in order to live in a more peaceful environment (Hess: 2003 in Geneva Declaration, 2008: 96-97).

The *Victims of Crime Survey 2013/14* (Statistics South Africa, 2014c) analysed the public's perceptions on motives for committing crimes. The survey studied public perception from all nine provinces, 31,390 dwelling units from 3,052 primary sampling units (Statistics South Africa, 2014: 66). As previously mentioned, in the Western Cape 85.2% of households in the survey believed criminals were motivated by drug needs (Statistics South Africa: 2014b: 2).

This study used the global estimated cost of insecurity USD70 (R474) per person, converted to 2014 prices, for the 'best' cost estimate. For the lower bound estimate, 8% of the average annual poor-household expenditure per capita was used. The

average annual household expenditure for poor households, R25,348, divided by the average household size of 3.8, was used to estimate the average annual household expenditure per capita: R6,671 (Statistics South Africa: 2014c: 50-52). Eight per cent of the estimated poor-household annual expenditure per capita equates to R534, which was used to estimate the lower bound cost of insecurity per person.

The calculation of the upper bound estimate used a similar approach to that of the lower bound estimate. The average annual non-poor household expenditure (R95,183) was divided by the average household size (3.8) to estimate the average annual non-poor household expenditure per capita (Statistics South Africa: 2014c: 50). Eight per cent of the estimated average annual non-poor household expenditure per capita (R25,048) was used as the upper bound estimate of the cost of insecurity per person, equivalent to R2,004 per year.

Additionally, the public perception of motives for crime given in the *Victims of Crime Survey 2013/14* by Statistics South Africa (2014b) was used to estimate the drug-related cost of insecurity for the Western Cape. The meth-attributable fraction derived from the percentage of patients who sought meth treatment in the Western Cape in 2013 (30.42%) was used to disaggregate the public perception about crimes committed for drug needs (85.2%) to an estimated percentage of crimes committed for meth needs in the Western Cape, equivalent to 25.9% of all crimes (SACENDU, 2014: 3-7 and Statistics South Africa, 2014c: 2). This meth-attributable fraction was derived as follows:

$$85.2\% * 30.42\% / 100 \approx 25.9\%$$

The population most affected by gang conflicts are residents of the Cape Flats and the Mitchells Plain/Khayelitsha district (Mashaba, 2006 and Everett 2014). The total population of these areas was therefore used for the estimated cost of insecurity

caused by conflict based on public perception and meth patient numbers. Equations 14, 15 and 16 summarise how the estimates were derived for the lower bound, upper bound and 'best' cost estimates, respectively.

Lower bound estimate:

$$[P_{CFMPK} * ((R25,348/3.8) * (CPI_{2014}/CPI_{2011})) * 8% * 85.2% * 30.42% \dots \dots \dots [14]$$

Upper bound estimate:

$$[P_{CFMPK} * ((R95,183 /3.8) * (CPI_{2014}/CPI_{2011})) * 8% * 85.2% * 30.42% \dots \dots \dots [15]$$

'Best' estimate:

$$[P_{CFMPK} * ((USD70 * 6.77) * (CPI_{2014}/CPI_{2003})) * 85.2% * 30.42% \dots \dots \dots [16]$$

Where: P_{CFMPK} represents the estimated population of the Cape Flats and Mitchells Plain/Khayelitsha districts in 2014, based on the average annual growth rate from 2001 to 2011. 2011 population estimates were used as a base year to estimate the 2014 population (1,731,162) (Statistics South Africa in City of Cape Town, 2013).

R25,382 represents the average annual poor-household expenditure in 2011 (Statistics South Africa, 2014b: 52).

R95,183 represents the average annual non-poor household expenditure in 2011 (Statistics South Africa, 2014b: 52).

USD70 represents the per capita cost of insecurity estimated by Hess: 2003 in the Geneva Declaration on the *Global Burden of Armed Violence* (2008: 89) for the 'best' cost estimate.

3.8 represents the average household size in South Africa (Statistics South Africa, 2014b: 50).

6.77 Reflects the average annual exchange rate of the USD to the ZAR in 2003 (Oanda, 2015).

CPI₂₀₁₄/CPI₂₀₀₃ is the consumer price index for 2014 and 2003 (109.7/60.5) (Statistics South Africa, 2015).

CPI₂₀₁₄/CPI₂₀₁₁ is the consumer price index for 2014 and 2011 (109.7/92.6) (Statistics South Africa, 2015).

8% reflects the percentage of annual expenditure that people living in conflict areas are willing to give up to feel secure.

85.2% represents the public perception of crimes attributed to drug needs (Statistics South Africa, 2014:2)

30.42% reflects the percentage of meth patients to all drug patients who sought drug treatment in 2013 (SACENDU, 2014).

While not everyone who resides in these areas may feel insecure, the estimate excludes the cost of insecurity for people who do not reside in the Cape Flats and the Mitchells Plain/Khayelitsha districts but may have to engage constantly in activities in these areas and may feel insecure when in these areas. Using the overall population to estimate the cost of insecurity compensates for the exclusion of non-residents engaging in activities in the area and therefore affected by the crime-related insecurity resulting from the effects of the meth pandemic.

3.9 Other Costs Considered: Social Protection Costs

Information and data pertaining to illicit drugs, and more specifically to effect of meth and its impact on various societal problems known to be associated with meth use, are unavailable. There are currently no reliable data on the physical abuse of children and limited studies on the form of maltreatment (neglect and abuse) (Human Science Research Council, HSRC in Western Cape Government, 2013:10-12). This study therefore aims to provide crude estimates based on available reports.

It was reported in 2013 that 8% of perpetrators of domestic violence on teens were under the influence of alcohol or drugs during the violent attack (Western Cape Government, 2013: 12). Applying the meth-prevalence of patients who sought treatment, 30.42% to the 8% results in an estimated 2.4% of these domestic violence cases being connected to meth use. This study then assumed that each beneficiary

of child protection received an equal annual amount from the Department of Social Development, derived from the total expenditure of R475.4 million spent on 101,197 beneficiaries in 2013/2014 (Department of Social Development, 2014: 71). It is therefore estimated that 2.4% of the expenditure on child protective services was attributed to the effects of meth use.

3.10 Other Costs Not Included

Other costs not included in this study were, among others:

- The costs of meth lab decontamination;
- The costs of meth-attributable fires and destruction of property;
- The costs of newborn toxicity caused by meth use by the mother;
- Low birth weight of babies born to meth-using mothers;
- Meth-attributable child maltreatment;
- The costs of meth-induced attempted suicides;
- The cost of meth-attributable road accidents and injuries;
- The costs of ambulance services at the scene of meth-attributable accidents;
- The productivity costs of attending to meth-attributable accidents;
- The opportunity costs of gangster activities.

These costs were not included because of time constraints and a lack of data.

CHAPTER 4

RESULTS

This chapter describes the estimated societal costs associated with meth use in the Western Cape. The chapter presents cost findings in 2014 prices based on the upper bound, lower bound and 'best' estimates. It discusses internal and external costs associated with meth use as well as intangible costs. Some costs presented should be interpreted with caution as data limitations affect the reliability of the estimates. However, such cases are clearly highlighted.

4.1 Estimated Cost of Productivity Loss

The study used results from the 2010 GBD, the meth prevalence rate among patients who sought primary meth treatment in 2013, and the minimum wages for South Africa. Results for total productivity loss in 2014 prices are presented in table 4.1 using the 2014 GDP deflator.

Table 4.1: Estimated Cost of Meth-Attributable Productivity Loss Among Primary Meth Abuse Treatment Patients in the Western Cape in 2010

Estimates	Minimum wages for Domestic Workers SA, 2010*	DALYs SA (amphetam ine, 2010)	DALYs SA (meth, 2010)	DALYs WC (meth, 2013)**	WC (R million) 2014 prices
Higher bound	13 559.4	37 742	33 895	21 647	3 725.5
'Best' estimate	13 559.4	19 961	17 927	11 449	1 966.5
Lower bound	13 559.4	9 362	8 407	5 369	928.7

Source: Dada et al., 2010-2014, IHME 2013, Nicosia et al 2009: 25-28, Statistics South Africa: 2015 and Department of Labour: 2011.

NOTE: Due to rounding, numbers may not sum precisely.
* Based on the average across different areas.
** DALYs were adjusted using meth patient data for 2013.

The estimated total productivity loss for 2014 attributed to meth use ranges between R928.7 million and R3.7 billion, with a 'best' estimate of approximately R2 billion, roughly 0.38% of the Western Cape GDP of R517.6 billion (World Bank, 2015). These estimates assume a 5% cumulative discount rate.

These conservative estimates are based on an assumption that meth users retire at age 64, given that the life expectancy in South Africa was 61.2 in 2014 and less than 1% of meth users who sought treatment were aged 60 and above (Statistics South Africa, 2014a: 6 and Dada et al., 2010-2014). The estimates exclude the cost of productivity loss associated with other non-communicable diseases excluding mental and behavioural disorders. The estimates presented exclude productivity loss costs indirectly associated with meth use, such as productivity lost by meth users during incarceration, violent deaths directly or indirectly associated with meth use, disabilities exacerbated by meth use, etc.

Gang-related productivity loss arising from violent deaths indirectly associated with the meth pandemic is discussed later in this chapter. However, many other forms of lost productivity associated with meth use have not been computed due to insufficient data. Hence, productivity loss associated with the meth pandemic is likely to be much higher than the estimates presented.

4.2 Estimated Costs of Meth Treatment

Based on data on the expenditure by the Western Cape Department of Social Development on drug abuse treatment, data from the SACENDU on inpatient and outpatient drug treatment, and treatment costs from inpatient facilities, it is estimated

that meth outpatient and inpatient treatment costs between R81.9 million to R54.3 million per year with a best estimate of R69.6 million (see table A3 in the appendix). However, this estimate, unfortunately, excludes the subsidised cost that is charged to outpatients, which is based on their family income. Owing to the lack of data on the different subsidised costs outpatients are charged for meth treatment, inpatient treatment costs were used instead for this cost category, as inpatient treatment costs are inclusive of all economic costs associated with the treatment.

Data on the costs and duration of treatment for meth addiction were obtained from four private inpatient treatment centres in the Western Cape: the Claro, Crescent, Kenilworth and Stepping Stones clinics. The estimated costs of treatment for the 2,189 patients treated, based on the treatment costs at the four private clinics, are presented in table 4.2. The average CPI for 2015 and 2014 were used to convert 2015 prices to 2014 prices.

Table: 4.2 Estimated Methamphetamine Treatment Costs in the Western Cape, 2014

Number of Patients		Unit Cost of Treatment (2015 prices)	Unit Cost of Treatment (2014 prices)	Total Cost (2014 Prices) R million
2 189	Upper Bound	73 030	71 036	155.5
	Best Estimate	56 960	55 405	121.3
	Lower Bound	37 000	35 990	78.8

Source: Alberts: 2015, Dada et al., 2014:3-13, Robbins: 2015, Kenilworth: 2015, Claro: 2015 and Statistics South Africa: 2015.
NOTE: Due to rounding, numbers may not sum precisely.

The total costs of meth-addiction treatment for the Western Cape are estimated to range between R79 million and R156 million in 2014 prices, with a 'best' cost estimate of R121 million. The upper bound cost accounts for approximately 1% of the 2013/2014 Western Cape health budget of R15.87 billion and 0.03% of the Western Cape GDP (World Bank, 2015 and Western Cape Government Provincial Treasury, 2013: 54).

This estimated cost excludes the cost of treating patients who are meth users but for whom meth was not the primary drug of choice. Thus, cost estimates presented in this study reflect the costs of treating primary meth users and exclude multiple drug users such as patients who take narcotics and then take meth to counteract the stupifying effects of the narcotic. It is estimated that only 1% of meth users access treatment in South Africa (IHME, 2013 and SACENDU, 2014).

4.2.1. Estimated Healthcare Costs of Non-Communicable Diseases Associated with Meth Use

The estimated costs of the treatment of meth-attributable Non-Communicable Diseases (NCDs) were based on data from the Medical Research Council (MRC: 2014) and medical aid pay-offs from Momentum, FedHealth, Medihelp, Resolution Health, Med Shield, Oxygen and Bonitas.

The NCDs presented in this study were derived from primary meth users who sought meth treatment in 2014 (MRC, 2014). It is estimated that approximately 99% of meth users do not seek treatment in South Africa. These NCDs analysed in this study have been documented to be associated with meth use (Buxton and Dove, 2008: 1537, Kish, 2008: 1681 and Plüddemann, 2010: 5-6).

The estimated costs of meth-attributable NCDs are presented in three cost estimates: a lower bound estimate, which comprises the lowest possible pay-offs from the abovementioned medical aid schemes across all NCDs reported. The upper bound estimate is based on the highest possible pay-offs from the medical aid schemes and the 'best' cost estimate is the average of all possible pay-offs for each NCD. Table 4.3 summarises the cost estimates for meth-attributable NCD healthcare.

Table 4.3 Estimated Meth-Attributable NCD Healthcare Costs in the Western Cape, 2014

NCD	# Of cases 2014	Unit Costs R000			Total Costs R000		
		Upper	Best	Lower	Upper	Best	Lower
Cardiovascular	27	35.3	13.4	4.9	927.1	351.7	127.6
Diabetes	37	35.3	13.4	4.9	1 270.4	482.0	174.9
Respiratory	74	19.8	10.3	4.9	1 425.2	740.8	350.0
Mental health	185	38.2	27.2	13.6	6 874.0	4 887.5	2,440.1
Liver disease	25	19.8	10.3	4.9	482.5	251.1	118.2
GIT	33	19.8	10.3	4.9	635.6	330.4	156.0
Hypertension	90	19.8	10.3	4.9	1 733.3	901.0	425.5
TOTAL	471				13 347.1	7 944.4	3 792.1

Source: MRC: 2014, Momentum Health: 2015, Fed Health: 2015, Bonitas: 2015 and Medical Aid Comparisons: 2015.
NOTE: Due to rounding, numbers may not sum precisely.

It is estimated that meth use accounts for between approximately R3.8 million and R13.3 million in healthcare for NCDs. The estimated costs indicate that the highest amount is spent on mental health cases and the lowest on the treatment of liver disease. The costs estimates reflect only a portion of the detrimental health effects of meth use, as many NCDs present themselves years after the patient has sought meth treatment. Data presented in these estimates only account for the NCDs of

primary meth users. Meth use by multiple drug users may result in NCDs but these cases have not been captured in this analysis.

4.3 Estimated Meth-Attributable Crime Costs

The meth-attributable crime costs were estimated using a top-down approach for policing services, justice and correctional services. The estimated budget allocation across the different crime categories was derived from the perceptions of five crime services experts on the resource intensity of different categories of crime. Responses were ranked from zero to ten, with zero representing the least resource-intensive crime categories and ten the most resource-intensive. The most resource-intensive crime categories accounted for up to 5% of the total policing budget and the least resource-intensive accounted for up to 1% of the total policing budget.

The public perceptions from the victims of crime survey (Statistics South Africa, 2014c: 18), the prevalence of primary meth users among patients who sought drug treatment, and data from SAPS on gang-related murders and attempted murders were used to estimate the meth-attributable fraction of the policing services costs. Table 4.4 summarises the meth-attributable crime cost estimates.

Table 4.4 Estimated Meth-attributable Crime Costs in the Western Cape, 2014

Crime Category	Lower Estimate R million	'Best' Estimate R million	Upper Estimate R million
Murder	18.9	28.0	37.0

Attempted murder	31.7	42.8	53.9
Property crimes	305.7	430.2	554.3
Robberies and theft	533.2	854.7	1 176.3
Drug-related Crimes	144.9	146.3	147.7
Driving under the influence of meth	80.8	109.6	138.4
Unlawful possession of firearms	17.1	24.3	31.4
Total Cost	1,132.3	1 635.9	2 139.6

Sources: Alda and Cuesta, 2011:931, SACENDU 2014:3-7, SAPS 2014a, SAPS, 2014c: 20, Statistics South Africa, 2014c: 18, Statistics South Africa 2015 and South African Press Association, 2014.

*Includes 20.09% of R144.3 million (equivalent to R28.9 million) from the Department of Social Development on crime prevention and support services.

NOTE: Due to rounding, numbers may not sum precisely.

It is estimated that meth use costs the government approximately R1.6 billion annually through crime, based on the 'best' cost estimate. The cost estimates in this study range from R1.1 billion to R2.1 billion per year. These estimates exclude the intangible costs that meth use places on society, such as the cost of insecurity created by crimes exacerbated and/or induced by meth use, injury, increased expenditure on security, reduced quality of life by victims of violent crimes or road traffic accidents, property damage, etc.

Using the 'best' cost estimates, meth accounts for approximately 2% of the national SAPS budget of R66.8 billion and approximately 11% of the estimated Western Cape SAPS budget of R14.5 billion.

(ii) Justice Costs

The estimated costs of policing services do not include the costs associated with trials and convictions. In order to estimate these additional costs associated with meth crimes, the expenditure reports from the Department of Justice and

Constitutional Development (2014: 110-111) and the National Prosecuting Authority (NPA 2015:28) were used.

Weights based on court days were used to estimate the NPA budget spent on the different crime trials in the lower courts, that is, the district and regional courts. A conservative 5% of the lower courts' expenditure was used to estimate the meth-attributable fraction of the lower court services. This weight was arrived at by taking 50% of the weight allocated to alcohol-attributable lower courts' services in a study costing alcohol use in South Africa (Budlender, 2009: 18). Table 4.5 summarises the findings of these computations.

Table 4.5 The Estimated Meth-Attributable Crime Cost on Justice in the Western Cape, 2014

Total Cases finalised (by NPA)	Estimated Meth-attributable Crime Cases Tried	Lower Estimate R million	'Best' Estimate R million	Upper Estimate R million
505 342	14 197	264.7	378.4	492.0

Sources: Alda and Cuesta, 2011: 931, Department of Justice and Social Development, 2014:110-111, National Prosecuting Authority, 2015: 28, 37 and SAPS 2014a and 2014c: 161.
NOTE: Due to rounding, numbers may not sum precisely.

It is estimated that meth accounted for R378 million of the expenditure of the Department of Justice and Social Development and the NPA in 2013/2014. This is an underestimate, as various crimes like assaults, rape, domestic violence, etc., are not reported or are ruled off, withdrawn or referred for mental treatment (Single et al., 2003:43 and NPA, 2015: 36). Crimes exacerbated by the effects of meth, such as rape and sexual violence, have not been included in this estimate despite studies revealing that meth use is associated with increased sexual risk behaviour (Watt et

al., 2015: 5). It has been excluded because there is insufficient evidence to determine the meth-attributable fraction of the cases reported.

(iii) Correctional Services Costs

The Department of Correctional Services (2014:27-28) reported that 3% (2,996) of sentenced offenders were sentenced for narcotics crimes in 2013/2014. However, this is an underestimate of the total number of sentences being served for narcotics offences as each offender was placed under only one crime category, regardless of the number of offences committed or the number of sentences imposed.

Table 4.6 summarises the ‘best’ cost estimates for meth-attributable crime services. Correctional services costs are based on the assumption that 3% of the total inmates in the correctional facilities were sentenced for narcotics offences, despite this being an underestimate.

Table 4.6 The Estimated Meth-Attributable Crime Institutional Costs in the Western Cape, 2014

Category	Estimated ‘Best’ Costs (R million)	% Of Cost distribution
Policing services	1 635.9	79%
Justice services	378.4	18%
Correctional Services	53.5	3%
Total	2 067.7	100%

Source: Alda and Cuesta, 2011: 931, Department of Correctional Services, 2013/2014:27-28, 104, Department of Justice and Social Development, 2014:110-111, SACENDU 2014: 3-7, SAPS, 2014b, 2014b: 20 and 2014c: 511-161, Statistics South Africa, 2014c: 18 and South African Press Association, 2014.

NOTE: Due to rounding, numbers may not sum precisely.

Based on the estimates presented in table 4.6 above, meth-attributable crime costs the government up to 0.4% of the Western Cape GDP. Annually, approximately R2.1

billion in resources is diverted from addressing other crimes to cope with meth-attributable crime.

For policing services, it is estimated that the meth pandemic accounts for 11% of the policing budget, which is equivalent to 79% of the total cost of meth-attributable crime services. This high proportion of policing costs relative to justice and correctional services costs may be attributed to the fact the many more crimes are reported than actually result in trials and convictions.

4.4 Estimated Meth-Attributable Transfer Costs

The estimates for the costs of material losses associated with meth-induced crimes were derived from Alda and Cuesta's (2011:931) findings on transfer costs associated with crime in South Africa (see table 3.3). The estimated percentage of the sum of the meth-attributable property crimes (30,349) to all property crimes reported in South Africa (562,768), meth-attributable robberies and theft (36,841) to total robberies and theft reported nationally (612,389), and the meth-attributable trio crimes (1,305) to total trio crimes in South Africa (49,120), equates to 5.6% of the total cases reported in South Africa (see table 3.2). Thus, 5.6% of the estimated transfer cost of crime was estimated to be attributable to meth. This equates to an estimated R563.2 million for the lower bound.

For the upper bound, the product of the percentage of the 2007 estimated costs to the 2007 GDP multiplied by the 2014 GDP were used (see table 3.3). The 'best' cost estimate was the average of the upper and lower bound estimates. The costs are illustrated in more detail in table 4.7.

Table 4.7 Estimated Meth-Attributable Transfer Costs in the Western Cape, 2014

Category	Lower Cost Estimate R million	'Best' Cost Estimate R million	Upper Cost Estimate R million
Residential property	232.5	261.0	289.6
Vehicle theft	267.0	299.0	330.9
Robbery	3.2	3.7	4.1
Weapons	22.9	25.9	29.0
Personal theft	31.5	36.4	41.4
Total	557.1	626.0	695.0

Source: Alda and Cuesta, 2011: 931, SACENDU, 2014: 3-7, SAPS 2014a, 2014c, 159-161, Statistics South Africa 2014b: 18, Statistics South Africa 2012 and Oanda, 2015.

NOTE: Due to rounding, numbers may not sum precisely.

It is estimated that meth contributes to approximately R626 million in transfer costs annually. The biggest cost driver in this category is vehicle theft, which accounts for 48% of the total transfer costs, followed by residential property crimes at 42% of the total costs.

4.5 Estimated Meth-Attributable Costs of Private Security

Meth-related crime and violence contribute to increased costs for private security both directly and indirectly. Based on the number of households in the Western Cape with a private security system and the public perception on motives for crime, it is estimated that an upper bound estimate of R365 million and lower bound estimate of approximately R40 million is attributable to the meth pandemic (SACENDU, 2014:7, SARb: 2015:93 and Statistics South 2014b: 168). The 'best' cost estimate, which is the average of the upper and lower bound estimates, was estimated to be R202

million (Alda and Cuesta, 2011: 931, SACENDU, 2014:7, SARB: 2015:93, Statistics South Africa 2015a and 2014b: 168 and Oanda, 2015).

4.6 Estimated Cost of Gang-related Productivity Loss

Gang conflicts in the Western Cape are caused by a number of things, such as disputes over drug supply turfs, revenge, the acquisition of new territory, etc. It is not possible to estimate accurately what proportion of the costs of gang conflict are directly or indirectly attributable to the meth pandemic because of the lack of information about the cause behind each particular conflict. It is estimated that meth contributes to the product loss associated with violent deaths to the value of R310 million at a 5% discount rate, R364 million at a 4% discount rate and R418 million at a 3% discount rate. Gang conflicts may also result in destruction of property, permanent disabilities, and other costs. As there are no data on these costs and the meth-attributable fraction of the related damages, these costs were excluded from the analysis.

4.7 Estimated Cost of Treatment of Gang-related Attempted Murders

Gang violence results in civilian deaths and also necessitates the treatment of cases registered as attempted murder. According to the findings by Norberg et al. (2009), on the cost of gunshot treatment in Cape town, it is estimated that the meth-attributable attempted murder costs from gunshot wounds amounted to R7.7 million (in 2014 prices) at the average treatment cost of R25.6 thousand and R67 million if the highest cost of treatment is considered (USD 19,600). These amounts are based on an estimated 299 cases of meth-attributable attempted murders (see table 3. 2).

Data are scarce on aspects of gang-related attempted murders such as the locality of gunshot wounds and the duration of treatment, as well as on the surgical costs in cases of murder by gunshot, i.e. where the patient lived long enough to be operated on but did not survive. Due to the lack of adequate data, the estimates only account for cases of attempted murders by gunshot and exclude cases of murder where the victim underwent unsuccessful treatment as the number of these latter cases were not specified in reports. The estimates provided are therefore only crude ones and are likely to underestimate the magnitude of the treatment costs of gang-related attempted murders.

4.8 Intangible Costs: Estimated Cost of Insecurity

Street gangs in the Western Cape are financed primarily through the drug trade (Roloff, 2014:9). These street gangs are known to be responsible for drive-by shootings that have resulted in civilian deaths (Roloff, 2014:11). This violence creates a feeling of insecurity in areas prone to gang violence, as described in chapter 3.

The meth-attributable costs of the feeling of insecurity created by conflict, based on public perceptions and the percentage of meth patients seeking treatment, are estimated to be R385 million for the 'best' cost estimate. The lower bound estimate is R284 million and the upper bound estimate is R899 million. While insecurity is an intangible cost and presents no direct opportunity costs, it is nonetheless a cost borne by society and therefore was included in this study.

4.9 Other Costs: Estimated Meth-Attributable Social Protection Costs

It was reported that 8% of perpetrators of domestic violence on teens were under the influence of alcohol or drugs during the attack (Western Cape Government, 2013: 12). Applying the meth-prevalence of patients who sought treatment, 30.42%, to the 8% results in an estimated 2.43% of domestic violence cases being attributable to meth use. This study assumed that each beneficiary of child care protection received an equal annual amount from the Department of Social Development equivalent to R4,699. Given this estimated unit cost, it is estimated that the meth-attributable cost of beneficiaries of foster care (79) and youth centres (18) is approximately R453,519 (Western Cape Department of Social Development, 2014: 61-71).

A victim empowerment expenditure of R15.5 million benefitted 18,136 individuals (Western Cape Department of Social Development, 2014: 61-71). It is estimated that R2.9 million was allocated to victims of meth crimes. This estimate was based on the assumption that each of the 18,136 victims received equal annual amounts to the value of R856.

4.10 Summary of Estimated Costs

This study has attempted to estimate the internal and external costs of meth use, incorporating intangible costs where applicable. A summary of the cost findings is presented in table 4.8 below. Table 4.9 illustrates a comparison of findings of the biggest cost drivers of meth use in the Western Cape and compared them to cost findings in the United States.

Table 4.8 Summary of the Estimated Societal Costs of Meth Use in the Western Cape 2014

Cost Category	Lower R million	Best R million	Upper R million	% of Total Costs	% of WC GDP
TANGIBLE COSTS					
Productivity loss	1 238.8	2 330.5	4 143.6	40.5	0.45
Transfers	557.1	626.0	695.0	10.9	0.12
Treatment/ healthcare	83.2	136.9	236 .1	2.4	0.03
Crime	1 444.5	2 067.7	2 691.0	36.0	0.40
Private Security	39.6	202.2	364.8	3.5	0.04
Social protection		0.453		0.01	0.00
TOTAL (tangible)	3 363.2	5 363.9	8 130.5	93.3	1.04
INTANGIBLE COSTS					
Insecurity	283.6	385.5	899.0	6.7	0.07
TOTAL (tangible + intangible)	3 646.8	5 749.3	9 029.5	100	1.11
% of Western Cape GDP	0.70	1.11	1.74		

Sources: Author's Estimates.

Table 4.9 Comparisons of the 'Best' Cost Estimates for the United States, 2005 and the Western Cape, 2014

Cost Category	United States			Western Cape		
	'Best' Cost Estimates R' million	% of Total Costs	% of USA GDP (2005)	WC 'Best' Cost Estimates R' million	% of Total Costs	% of WC GDP (2014)
Productivity Loss	2 410.0	1.6	0.01	*1 05.9	33.1	0.37
Mortality Costs	105 606.3	71.1	0.00	424.6**	7.4	0.08
Treatment/ Healthcare	5 696.7	3.6	0.01	136.9	2.4	0.03

Crime and Justice	26 741.9	18.0	0.03	2 067.7	36.0	0.40
Other***	34 205.2	5.4	0.14	1 214.2	21.1	0.23
Total Costs	148 544.7	100	0.18	5 749.3	100	1.11

Source: Nicosia et al., 2009: 103 and Author's estimates.

NOTE: Due to rounding, numbers may not sum precisely.

*Reflects productivity loss costs derived from Years Lived with Disability (YLD).

** Reflects productivity loss costs from Years of Life Lost (YLL) and gang-related productivity loss.

***Includes cost categories not shown in table 4.9, namely: for the USA, child endangerment, production/environment and premature death. For the Western Cape, this includes private security, social protection, feeling of insecurity and transfers.

It is evident that the largest cost drivers of the estimated total costs of meth use in the Western Cape are productivity loss and crime; which together account for up to 69% of the total estimated costs. Crime has a snowball effect on other cost categories such as gang-related productivity loss, private security costs, gun shot treatment, etc. Interventions aimed at curbing meth-attributable crime are likely to cut the social costs associated with meth use significantly.

Productivity loss costs for the Western Cape accounted for 33% of the total cost, 0.37% of the Western Cape GDP. In the United States, these costs accounted for 1.6% of the total costs, 0.01% of the United States GDP. Estimates of productivity loss in the United States were derived from days of absenteeism by meth users, lost product during incarceration the lower probability of meth users working and additional employer costs associated with employing meth users such as drug testing and higher costs of healthcare. Productivity loss through premature mortality for the United States accounted for 71% of the total costs at R105.6 billion. For the Western Cape, these estimates were derived from premature mortality through gang-related productivity loss and Years of Life Lost (YLLs) to mental and behavioural disorders associated with meth use, and the minimum wage for domestic workers. Estimates for the Western Cape excluded productivity lost during meth-attributable incarceration and meth treatment as well as YLLS associated with meth-induced suicides and other non-communicable diseases, other than mental and behavioural disorders,

caused by meth use. The differences in the derivation of the two estimates, the inclusion of the gang-related productivity loss for the Western Cape, the differing meth use prevalence rates in the two studies and the use of the minimum wages to estimate productivity loss for the Western Cape account for some of these wide variation in the proportion of total costs in the two studies.

The crime and justice costs in the Western Cape used a top-down approach, which was dependent on the amount allocated to these services by the government. Meth-attributable crime in the Western Cape accounts for a higher proportion of the Western Cape GDP than meth-related crime in the United States. The same is true for the overall costs of meth use to the Western Cape economy. The total costs of meth use in the Western Cape account for approximately 1.11% of the Western Cape GDP compared to approximately 0.2 % in the United States. Meth-attributable costs for the Western Cape, according to these estimates, account for more than 5 times the proportion of the Western Cape GDP than do the equivalent costs in the United States relative to the U.S. GDP. However, it is worth noting that the prevalence rate in the Western Cape is much higher, at an estimated 4.87%, than the 0.5 % in the United States, which would be one reason for the higher costs (Degenhardt et al., 2013: 382, Nicosia et al. 2009: 1 and Statistics South Africa, 2014a: 16).

The costs of treatment and healthcare for meth addiction and meth-related illnesses account for a surprisingly small portion of the overall costs, only 2.4% of the total costs, equivalent to 0.03% of the Western Cape GDP. These costs are underestimated. It is estimated that only approximately 1% of meth users in the province are accounted for in the recorded costs of meth treatment. This estimate is based on the number of DALYs lost to meth use reported in the 2010 GBD study (Degenhardt et al., 2013: 1566). According to Meade et al.'s findings (2015: 4), meth users perceive meth treatment to be ineffective and even counterproductive.

If all other estimated cases of meth in the province were to seek treatment, the healthcare costs could be as high as R13.7 billion, based on a 'best' cost estimate of R137 million. It is estimated that in the United States, 10.7% of meth users access treatment, which results in drug treatment and healthcare costs totalling USD 896.8 million or R5.7 billion (Nicosia et al., 2009: 1-10, 103 and World Bank, 2006: 5).

Healthcare and meth addiction treatment accounts for 3.8% of the total costs in the United States. Fewer meth users access treatment in the Western Cape than in the United States. However, the proportion of healthcare and treatment costs to total costs in the Western Cape (2.8%) is relatively comparable to that in the United States (3.8%). In the Western Cape the healthcare and treatment costs accounted for 0.03% of the Western Cape GDP in 2014, as opposed to 0.01% for the United States. Thus, meth treatment and healthcare costs in the Western Cape require a larger share of the GDP than do these costs in the United States.

CHAPTER 5

DISCUSSION and CONCLUSION

5.1 Summary of Findings

The meth pandemic presents a serious and complex problem for both society and the state in the Western Cape. Although the meth precursor chemicals, ephedrine and pseudoephedrine, are legitimately used for medicinal purposes such as bronchitis treatment, they are also used for the illicit manufacture of meth, which results in various tangible and intangible costs to both society and government.

Meth use costs the Western Cape between R3.6 billion and approximately R9.0 billion a year, with a 'best' estimate of approximately R5.7 billion per year based on the most recent data on patients who sought meth treatment. This estimate includes intangible costs such as the cost of insecurity, which is intensified by the meth pandemic. The tangible costs account for a 'best' cost estimate of approximately R5.4 billion, equivalent to 1.04% of the Western Cape GDP. This estimate excludes meth users who may need meth treatment but did not access treatment during the study year. The costs presented are therefore an underestimate of the magnitude of meth externalities to society and government in the Western Cape.

Productivity loss, including mortality costs derived from the YLL, is the largest cost category for the Western Cape, accounting for 41% of the total estimated costs. The estimated meth-attributable productivity loss ranges between R1.2 billion and R4.1 billion, with a 'best' cost estimate of R2.1 billion, which includes gang-related productivity loss associated with meth use. This estimate excludes productivity loss related to meth-induced suicides and accidents, productivity loss during meth-attributable incarceration or treatment and productivity loss associated with non-

communicable diseases, excluding mental and behavioural disorders. The estimate is based on the minimum wage for South Africa and hence is likely to underestimate the magnitude of productivity loss if meth users earn or produce more than the minimum wage.

The estimated productivity loss associated with alcohol is much higher than that of meth. Matzopoulos et al. (2014: 130) estimated the alcohol-attributable productivity loss to premature mortality and morbidity in South Africa to range between R8.2 billion and R9.8 billion. Alcohol consumption in South Africa is relatively high, with total pure alcohol consumption per capita, for persons over the age of 15, of 27 litres (for drinkers only) in 2010 (World Health Organisation, 2014). While meth use in the Western Cape is high, with an estimated prevalence rate of 4.87% for persons aged 15 and above, it is a less pervasive problem nationally than alcohol, and hence productivity loss costs are lower for meth than for alcohol. Moreover, meth is an illicit drug and meth users do not pay taxes for meth use, unlike alcohol use. Thus, meth use effects on income do not accurately compare to the effect abusive alcohol consumption has on income. However, as a result of the paucity of meth data on meth, this comparison was made to gauge to what extent substance abuse can affect income in South Africa.

In Australia, illicit drug use, including meth, accounted for AUD1.6 billion (R7.5 billion) in productivity loss, 23.8% of the total costs of illicit drug use (Collins and Lapsley 2008: 64). In the United States, meth-attributable productivity loss accounted for 2.9% of the estimated total 'best' cost estimate at USD687 million (R4.4 billion) (Nicosia et al., 2009:103). This estimate included productivity loss during meth-attributable incarceration, absenteeism, time in treatment and other employer costs (Nicosia et al., 2009: 43).

One of the greatest impacts of meth use is on crime, as this has a ripple effect, exacerbating the scale of other costs associated with meth use such as transfer costs, the cost of insecurity, gang-related productivity loss, etc. The greatest cost category of the estimated meth-attributable crime services for the Western Cape is policing, which contributes to 28% of the total estimated costs. Along with justice and correctional services costs, these services are estimated to account jointly for 36% of the total estimated costs, equivalent to 0.4% of the Western Cape GDP at an estimated value of R2.1 billion. An additional cost of R1.6 billion attributed to increased expenditure on private security, transfers costs, gunshot treatment and gang-related productivity loss are linked to meth-attributable crimes. Thus, the opportunity cost of the external and internal costs of meth-attributable crime is estimated to range between R2.6 billion and R5.1 billion, with a 'best' cost estimate of R3.6 billion, approximately 0.7% of the Western Cape GDP.

In the United States, the costs of crime and criminal justice accounted for 18% of the total costs of meth use at USD4.2 billion (or R26.7 billion), the second highest cost category after intangibles/premature mortality which took up 71% of the total costs at a 'best' estimated cost of USD16.6 billion (R105.6 billion), 0.03% of the GDP in 2005 (Nicosia et al., 2009: 103 and World Bank, 2015).

In Australia, results of a similar study concluded that the costs of illicit drug-attributable crime amounted to AUD3.6 billion (R16.8 billion), 53% of the total tangible cost of AUD6.9 billion (R32.3 billion), equivalent to 0.39% of the Australian GDP in 2005 (Collins and Lapsley, 2008: 64 and World Bank, 2015). Amphetamines were one of the illicit drugs considered, but cost estimates were not disaggregated by drug type.

The present study's findings on the cost of treatment appear to be low relative to the total costs, at a 'best' estimate of approximately R137 million for inpatient treatment

and associated healthcare. It is estimated that this cost reflects only 1% of the potential full cost of treating all meth users in the Western Cape, based on the estimated DALYs lost to meth use.

The proportion of the estimated meth-attributable costs of treatment to estimated total costs to society in the Western Cape is within the ambit of the proportions in other comparable studies. In the United States, the costs of meth treatment and healthcare accounted for 4% of the total estimated costs of meth use at USD897 million (R5.7 billion) (Nicosia et al., 2009: 103). In Australia, the treatment costs of illicit drugs accounted for 2.9% of the total tangible costs at AUD202 million (R945.4 million) (Collins and Lapsley 2008: 64), quite similar to the estimated proportion of the costs of meth-related illness for the Western Cape at 3% of total costs.

5.2 Research Limitations

Costing studies are subject to limitations arising from the shortage of plausible data. Further research is essential to estimate more accurately the economic costs of meth use.

Meth-attributable productivity loss is widespread and growing. The productivity loss to the employer includes drug tests, higher healthcare and benefits costs, reduced output, voluntary absenteeism and absenteeism during treatment, the costs of hiring a replacement, etc. The costs to society include a lower probability of working owing to disabilities and premature mortality that reduce the productive years. The external costs associated with meth-attributable productivity loss are the feeling of insecurity arising from gang violence, which inhibits non-meth users from going to work or engaging in their daily activities for fear of being caught in the crossfire during gang

conflicts. The estimated costs presented in this study only account for a fraction of all economic costs associated with meth-attributable productivity loss. Additionally, the DALYs used to estimate productivity loss costs only account for years of life lost and years of life lived with mental and behavioural disorders associated with meth use and excludes other disorders such as cardiovascular and lung disease. For these latter cases, patients would have to be traced over time to attribute the NCDs incurred later in life to their meth use habits in the past.

The estimate of the cost of illness in this study is subject to three limitations. The first is the use of the market value for the estimate of treatment costs, which only provides estimates of inpatient treatment in private centres. Unfortunately, time and resource limitations inhibited primary data collection using an ingredients-based approach to cost each individual input cost of outpatient treatment. Outpatient drug treatment in the Western Cape is subsidised and costs obtained from the treatment facilities are an underestimate of the actual cost of treatment incurred by the government. Additionally, the subsidised prices charged to patients in outpatient centres are subject to family income and fluctuate depending on the income bracket, thus making it even more difficult to estimate the treatment cost.

The second limitation concerns the number of patients seeking treatment. Globally, one in six people who suffer from drug use or drug use disorders receives treatment annually. In Africa, this rate is one in eighteen (UNODC, 2015: 30). In the Western Cape, drug treatment facilities have increased from 7 to 24 since 2009 (Luhanga, 2012). However, there is a wide disparity between persons who access treatment and persons who need treatment, based on the number of meth users from the estimated DALYs lost to meth use in South Africa in 2010.

Lastly, the estimated cost of healthcare presented in this study reflects only a fraction of the long-term effects of meth on healthcare. The NCDs presented by meth users

may be underreported. This is attributable to the fact that many of these NCDs only surface years after initiating meth use, or years after meth treatment, and some patients do not access treatment, hence their cases of NCDs are not recorded as meth-related. Additionally, the intangible costs associated with these NCDs, such as reduced quality of life, were excluded from the analysis, owing to lack of data, further shrinking the estimated costs of healthcare. Moreover, the costs of treatment of these NCDs were derived from medical aid pay-offs, which do not reflect the full treatment cost per specific NCD case.

The meth-attributable costs of crime presented in this study were underestimated, as a substantial number of crimes in South Africa are not reported. According to the *Victims of Crime Survey 2014*, only 89% of murders, 56% of burglaries, 60% of home robberies and 57% of theft from vehicles were reported to the police in South Africa (Statistics South Africa, 2014c: 43). These are the crimes that meth is mostly associated with. Consequently, the magnitude of the economic costs of meth-attributable crime is much higher than the estimates presented in this study. Additionally, this study based the meth-attribution to crime on the perception of the victims of crime survey findings. Meth-attributable crimes may be either lower or higher than the public perceptions used in this study.

This study attributed 5% of the lower courts expenditure to meth crimes, based on 50% of the 10% attributed to alcohol-related crimes used in an alcohol costing study by Budlender (2009: 19). However, as meth is considered to be associated with violent crimes (Nicosia et al., 2009: 67) it could account for a higher proportion of lower courts services than the conservative 5% used in this study.

The NPA prosecuted approximately 23% of the total crimes reported by SAPS in 2013/2014, thus the estimates of justice costs are calculated at 23% of the estimated meth-attributable crimes. The costs of prosecuting all meth-attributable crimes, which

may take longer than one calendar year, is likely much higher than the 23% used in this study.

The estimated meth-attributable justice costs are subject to three shortfalls. The estimated costs exclude costs to society such as legal representation costs. Costs associated with victim compensations were also not included. Lastly, the costs of the impact of these crimes to society were excluded, which underestimates the opportunity cost of meth-attributable crime on society. The incarceration costs presented in chapter 4 exclude the costs of productivity lost during incarceration as well as social costs to the families of the incarcerated e.g. foster care for children whose parents are incarcerated.

The upper bound estimate of transfer costs was derived from the product of the percentage of transfer costs in 2007 and the 2014 GDP. This does not precisely gauge the transfer costs, as material losses to crime are not necessarily proportional to the GDP of the year in which these losses were incurred. However, as there was no more precise method of measuring the upper bound, this method was used to provide a possible maximum meth-attributable cost for this category.

The present study draws on findings from previous studies and is thus subject to limitations borne by these previous studies. In the absence of more reliable and applicable data, this study provides a crude estimate of meth-attributable costs on society and government.

5.3 Recommendations for Policy

The meth pandemic requires interventions aimed at addressing the source of the plague. This means interventions that target both the supply and the demand sides of the meth pandemic.

On the demand side, meth use is most dominant among the youth in the Western Cape. Interventions should aim to prevent meth use through drug prevention strategies at schools, the workplace and public places. These interventions should highlight the long-term effects of meth use such as airing consented stories of previous meth users and the effects meth had on them. Such interventions should also be aired on radio, television, social media sites, billboards and outdoor advertising to reach numerous people. Such policies should aim to halt and reduce the demand for meth among the youth. Given that meth is highly addictive, interventions aimed at preventing experimental and recreational meth use should be implemented. These may include outreach services that provide a combination of services including teaching about the dire effects of meth use, provide meth addiction counselling, advice on meth use cessation, etc. These outreach services should also target the workplace to teach and advise about meth use and its consequences.

On the supply side, the meth pandemic must be addressed through policies aimed at curbing the meth supply. Stricter laws on the trafficking of meth and its precursor chemicals need to be enforced. Such laws may include harsher sentences for meth or its precursor chemical trafficking. This would lower the potency of the drug, as happened in the United States after meth precursor restrictions in the United States, Canada and Mexico were implemented (UNODC, 2014: 48). Law enforcement requires adequate funding which will necessitate efficient use of the available resources. One method of ensuring efficient resource use is by directing these scarce resources primarily to drugs such as meth, that have the most dire effects on society

as opposed to recreational drugs like marijuana which take up a lot of police and law enforcement time, effort and funding but have minor consequences on society.

According to the UNODC (2015: 34), the ratio of savings to investing in treatment for halting consumption and preventing drug use relapse is 3:1. For every dollar invested in treatment, three dollars are saved. When crime, productivity loss and health are incorporated, the ratio rises to 13:1, showing that drug treatment is cost effective. Investing enough in meth treatment to meet the associated demand would result in more than proportionate savings through the diminished total costs that would accrue to society and government.

One way to increase access to cost-effective treatment may be through the provision of integrated healthcare with service providers who are adequately trained and equipped to diagnose drug use or drug use disorders and able to counsel, treat, recommend treatment or refer for treatment. This will enable vulnerable groups with limited access and information on drug abuse treatment to gain awareness of drug abuse treatment, as these groups also require other health services. The aim is to address multiple problems within one health visit: treatment, HIV/AIDS screening, drug abuse counselling and screening, etc. A similar intervention should be implemented in schools and pre-schools in an effort to curb the demand for meth use through the provision of drug counselling services that will potentially prevent the use of meth for recreational or other purposes and enforce meth-free norms.

There is evidence of escalating meth and precursor seizures at various points of entry in South Africa, as alluded to previously. However, despite heavy restrictions on ephedrine sales in South Africa, meth production and use remains relatively high. One solution may be to restrict domestic purchases and online purchases of medicinal drugs containing the precursor chemicals ephedrine and pseudoephedrine

such as ephedra. The next section provides a recommendation for addressing the unintended consequences of meth precursor chemical restrictions.

5.4 Future Research

Extensive research aimed at designing a substitute drug through organic modification techniques for obesity treatment, Parkinson's, asthma, spinal anaesthesia, Attention Deficit Hyperactivity Disorder (ADHD), bronchitis, etc. in South Africa, may, if successful, be highly effective in curbing the potency and, to a large extent, the quantities of meth produced locally. This is likely to be more effective if drugs containing precursor chemicals are banned following successful research on substitute drugs that accurately mimic the effects of ephedrine and pseudoephedrine but curb the side effects. Such drugs could then be used instead, for the treatment of such diseases as those mentioned above.

Mexico is a supplier of meth but does not seem to have the chemical plants that manufacture pseudoephedrine or ephedrine. Yet 259 meth labs were dismantled there in 2012 (UNODC, 2014: 74-75). The precursor chemicals were most likely imported. Interventions aimed at curbing meth precursor supplies and manufacturing are likely to be most successful if a global agreement is made to restrict these chemicals. This would require a joint agreement across multiple levels of governments.

In-depth qualitative studies are necessary to estimate accurately the opportunity costs of meth use on users and families of previous users, and to identify the underlying reasons for the high prevalence in the province. This will enable the

costing of meth-attributable suicides and suicide attempts, the opportunity costs of gangsters, and meth-attributable child maltreatment costs.

There are limited studies on the relationship between meth use and sexual reproductive health. The meth-attributable factor for HIV/AIDS infection risk is a key area for future longitudinal studies, particularly in developing countries with high HIV/AIDS prevalence rates. Additionally, longitudinal costing studies on newborn meth toxicity effects and treatment, meth-attributable road injuries, meth-lab injuries and reduced quality of life associated with meth use are necessary to reflect accurately the extent of meth's detrimental impact on the economy.

5.5 Concluding Remarks

Despite the limitations arising from constraints on time and resources, and the general lack of data, the present study provides a comprehensive analysis of the internal and external costs associated with meth use that are borne by the user, the government and society in the Western Cape. The estimates provided in this study aim to depict the extent of meth-use detriment to the Western Cape economy in monetary terms. The estimates presented pertain to the Western Cape, where 83% of primary meth users who sought treatment in 2013 reside. Thus, these estimated costs can be generalised for South Africa, assuming there was no underreporting of patients who sought meth treatment in 2013. These estimates, disaggregated by cost category, should help policy makers to make better decisions about how to direct resources most effectively so as to alleviate some of the associated externalities of the meth pandemic. This will make some of the scarce resources, presently tied up in addressing the meth pandemic, available for other pressing societal needs.

List of References

1. Aguirre, K. 2008. 'La Violencia Armada Como Freno Al Desarrollo: Midiendo La Relación Y Sus Costos,' in Fleitas, D.M. ed. (2010). *El Control de Las Tranferennias Internacionales de Armas*. Bueno Aires: OXFAM, pp57-70.
2. Alberts. C. 2014. *Stepping Stones Quotation Information*. [Electronic mail, 10 March 2015].
3. Alda, E., & Cuesta, J. 2011. A Comprehensive Estimation of Costs of Crime in South Africa and Its Implications For Effective Policy Making. *Journal of International Development*. 2011 (23): 926-935. Available from: http://www.researchgate.net/publication/227690089_A_comprehensive_estimation_of_costs_of_crime_in_South_Africa_and_its_implications_for_effective_policy_making [Accessed on 3 September 2015].
4. Allard, D., & Burch, V.C. 2005. The Cost of Treating Serious Abdominal Firearm-Related Injuries in South Africa. *South African Medical Journal*. 95 (8): 591-594.
5. Australian Drug Foundation 2014. *What Are Amphetamines?* Melbourne, Australia. Available from: http://www.druginfo.adf.org.au/attachments/article/31/DF_Amphetamines_Nov2014.pdf [Accessed on 10 October 2015].
6. Badel, A., & Greaney, B. 2013. Exploring the Link Between Drug Use and Job Status in the U.S. *The Regional Economist*. July 2013. Available from: <https://www.stlouisfed.org/publications/regional-economist/july-2013/exploring-the-link-between-drug-use-and-job-status-in-the-us> [Accessed on 2 September 2015].
7. Bennett, T., Holloway, K., & Farrington, D. 2008. The Statistical Association Between Drug Misuse and Crime: A Meta-Analysis. *Aggression and Violent Behaviour*. 2008 (13): 107-118. Available from: http://www.researchgate.net/publication/223551712_The_Statistical_Association_between_Drug_Misuse_and_Crime_A_Meta-analysis [Accessed on 3 September 2015].
8. Bloom, D.E., Cafiero, E.T., Jané-Llopis, E., & Abrahams-Gessel, S. 2011. *The Global Economic Burden of Non-Communicable Diseases*. Geneva: World

Economic Forum.

9. Bonitas. 2015. *What will it Cost?* Available from: <http://www.bonitas.co.za/plan-standard.html> [Accessed on 4 August 2015].
10. Budlender, D. 2009. *National and Provisional Government Spending and Revenue Related to Alcohol Abuse*. Soul City. November 2009: 3-26.
11. Buxton, J. A., & Dove, N. A. 2008. The Burden and Management of Crystal Meth Use. *CMAJ*. 178 (12): 1537-1539. Available from: <http://www.cmaj.ca/content/178/12/1537.full.pdf> [Accessed on 7 September 2015].
12. Byford, S., Torgerson, J. T., & Raftery, J. 2000. Cost of Illness Studies. *BMJ*. 320 (13 May 2000): 1335. Available from: <http://www.bmj.com/content/bmj/320/7245/1335.1.full.pdf> [Accessed 9 November 2015].
13. City of Cape Town. 2015. *2011 Census Suburb Profile*. Available from: <https://www.capetown.gov.za/en/stats/Pages/2011-Census-Suburb-Profiles-land.aspx> [Accessed on 18 July 2015].
14. Centre for Social Impact Bonds. 2013. *Top-Down and Bottom-Up unit Cost Estimation*. Available from: https://data.gov.uk/sib_knowledge_box/top-down-and-bottom-unit-cost-estimation [Accessed on 14 March 2015].
15. Collins, D., Lapsley, H. M. & the University of South Wales. 2008. *The Costs of Tobacco, Alcohol and Illicit Drug Abuse to Australian Society in 2004/2005*. Australia. Commonwealth of Australia.
16. Corman, H., & Mocan, H. N. 1996. *A Time-Series Analysis of Crime and Drug Use in New York City*. Massachusetts. National Bureau of Economic Research. Available from: <http://www.nber.org/papers/w5463.pdf> [Assessed on 2September 2015].
17. Dada, S., Burnhams, N. H., Williams, Y., Johnson, K., Parry, C., Bhana, A., Timol, F., Nel, E., et al. 2014. *Monitoring Alcohol, Tobacco and Drug Abuse Treatment Admissions in South Africa*. Tygerberg, South Africa. South African Community Epidemiology Network on Drug Use. Available from: <http://www.mrc.ac.za/adarg/sacendu/Sacenduphase35.pdf> [Accessed on 7 February 2015].

18. Dawkins, M. P. 1997. Drug Use and Violent Crime among Adolescents. *Adolescence*. 321 (26): 395-405.
19. Degenhardt, L., Whiteford, H. A., Ferrari, A. J., Baxter, A. J., Charlson, F. J., Hall, W. D., Freedman, G., Burstein, R., 2013 et al. Global Burden of Disease Attributable to Illicit Drug Use and Dependence: Findings from the Global Burden of Disease Study 2010. *Lancet*. 382 (9 November 2013): 1567-1574. Available from: [http://dx.doi.org/10.1016/S0140-6736\(13\)61530-5](http://dx.doi.org/10.1016/S0140-6736(13)61530-5) [Accessed 8 April 2015].
20. Department of Correctional Services. 2014. *2013/2014 Annual Report*. South Africa. Department of Correctional Services. Available from: <http://www.dcs.gov.za/docs/2015%20doc/DCS%20Annual%20Report%202013-14.pdf> [Accessed on 6 August 2015].
21. Department of Justice and Constitutional Development. 2014. *Annual Report 2013/2014*. Pretoria. Department of Justice and Constitutional Development. Available from: <http://www.justice.gov.za/reportfiles/anr2013-14.pdf> [Accessed on 2 August 2015].
22. Department of Justice and Constitutional Development. 2015. *Courts in South Africa*. South Africa. Department of Justice and Constitutional Development Available from: <http://www.justice.gov.za/about/sa-courts.html> [Accessed on 22 September 2015].
23. Department of Social Development: Central Drug Authority. Undated. *National Drug Master Plan 2013-2017*. South Africa. Department of Social Development. Available from: http://www.dsd.gov.za/index2.php?option=com_docman&task=doc_view&gid=414&Itemid=3 [Accessed on 27 February 2015].
24. Drummond, M. F., Sculpher, M. J., Torrance, G. W., O'Brien, B. J., & Stoddart, G. L. 2007. *Methods for the Evaluation of Health Care Programmes*. 3rd edition. New York. Oxford University Press, Inc.
25. Everett, C. 2014. Cape Town: Most Violent City in Africa Struggles with Entrenched Gang Culture. *International Business Times*. 25 November 2014. Available from: <http://www.ibtimes.co.uk/cape-town-most-violent-city-africa-struggles-entrenched-gang-culture-1476375> [Accessed on 16 July 2015].

26. Geneva Declaration. 2008. *Global Burden of Armed Violence 2008*. Geneva. Geneva Declaration Secretariat. Available from: <http://www.genevadeclaration.org/measurability/global-burden-of-armed-violence/global-burden-of-armed-violence-2008.html> [Accessed on 13 Jul 2015].
27. Green, C. 2015. *Perception of Resource Intensity of Crime Categories in the Western Cape*. Interviewed by Vanessa Darsamo [in Person]. 9 October 2015.
28. Hender, M. 2010. *Drug-Related Crime in Cape Town*. Institute of Security Studies. Available from: <http://www.polity.org.za/article/drug-related-crime-in-cape-town-2010-10-07> [Accessed on 8 June 2015].
29. Henkel, D. 2011. Unemployment and Substance Use: A Review of the Literature (1990- 2010). *Current Drug Abuse Reviews*. 2011 (4): 4-27. Available from: <http://www.uniad.org.br/desenvolvimento/images/cpia%20de%200002CDAR.pdf> [Accessed on 2 September 2015].
30. Hobkirk, A. L. Watt, M. H., Green, K. T., Beckham, J. C., Skinner, D., & Meade, C. S. 2015. Mediators of Interpersonal Violence and Drug Addiction Severity Among Methamphetamine Users in Cape Town, South Africa. *Addictive Behaviours*. 42 (8): 167-171. Available from: <http://dx.doi.org/10.1016/j.addbeh.2014.11.030> [Accessed on 5 June 2015].
31. Independent Financial Consultants. 2015. *Fedhelath- Maxima Plus Medical Aid Plan*. Available from: <http://www.medicalaid-quotes.co.za/medical-aids/fedhealth/maxima-plus> [Accessed on 4 August 2015].
32. Independent Medical Aid Specialists. 2014. *Momentum Health Medical Aid Comparison - 2015 Plans* Available from: <http://www.medicalaidcomparisons.co.za/momentumcomp.aspx#plans%204-6> Assessed on 4 August 2015.
33. International Narcotics Control Board. 2014. *International Narcotics Control Board 2014*. New York. United Nations. Available from: https://www.unodc.org/documents/southeastasiaandpacific//Publications/2015/in_cb/INCB_Annual_Report_2014_EN.pdf [Accessed on 27 August 2015].
34. Institute for Health Metrics and Evaluation. 2013. *2010 Global Burden of Disease Results by Drug Use Disorder*. Available from:

<https://cloud.ihme.washington.edu/index.php/s/d559026958b38c3f4d12029b36d783da?path=%2F2010> [Accessed on 21 March 2015].

35. Kish, S. 2008. Pharmacologic Mechanisms of Crystal Meth. *Mechanisms and Innovations*. 178 (18): 1679-1682. Available from:
<http://www.cmaj.ca/content/178/13/1679.full.pdf> [Accessed on 7 September 2015].
36. Koopman, C., Rosario M., & Rotheram-Borus, M. J. 1993. Alcohol and Drug Use and Sexual Behaviors Placing Runaways at Risk for HIV Infections. *Addictive Behaviors*. 19, (1): 95-103. Available from:
http://www.researchgate.net/publication/223688426_Alcohol_and_drug_use_and_sexual_behaviors_placing_runaways_at_risk_for_HIV_infection_Addict_Behav [Accessed on 5 September 2015].
37. Koopmanschap, M. 1999. The Friction Cost Method of Measuring Indirect Cost of Disease. *Journal of Economics*. 14 (2): 171-189.
38. Loggenberg, L. 2015. *Perception of Resource Intensity of Crime Categories in the Western Cape*. Interviewed by Vanessa Darsamo [in Person]. 7 October 2015.
39. Lotz, C. 2015. *Perception of Resource Intensity of Crime Categories in the Western Cape*. Interviewed by Vanessa Darsamo [in Person]. 7 October 2015.
40. Luhanga, P. 2012. Scourge of Tik Sees Thousands Attending Western Cape Rehab Centres. *West Cape News*. 17 July 2012. Available from:
<http://westcapenews.com/?p=4622> [Accessed on 28 May 2015].
41. Makoae, M., Dawes, A., Loffell, J., & Ward, C. L. 2008. *Children's Court Inquiries in the Western Cape*. Final report to the Research Directorate, Department of Social Development, Provincial Government of the Western Cape. Cape Town: Human Sciences Research Council.
42. Matzopoulos, R., Truen, S., Bowman, B., & Corrigan, J. 2014. The Cost of Harmful Alcohol Use in South Africa. *South African Medical Journal (SAMJ)*. 104 (2): 127-132.
43. Mashaba, M. 2006. All-Out Drug War in Western Cape. *Cape Argus*. 19 May 2005. In Institute of Security Studies. 28 November 2006. Available from:

<https://www.issafrica.org/iss-today/all-out-drug-war-in-western-cape> [Accessed on 13 July 2015].

44. Meade, C. S., Watt, M. H., Sikkemaa, K. J., Deng, L. X., Ranby, K. W., Skinner, D., Pieterse, D., & Kalichmann, C. S. 2012. Methamphetamine Use is Associated with Childhood Sexual Abuse and HIV Sexual Risk Behaviours Among Patrons of Alcohol-Serving Venues in Cape Town, South Africa. *Drug and Alcohol Dependence*. 126 (2012): 232-239.
45. Meade, C. S., Towe, S. L., Watt, M. H., Ryan, L. B., Myers, B., Skinner, D., Kimani, S., & Pieterse, D. 2015. Addiction and Treatment Experience Among Active Methamphetamine Users Recruited from A Township Community in Cape Town, South Africa: A Mixed Methods Study. *Drug and Alcohol Dependence*. 2015.
46. Milan, M. 2012. Tik and HIV: A ticking Time Bomb. *Mail & Guardian*. 24 May 2012. Available from: <http://mg.co.za/article/2012-05-24-tik-and-hiv-a-ticking-time-bomb> [Accessed on 28 February 2015].
47. Miles, A. Undated. *Substance Use, Parenting Stress and Child Maltreatment: Exploring These Relationships in a Sample of At Risk Mothers*. Masters Thesis. University of Cape Town.
48. Møller, L., & Matic, S. 2010. *Best Practice in Estimating the Costs of Alcohol: Recommendations for Future Studies*. Copenhagen: WHO Regional Office for Europe.
49. Molitor, F. 1998. Association of Methamphetamine Use During Sex With Risky Sexual Behaviors and HIV Infection Among Non-Injection Drug Users. *Western Journal of Medicine*. 168 (2): 93-97. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1304836/pdf/westjmed00329-0019.pdf> [Accessed on 5 September 2015].
50. Mullahy, J., and Sindelar, J. L. 1993. Alcoholism, Work and Income. *Journal of Labour Economics*. 11 (3): 494-520. Available from: <http://tools.medicine.yale.edu/sindelar/files/Mullahy%20and%20Sindelar%201993%202535083.pdf> [Accessed on 2 September 2015].
51. Myers, B., Kline, T. L., Doherty, I. A., Carney T., & Wechsberg, W. M. 2014. Perceived Need For Substance Use Treatment Among Young Women From

- Disadvantaged Communities in Cape Town, South Africa. *BMC Psychiatry*.14 (100): 1-10.
52. National Institutes of Health. 2014. *Health Economics Information Resources: A Self Study Course*. NIH. Available from: <https://www.nlm.nih.gov/nichsr/edu/healthecon/glossary.html#Cost> [Accessed on 27 October 2015].
53. National Institute on Drug Abuse. 2014. *Drug Facts: Methamphetamine*. NIDA. Available from: <https://www.drugabuse.gov/publications/drugfacts/methamphetamine> [Accessed on 5 March 2015].
54. National Prosecuting Authority. 2015. *Annual Report 2014/ 2015*. South Africa. National Prosecuting Authority.
55. Nicosia, N., Pacula, R. L., Kilmer, B., Lundberg, R., & Chiesa, J. 2009. *The Economic Cost of Methamphetamine Use in United States, 2005*. RAND Corporation, California.
56. Nordberg, J., Nilsson, T., Eriksson, A., & Hardcastle, T. 2009. The costs of a bullet – Inpatient Costs of Firearm Injuries in South Africa. *South African Medical Journal*. 99 (6): 442-444.
57. Nwabisa, P. 2013. Millions for Western Cape Substance Abuse Programmes. *GroundUp*. 11 September 2013. Available from: <http://groundup.org.za/content/millions-western-cape-substance-abuse-programmes> [Accessed on 26 August 2015].
58. Oanda. 2015. Historical Exchange Rates. Available from: <http://www.oanda.com/currency/historical-rates/> [Accessed on 25 February 2015].
59. Padilla, R., & Ritter, A. V. 2008. Meth Mouth: Methamphetamine and Oral Health. *Talking With Patients*. 20 (2): 148-149. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1708-8240.2008.00167.x/epdf> [Accessed on 7 September 2015].
60. Parliament of Republic of South Africa. 2012. Research Unit. *Gang Violence in the Western Cape*. Available from: http://pmg-assets.s3-website-eu-west-1.amazonaws.com/docs/120821%20gang_0.pdf [Accessed on 14 July 2015].

61. Parry, C., Plüddemann, A., Louw, A., & Leggett, T. 2004. The 3-Metros Study of Drugs and Crime in South Africa: Findings and Policy Implications. *The American Journal of Drugs and Alcohol Abuse*. 30 (1): 167-185.
62. Pietsch, J., Paulick, T., Schulz, K., Flössel, U., Engel, A., Schmitter, S., & Schmidt, U. 2013. Escalation of Methamphetamine-Related Crime and Fatalities in the Dresden Region, Germany, Between 2005 and 2011. *Forensic Science International*. 233 (2013): 51-54. Available from <http://www.sciencedirect.com/science/article/pii/S0379073813004003> [Accessed on 5 June 2015].
63. Pillay, M. 2014. *Making of a People: The story of Gangs on the Cape Flats*. Available from: <http://woordendaad.co.za/index.php/nuutste-uitgawe/87-woordendaad/posters/120-the-story-of-gangs-on-the-cape-flats> [Accessed on 15 July 2015].
64. Plüddemann, A. 2010a. Methamphetamine ("tik") Use, Sexual Risk, Aggression and Mental Health Among School Going Adolescents in Cape Town. Ph. D. Thesis. University of Cape Town.
65. Plüddemann, A. 2010b. *Methamphetamine Use, Aggressive Behaviour and Other Mental Health Issues Among High-School Students in Cape Town, South Africa*. *Drug and Alcohol Dependence*. 109 (2010): 14-19.
66. Plüddemann, A., & Parry, C. 2012. *Methamphetamine Use and Associated Problems Among Adolescents in the Western Cape Province of South Africa: A need for Focused Interventions*. Medical Research Council South Africa. Available from: <http://www.mrc.ac.za/policybriefs/Methamphetamine.pdf> [Accessed on 16 February 2015].
67. Rix. 2015. *Perception of Resource Intensity of Crime Categories in the Western Cape*. Interviewed by Vanessa Darsamo [in Person]. 9 October 2015.
68. Robbins 2015. *Costs of Meth Treatment*. Interviewed by Vanessa Darsamo [In Person]. 25 February 2015.
69. Roloff, N. 2014. *Gang Typologies in the Western Cape*. The Safety Lab Available from: <http://safetylab.co.za/wp-content/uploads/2014/05/document/Gang%20Typologies%20of%20Western%20Cape%20-%20Final%20updated%20print.pdf> [Accessed on 13 July 2015].

70. South African Press Association. 2014. Gang Violence Remains Major Contributor to WC Murder Rate. *eNCA*. 22 September 2014. Available from: <https://www.enca.com/gang-violence-remains-major-contributor-wc-murder-rate> [Accessed on 30 July 2015].
71. Semple, S. J. Patterson, L. T., & Grant, I. et al. 2004. The Context of Sexual Risk Behavior Among Heterosexual Methamphetamine Users. *Addictive Behaviors*. 29 (2004): 807-810. Available from: http://ac.els-cdn.com/S0306460304000218/1-s2.0-S0306460304000218-main.pdf?_tid=076241a4-9791-11e5-8bc5-0000aacb361&acdnat=1448908665_579cfc2e2ebe8964be7ef40d1e564ade [Accessed on 5 September 2015].
72. Sias G. 2015. *Perception of Resource Intensity of Crime Categories in the Western Cape*. Interviewed by Vanessa Darsamo [in Person]. 7 October 2015.
73. Single, E., Collins, D., Easton B., Harwood, H., Lapsley, H., Kopp, P., & Wilson E. 2001. *International Guidelines for Estimating the Costs of Substance Abuse-2001 Edition*. Available from: http://drogfokuszpont.hu/wp-content/uploads/kokk_ped_guidelines_2001.pdf [Accessed on 20 November 2015].
74. Single, E., Collins, D., Easton B., Harwood, H., Lapsley, H., Kopp, P., & Wilson E. 2003. *International Guidelines for Estimating the Costs of Substance Abuse*. 2nd Edition. World Health Organization. Switzerland.
75. South African Police Service. 2014a. *Annual Report 2013/2014. Department of Police. Vote 25*. South Africa. Available from: http://www.saps.gov.za/about/stratframework/annualreports_arch.php [Accessed on 19 June 2015].
76. South African Police Service. 2014b. *Crime Situation in South Africa (Released 19 September 2014)*. South African Police Service. Available from: http://www.saps.gov.za/resource_centre/publications/statistics/crimestats/2014/crime_stats.php [Accessed on 1 March 2015].
77. South African Police Service. 2014c. *Western Cape Annual Report 2013/2014*. Western Cape, South Africa. South African Police Service. Available from:

http://showme.co.za/parl/files/2014/11/SAPS-Annual-Report-2013_2014_2_full-Low-res.pdf [Accessed on 19 June 2015].

78. South African Police Service. 2015a. *About the Forensic Science Lab*. South Africa. Available from: <http://www.saps.gov.za/faqdetail.php?fid=6> [Accessed on 22 September 2015].
79. South African Police Service. 2015b. *Annual Report 2014/2015*. South Africa. South African Police Service Available from: http://www.gov.za/sites/www.gov.za/files/SAPS_Annual_Report_2014-15.pdf [Accessed on 18 November 2015].
80. South African Reserve Bank. 2015. *Supplement to the Quarterly Bulletin March 2015 National Accounts of South Africa: 1946–2014*. Available from: <https://www.resbank.co.za/Lists/News and Publications/Attachments/6650/March – Supplement 2015 – Stats Tables.pdf> [Accessed on 17 September 2015].
81. South African Revenue Services. 2015. *Millions of Rands Worth of Drugs and Counterfeit Goods Confiscated at OR Tambo Airport- Liquid Methamphetamine Worth R37. 6 Million Among Bust*. Available from: <http://www.sars.gov.za/Media/MediaReleases/Pages/25-August-2015---Millions-of-rands-worth-of-drugs-and-counterfeit-goods-confiscated-at-OR-Tambo-Airport-.aspx> [Accessed on 27 August 2015].
82. Statistics South Africa. 2014a. *Mid-Year Population Estimates 2014*. StatsSA database. [Accessed on 20 February 2015].
83. Statistics South Africa. 2014b. *Poverty Trends in South Africa: An examination of Absolute Poverty between 2006 and 2011*. StatsSA database. Accessed on 8 September 2014.
84. Statistics South Africa. 2014c. *Victims of Crime Survey 2013/14*. StatsSA database. Accessed on 11 July 2015.
85. Statistics South Africa. 2015. *Consumer Price Index*. StatsSA database. [Accessed on 19 June 2015].
86. Stytler, M. 2015. *Crime and Security- Definitions of Various Crimes*. Available from: <http://irr.org.za/reports-and-publications/south-africa-survey/south-africa-survey-online-2014>. [Accessed on 26 September 2015].

87. Tagar, E., Sundaram, M., Condliffe, K., Matatiyo, B., Chimbwandira, F., Chilima, B., Mwanamanga, R., Moyo, C., Chitah., B., M. et al. (2014). Multi-Country Analysis of Treatment Costs for HIV/AIDS (MATCH): Facility-Level ART Unit Costs Analysis in Ethiopia, Malawi, Rwanda, South Africa and Zambia. *PLOS One*. 9 (11): 1-9. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4229087/pdf/pone.0108304.pdf> [Accessed on 12 July 2015].
88. Underhill, G. 2013. Gangs in Cape Town. A daily Dance with Death. *Mail & Guardian*. 23 August 2013. Available from: <http://mg.co.za/article/2013-08-22-gangs-in-cape-town-a-daily-dance-with-death> [Accessed on 28 August 2015].
89. United Nations Office on Drugs and Crime. 2003. *Terminology and Information on Drugs*. 2nd Edition. New York. United Nations.
90. United Nations Office on Drugs and Crime. 2014. *World Drug Report 2014*. New York. United Nations.
91. United Nations Office on Drugs and Crime. 2015. *World Drug Report 2015*. New York. United Nations.
92. Watt, M., Kimani, S., M., Skinner, D., & Meade, C., S. 2015. Nothing Is Free: A Qualitative Study of Sex Trading Among Methamphetamine Users in Cape Town, South Africa. New York. *Springer Science and Business media*.
93. Watt, M., Meade, C., S., Kimani, S., MacFarlane, J., C., Choi, K., W., Skinner, D., Pieterse, D., Kalichman, S., C. et al. 2014. The Impact of Methamphetamine ("Tik") on a Peri-Urban Community in Cape Town, South Africa. *International journal of drug policy*. 25 (2014): 219-225. Available from: <http://dx.doi.org/10.1016/j.drugpo.2013.10.007> [Accessed on 5 June 2015].
94. Wechsberg, W., M., Jones, H., E., Zule, W. A., Myers, B. J., Browne, F. A., Kaufman, M. R., Luseno, W. Flisher, A., J., et al. 2011. Methamphetamine ("tik") Use and Its Association with Condom Use among Out-of-School Females in Cape Town, South Africa. *AmJ Drug Alcohol Abuse*. 36 (4): 1-9.
95. Western Cape Government. 2013. *Integrated Provincial Violence Prevention Policy Framework*. Western Cape. Western Cape Government. Available from: <https://www.westerncape.gov.za/text/2013/September/violence-prevention-cabinet-policy-final.pdf> [Accessed on 22 September 2015].

96. Western Cape Government. 2014. *Community Safety Annual Report 2013/2014*. Western Cape. Western Cape Government. Available from: https://www.westerncape.gov.za/sites/www.westerncape.gov.za/files/department_of_community_safety_annual_report_2013_2014.pdf Accessed on 5 May 2015.
97. Western Cape Government Provincial Treasury. 2014. *Budget Overview of Provincial Revenue and Expenditure 2013*. Western Cape. Western Cape Government. Available from: https://www.westerncape.gov.za/assets/departments/treasury/Documents/Budget/2014/opre_2014_to_printers_3_march_2014_final.pdf [Accessed on 7 June 2015].
98. World Bank. 1993. *World Development Report: Investing in Health*. Washington. The International Bank.
99. World Bank. 2006. Population Reference Bureau. *2006 World Population Data Sheet*. World Bank. Available from: <http://www.prb.org/pdf06/06worlddatasheet.pdf> [Accessed on 14 November 2015].
100. World Bank. 2015. *South Africa*. Available from: <http://www.worldbank.org/en/country/southafrica> [Accessed on 24 September 2015].
101. World Health Organisation. 2003. *Making Choices in Health: WHO Guide to Cost-Effectiveness Analysis*. Geneva. World Health Organisation.
102. World Health Organisation. 2014. *South Africa: Alcohol Consumption: Levels and Patterns*. World Health Organisation. Available from: http://www.who.int/substance_abuse/publications/global_alcohol_report/profiles/zaf.pdf [Accessed on 27 October 2015].
103. World Health Organisation. 2015. *Management of Substance Abuse- Amphetamine-Type Stimulants*. World Health Organisation. Available from: http://www.who.int/substance_abuse/facts/ATS/en/ [Accessed on 7 October 2015].

APPENDIX

Table A1: DALYs Lost to Amphetamine Use Through Mental and Behavioural Disorders for South Africa 2010

Age	Mean DALY	Upper DALY	LOWER DALY
0-6 days	37.0722	8.53597	0.82361
7-27 days	22.2574	9.74065	0.898055
28-364 days	280.527	81.1266	6.96263
10-14 years	441.764	834.354	167.636
15-19 years	3258.55	6214.62	1534.07
20-24 years	4882.52	9302.96	2358.35
25-29 years	4485.73	8500.33	2147.96
30-34 years	3082.7	5789.4	1458.33
35-39 years	1756.84	3339.43	819.133
40-44 years	952.273	1816.12	424.791
45-49 years	639.133	1160.49	265.872
50-54 years	474.144	852.589	193.032
55-59 years	300.517	535.57	117.282
65-69 years	51.0451	84.4557	12.4884
70-74 years	22.8415	29.0795	2.40557
75-79 years	11.0661	9.64731	0.211797
80+ years	6.64949	3.67551	0.125388

Source: IHME 2013.

Table A2: Treatment Costs by Type of Facility in the Western Cape

Treatment Centre	Inpatient/ Outpatient	Duration of Treatment	Daily Cost R	Total Treatment Cost R
A	Inpatient	21	1,761.90	37,000
B	Inpatient	21	2,608.19	54,772
C	Inpatient	28	2,608.21	73,030
D	Inpatient	35	Income dependent	≈5,850
E	Inpatient	35	Income dependent	≈5,850
F	Inpatient	56	Free	Free
G	Outpatient	24	60.00	1,440
H	Outpatient	63	Free	Free
I	Outpatient	40	Free	Free
J	Outpatient	84	255.95	21,500
K	Outpatient	40	Free	Free
L	Outpatient	40	Free	Free
M	Outpatient	40	R60 +R20 to R40	70
N	Outpatient	40	Free	Free
O	Outpatient	40	Free	Free
P	Outpatient	40	Free	Free

Source: Personal communication and email, 2015.

Estimation of Outpatient and Inpatient Costs

This study used only inpatient costs for the estimation of the costs of treatment owing to the discrepancies in the basic costs charged at outpatient facilities. However, a crude estimate of the cost of treatment for both inpatients and outpatients is provided below.

The estimated expenditure on substance abuse by the Department of Social Development in 2013/2014 was R84.9 million. It is estimated that 30.42%, equivalent to R25.8 million, was allocated to meth cases, based on the meth use prevalence among patients who sought drug abuse treatment. The estimated inpatient meth treatment cases, 790, was derived from the product of the total inpatients (2,598) and the meth prevalence among patients (30.42%). The upper, best and lower unit costs of inpatient treatment and the estimated cost of outpatient and inpatient treatment for meth are illustrated in table A3. These estimates exclude the additional (subsidised) costs charged to patients, which vary depending on the patients' income or family income bracket.

Table A3: Estimated Meth Inpatient and Outpatient Treatment Costs in the Western Cape

	Inpatient unit costs	Total inpatient costs	Outpatient + Dept. Social Development*	Total Estimated Treatment Costs
Upper	71,036	56,134,614	25,817,608	81,952,222
Best	55,405	43,782,693		69,600,301
Lower	35,990	28,440,103		54,257,711

Source: Source: Alberts: 2015, Dada et al., 2014:3-13, Department of Social Development: 2014: 71, Robbins: personal communication, 2015 February, 25, Kenilworth: 2015, Claro: 2015 and Statistics South Africa: 2015.

NOTE: Due to rounding, numbers may not sum precisely.

*Costs by the Department of Social Development include expenditure on aftercare services.

Table A4: Crime Services Experts Perception on Resource Intensity by Crime Category in the Western Cape

Crime Category	Score: A	Score: B	Score: C	Score: D	Score: E	Average	Average %
Murder	10	10	9	8	8	9	5%
Sexual Crimes	7	9	9	7	8	8	4%
Attempted murder	8	10	9	8	6	8	4%
Assault: bodily harm	6	6	6	4	6	6	3%
Common assault	4	5	6	3	7	5	3%
Common robbery	5	10	6	6	8	7	4%
Robbery: aggravating	7	10	6	8	10	8	4%
Arson	7	0	7	7	4	5	3%
Malicious injury to property	3	6	5	4	5	5	2%
Burglary at non-res. premises	5	4	5	5	7	5	3%
Burglary at res. premises	5	6	5	5	9	6	3%
Theft of motor vehicle	5	9	5	5	9	7	3%
Theft out of motor vehicle	5	6	5	5	10	6	3%
Stock-theft	7	0	0	6	8	4	2%
Unlawful firearms, ammunition	8	10	9	7	5	8	4%
Drug-related crime	7	10	5	4	6	6	3%
Driving under the influence	6	10	5	6	3	6	3%
All other theft	4	10	5	6	7	6	3%
Commercial crime	7	8	6	8	3	6	3%

Shoplifting	4	4	4	5	4	4	2%
Carjacking	8	10	9	8	10	9	5%
Truck hijacking	8	10	9	8	10	9	5%
Robbery at res. premises	8	10	5	8	10	8	4%
Robbery at non-res. premises	8	9	5	8	10	8	4%
Culpable homicide	10	10	7	7	3	7	4%
Public violence	7	10	9	7	3	7	4%
Crimen injuria	2	0	6	3	2	3	1%
Child neglect/ ill-treatment	8	9	9	5	4	7	4%
Kidnapping	9	10	9	7	3	8	4%
TOTALS	188	290	290	178	188	191	100%

Source: Green: personal communication 2015, October 9, Loggenberg: personal communication 2015, October 7, Lotz: personal communication 2015, October 7, Rix: personal communication 2015, October 9, and Sias: personal communication 2015, October 7.

Table A5: Western Cape Mid Year Population by Age Group, 2014

Age	Male	Female	Total
0-4	287,330	279,654	566,984
5-9	268,488	263,965	532,453
10-14	262,719	257,445	520,164
15-19	264,095	258,788	522,883
20-24	265,627	259,250	524,878
25-29	268,392	260,634	529,026
30-34	237,476	241,859	479,335

35-39	221,030	221,944	442,975
40-44	205,595	218,548	424,143
45-49	185,804	204,533	390,338
50-54	156,285	173,216	329,501
55-59	125,729	143,086	268,815
60-64	96,816	110,137	206,953
65-69	69,674	88,394	158,068
70-74	47,236	62,430	109,666
75-79	29,215	34,588	63,803
80+	19,504	26,836	46,340
Total	3,011,016	3,105,308	6,116,324

Source: Statistics South Africa, 2014a: 16.