Research Report

The New Zealand
Drug Harm Index 2016

Acknowledgements

Author

Dr Michael McFadden
Director McFadden Consultancy

Contents

List of tables

List of figures

Abbreviations

ATS   amphetamine-type stimulant

GHB   gamma hydroxybutyrate

MDMA   3,4-methylenedioxy-methamphetamine

NBOMe   N–methoxybenzyl, a series of synthetic drugs with hallucinogenic effects

Project summary

Project: Author:	Development of a revised Drug Harm Index Dr Michael McFadden, Director McFadden Consultancy
Aim	The new Drug Harm Index provides a comprehensive evaluation of the costs of harmful illicit drug use, focusing on the social cost of use by drug type. Estimates of total harm, harm per kilogram of drug consumed and harm per user are included. Illicit drugs include legal drugs diverted to the illicit drug market and exclude alcohol and tobacco.
Method	The method involved identifying the number of drug users and the extent of drug use by category of drug. Where hard data existed (e.g. drug-related deaths, treatment sessions, crime statistics), the estimated harm was calculated for given drug types. In the absence of hard data, expert opinion (following a method developed by Nutt et al, 2010) was used to provide a basis for the future estimate of the dollar harms for drugs. Unlike previous drug harm indexes, the social cost of harm associated with drug use (personal harm and community harm) was separated from the costs associated with attempts to address the issue (intervention costs). Cost estimates included explicitly for the first time include harm to family and friends of drug users, funding of other criminal activities and reduction in taxation revenue.
Results	The estimated social cost of drug-related harms and intervention costs in 2014/15 was $1.8 billion. Details are given below. | Drug group	Personal harm $(m)	Community harm $(m)	Total harm $(m)	Intervention cost $(m)	Total social cost $(m)
---	---	---	---	---	---
Amphetamine-type stimulants	256.4	91.4	347.8	16.4	364.2
Cannabinoids	256.4	720.3	976.7	305.9	1,282.6
Hallucinogenic and psychedelic drugs	8.0	9.0	17.0	5.3	22.3
Opioid and sedative drugs	80.1	72.0	152.1	23.8	175.9
Total	**601.0**	**892.7**	**1,493.7**	**351.4**	**1,845.0**	
Discussion	The new Drug Harm Index is a conservative measure of the harms associated with the use of illicit drugs in New Zealand. The Index can be extended to accommodate new and emerging drugs into the Index in the future. This method will also extend the useful life of the proposed Drug Harm Index. It provides new insights into who actually suffers from the burden imposed by illicit drug use.

Introduction

The first published Drug Harm Index (DHI) was developed by the Australian Federal Police during 2001 in response to the Australian Government's interest in the social impact of its policies to curb the abuse of illicit drugs (McFadden et al, 2002) and subsequently revised in 2003, 2006 and 2008 (Attewell & McFadden, 2008). It was followed by other DHIs, including Great Britain in 2005, the United Nations Office on Drugs and Crime (UNODC) in 2005 and New Zealand in 2008 (MacDonald et al, 2006; UNODC, 2005; Slack et al, 2008).

As in Australia, the main impetus for the development of a DHI elsewhere was an interest in measuring the impact of government policy in relation to illicit drugs. The success or otherwise of a DHI in accomplishing this goal is heavily dependent on the ability to specify in detail what is expected from its application. In New Zealand this important step was completed in 2008, and in the current project it is subject to further revision. The following section provides more detail on what is expected of a DHI in the New Zealand context.

Research scope

The scope of the task was defined in the Request for Proposal issued by the Ministry of Health on 29 May 2015. An excerpt is provided here to clarify the purpose of the project.

> *The Ministry of Health is seeking Proposals from organisations with the skills and expertise necessary to develop an updated Drug Harm Index that builds on previous work in 2008. The new Drug Harm Index will provide a comprehensive evaluation of the costs of harmful illicit drug use, focusing on the social cost of use per drug type. This is subject to the agreement of parameters and methodology for developing a new updated Drug Harm Index. As well as the drug types considered in the previous Index, this Index will consider NBOMEs and other unapproved psychoactive substances, reflecting the ever changing drug scene in New Zealand. As part of this work, we require Respondents to:*
>
> - *Develop and agree a methodology for a new Drug Harm Index*
>
> - *Develop a new Drug Harm Index*
>
> - *Provide other relevant advice, including how the Drug Harm Index can be maintained.*
>
> *Development of a new Drug Harm Index and the associated report should assist agencies assess the costs and benefits of their current interventions; assist agencies evaluate how effective they have been in achieving the aims of the National Alcohol and Other Drug Policy; alert policy makers to the cost of harms associated with new drugs that have been introduced or are becoming more prevalent; help guide future enforcement activities and harm reduction strategies; and to inform future advice about how best to manage a reduction in harm caused by illicit drugs.[1]*

The project is a collaborative one, with the active involvement of a number of government and non-government agencies. The project relies on work that has gone before, including research by Slack and others on behalf of the New Zealand Police (Slack et al, 2008), the original research by the Australian Federal Police (Attewell & McFadden, 2008), Moore's estimates of harms per kilogram of

---

[1] Request for Proposal, *Development of a New Drug Harm Index*. Date RFP issued: Friday, 29 May 2015.

drug consumed (Moore, 2007), and the expert panel survey of drug harms (Nutt et al, 2010). The current study was constructed on the foundations laid by these earlier works.

There are core components of the DHI that have remained the same through the various versions:

- the identification of drugs of interest – these include all illicit drugs and legal drugs diverted to the illicit market (alcohol and tobacco are excluded)

- an estimate of the total harm to the community caused by illicit drugs, expressed in dollar terms (all dollars are New Zealand dollars unless otherwise stated)

- a method for distributing these costs against drugs of interest

- an estimate of consumption for each drug of interest

- calculation of total dollar harm for each drug of interest

- the calculation of an average dollar harm per kilogram of specific drug consumed.

In addition, the original New Zealand DHI has an estimate of dollar harm per drug user.

The first task of the current project was to update existing estimates. The second task was to calculate estimates of harm for new and emerging drugs. The latter is a major issue for maintaining the relevance of the DHI. The issue is not dissimilar from the problem of dealing with existing drugs whose harms are not well known, and the solution, as indicated later, is the same.

Report structure

There are differences in the content and method employed in this version compared with the original version of the New Zealand DHI. The current report adopts a different methodology, introduces some innovative techniques and varies from the approach adopted in the earlier report, where this was deemed appropriate. The emphasis was on building on the earlier report rather than replacing it or copying its approach. Nevertheless, in order to assist the reader in cross-referencing the two studies, this report has been structured as far as possible to reflect the structure of the earlier DHI report (Slack et al, 2008).

Following this introduction, the report reviews existing knowledge and its implications for the project, before outlining the method in detail. This is followed by an overview of drug use in New Zealand. Next comes a section on drug harm calculation, which is the backbone of the report and has a matching degree of detail. The results and recommendations sections describe the output of the calculation and their implications. Separate sections are devoted to the practical application of the new DHI and a consideration of potential future directions for the maintenance and application of the DHI.

There are two technical attachments to the report. These are included for individuals with both the interest and skills to follow the logic of the processes involved in compiling the New Zealand DHI 2016. Attachment A provides details of the methods used to estimate the extent of drug consumption, and Attachment B has a similar level of detail in relation to the calculation of harm. These calculations are necessarily complex, and further information or explanation can be obtained by contacting the author.

The report also includes a number of observations arising from the development of the DHI. These are items of interest related to the purpose of the paper but not essential to understanding its main theme. The reader may safely ignore these inserts, which are clearly labelled. For some, these will provide greater insight into the workings and implications of the new DHI.

It should be noted that the development of a DHI involves the specification of a complex model with numerous assumptions. It is preferable that all such assumptions be made explicit, but in practice this is not always the case. Typically, researchers will describe the assumptions underlying their model; they are less likely to describe the assumptions underlying estimates imported from other sources.

Due to their complexity models are not really 'right' or 'wrong'. Rather their validity is assessed by how well they fit the world they are attempting to describe. The critical aspect of any model is to be sufficiently transparent to permit an independent evaluation of its worth. In keeping with this approach, the current report was subject to independent professional review.

Background

This section provides a brief history of DHIs developed in New Zealand and elsewhere. The following summary is based largely on that produced by Attewell and McFadden (2008). In fact, 2008 marks a watershed year in relation to the development of DHIs. Six separate DHIs were developed in the years 2001–2008 and none since. The summary is followed by a literature review of relevant, though sparse, post-2008 publications.

A brief history

As indicated earlier, the first published DHI was developed for the Australian Federal Police in 2001. At that time the development of an index was in response to two quite separate issues.

- Law enforcement had long struggled with the reporting and interpretation of illicit drug seizures. There were, and still are, two options for most agencies. Reporting the number and weight of seizures by drug type provides an accurate picture of what has occurred, but it is difficult to interpret in terms of general trends. A decrease in seizures of one drug type might be counterbalanced by an increase for another drug type. The alternative is simply to report the aggregate number and weight for all seizures across all drug types. This has the benefit of being a single number, but it is remarkably coarse.

- The Australian Government had introduced an output–outcome reporting regime for Commonwealth departments to increase departmental accountability and shift agencies' perspective from an emphasis on properly acquitting the funds provided to an emphasis on the social impacts of government programmes.

Nearly all public sector agencies struggle with measuring the social impact of their programmes. This is hardly surprising given that government programmes operate in complex environments, with many other players, forces and environmental factors involved. The original DHI provided law enforcement with a way of reporting its drug seizure activity in a single meaningful number that also represented the dollar value of its social impact to the community. In 2007 the Victorian Police began developing a DHI, and one year later the New Zealand Police introduced its own version (Willis et al, 2010; Slack et al, 2008).

Although the DHI was originally developed in a law enforcement context, its wider applicability was soon recognised in that a single index would be of value in tracking the total harm caused by illicit drugs. This approach involves a weighted aggregate of key harm measures such as mortality, morbidity and drug-related crime. It was this latter application that led to the development of the Home Office Drug Harm Index in the United Kingdom in 2004 (MacDonald et al, 2006). A similar approach was adopted by the UNODC in developing its Illicit Drug Index in 2005 to provide a single measure of harm across regions and countries, and across time (UNODC, 2005, 2006). An excerpt from Attewell and McFadden (2008) provides a summary of the similarities and differences between the various measures:

> All are used as summary measurements to compare policy outcomes either internally or externally. However, there are differences in approach and method. The United Kingdom index concentrates on a set of measurable indicators that are related to the social harms caused by drugs. The index for the base year (1988) was set at 100, and subsequent levels of harm were plotted against that point. Thus, it is a relative rather than an absolute measure of harm. The AFP

and New Zealand indices share the same methodology, the only difference being that AFP had an independent estimate of the economic cost of drug use in the community, whereas the New Zealand study developed its own measurements. Both forms of measurement provide absolute estimates of the level of harm in economic terms, and both are used by their respective law enforcement agencies to report performance. There are differences: the bottom-up approach used in New Zealand resolved the issue of double-counting harm by counting polydrug users in each of the relevant drug categories. The top-down approach used in Australia avoided this problem by segmenting harm at the aggregate level. The issue remains important if harm at the drug-user level is of interest. (p. 42)

Of the various DHIs developed between 2001 and 2008, only two remain in use, the New Zealand DHI and the Australian DHI. I have been unable to locate any public explanation of the fate of the UK and UNODC DHIs. Personal communication with the Home Office and the UNODC remains unanswered after several months and repeated requests. From the published material it appears that neither DHI was in use three years after its inception.

It should be noted that the Victorian Police version was always an internal measure and not subject to public scrutiny. The reasons for the survival of the two law enforcement-sponsored DHIs is not altogether clear. Possibly the ability of the respective DHIs to provide feedback in an organisational environment that is conducive to feedback may be one factor. It should also be noted that these DHIs report results in dollar values, which assists interpretation by the general public and professional community alike. In short, they have a clear message.

Literature review post-2008

The literature review post-2008 was conducted using Google, Google Scholar and university library research engines using the key words 'drug harm index'. The following reports were identified as potentially relevant:

Greenfied V & Paoli L (2010). *If supply-oriented drug policy is broken, can harm reduction help fix it? Melding disciplines and methods to advance international drug control policy*, United States Naval Academy, Department of Economics, Working Paper 2010–30.

Melberg H, Hakkarainen P, Houborg E, Jääskeläinen M, Skretting A, Ramstedt M & Rosenqvist P (2011). Measuring the harm of illicit drug use on friends and family, *Nordic Studies on Alcohol and Drugs*, 28, 2, 105–121.

Morgan C, Muetzelfeldt L, Muetzelfeldt M, Nutt D & Curran H (2010). Harms associated with psychoactive substances: findings of the UK National Drug Survey, *Journal of Psychopharmacology*, 24, 2, 147–153.

Nutt D, King L and Phillips L (2010). Development of a rational scale to assess the harm of drugs of potential misuse, *The Lancet*, 369, 9566, 1047–1053.

Pedersen W & Von Soest T (2015). Which substance is most dangerous? Perceived harm ratings among students in urban and rural Norway, *Scandinavian Journal of Public Health*, 43, 385–392.

Reuter P (2009). Ten years after the United Nations General Assembly Special Session (UNGASS): assessing drug problems, policies and reform proposals, *Addiction*, 104: 510–517.

Ritter A (2009), Methods for comparing drug policies – the utility of composite Drug Harm Indexes, *International Journal of Drug Policy*, 20, 6, 475–479.

van Amsterdam J, Opperhuizen A, Koeter M & van den Brink W (2010). Ranking the harm of alcohol, tobacco and illicit drugs for the individual and the population, *European Addiction Research*, 16, 4, 202–207.

There are two strands in the literature post-2008. The first relates to critiques of existing DHIs. In general, most commentators were sympathetic to the aims of developing a DHI (Greenfield & Paoli, 2010; Nutt el al, 2010; Ritter, 2009). In this they were consistent with a 2006 review conducted by the Beckley Foundation (Roberts et al, 2006). The notion of a single measure of drug harm that can be used to measure the benefits of illicit drug policy and practice is highly appealing. Most realised the problems that beset the measurement of any behaviour that is illegal. Reuter (2009) was more sceptical, suggesting that any single measure of drug-associated harms was unlikely to capture the complexity of the environment within which drug markets operate.

The second strand relates to an innovative approach to measuring harm. Nutt et al (2010) proposed the use of expert opinion to develop a scale of drug harm. They noted that drug abuse is a major health issue and that drugs are regulated by a classificatory system in the UK that purportedly reflects their relative harm, but that the basis for the classification is not transparent. They developed a classification system based on rankings provided by experts in the field. The ranking covered both legal and illegal drugs.

Despite the fact that their interest was in creating a rational and defensible classificatory system for illicit drugs, it was immediately apparent that this approach had application to the development of DHIs. In fact, the 2008 revision of the Australian DHI incorporated this approach into its methodology by transferring the UK rankings to the Australian context (Attewell & McFadden, 2008) using an earlier version of the paper reported in *The Lancet* (Nutt el al, 2010). The work by Nutt et al was also impressive because it provided the results in a way that could be readily understood and conveyed. See Insert 1 on the following page, an excerpt from *The Economist* of 2 November 2010 (*The Economist*, 2010).

This seminal work provided the impetus for a number of papers relating to perceived level of harm, as estimated by users or the general public rather than by expert groups (Melberg et al, 2011; Morgan et al, 2010; Pedersen & Von Soest, 2015; van Amsterdam et al, 2010). Morgan et al conducted a survey of 1,501 drug users in the UK and found a high correlation between the rankings provided by users and those provided by the experts of the Nutt et al (2010) study. In general, there is considerable consensus between experts, users and independent assessments (such as the various DHIs) on the relative harm associated with traditional drug types, which provides a strong underpinning for further work in the area. The question is not about which drugs cause harm but rather how we can quantify in economic terms our existing consensus on the relative harm created by illicit drugs.

In an important extension of the survey technique to measure harm, Melberg et al (2011) included a willingness-to-pay question into a survey of drug harm. Willingness-to-pay, as the phrase implies, is a technique to measure how much a community is willing to pay to achieve a given outcome. Melberg et al found that one in fourteen members of the public knew socially or were related to a drug user (i.e. family and friends). Family and friends of drug users indicated they would be willing to spend between 500 and 13,000 euros to treat the drug user.

The other highly relevant aspect of the Melberg et al study is that it draws attention to a type of harm not included in previous DHIs, namely the harm to family and friends. The inclusion of this harm was an innovative feature of the current study. The Melberg et al study and its implications will be discussed in greater detail later.

INSERT 1.

Nov 2nd 2010, 12:30 by The Economist online
A new study suggests alcohol is more harmful than heroin or crack

Most people would agree that some drugs are worse than others: heroin is probably considered to be more dangerous than marijuana, for instance. Because governments formulate criminal and social policies based upon classifications of harm, a new study published by the Lancet on November 1st makes interesting reading. Researchers led by Professor David Nutt, a former chief drugs adviser to the British government, asked drug-harm experts to rank 20 drugs (legal and illegal) on 16 measures of harm to the user and to wider society, such as damage to health, drug dependency, economic costs and crime. Alcohol is the most harmful drug in Britain, scoring 72 out of a possible 100, far more damaging than heroin (55) or crack cocaine (54). It is the most harmful to others by a wide margin, and is ranked fourth behind heroin, crack, and methamphetamine (crystal meth) for harm to the individual.

Harm caused by drugs
100=maximum

Source: "Drug harms in the UK", by David Nutt et al. The *Lancet*
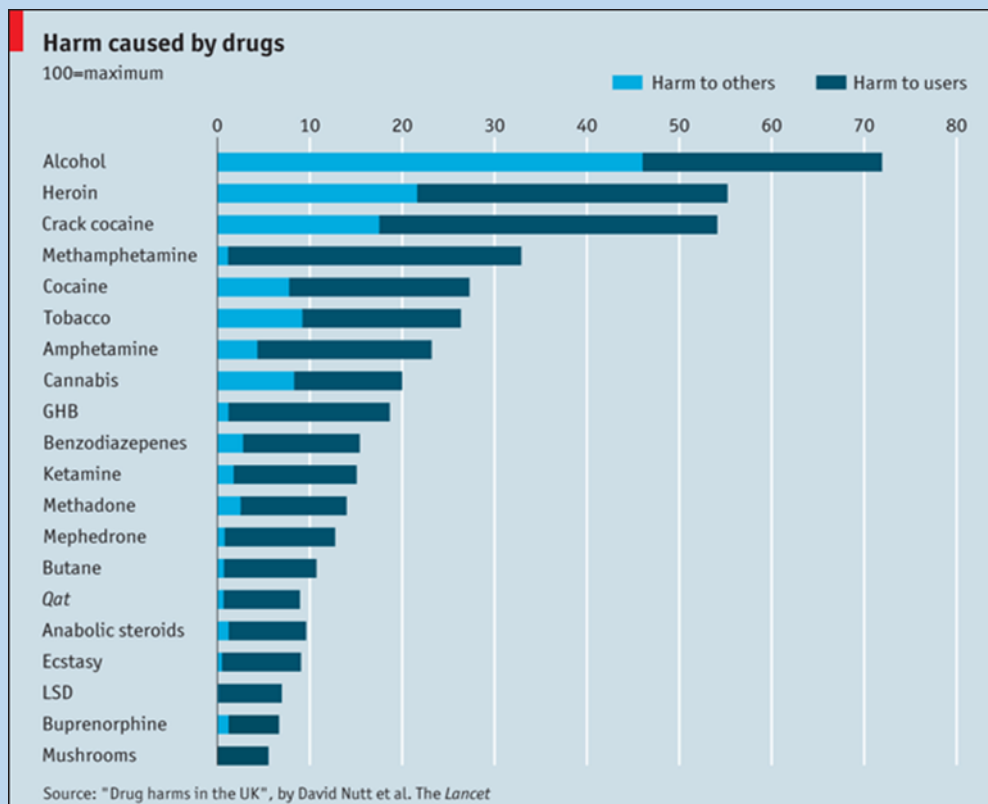
Implications for study

Several issues arose from the literature review. The first is the importance of knowing the question one is attempting to answer. There are two broad streams in the experience with DHIs to date. Some parties (including the UK and the UNODC) are primarily interested in mapping the total harm attributable to illicit drug use across both time and place. Other parties, primarily law enforcement, are more interested in assessing the value of their intervention to curbing the social harms associated with the use of illegal drugs. In terms of what is counted in the measurement of harm, one aim (impact of intervention) is a subset of the other (total harm attributable to drugs).

For our purposes, the total cost of illicit drug use can be considered to have three components:

    A.   the cost of personal harm (i.e. the harms that descend upon an individual as a consequence of their drug use), which will comprise physical health, psychological wellbeing and personal wealth

    B.   the cost of community harm (i.e. the cost of crime attributable to drug use, injury to others, the various harms to family and friends and a reduced tax base)

    C.   the cost of intervention – interventions occur as a result of attempts to address the harms associated with illicit drug use and include health, education and law enforcement.

The total harm attributable to illicit drug use is the sum of two components:

    Total Harm Cost = A + B

As noted, interventions are an attempt to address the harm associated with illicit drugs, not a harm *per se*. Nevertheless, the community incurs a social cost in providing funds for these interventions, and the opportunity to devote these funds to other worthwhile purposes is lost. Thus, the total social cost of illicit drugs can be described as:

    Total Social Cost = A + B + C

Within this report, total harm is seen as being different from social cost. This breaks a long tradition of including 'intervention costs' as harms. This interpretation is certainly novel and may appear counterintuitive. Consider the extreme case where the sum total of government and private interventions eliminates all personal and community harms associated with illicit drugs, and these interventions need to be ongoing to contain the harms associated with drug use. In this case, we have expended C to save A + B. One cannot save C by spending C.

Insert 2 provides a concrete example of this issue. Of course, there will always be examples of where a specific intervention replaces another on the grounds of efficiency and effectiveness. It remains crucial that we consider the types of questions to be answered before applying indexes such as the DHI to particular issues.

INSERT 2.

This insert illustrates the potential dangers of including intervention costs as a type of harm. It is, of course, hypothetical.

Previous research has established that the sedative drug Stupor costs the community $10 million annually in personal and community harms. No attempts have been made to address the growing threat from Stupor to date. An innovative and ongoing programme is introduced that reduces the harms associated with the sedative drug by 50%. The annual cost of the programme is $2.5 million. Under the traditional approach, the total harm associated with the drug is now $12.5 million and the return on investment is $2.50 for every dollar invested in the programme. In reality, the actual harm avoided remains at $10 million and the return on investment 2:1. The traditional method overestimates the benefits associated with an intervention when it includes those costs as part of the harm incurred.

The second issue is more methodological in character. The scarcity of information on harms caused by specific drugs is an obstacle to the development of a useful DHI. This is especially true with regard to new and emerging drugs, where objective information on harms is preferable to the subjectivity of early reports based on few cases. The pioneering efforts of Nutt et al (2010) to develop a rational scale to assess the harm of drugs of potential misuse is especially noteworthy. This provides a method, or the basis of a method, for assessing harm in the absence of other measures. The subjectivity of the rating can be ameliorated by aligning the relative rankings against drugs whose harm is already known in economic terms.

Finally, the literature contains some hints on the characteristics of a good DHI. It is perhaps noteworthy that the underpinnings of the New Zealand DHI and the Australian DHI are relatively simple when compared to that of the UK and UNODC DHIs. Although the quest for accuracy is commendable, it is not always the case that increased detail will result in a commensurately improved model.

As an example, imagine that we are interested in estimating the proportion of people with a certain physical attribute, which can be confirmed by a simple examination. For simplicity, we will assume that 50% of the population has the attribute. If we examined 100 people we could assume that our estimate was within 10% of the true value. If we examined 500 people, this reduces to 4%, which might be a worthwhile reduction. Boosting the sample to 1,000 people only has a marginal effect reducing the 4% from the sample of 500 to 3%. In short, adding numbers or complexity will very quickly arrive at a point where the incremental benefit may not justify the additional cost.

Similarly, it is always tempting to include known costs because they are known, irrespective of scale. However, we need to consider whether the inclusion of a harm with a very marginal contribution to the overall estimate can be justified.

The literature review has guided the rest of the study to adopt a combined model that used hard economic data where it was available and expert opinion where it was not (noting that the opinions will be matched against hard data where possible). The model will remain simple and be specific about its various uses (total harm versus intervention impact). Clear guidance will be provided on its update and maintenance. While the model itself is simple, it should be remembered that the underlying calculations are not.

METHOD

This section sets out the general framework used for the research. As such, it is reliant on the earlier development of the New Zealand DHI and the Australian DHI. Slack et al (2008), Attewell and McFadden (2008) and McFadden (2006) provide more detail. The proposed method is also innovative in that it extends a technique developed by Nutt et al (2010) to rank drug-related harms to estimate in dollar terms the harm associated with new and emerging drugs. This innovation should provide policy makers and practitioners with an evidence base that has hitherto been lacking. This report also introduces a modified framework for categorising harm which explicitly states exactly who bears the brunt of the social costs associated with drug abuse.

Conceptual framework

This current study introduced a new framework for categorising harms that emphasises who bears the burden of illicit drug use. As discussed earlier (and repeated here for continuity of the text), costs were treated within the following framework:

A.   The cost of personal harm, i.e. the harms that descend upon an individual as a consequence of their drug use. This will comprise physical health, psychological wellbeing and personal wealth.

B.   The cost of community harm, i.e. the cost of crime attributable to drug use, the various harms to family and friends and a reduced tax base.

C.   The cost of intervention. Interventions occur as a result of attempts to address the harms associated with illicit drug use and include health, education and law enforcement.

The individual costs associated with each component are generally consistent with the previous New Zealand and current Australian DHIs. Two significant modifications, outlined in detail below, relate to the inclusion of estimates of harm to family and friends and a re-evaluation of crimes attributable to drug use.

The personal harms related to drug use are the drivers of all other costs. Without significant harm to the individual, there is unlikely to be harm to family or friends or the need for government or community intervention. Personal harms include poor health, injury, psychological trauma, poor interpersonal relationships, loss of income, loss of lifestyle, and arrest and imprisonment. The fact, that these outcomes can be identified as separate harms does not necessarily imply that they should be measured separately. Actual measures of personal harm used in this report included the cost of premature death and the cost of years of life lost through drug-related disability. Both these measures incorporate a range of personal harms (Ministry of Transport, 2014; Murray et al, 2012).

As with Slack et al (2008), this report did not consider the potential benefits of illicit drug use. One would assume, given that illicit drug use is a matter of choice, that the perceived benefits must exceed the personal harms incurred for any rational individual. Regardless of the debate on the merits or otherwise of including the benefits of illicit drug use, the current approach has the potential to provide an approximate estimate of total harm adjusted for perceived benefits by eliminating some or all personal harm from the calculation of total harm.

Community harms are the harms borne by the wider community as a result of the use of illicit drugs. The largest component of this traditionally has been drug-related crime. The present study considered new ways of estimating crime costs by distinguishing between crime committed to fund

drug habits and crime funded by the profits of drug trafficking. The emphasis in the literature tends to be on acquisitive crime to fund the drug habits. To this we have added the use of the profits of crime to fund further crime by organised criminal groups. This estimate utilised recent work in New Zealand and Australia. This category also includes an estimate of the revenue loss to the tax base which includes the non-payment of company tax and GST thereby reducing the revenue available to government to provide services.

The other innovation in this harm type was an estimate of the pain and suffering inflicted on friends and relatives. Again, this is a higher-level measure that incorporates a range of specific harms. As noted previously, an existing body of research has indicated that this is a major contributor to the harm associated with drug use.

The final category of social cost is the cost of interventions. Potentially this includes a wide range of government services, including:

- education programmes to deter future drug use
- treatment and counselling services
- hospital admissions, emergency treatment and ambulance attendance
- police, customs and other law enforcement activities addressing supply
- courts and prisons.

Strictly speaking, none of the above are harms, rather they are costs incurred in seeking to prevent or ameliorate the impact of drug abuse. As indicated earlier, it is reasonable to include these costs if we are interested in the total cost of drug abuse to the community. However, there are other circumstances where we might treat these categories differently. The evaluation of intervention strategies has already been mentioned. On a broader level, the government and the community will have a strong interest in knowing the harm caused by drugs (equivalent to the sum of personal and community harm) and what the government is investing to address the problem (equivalent to intervention costs). The new classification of harm and costs will make it easier to answer such questions. It should be noted that the cost of interventions will not include those provided by the private sector or charitable organisations, except where these are supported by government funding.

Expert opinion survey

The second innovation in the methodology is the introduction of a survey of expert opinion on harms associated with illicit drugs. Far more is known about the harms associated with traditional drugs than for newer drugs. Similarly, there tends to be more known about really harmful drugs than less harmful drugs. This survey provides additional information for the evidence base on illicit drugs where other evidence might be lacking, especially with respect to new and emerging drugs. The new survey differs from Nutt et al (2010) in two respects. First, it does not include legal drugs such as alcohol and tobacco, as these are outside the scope of this project. Second, the actual or potential harm in dollar terms is calculated by interpolating drugs where no estimate of economic harm exists between drugs of known harm, based on the relative rankings. In effect, this converts Nutt et al's estimate of relative harm into an estimate of absolute harm.

A panel of 25 experts was invited to participate. These individuals represented a diversity of backgrounds, providing additional strength to the survey. They included representatives from user groups, treatment, health, justice, police and customs. Administration of the survey was undertaken by the Ministry of Health. An extract from the questionnaire (Figure 1) is included for reference on the following page.

Figure 1. Extract from expert panel questionnaire on illicit drug harm

This questionnaire is about the harm caused to an individual user. The individual could be a dependent user or a recreational/casual user. Each drug should be scored according to the following scale.

Very low harm	Low 1	Medium	High	Very high harm
1	2	3	4	5

Please enter the number corresponding to your considered view of harm in the space allocated below.

Dependent user

Drug type	Personal harm	Community harm
Heroin		
Other opioids		
Sedatives		
Cannabis		
Synthetic cannabis		
Hallucinogens		
Ketamine		
Cocaine		
Ecstasy		
Methamphetamine		
Amphetamine sulphate		
Dexamphetamine		
Other stimulants		

Casual user

Drug type	Personal harm	Community harm
Heroin		
Other opioids		
Sedatives		
Cannabis		
Synthetic cannabis		
Hallucinogens		
Ketamine		
Cocaine		
Ecstasy		
Methamphetamine		
Amphetamine sulphate		
Dexamphetamine		
Other stimulants		

There are a number of points to note about the expert panel survey.

- First, the questionnaire does not include items relating to intervention costs. These can be sourced directly from the relevant agencies.

- Second, the questionnaire is a living document. The panel has the opportunity to add or delete drugs from the list so that it retains its relevance. It could be extended at the panel's discretion to licit drugs that cause harm.

- Third, the survey should prove especially valuable in quantifying the potential harm of new and emerging drugs. As such, it could be an integral part of any early warning system. In fact, the use and value of the survey for other purposes have the potential to be just as important as its application to the Drug Harm Index.

- Fourth, the questionnaire does not include reference to NBOMEs and other emerging drugs, although estimation of harm for new drugs was one of the original aims of the research. These were not included at this point because, as a first step, it was necessary to confirm the application of the new technique to known drugs. Once validated, the technique can be extended to other drugs.

Prevalence versus incidence

The majority of DHIs have used a prevalence approach to calculating harms, as is common in burden of disease studies. The approach is explained by Slack et al (2008):

> The prevalence approach estimates resource diverted in a given year due to the impacts of past and present illicit drug use. The costs estimated using the prevalence approach are then compared to a counterfactual situation, in this case where no illicit drugs were ever used. That is, in order to determine the harm avoided by reducing drug consumption we compare the current situation with drug use to a hypothetical case where there is no harmful drug use. ………. The prevalence approach has the advantage of using currently available health data, such as mortality and morbidity figures related to illicit drug use, to define what a counterfactual population would have looked like today. This is likely to result in more robust estimates than under the major alternative approach based on incidence.

The claim that it results in 'more robust' estimates than the incidence approach is a courageous one. In contrast to the prevalence approach, the incidence approach uses data from a defined period (normally a year) to estimate harm. The preferred method will depend, first, on the question to be answered, and second, on variability in the data.

The prevalence approach is primarily a historical one. It calculates the harm that could have been avoided had illicit drugs never existed. It answers the question 'How much harm has historical illicit drug use caused?' The alternative question is of more interest to government, policy makers, practitioners and the community: 'How much harm is current drug use causing now and likely to cause in the near future?' An approach based on current levels of harm is preferable for addressing this question. The future is more akin to the present and the immediate past rather than the distant past. In the present case, the incidence method is preferred.

Nevertheless, it is true that estimates based on a single year could be subject to variability from year-to-year. This is addressed by using averages over a number of years, where possible, and by comparison with alternative data sets. A modified incidence approach was used in this report as being more representative of the aims of this study.

In a steady-state world, there should be no difference between estimates based on prevalence and incidence. However, the world of illicit drugs is one of rapid change.

Polydrug users

There is an ever-present risk of double counting when considering drug use at the level of individual drugs. Many users consume more than one drug type, so the sum of users at the individual drug level exceeds the total number of drug users. Polydrug use is both complex and important. This study addressed the problem by adjusting the estimated user population of specific drugs by the ratio of the total number of individual drug users to the sum of the drug users at the individual drug level. In effect, this assumes that the probability of a specific drug being used in combination with another drug is equal for all drug types.

It should be noted that the original version of the New Zealand DHI uses survey information, where available, to allocate users of two classes of drug to the class with the highest harm profile. This facility is not available for all drugs, and thus Slack et al's (2008) estimates of the drug user population are probably overstated. It also tends to transfer harms from less harmful drugs to more harmful drugs, potentially skewing the distribution of results.

Closing comment on method

In summary, the current method included many of the building blocks used in the previous version of the New Zealand Drug Harm Index. There was a change to the way this material is presented. The base information was organised into a common-sense and practical structure of personal harm, community harm and intervention costs. There were changes to the content as well. Drug use affects not only the drug user but also their family and friends. An estimate of this harm was included in the revised DHI. Estimates of the harm associated with the diversion of capital into illicit drug trafficking have been thoroughly overhauled, especially with respect to organised crime.

Drug use

The extent of drug use in society is always difficult to ascertain. The activity itself is illicit and in many respects constitutes a 'victimless' crime. The most widely used technique is the sample survey of the population, participation in which is voluntary and anonymity is guaranteed. Nevertheless, the sample survey may fail to reach a portion of the drug user population, such as the homeless and those in prison. Specialised surveys of particular subsets are also used, including those in treatment, in prison or recently arrested.

Some indication of the variability in estimating the number of drug users can be found in Hall et al (2000), who used three separate methods with different multipliers to estimate the number of heroin users in Australia. The result for Australia ranged from 67,000 to 92,000; the median was 74,000 and the mean 77,000. In the calculation of overall harm or cost to the community, one of the most influential factors is the estimated number of drug users, and this may be subject to some variation.

Nevertheless, given the various factors dampening the response rate to a general survey, it is safe to conclude that these results constitute a conservative estimate of the prevalence of drug use in the population.

Prevalence of drug use

The extent of drug use in New Zealand was estimated using data extracted from the 2012/13 New Zealand Health Survey. The results of that survey had not been published at the time of compiling this report. The design for the extract was developed by Martin Woodbridge, Ministry of Health. This design uses the same definition of 'illicit drug group' as is intended for the analysis of the 2012/13 New Zealand Health Survey. Specific drug types were classified into drug groups as follows.

Table 1. Illicit drug groups and corresponding drug types

Illicit drug group	Illicit drug type
Amphetamine-type stimulants	- Amphetamine - Methamphetamine - Dexamphetamine - Pharma-stimulants - Cocaine
Cannabinoids	- Cannabis - Synthetic cannabis
Hallucinogenic and psychedelic drugs	- LSD - Ecstasy - Ketamine
Opioid and sedative drugs	- Pharma-opioids - Heroin/homebake - Pharma-sedatives - GHB

The original New Zealand DHI classified ecstasy as a stimulant rather than among the hallucinogenic and psychedelic drugs. The rise of the 'pharma-drugs' is another significant change. A pharma-drug is a legal drug that has been diverted illegally to the illicit drug market. It should also be noted that the cannabinoids group contains both natural and synthetic cannabis. Hereafter the term 'cannabis' refers specifically to the natural product and 'cannabinoids' to the group.

> **Note: The data were extracted for the specific requirements of the study. It is unlikely that the 2012/13 New Zealand Health Survey when published will correspond to the numbers provided here. The correction for polydrug use is the most probable source of variation between the data sets. The extraction of specific subsets might also contribute.**

The definition of a dependent user proposed for the 2012/13 New Zealand Health Survey was also adopted to ensure consistency of approach. Drug users were categorised as dependent if drug use was weekly or more frequent and resulted in self-reported harms. All other users were classified as casual. Table 2 has details of drug use by drug type in New Zealand in 2012/13. These estimates have been adjusted for polydrug use by applying users fractionally across drug types. Prevalence rates were derived from the 2012/13 Health Survey and applied to an estimated population of those 15–75 years of age to calculate the number of users by drug type.

Note that the reliability of estimates of the number of drug users by drug type depends on sample size. While this was generally not an issue at the broader level of drug category (e.g. opioids and sedatives), it was often an issue with specific drug types (e.g. heroin). Also note that all calculations were done using highest degree of accuracy possible. For example, in the following table the number of regular cannabinoid users was estimated at 26,021.88. This is suggestive of a degree of accuracy that is not possible with such data. To remove this impression of extreme accuracy, the number of users has been rounded to the nearest hundred. Note that rounding always takes place as the final operation so that totals reported may differ from the sum of constituent estimates. Nevertheless, all estimates are the best available given the data.

Table 2. Estimated population by drug group, adjusted for polydrug use

Drug group	Estimated number of users		
	Dependent	**Casual**	**Total**
Amphetamine-type stimulants	1,400	24,300	25,700
Cannabinoids	26,000	253,300	279,400
Hallucinogenic and psychedelic drugs	500	53,300	53,700
Opioid and sedative drugs	2,000	27,200	29,200
Total	29,900	358,100	388,000

Table 2 suggests that there were approximately 388,000 individual illicit drug users in 2012/13. This figure is derived directly from the Health Survey results. The number of users in each of the drug groups sums to a total of 532,600 users. This indicates that 37% of all users are polydrug users. For our purposes, a polydrug user was one who used drugs across the various drug groups. Users who used a number of different drugs within a group (e.g. both heroin and homebake) were not considered polydrug users.

It should be noted that the estimated proportion of polydrug users is, in fact, a ceiling based on an assumption that polydrug use is limited to use across two drug categories. This is almost certainly not the case; where an individual used three or more drug groups, the proportion of individual polydrug users would be less. There was insufficient data available to make an accurate assessment of the actual proportion of individual polydrug users.

The following insert illustrates some of the issues relating to polydrug use.

INSERT 3.

Anecdotally, it would appear that dependent users are likely to be tagged as probable polydrug users. The results here suggest the opposite, with 50% of casual users estimated as polydrug users compared to 11% of dependent users. It is not clear whether this is related to the methodology used or whether it is a genuine finding. If this finding is confirmed by other studies, it has implications for our approach to polydrug use.

Illicit drug consumption in New Zealand

Drug consumption is even more difficult to estimate than the number of users. While the composition and purity of some drugs are relatively stable, this is not always the case. This is especially true of the 'party drugs' where, for example, a drug labelled 'Ecstasy' may in fact contain very little MDMA. The strength and components of the amphetamines are also known to vary. To maintain consistency with the previous version of the DHI, estimates of the typical amount consumed per occasion of use were adopted from that report (Slack et al, 2008). It should be noted that the current report uses a wider group of specific drug types than the 2008 report. Where drugs had a natural affinity, estimates of average consumption were shared. A complete description of the calculations and source data is provided in Attachment A.

The results of this analysis are provided in Tables 3 and 4. The results for cannabinoids apply to dry-leaf equivalent and for other drugs to the pure component, as per Slack et al (2008). Again, amounts have been rounded to avoid the impression of a highly accurate estimate. Table 3 has been rounded to the nearest ten except for hallucinogenic and psychedelic drugs, where the actual estimate is shown. Estimates for this group are influenced by the fact that the psychoactive content of a dose is typically small compared to other drugs.

Table 3. Drug group, user type and total amount consumed

Drug group	Total kilograms consumed per year		
	Dependent users	Casual users	All users
Amphetamine-type stimulants	130	160	290
Cannabinoids*	16,190	11,260	27,440
Hallucinogenic and psychedelic drugs	3	21	24
Opioid and sedative drugs	260	250	500

*   Dry-leaf equivalent. All other drug groups report pure component.

Table 4. Drug group and amount consumed per user

Drug group	Grams consumed per user per year		
	Dependent users	**Casual users**	**All users**
Amphetamine-type stimulants	90	10	10
Cannabinoids*	620	40	100
Hallucinogenic and psychedelic drugs	5.6	0.4	0.4
Opioid and sedative drugs	130	10	20

*   Dry-leaf equivalent. All other drug groups report pure component.

As expected, the cannabinoids were the principal drug group by amount consumed. The total weight of pure stimulants was estimated at 290 kg and of opioids and sedatives at 500 kg. The average consumption per user is given in Table 4, with the same rounding rules as for Table 3.

Drug harm calculations

Harm calculations were made in relation to the illicit drug groups described in Table 1. As noted previously, harms were categorised as *personal* where they related to drug users themselves, and as *community* where they related to the wider New Zealand community. The cost of government attempts to curtail the use of illicit drugs or to moderate their harmful effects was included in *intervention* costs. As mentioned earlier, this classificatory system is introduced here for the first time. The new system is explicit about who suffers harm and what harms they suffer.

Personal harms

Personal harms included in the report include harms related to premature death and harms related to a reduction in the quality of life resulting from illicit drug use.

Premature death

The classification of cause of death is a complex matter and the method used will depend to a large extent on the questions to be resolved. Rather than analyse existing health records in detail, it was decided to exploit, if possible, existing data sources. New Zealand reports annually to the UNODC on a range of drug-related matters, including the number of drug-related deaths. This has the advantage that the definition of a drug-related death conforms to a widely accepted standard. Therefore, to maintain consistency with internationally agreed standards, the number of drug-related deaths was sourced from the UNODC drug-related mortality tables (UNODC, 2014).

At the time the report was published, the most recent year available for New Zealand was 2011, with 78 deaths registered in this year. Amphetamines, cannabis, opioids and cocaine were ranked in that order as the drugs primarily responsible for these deaths. Note that the UNODC records drug-related deaths including, but not restricted to, overdose deaths. The data definition provided means that deaths are included with either a contributing cause code, or a nature of injury code of toxic effect of various drugs or of mental and behavioural disorders due to use of cannabinoids, or cocaine. These were not underlying causes of deaths, but include deaths where usage was a contributing cause for example it includes suicides and car accidents. This ranking demonstrates that New Zealand's illicit drug environment differs from the majority of countries where heroin is indicated as the primary cause of drug-related deaths. The mortality estimate is perhaps slightly older than is desirable. In the figures for 2010, 10 of 75 deaths are recorded as due to overdose. This is low compared to most developed nations and is indicative of the low prevalence of heroin in New Zealand.

The most recent government estimate for the value of a human life is $3,948,300, based on a willingness-to-pay study conducted by the Ministry of Transport (2014). Estimated costs associated with premature death were allocated across drug groups nearly in accordance with the UNODC data. The 10 overdose deaths were allocated to the opioid & sedative drugs group. Of the remaining deaths, one was allocated to hallucinogenic and psychedelic drugs. Deaths attributable to this group are rare, but they do occur. The remaining 64 deaths were divided between the amphetamine-type stimulants group and the cannabinoids on the basis of the UNODC rankings. Attachment B has more detail.

Table 6 has an estimate of harm from this source by drug group. The total cost of premature death was estimated as $296.1 million using 2010 deaths reported and the 2014 value of a human life. The amphetamine-type stimulants group and the cannabinoids each recorded values of $126.3 million.

Loss of quality of life

This study took a top-down approach to the calculation of the loss of quality of life. The proportion of costs related to a reduced quality of life were estimated as a proportion of the costs associated with premature deaths. Four studies were identified for this purpose, and the results are reported in Table 5. Note that the proportions provided were based on data from these studies that detailed costs related to premature death and to loss of quality of life separately.

Table 5. Estimated proportion of disability costs by scope and location

Source	Scope	Location	Proportion of disability costs to premature death costs
Murray et al (2012)	All disease	Australasia	1.22
Melberg et al (2011)	Drugs	Northern Europe	0.85
Moore (2007)	Drugs	Australia	1.05
Degenhardt et al (2013)	Drugs	Global	4.58

There is general agreement between the studies that the overall cost of drug-related disability is nearly equivalent to the cost of premature death. Degenhardt et al (2013) is the exception with disability-related costs exceeding those related to premature death by a factor of 4.58. The Degenhardt estimate is based on a global estimate of these burdens. It is highly probable that the sample base of the other three studies (Northern Europe, Australasia and Australia) have a good deal more in common with each other than they do with a global estimate.

It was decided to exclude the Degenhardt estimate from the final multiplier calculation, which was based on the average of the other three studies. The resulting multiplier was 1.03. This result is consistent with the Ministry of Transport's assumption that the economic cost of loss of life is equivalent to that of permanent disability (Ministry of Transport, 2014). Results by drug group are provided in Table 6. Attachment B has more detail.

Overall, years of life lost through disability accounted for an estimated harm of $304.8 million, the majority of which ($260.2 million) related to cannabinoids or amphetamine-type stimulants.

Table 6. Personal harms by drug group

Drug group	Deaths per annum	Premature death cost ($m)	Loss of quality of life* cost ($m)	Estimated personal harm cost ($m)	Average harm per dependent user cost ($)
Amphetamine-type stimulants	32	126.3	130.1	256.4	184,200
Cannabinoids	32	126.3	130.1	256.4	9,900
Hallucinogenic and psychedelic drugs	1	3.9	4.1	8.0	17,800
Opioid and sedative drugs	10	39.5	40.6	80.1	39,600
Total	**75**	**296.1**	**304.8**	**601.0**	**20,100**

*   Disability costs as a proportion of premature death costs. Multiplier is 1.03.

Summary and comment

In previous versions of the DHI in New Zealand and Australia, the true cost of drug abuse to drug users has been obscured by the classificatory system used, which derived from cost-of-drug-abuse studies carried out in Australia by Collins and Lapsley (2002, 2008). The total cost of personal harm to drug users in New Zealand is now estimated at $601.0 million, with half of that amount due to years lived with a drug-related disability. Cannabinoids and ATS caused the most harm in total. The personal harm to individual users reveals a different story, with ATS causing the most harm at $184,200 per dependent user, while cannabinoids account for the least personal harm at $9,900 per annum per dependent user. The high overall cost associated with cannabinoids is due largely to the extent of consumption in New Zealand. Later the results of the expert panel will suggest that there are significant differences between social costs associated with natural and synthetic cannabis.

The apportioning of all personal harms solely to dependent users is worthy of comment. There is a small amount of personal harm incurred by casual users; however, this amount is almost negligible in relation to the harms casual use inflicts on the broader community (this will be the subject of later discussion). Rather than make an unreliable estimate of a minor cost, it was decided to fold these costs into those incurred by dependent users.

Community harms

Community harms occur in different domains. First, there are specific harms that affect the family and friends of drug users. The current revision of the DHI is the first published DHI to include this cost. Second, there are a variety of harms that follow drug-related crime, including acquisitive crime by drug users to fund drug purchases, and the reinvestment of profits in a wider range of crimes to assist in the diversification of criminal enterprises. Third, there are harms caused by a reduced revenue base to the government. The sale of illicit drugs is not subject to GST, and organised crime does not pay company tax on its profits. The reduced tax base means fewer funds are available for services such as health, education and infrastructure spending.

Family and friends of drug users

Traditionally, the literature, including advice from a range of organisations, tends to focus on the role of family and friends as a conduit to alleviating or ameliorating the harms experienced by drug users. Intuitively one would think that family and friends would be significantly affected by the experience of a friend or family member who has a drug problem. There is a limited literature on the topic as well as recent evidence of renewed interest in this issue (Shanahan et al, 2015).

Nevertheless, in previous versions of the DHI, the harm to family and friends was largely absent and what was included was hidden within other categories. There is reason to believe that the harm experienced by family and friends is an important issue in its own right. Melberg et al (2011) conducted a representative survey of 3,092 adults in Copenhagen, Helsinki, Oslo and Stockholm. Almost half of the respondents had at some time known and been concerned about the drug abuse of a personal acquaintance (i.e. family or friend). In Oslo, 14% of respondents indicated that they were willing to pay for the treatment of a friend. In fact, median responses across all respondents ranged from 500 euros for a friend to 13,000 euros for a child.

It is argued that the amount family and friends are willing to pay is closely related to the personal harm or distress that family and friends experience as a result of another's drug habits. While a proportion of respondents willing to pay for treatment might be acting entirely from altruism, indications from the Melberg et al study indicate that there are significant harms experienced by family and friends, with 6.5% reporting they had feared violence from the drug user and 22.5% acknowledging they had been worried in the past 12 months. From these figures it would appear that willingness to pay and incurred harm may be closely related. It is noted that the extent of the impact altruism has on the final estimates is probably more than compensated for by conservative estimates of other key variables described in the following paragraph.

The current measure assumed that the proportion of the adult population willing to pay for treatment for friend or family was the same in New Zealand as in Norway. This assumption is conservative, as New Zealand's adult population has a higher proportion of current drug users than Norway's. It was also assumed that the average willingness-to-pay figure for family and friends was 500 euros. Again this was a conservative figure given the range of 500 to 13,000 euros in the Melberg study. The number of family and friends willing to pay 500 euros each was calculated as 14% of the adult New Zealand population in 2014.

It was also assumed that drug users causing significant harm to family and friends would be dependent users. The results were converted to New Zealand dollars and adjusted by the Consumer Price Index to allow for an increase in costs since the time of the study.

The results are reported in Table 7. Estimated harm was distributed by drug group according to the number of dependent users in each. This method assumes that the number of family and friends involved is constant across drug groups. As such, the annual harm per dependent user is $14,600 regardless of the drug of abuse.

Table 7. Estimated harm to family and friends by drug group

Drug group	Number of dependent users	Estimated number of family and friends	Estimated harm ($m)
Amphetamine-type stimulants	1,400	19,200	20.4
Cannabinoids	26,000	359,400	380.9
Hallucinogenic and psychedelic drugs	500	6,200	6.6
Opioid and sedative drugs	2,000	28,000	29.6
Total	**29,900**	**412,700**	**437.5**

The economic value of the harm experienced by the family and friends of frequent drug users is $437.5 million. This is the largest single category of harm identified in this study and has not been previously reported in the literature. Note that this report did not take into account one significant family relationship: children. The children of drug users, especially dependent drug users, are subject to a variety of harms. There is insufficient information available to allow an estimate of the social cost borne by children of drug users.

Acquisitive crime

Acquisitive crime as a means of funding illicit drug purchases has long been assumed and long been hotly debated. It is a difficult area. For example, based on figures for the UK DHI (Goodwin, 2007), acquisitive crime accounted for 61.9% of the 2005 index. In contrast, figures from Slack et al (2008) suggest that property losses accounted for 6.1% of the NZ DHI. There are obviously differences in method, but it is cautionary to observe that under two separate measures of drug harm the relative contribution of property crime can differ tenfold.

The community tends to be more certain about the link between drugs and crime. It is a commonly held community belief that many dependent drugs users fund their habit through acquisitive crime. A Ministry of Health survey of community attitudes to illegal drugs provides examples of this:

> *Illegal drug taking to excess was associated with criminal behaviour and also generally becoming more financially stressed with the need to fund the drug habit.*
>
> • *That's when they start burglaring and bashing people just to get what they want. (Napier, parents of Year 7 and 8 children, female)*
>
> • *And breaking into everybody's cars and getting their stereos and what not and selling them off on the market. (Napier, parents of Year 7 and 8 children, female)*
>
> • *Socially it can destroy you because you have to fork out all your money to get more of this. Eventually you have to go and slum and steal. (Christchurch, 17–18 years, male)*
>
> • *I guess it ends up in committing more crimes to pay off stuff for P and those things. (Auckland, Māori, student, 18–24 years, male)*
>
> *(Ministry of Health, 2009, p.43)*

The evidence from the literature is quite different. Stevens (2008) traced the development of the political debate in the UK over drugs and crime and concluded that this link had been exaggerated. Bryan et al (2013) conducted a recent and detailed survey of the links between heroin use, cannabis only use and crime. They reported that while heroin use was related to the incidence of acquisitive crime, cannabis use was not. Furthermore, they noted that 43% of acquisitive crime by heroin users was related to the need to buy drugs. The fact that illicit drug users may be implicated in acquisitive crime is not evidence that that these crimes were committed for the purpose of purchasing drugs. Caulkins and Kleiman (2011) have covered the complexities of this area.

A secondary concern relates to the extrapolation of rates of involvement of drug users in resolved acquisitive crime to unresolved crime. For example, in 2014 nearly 20% of 175,000 acquisitive crimes reported in New Zealand were resolved (based on figures provided in Attachment B). According to Bryan et al (2013), the proportion of individuals committing acquisitive crime while under the influence of drugs ranges from 52% in the case of heroin to 9% in the case of cannabis. It is perhaps a reasonable assumption that impaired individuals will be more likely to leave behind evidence of their identity and more likely to be detected in the act. Thus, the rate of drug involvement in resolved crimes may overestimate the rate of involvement in unresolved crimes. (This cannot be proven, as unresolved crime by definition has no known perpetrator.)

In a complex situation the following method was employed. The number of acquisitive crimes, the average property cost per crime and the proportion of arrestees dependent on drugs were derived from New Zealand sources. The proportion of arrestees who used major drugs in the past 12 months and claimed to be dependent (30% of arrestees) during that time was used as an indicator of the extent of drug-related acquisitive crime. Attachment B has more detail. The results are given in Table 8.

Table 8. Estimated cost to the community of drug-related acquisitive crime

Drug group	Number of dependent users	Estimated harm $m	Cost per dependent user $
Amphetamine-type stimulants	1,400	32.6	23,400
Cannabinoids	26,000	63.9	2,500
Hallucinogenic and psychedelic drugs	500	1.9	4,200
Opioid and sedative drugs	2,000	41.4	20,400
Total	**29,900**	**139.7**	**4,700**

The economic value of property lost as a result of acquisitive crime committed to fund drug use is $139.7 million. It was also assumed that acquisitive crime was committed by dependent users and not casual users. The cost per user was estimated at $4,700 for all dependent users. It is estimated that dependent users of amphetamine-type stimulants had the highest level of drug-related crime by value at $23,400 per user; this was strongly driven by the results for methamphetamine. This was followed by users of opioid & sedative drugs at $20,400.

Organised crime

Organised crime plays a significant role in drug production, importation and distribution. The majority of harms relating to drug trafficking are drug-related and dealt with in the other sections of this report. This section is concerned with harms that actually extend beyond the harms traditionally associated with illicit drugs. In part, this is due to the evolution of organised crime structures and to the diversification of business. Organised crime acts like legitimate business in attempting to lower the risk associated with activities. One strategy to reduce risk is diversification.

Drug crime is highly profitable but not all profits of crime are reinvested in crime. Recent work (McFadden, 2015) undertaken on behalf of the New Zealand Police suggests that 56% of the revenue from drug trafficking is reinvested in criminal activity, while the remainder is used to support a lifestyle. The majority reinvested will fund further drug trafficking; however, some will be invested in other activities such as extortion, fraud, pornography and weapons trafficking. (Insert 4 provides an interesting example of the link between illegal fishing and drugs.) The exact proportion invested elsewhere is difficult to estimate.

Hughes et al (2015) provided a network analysis of the links between major drug crimes and other types of crime in Australia. They found that 28.5% of cases in the linked network were not drug-related and that the majority of cases were associated with economic crime. There is insufficient information available to calculate the actual proportion of profits from drug trafficking reinvested in other crime. Based on the Hughes et al figures it is unlikely to exceed 28.5%. A conservative estimate of 20% was used in the model. Thus, the proportion of drug-related revenue reinvested in other crime is 20% of 56%, or approximately 11%. More detail on the method employed is provided in Attachment B. The results are provided in Tables 9 and 10.

Table 9. Reinvestment in organised crime by drug group and user type

Drug group	Expenditure on illicit drugs ($m)		Reinvestment in organised crime ($m)		
	Dependent	Casual	Dependent	Casual	Total
Amphetamine-type stimulants	34.0	42.4	3.8	4.8	8.6
Cannabinoids	323.7	225.1	36.3	25.2	61.5
Hallucinogenic and psychedelic drugs	0.2	1.6	0.02	0.2	0.2
Opioid and sedative drugs	1.0	1.0	0.1	0.1	0.2
Total	**358.9**	**270.1**	**40.2**	**30.3**	**70.4**

Over $70 million in funding for other criminal activities is provided each year from drug trafficking. The majority of this (nearly 90%) is generated from the sale of cannabinoids. The indirect funding of other criminal activity touches all drug users. In general, the casual user does not face the range or intensity of harms endured by dependent users. Nevertheless, the casual user makes a significant contribution to the expansion of criminal activity beyond drug trafficking and into other forms of crime. Over $30 million derived from the profits of sales of illicit substances to casual users is used annually to fund a diverse range of crimes. This is over 40% of all non-drug criminal activity derived from the profits of drug trafficking.

INSERT 4.

http://www.fish.govt.nz/mi-nz/Press/Recidivist+paua+poacher+sentenced+on+poaching+and+drug

Recidivist paua poacher sentenced on poaching and drug charges
9 November 2012

A fifty-four-year-old Upper Hutt man was sentenced in the Wellington District Court yesterday for his role in a black market paua ring and for methamphetamine offences. Saravuthy Mao was sentenced on all charges to five years and three months imprisonment and banned from fishing for three years. Mr Mao was the ringleader for a group that poached paua from the Wellington coastlines between January and March 2010. The illegal paua was on-sold into the Auckland Asian community and restaurants. Mr Mao committed these offences while on parole from prison for past poaching offences. During late 2010 Mr Mao was identified as the leader of a poaching ring which included his associate Ronald Daly. In early 2011, fishery and police officers executed a search warrant at an Upper Hutt property and found scales for measuring methamphetamine, $16,135 cash, and 6.7 grams of methamphetamine. A further $13,770 cash was later located at the address of another associate, Harlee Watene. Ministry for Primary Industries (MPI) Manager – Operational Support Unit, Gray Harrison says the case was a MPI and Police combined effort. "The outcome of this case is a great example of inter agency co-operation on the frontline. It highlights what can be achieved by dedicated staff intent on apprehending offenders who compromise the sustainability of our fisheries and at the same time engage in serious drug offending," says Mr Harrison.

Table 10. Reinvestment in organised crime per user

Drug group	Number of users		Reinvestment in organised crime per user $		
	Dependent	Casual	Dependent	Casual	All users
Amphetamine-type stimulants	1,400	24,300	1,200	200	300
Cannabinoids	26,000	253,300	300	200	200
Hallucinogenic and psychedelic drugs	500	53,300	> 20	> 20	> 20
Opioid and sedative drugs	2,000	27,200	> 20	> 20	> 20
Total	**29,900**	**358,100**	**300**	**100**	**200**

The preceding analysis and estimates relate to the reinvestment of drug trafficking profits into other illegal activities. There is a further threat posed by drug trafficking profits entering the legitimate economy as organised crime seeks to diversify further by investing in legitimate business. This is in addition to any money laundering activities.

This is not a new problem. McDowell and Novis (2001) describe the negative impacts of criminal profits being invested in the legitimate economy as:

- undermining the private sector by subsidising legitimate business with drug profits, thereby creating a competitive advantage over honest businesses
- undermining the integrity of financial markets by moving large sums of money through the international financial system
- loss of economic control that the previous point entails, especially to developing economies
- the economic damage that ensues from the perception that countries are corrupt and involved in the laundering of drug profits.

These threats are less likely to occur in countries with strong institutions, transparent government and appropriate checks and balances in place. Nevertheless, there has been concern in a number of developed countries about the growing threat to small business and recently the property market associated with the business diversification strategy of organised crime. No attempt was made to include a current estimate of these costs on the New Zealand economy due to the size of that task. Government and policy makers should be aware that drug trafficking is one of the primary sources of funds used by organised crime to diversify into legitimate business.

Reduced tax base

A further aspect of the economic harm associated with organised crime's involvement in drug trafficking is the loss to the tax base available to the government. Modern organised crime will seek to lower its risk through diversification and enhance its profitability by tax avoidance. Organised crime generally pays neither GST nor company tax. In doing so, it reduces the government's ability to provide services to the people of New Zealand. Table 11 has details of tax avoided by drug group and source of income.

Table 11. Tax avoided by organised crime by tax type and source of income

Tax type	Drug group	Income derived from dependent users: tax avoided ($m)	Income derived from casual users: tax avoided ($m)	Income from all users: tax avoided ($m)
GST	Amphetamine-type stimulants	4.2	5.3	9.5
	Cannabinoids	40.3	28.0	68.3
	Hallucinogenic and psychedelic drugs	0.02	0.20	0.22
	Opioid and sedative drugs	0.13	0.12	0.25
	Total	**44.7**	**33.6**	**78.3**
Company	Amphetamine-type stimulants	9.0	11.3	20.3
	Cannabinoids	86.0	60.0	145.8
	Hallucinogenic and psychedelic drugs	0.05	0.42	0.47
	Opioid and sedative drugs	0.27	0.26	0.53
	Total	**95.3**	**71.7**	**167.1**
All taxes	Amphetamine-type stimulants	13.3	16.5	29.8
	Cannabinoids	126.3	87.8	214.1
	Hallucinogenic and psychedelic drugs	0.07	0.62	0.70
	Opioid and sedative drugs	0.40	0.38	0.78
	Total	**140.0**	**105.4**	**245.4**

The basis of this measure was the income derived from drug trafficking, as it was for the estimate of organised crime's reinvestment in other crime. An accurate assessment of GST would be based on revenue less any GST credits. With an illegal enterprise such as drug trafficking, it is difficult to estimate the extent of GST credits. As an alternative and conservative estimate, GST was calculated against estimated profit, as company tax properly is. Tax avoided was calculated by multiplying estimated profit by income by the GST rate of 15% and by the company tax rate of 32%. McFadden (2015), using New Zealand Police data, estimated that drug-related revenue included 83% profit, with the remaining 17% reimbursing the costs of running the business.

Overall, $245 million is lost to the tax base through the failure to pay appropriate taxes in relation to revenues and profit generated by illegal drug trafficking. Naturally, given the illicit nature of drug trafficking, this additional revenue could only be realised either by the legalisation of illegal drugs or by the diversion of this investment into legal forms of investment. Nevertheless, it remains a genuine social harm associated with illegal drug trafficking.

Summary

The community harms reported above are numerous and the accompanying tables complex. Table 12 has the detail of cost summarised at a higher level.

Table 12. Summary of specific community harms by drug group ($ million)

Drug group	Family and friends	Acquisitive crime	Organised crime	Reduced tax base	Total
Amphetamine-type stimulants	20.4	32.6	8.6	29.8	91.4
Cannabinoids	380.9	63.9	61.5	214.1	720.3
Hallucinogenic and psychedelic drugs	6.6	1.9	0.2	0.70	9.0
Opioid and sedative drugs	29.6	41.4	0.2	0.78	72.0
Total	**437.5**	**139.7**	**70.4**	**245.4**	**892.7**

In total, the cost to the community of harms associated with drug abuse was $892.7 million in 2014, which exceeds the collective harms to the drug users themselves ($601.0 million). The single largest contributor to this result was harm to family and friends at $437.5 million. There is at least a suggestion that more attention could be given to this group. Whether that is required or not is difficult to assess as this group collectively is probably more interested in the outcomes for drug users. Certainly, information on harm to family and friends is largely absent from public statistics globally.

The contribution of crime in its various forms is also significant, accounting for another $455.2 million. The role income from drug trafficking plays in a wider network of crime is almost certainly underestimated. On the other hand, tax avoided in terms of GST or company tax is unlikely to be recovered in full under any circumstances. Nevertheless, it remains a quantifiable source of harm to the community.

Cost of interventions

The report so far has been concerned with the harms to both users and the community that can be attributed to drug use. As noted earlier, traditionally the costs of treatment, law enforcement, courts and corrections have been included somewhat indiscriminately with the direct harms caused by drug use. This has the unfortunate implication that costs associated with addressing the problem become part of the problem itself.

It was argued earlier that a proper analysis of the social costs of illegal drugs will distinguish between the actual harms and attempts to address them. It had been intended to estimate the cost of intervention according to the class of intervention, including:

- education programmes to deter future drug use
- treatment and counselling services
- hospital admissions, emergency treatment and ambulance attendance

- police, customs and other law enforcement activities addressing supply
- courts and prisons.

At this point, however, it is not possible to distribute costs across this framework. As an alternative, the traditional activity-based methods of allocating intervention costs against the sponsor agency was used. Complications remained. Many interventions are general and do not target specific drug types. In fact, a number of interventions address alcohol, tobacco and illegal drugs under the one programme. On the other hand, some programmes are drug specific, but it is difficult to draw strict boundaries and the problem remains: what to do with general intervention costs?

It would appear from discussions with agency representatives that general interventions are more common than drug-specific ones. This is especially true of activities that are preventive or educational, or more broadly based on lifestyle or community. Given that the majority of harms accrue to dependent users, it was decided to allocate intervention costs to drug groups by the number of dependent users. This approach is based on expediency given the general nature of much of this work.

The Ministry of Health, New Zealand Police, Customs and Corrections were approached to provide direct estimates of their expenditure on drug-related issues. Court costs were calculated by estimating the proportion of appearances before court where illicit drugs or drug-related acquisitive crime were the principal offence. (See 'Acquisitive Crime', above, for details of the estimation of drug-related cases.) This rate was applied to the 2014/15 court budget. Table 13 has details of costs by government agencies. The total cost of interventions was $351.4 million. In effect, the government has invested this amount in addressing a problem that causes $1.5 billion of harm to the community each year.

Table 13. Cost of intervention by drug group and intervention type ($ million)

Drug group	Health	Police/ Customs*	Courts/ Corrections	Total
Amphetamine-type stimulants	3.6	4.8	52.1	16.4
Cannabinoids	68.2	89.8	108.5	305.9
Hallucinogenic and psychedelic drugs	1.2	1.6	3.0	5.3
Opioid and sedative drugs	5.3	7.0	6.3	23.8
Total	**78.3**	**103.1**	**170.0**	**351.4**

*   Customs estimates are not available at this point.

These figures should be treated as preliminary. In the long term, it is hoped that a more uniform and centralised method of reporting intervention costs can be developed.

INSERT 5.

The interaction between agencies and the type of intervention is nicely illustrated in the case of Corrections. Corrections spend approximately $5 million each year on rehabilitation and treatment programmes for those serving custodial and non-custodial sentences.

Expert evaluation

The method relating to the expert panel has been described above. In all, 25 identified experts in the field were approached to participate. One declined to participate, 12 responded and 12 failed to respond. The questionnaire was, to some extent, exploratory and there is the potential to build a more substantial survey from these beginnings.

Participants were asked to rank drugs listed in the 2012/13 Heath Survey for both dependent and casual users according to the following scale:

1   Very low harm

2   Low

3   Medium

4   High

5   Very high harm

Averages for personal and community harms were calculated separately and in aggregate for both dependent and casual users. In addition, expert rankings were correlated with drug harms known from other sources. Overall, the results are similar to those reported elsewhere in this report. The two figures on the following page have details of the results.

Methamphetamine was ranked as the most harmful drug for dependent users, followed closely by heroin/homebake. Methamphetamine was ranked as being responsible for high to very high harm for dependent users. Ecstasy and LSD were ranked as contributing a lower level of harm to dependent users, with a median ranking of medium harm. Harms were generally lower for casual users.

Rankings for personal harm tended to be higher than those for community harm. This differs from the harms assigned in this report. Note that the report includes several harms that have not been previously reported, and that these all relate to community harms.

The primary purpose of including the expert panel was to provide estimates of harm for individual drugs that have not been reported on directly in this report. This has been done for specific drugs in the 2012/13 Health Survey. The process involved calculating harm for specific drug types where this was not known by interpolating points between known values using the relative rankings. The known social cost per dependent and casual drug user for each drug group used in this report was assigned to the major drug in that class. Thus, the social cost for amphetamine-type stimulants was assigned to methamphetamine, that for the cannabinoids to cannabis, hallucinogenic and psychedelic drugs to Ecstasy, and opioid and sedative drugs to the pharma-opioids.

Figure 2. Expert rankings of personal and community harms for dependent users
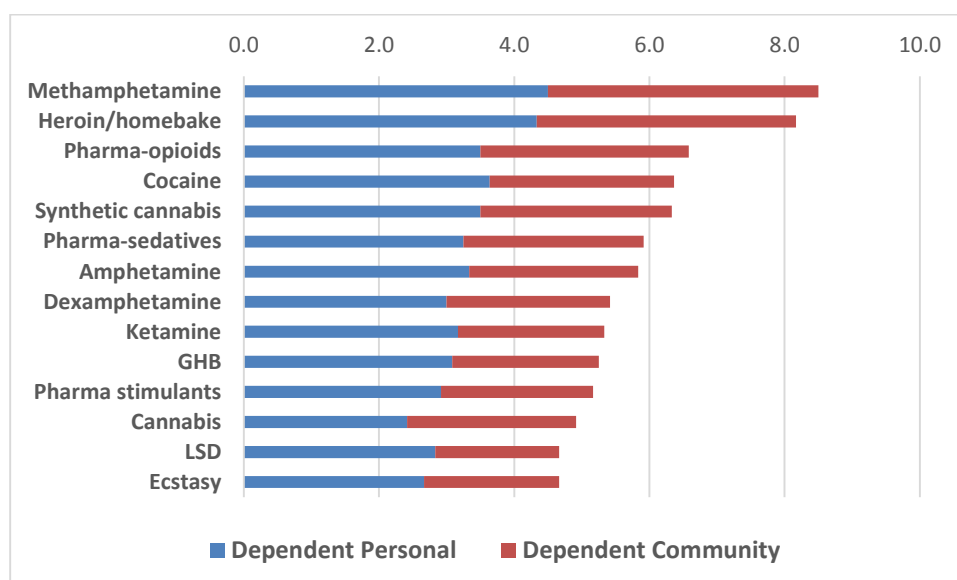
Figure 3. Expert rankings of personal and community harms for casual users
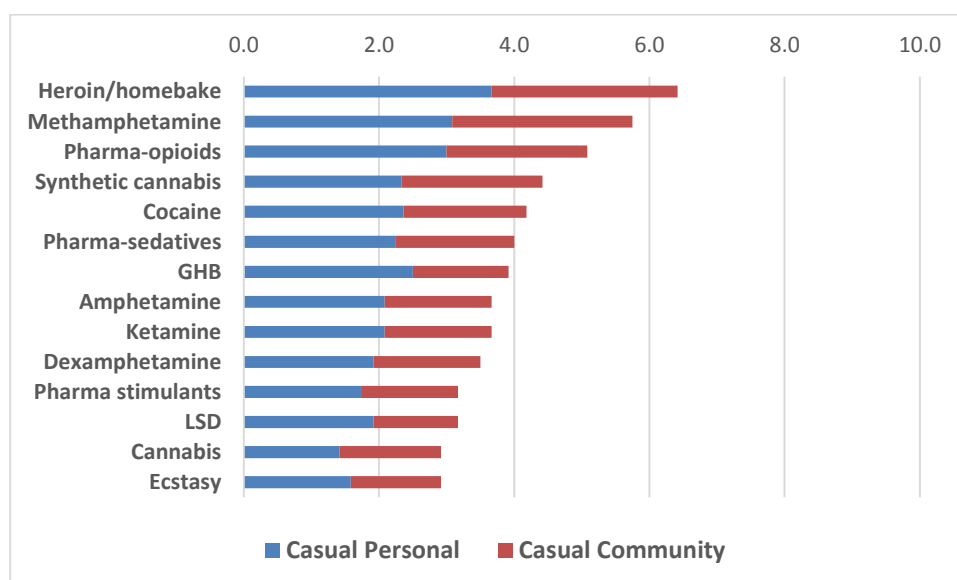
The results are presented in Table 14 by drug user type. Note that drug types with a known value are shown in bold. Intervention costs have been included in the social cost estimates. Total harm and social cost are equivalent for casual users because intervention costs, as mentioned earlier, were distributed against dependent users only. Figures have been rounded. There was a reasonable fit between the rankings and known values for dependent users. The fit for casual users was not quite as close, perhaps reflecting the difficulty in assessing harm where the level of harm is low. The procedure for interpolating results could be developed further.

Overall, the results would appear to validate the use of this method, although further fine tuning is recommended, mainly with respect to technical issues. Now that a baseline has been successfully established, the method can be used to derive estimates for NBOMEs and other emerging drugs.

Table 14. Estimated social cost and total harm per annum by drug user and specific drug type

Drug type	Dependent			Casual		
	Harm ranking	Total harm per user	Social cost per user	Harm ranking	Total harm per user	Social cost per user
Methamphetamine	4.3	**111,300**	**116,600**	2.9	**8,300**	**8,300**
Heroin/homebake	4.1	98,600	104,000	3.2	9,300	9,300
Pharma-opioids	3.3	**38,300**	**44,300**	2.5	**3,200**	**3,200**
Cocaine	3.3	36,200	42,300	2.1	2,700	2,700
Synthetic cannabis	3.2	35,900	42,000	2.2	2,800	2,800
Pharma-sedatives	3.0	31,800	38,200	2.0	2,600	2,600
Amphetamine	2.9	31,000	37,500	1.8	2,500	2,500
Dexamphetamine	2.7	27,000	33,600	1.8	2,400	2,400
Ketamine	2.7	26,200	32,900	1.8	2,500	2,500
GHB	2.6	25,400	32,100	2.0	2,600	2,600
Pharma-stimulants	2.6	24,600	31,400	1.6	2,200	2,200
Cannabis	2.5	**22,100**	**29,100**	1.5	**2,100**	**2,100**
LSD	2.3	4,700	6,200	1.6	2,200	2,200
Ecstasy	2.3	**4,700**	**6,200**	1.5	**400**	**400**

Table 14 represents the preliminary findings of a new method, so caution is advised in using these estimates. More detail of the method is available from the author.

Main results

This section summarises estimated drug-related costs incurred by drugs users and the community in 2014 dollar figures using the most recent data available. Note that these tables relate to the total social cost and include the costs of interventions.

Table 15. Summary of social costs, by drug group ($ million)

Drug group	Personal harm ($m)	Community harm ($m)	Intervention costs ($m)	Total social costs ($m)
Amphetamine-type stimulants	256.4	91.4	16.4	364.2
Cannabinoids	256.4	720.3	305.9	1,282.6
Hallucinogenic and psychedelic drugs	8.0	9.0	5.3	22.3
Opioid and sedative drugs	80.1	72.0	23.8	175.9
Total	**601.0**	**892.7**	**351.4**	**1,845.0**

Table 16. Summary of social costs per kilogram of illicit drug by drug group

Drug group	Personal harm ($) per kg	Community harm ($) per kg	Intervention costs ($) per kg	Total social costs ($) per kg
Amphetamine-type stimulants	872,000	311,000	56,000	1,239,000
Cannabinoids	9,000	26,000	11,000	47,000
Hallucinogenic and psychedelic drugs	334,000	375,000	221,000	929,000
Opioid and sedative drugs	160,000	144,000	48,000	352,000

Table 17. Summary of social costs by user type

Drug group	Total cost ($m): dependent use	Total cost ($m): casual use	$ cost per dependent user	$ cost per casual user
Amphetamine-type stimulants	162.3	201.9	116,600	8,300
Cannabinoids	756.5	526.1	29,100	2,100
Hallucinogenic and psychedelic drugs	2.8	19.5	6,200	400
Opioid and sedative drugs	89.7	86.2	44,300	3,200
Total	**1,011.3**	**833.7**	**33,800**	**2,300**

Future directions

The information relating to the type and extent of drug use and its subsequent harms is complex and subject to change. The main obstacle, both in New Zealand and globally, to the development of best practice interventions and evidence-based policy is the lack of available and valid data sets. This contrasts with the situation in road safety, for example, where the dimensions of the problem can be framed and the effect of interventions tested. It is suggested that this difference is influenced by two principal factors.

1. Drug trafficking is illegal. Collecting information on drug prevalence is an attempt to gauge an illegal activity and, as with all illegal activities, there are obvious barriers to this collection.

2. Transport and road safety is a reasonably homogeneous activity. Responsibility for drug practice and policy is spread over a number of agencies.

It should be emphasised that much has been achieved. The establishment of the National Drug Intelligence Bureau ensures that information collection and sharing is coordinated across agencies. There are well-established surveys, and there are relevant data sets held by the Ministry of Health and others. Appropriate coordinating committees are in place and meet regularly. It should also be noted that the New Zealand data collections are excellent by world standards.

A number of specific recommendations follow. (It is recognised that competing priorities may claim precedence over the following.)

- The survey of illicit drug use conducted by the Ministry of Health is a key source of information. The period between surveys is currently five years. The cost of the survey is doubtless a consideration. It would be useful to have a restricted set of data collected in between full surveys. This interim survey could focus solely on drugs in use and frequency of use and be part of a wider survey to contain costs. Questions dealing with new and emerging drugs should be included. Consideration could also be given to allocating additional sources to allow the dissemination of findings at an earlier date than is the current practice. If adopted, this proposal would ensure the timely and regular reporting of information crucial to policy development and evaluation.

- The use of the DHI as an indicator of the benefits of a programme should be made best practice, or even mandatory, for government-funded research and evaluation. Evaluations of current or proposed interventions typically involve an estimate of both the costs and benefits involved. The use of the DHI to measure benefits will assist in improving the comparison between various options by providing a common measure. It is not intended to restrict evaluation to the DHI alone. The DHI cannot encompass all possible benefits, and other measures of success are not only advisable but necessary.

- For some agencies, the estimation of drug-related costs was difficult. Part of the problem is that agency costs in relation to illicit drugs are included with other harmful (yet legal) drugs such as tobacco and alcohol. Although recognising the cost involved in altering systems, it would be advantageous, at least at the agency budget level, to have funding related to illicit drug programmes and activities separately identified.

- The expert panel has the potential to be used for purposes beyond those required for the DHI. It could be a useful tool in any early warning system for new and emerging drugs, especially for estimating the potential size of the problem should a new drug gain wider acceptance. Responsibility for the ongoing support of the survey should be firmly established in an existing agency unit.

- The identification of the harm caused to the family and friends of drug users is an important development. The figure is conservative so the actual harm could be much higher. It is also heavily dependent on a Scandinavian estimate. A partial replication of the Melberg et al (2011) study would confirm the actual extent of harm to family and friends in New Zealand. Suitable questions could form part of the next Health Survey.

- There are some concerns over the expansion of organised crime into a variety of activities. It would be advantageous to develop a more accurate estimate of the amount of drug-related revenue organised crime invests in other crime types and in legal enterprises as part of its diversification strategy.

Practical applications

This section provides a commentary on practical applications of the DHI.

It should be remembered that on page 2 of this report the following prescription for the revised DHI was given (it is repeated here for ease of reference).

> *Development of a new Drug Harm Index and the associated report should assist agencies assess the costs and benefits of their current interventions; assist agencies evaluate how effective they have been in achieving the aims of the National Alcohol and Other Drug Policy; alert policy makers to the cost of harms associated with new drugs that have been introduced or are becoming more prevalent; help guide future enforcement activities and harm reduction strategies; and to inform future advice about how best to manage a reduction in harm caused by illicit drugs.*

The primary purpose of the revised DHI is to provide an evaluation tool for agencies. The DHI is only part of the evaluation equation. To estimate the benefits in dollar terms of an intervention, the reduction in consumption of illicit drugs that follow the intervention is also required. The two steps have tended to be conflated in previous research. Any practical application of the DHI requires an equally rigorous method for determining the resulting reduction in consumption.

It should also be noted that any evaluation is strengthened by the use of multiple measures. The DHI provides a good basis for comparing the value of different interventions, while evaluations specific to the intervention under study provide deeper insights into how and why a particular intervention works. It is recommended that in estimating the benefits of an evaluation, the benefits should be restricted in most cases to personal and community harms. Intervention costs are of interest if the purpose of the study is to identify the total cost to the community or where there are reasons to believe the proposed intervention will eliminate the need for one or more existing interventions.

The next purpose is to alert policy makers to the potential harms of new drugs. The revised DHI again provides a level playing field and the expert panel survey an innovative method for achieving this end. The DHI provides a formal process for evaluating the harm of new drugs, and it is highly relevant to the success of this method that appropriate administrative support for this process is in place.

Also relevant to this purpose is the transparent and modular design of the revised DHI. The model for producing DHI estimates by drug type, drug group, type of harm and user group is transparent. This structure will allow the addition of new drugs and the revision of data relating to existing drugs on an ongoing basis. The revised DHI should therefore retain its currency over time. Again, the provision of adequate administrative support is required.

The currency of the DHI is also relevant to the final objective, the guidance of future policy and practice. The DHI should assist on a number of fronts. First, it should assist in identifying what has worked and what has not. Second, it should identify trends in overall harm, whether the problem is increasing, decreasing or static. Third, it should show the trend in specific harms; for example, whether the personal harms associated with drug use are falling while the harms associated with the involvement of organised crime in drug trafficking are increasing. Finally, it should provide greater insight into the complex and rapidly evolving world of illicit drug use.

Recommendations

The following recommendations are made:

- The economic estimates of harm related to drug use be adopted as the basis for a revised DHI.

- The new classification system of personal harms, community harms and intervention costs be adopted for the reporting of results.

- An ongoing and appropriately supported expert panel on drug harm be established to provide feedback through a regular survey of drug harms.

- Consideration should be given to the matters raised in the Future Directions and Practical Applications sections of the report.

References

Attewell R & McFadden M (2008). Measuring the benefits of drug law enforcement: The development of the Australian Federal Police drug harm index, *Bulletin on Narcotics*, 60 1–2: 45–58.

Bryan M, Del Bono E & Pudney S (2013). *Drug-related crime*, ISER Working Paper Series, 2013–08, Institute for Social and Economic Research.

Caulkins J & Kleiman M (2011). Chapter 10 Drugs and crime in *The Oxford Handbook of Crime and Criminal Justice*, Oxford University Press, New York, 275–310.

Collins D & Lapsley H (2002). *Counting the Cost: Estimates of the Social Costs of Drug Abuse in Australia in 1998–9,* Canberra: Commonwealth Department of Health and Ageing.

Collins D & Lapsley H (2008). *The costs of tobacco, alcohol and illicit drug abuse to Australian society in 2004/05*, Commonwealth of Australia.

Degenhardt L, Whiteford H, Ferrari A, Baxter A, Charlson F, Hall W, Freedman G, Burstein R, Johns N, Engell R, Flaxman A, Murray C & Vos T (2013). Global burden of disease attributable to illicit drug use and dependence: findings from the Global Burden of Disease Study 2010, *The Lancet*, 382, 1564–74.

Goodwin A (2007). *Measuring the harm from illegal drugs: the Drug Harm Index 2005*, Home Office Online Report 22/07 accessed 31 July 2015 at http://webarchive.nationalarchives.gov.uk/20110220105210/rds.homeoffice.gov.uk/rds/pdfs07/rdsolr2207.pdf

Greenfied V & Paoli L (2010). *If supply-oriented drug policy is broken, can harm reduction help fix it? Melding disciplines and methods to advance international drug control policy*, United States Naval Academy, Department of Economics, Working Paper 2010–30.

Hall W, Ross J, Lynskey M, Law M & Degenhardt L (2000). *How many dependent heroin users are there in Australia*? Monograph 44. Sydney: National Drug and Alcohol Research Centre.

Hughes C, Chalmers J, Bright D & McFadden M (2015). *Trafficking in multiple commodities: Exposing Australia's polydrug and poly-crime networks*. National Drug Law Enforcement Fund, Monograph. In press.

MacDonald Z, Collingwood J & Gordon L (2006). *Measuring the harm from illegal drugs using the Drug Harm Index – an update*, London, Home Office, Online Report 08/06.

McDowell J & Novis G (2001). *The Consequences of Money Laundering and Financial Crime*, Bureau of International Narcotics and Law Enforcement Affairs, US Department of State.

McFadden M (2006). The Australian Federal Police Drug Harm Index: A new methodology for quantifying success in combating drug use, *Australian Journal of Public Administration*, 65(4), 68–81.

McFadden M (2015). *Development of a Proceeds of Crime Disruption Index*, New Zealand Police, Wellington.

McFadden M, Mwesigye S & Williamson G (2002). Pricing outputs: A case study in law enforcement*, Australian Journal of Public Administration*, 61(4), 80–88.

Melberg H, Hakkarainen P, Houborg E, Jääskeläinen M, Skretting A, Ramstedt M & Rosenqvist P (2011). Measuring the harm of illicit drug use on friends and family, *Nordic Studies on Alcohol and Drugs*, 28, 2, 105–121.

Ministry of Health (2009). *Research into knowledge and attitudes to illegal drugs – a study among the general public and people with experience of illegal drug use*, Wellington.

Ministry of Health (2015). Request for Proposal, *Development of a New Drug Harm Index*. Date RFP Issued: Friday, 29 May 2015.

Ministry of Transport (2014). *Social Cost of Road Crashes and Injuries 2014 update*, Wellington.

Moore T (2007). *Working estimates of the social cost per gram and per user for cannabis, cocaine, opiates and amphetamines*, Drug Policy Modelling Program Monograph 14, Turning Point.

Morgan C, Muetzelfeldt L, Muetzelfeldt M, Nutt D & Curran H (2010). Harms associated with psychoactive substances: findings of the UK National Drug Survey, *Journal of Psychopharmacology*, 24, 2, 147–153.

Murray C et al (2012). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010, *The Lancet*, 380, 2213. (Full author list exceeds 400 names.)

Nutt D, King L & Phillips L (2010). Development of a rational scale to assess the harm of drugs of potential misuse, *The Lancet*, 369, 9566, 1047–1053.

Pedersen W & Von Soest T (2015). Which substance is most dangerous? Perceived harm ratings among students in urban and rural Norway, *Scandinavian Journal of Public Health*, 43, 385–392.

Reuter P (2009). Ten years after the United Nations General Assembly Special Session (UNGASS): assessing drug problems, policies and reform proposals, *Addiction*, 104: 510–517.

Ritter A (2009), Methods for comparing drug policies—the utility of composite Drug Harm Indexes, *International Journal of Drug Policy*, 20, 6, 475–479.

Roberts M, Bewley-Taylor D & Trace M (2006). *Monitoring Drug Policy Outcomes: The Measurement of Drug-related Harm*, The Beckley Foundation, Report Nine.

Roper T & Thompson A (2006). *Estimating the costs of crime in New Zealand in 2003/04*, New Zealand Treasury Working Paper 06/04.

Shanahan M, Seddon J & Ritter A (2015). Exploring the economic costs to family members affected by drug use: A discrete choice experiment, Drug Policy Modelling Program, UNSW, Accessed 30 December 2015 at https://dpmp.unsw.edu.au/project/exploring-economic-costs-family-members-affected-drug-use-discrete-choice-experiment

Slack A, O'Dea D, Sheerin I, Norman D, Jiani Wu & Nana G (2008). *New Zealand Drug Harm Index,* BERL report for the New Zealand Police.

Stevens, A. (2008). Weighing up crime: The overestimation of drug-related crime, *Contemporary Drug Problems*, 35(2/3), 265.

The Economist (2010). Drugs that cause most harm, The Economist Online, accessed 31 July 2015 at www.economist.com/blogs/dailychart/2010/11/drugs_cause_most_harm

United Nations Office on Drugs and Crime (2005). *World Drug Report 2005*, United Nations Publication, E.05.XI.10.

United Nations Office on Drugs and Crime (2006). *World Drug Report 2006*, United Nations Publication, E.06.XI.10.

United Nations Office on Drugs and Crime (2014). Drug-related mortality with ranking of drugs as primary cause of death (2012 or latest year available), accessed 19 September 2015 at www.unodc.org/documents/wdr2014/Statistics/Mortality_2014.xls

van Amsterdam J, Opperhuizen A, Koeter M & van den Brink W (2010). Ranking the harm of alcohol, tobacco and illicit drugs for the individual and the population, *European Addiction Research*, 16, 4, 202–207.

Willis K, Homel P & Anderson J (2010). *Developing the capacity and skills for national implementation of a drug law enforcement performance measurement framework*, Monograph Series No. 34, National Drug Law Enforcement Research Fund.

Attachment A: Calculation of prevalence of drug use

Sources of data

Aggregated information was extracted from the Drug Use module from the 2012/13 New Zealand Health Survey by the Health and Disability Intelligence Unit, Ministry of Health.

Ad hoc request number	Request title
2015 134	New Zealand Drug Harm Index 2015 (NZDHI 2015): Advice on development of Drug Harm Index and data extraction from NZHS 2012/13 for drug use prevalence and harms

Information relating to consumption was sourced from:

Moore T (2007). *Working estimates of the social cost per gram and per user for cannabis, cocaine, opiates and amphetamines*, Drug Policy Modelling Program Monograph 14, Turning Point.

Slack A, O'Dea D, Sheerin I, Norman D, Jiani Wu & Nana G (2008). *New Zealand Drug Harm Index*, BERL report for the New Zealand Police.

Adjustment for polydrug use

Reference	Drug group	Weekly or more	Less often	Total
IndATSLeastWkDenUsePYr /IndATSLessWkDenUsePYr	Amphetamine-type stimulants	3,400	34,000	37,400
IndCanoidsLeastWkDenUsePYr /IndCanoidsLessWkDenUsePYr	Cannabinoids	130,000	244,000	374,000
IndHallPsyLeastWkDenUsePYr /IndHallPsyLessWkDenUsePYr	Hallucinogenic and psychedelic	1,900	78,000	79,900
IndOpoidSedLeastWkDenUsePYr /IndOpoidSedLessWkDenUsePYr	Opioid and sedative	7,300	34,000	41,300
	Calculated total	142,600	390,000	532,600

There are 532,600 estimated users of the four individual drug groups, the number of unique individuals is lower. The following table provides the number of unique individuals.

Reference	Drug group	Weekly or more	Less often	Total
Ind4DrugsLeastWkDenUsePYr /Ind4DrugsLessWkDenUsePY	All groups combined	128,000	260,000	388,000

The number of unique persons was 388,000 of whom 128,000 used drugs at least weekly and 260,000 less often. The individual drug group estimates were adjusted by the overall rate of unique individuals to total respondents (highlighted above). This assumes that the probability of polydrug use is equal across users and drug group. For our purposes, the use of multiple drugs within a drug group was not considered to represent polydrug use. The estimated number of unique individuals for each drug group is provided below.

Drug group	Weekly or more	Less often	Total
Amphetamine-type stimulants	3,052	22,667	25,719
Cannabinoids	116,690	162,667	279,357
Hallucinogenic and psychedelic	1,705	52,000	53,705
Opioid and sedative	6,553	22,667	29,219
Total	**128,000**	**260,000**	**388,000**

Estimated number of dependent and casual users

A dependent user was defined as an individual who used drugs at least weekly and who indicated at least one personal harm related to drug use in the past year. Estimated rates of at least one harm among frequent users (weekly or more often) were provided in the Health Survey extract.

Dependent users in each group were calculated by multiplying the estimated number of frequent users by the relevant prevalence rate for reported harm. Casual users were estimated as all remaining users.

Drug group	Harm prevalence	Dependent	Casual	Total
Amphetamine-type stimulants	45.6%	1,392	24,327	25,719
Cannabinoids	22.3%	26,022	253,335	279,357
Hallucinogenic and psychedelic	26.4%	450	53,255	53,705
Opioid and sedative	30.9%	2,025	27,195	29,219
Total		**29,889**	**358,111**	**388,000**

Estimated consumption

Consumption was calculated by multiplying the number of users by the average number of occasions of use in a year by the average dose per occasion. User numbers were sourced from the previous table. Average number of occasions per year and average doses were derived from Slack et al (2008). The allocation of consumption across dependent and casual users was more difficult. There was no ready means of estimating this using New Zealand sources. Although not designed for this purpose, figures reported by Moore (2007) in an Australian context suggest that the dependent user consumes approximately 14 times the amount consumed by a casual user. In our context, this translates into daily use by a dependent user compared to an average fortnightly use by a casual user.

Thus, the proportion allocated to dependents was equivalent to 14 times the number of dependent users divided by the total of 14 times the dependent users plus the number of casual users. Details are provided below.

Drug group	Amphetamine-type stimulants	Cannabinoids	Hallucinogenic and psychedelic	Opioids and sedative
Total users	25,719	279,357	53,705	29,219
Average occasions	20.4	89.3	7.4	34.2
Total occasions	524,659	24,946,554	397,420	999,299
Average dose (g)	0.56	1.10	0.06	0.50
Total consumption (kg)	294	27,441	24	500
Dependent consumption (kg)	131	16,186	3	255
Casual consumption (kg)	163	11,255	21	245

Drug group	Amphetamine-type stimulants	Cannabinoids	Hallucinogenic and psychedelic	Opioids and sedative
Dependent users	1,392	26,022	450	2,025
Casual users	24,327	253,335	53,255	27,195
Moore's conversion	0.44	0.59	0.11	0.51
Dependent consumption (kg)	130.66	16,185.78	2.52	255.01
Casual consumption (kg)	163.15	11,255.43	21.32	244.64
Average consumption per dependent (g)	93.89	622.01	5.61	125.94
Average consumption per casual (g)	6.71	44.43	0.40	9.00
Average consumption per user (g)	11.42	98.23	0.44	17.10

Attachment B: Calculation of drug harms

Sources of data

Information relating to the prevalence of drug use including consumption was taken from Attachment A.

Other sources included:

http://www.directfx.co.nz/CurrencyChart.html

http://www.stats.govt.nz/browse_for_stats/economic_indicators/CPI_inflation/ConsumersPriceIndex_HOTPJun15qtr.aspx

Hughes C, Chalmers J, Bright D & McFadden M (2015). *Trafficking in multiple commodities: Exposing Australia's polydrug and poly-crime networks.* National Drug Law Enforcement Fund, Monograph. In press.

McFadden M (2015). *Development of a Proceeds of Crime Disruption Index*, New Zealand Police, Wellington.

Melberg H, Hakkarainen P, Houborg E, Jääskeläinen M, Skretting A, Ramstedt M & Rosenqvist P (2011). Measuring the harm of illicit drug use on friends and family, *Nordic Studies on Alcohol and Drugs*, 28, 2, 105–121.

Ministry of Transport (2014). *Social Cost of Road Crashes and Injuries 2014 update*, Wellington.

Moore T (2007). *Working estimates of the social cost per gram and per user for cannabis, cocaine, opiates and amphetamines*, Drug Policy Modelling Program Monograph 14, Turning Point.

Murray C et al (2012). Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010, *The Lancet*, 380, 2213.

National Drug Intelligence Bureau (2014). *Street-price of drugs.*

Roper T & Thompson A (2006). *Estimating the costs of crime in New Zealand in 2003/04*, New Zealand Treasury Working Paper 06/04.

United Nations Office on Drugs and Crime (2014). *Drug-Related Mortality With Ranking Of Drugs As Primary Cause Of Death (2012 Or Latest Year Available)*, accessed 19 September 2015 at www.unodc.org/documents/wdr2014/Statistics/Mortality_2014.xls

Personal harm

Drug-related deaths were taken from the most recent New Zealand submission to the UNODC. There were 10 overdose deaths, which were assigned to the opioid and sedatives group. Although not mentioned in the submission, a small number of deaths can be attributed to the use of hallucinogens and psychedelic drugs. One death per annum was allocated to this group. Cannabis, amphetamines and cocaine were ranked in that order as the primary causes of death. As amphetamines and cocaine both belong to the same drug group, it was decided to split the remaining deaths between amphetamine-type stimulants and cannabinoid groups. The Ministry of Transport 2014 estimate of the value of a human life ($3,948,300) was used to calculate the economic cost.

A top-down approach was adopted to the calculation of harms relating to a reduced quality of life. Four studies reported both the harms associated with years of life lost through premature death and the years of life lost through disability (Degenhardt et al, 2013; Melberg et al, 2011; Moore, 2007; and Murray et al, 2012). There was general agreement between the studies that the overall cost of drug-related disability is nearly equivalent to the cost of premature death. Degenhardt et al (2013) is the exception, with disability-related costs exceeding those related to premature death by a factor of 4.58.

Harms related to disability were estimated to be 103% of those associated with premature death. In the absence of other evidence, it was assumed that the multiplier of 103% was the same across drug groups. This has the potential to skew results across drug groups.

Drug group	Premature deaths	Estimated cost of:		Total harm	Dependent users	Cost per user
		premature death	loss of quality of life			
Amphetamine-type stimulants	32	126,345,600	130,066,581	256,412,181	1,392	184,249
Cannabinoids	32	126,345,600	130,066,581	256,412,181	26,022	9,854
Hallucinogenic and psychedelic	1	3,948,300	4,064,581	8,012,881	450	17,797
Opioid and sedative	10	39,483,000	40,645,806	80,128,806	2,025	39,575
Total	**75**	**296,122,500**	**304,843,549**	**600,966,049**	**29,889**	**20,107**

Community harms

(a)   Harm to family and friends

Melberg et al (2011) conducted research into the harms suffered by family and friends of drug users. His report suggested that approximately 50% of the public knew socially, or were related to, a drug user (i.e. family and friends). Furthermore, 14% of the family and friends of drug users were willing to spend between 500 and 13,000 euros to treat the drug user. Willingness-to-pay is assumed to be equivalent to the value of the harm suffered by family and friends. Total harm was distributed across drug groups by the number of dependent users.

In the absence of any similar data from New Zealand these amounts adjusted to 2014 values were applied to the New Zealand population. The amount an individual was willing to pay was set at 500 euros, the lower end of the range.

- The 2010 exchange rate of New Zealand dollars to euros was approximately 2.

- Therefore 500 euros converts to $1,000.

- The increase in CPI in New Zealand was 5.8% from 2010 to 2014.

- The current value calculated at $1,058 was rounded to $1,060 for these calculations.

- The estimated number of family and friends in 2014 was 412,748.

- Total willingness-to-pay was estimated at $437,512,880.

Drug type	Dependent users	Estimated family and friends	Estimated harm ($)
Amphetamine-type stimulants	1,392	19,218.28	20,371,376
Cannabinoids	26,022	359,351.08	380,912,147
Hallucinogenic and psychedelic	450	6,217.68	6,590,739
Opioid and sedative	2,025	27,960.96	29,638,618
Total	**29,889**	**412,748**	**437,512,880**

(b)   Acquisitive crime

Acquisitive crime was defined as either (a) unlawful entry with intent / burglary, break and enter, and (b) theft and related offences. According to the Statistics New Zealand website there were 53,265 reported cases of the former and 119,323 of the latter in 2014. Not all cases are reported. Multipliers provided by New Zealand Treasury (Roper & Thompson, 2006) were used to estimate unreported cases of 63,918 and 564,398 respectively. The average cost of a burglary was $2,704 and theft $603 based on New Zealand Treasury estimates for 2006 adjusted to 2014 values. There has been considerable debate over the proportion of acquisitive crime that could be attributed to drugs. Using data from arrestees in 2014 the following table was generated.

	Methamphetamine	Cannabis	Ecstasy	Opioids	Total
% using in past 12 months	30	68	16	47	**161**
% of past-year user reporting dependent on drug	37	32	4	30	
% fulfilling both of the above	11	22	1	14	**48**
% adjusted for polydrug use*	7	14	0	9	**30**

*   The total proportion of arrestees reporting drug use exceeds 100%, indicating significant polydrug use. Final estimates were adjusted by 100/161.

The above distribution was also used to spread costs over drug groups. Results are provided in the following table.

	Estimate	Number of dependent users	Cost per user ($)
Number of acquisitive crime	800,904		
Average value of property lost	Burglary $2,704 Theft $603		
Total value of property lost	$472,476,453		
Total value of drug-related	$139,688,690	29,889	4,673
Amphetamine-type stimulants	$32,574,464	1,392	23,401
Cannabinoids	$63,857,687	26,022	2,454
Hallucinogenic and psychedelic	$1,878,167	450	4,174
Opioid and sedative	$41,378,373	2,025	20,434

(c)   Reinvestment in organised crime

Organised crime reinvests some of its profits into further crime and the remainder into maintaining lifestyle. Based on an analysis of New Zealand Police criminal assets data, it is estimated 56% of revenue from drug trafficking is reinvested in further criminal activity (McFadden, 2015). Where that revenue is invested in drug trafficking, the consequent harm has already been included in the DHI. Some of this revenue is invested in other forms of crime, and these have not been included in the DHI at this point. A conservative estimate based on Hughes et al (2015) suggests that 20% of criminal revenue could be invested in further crime other than drug trafficking.

The calculation was based on the previously calculated estimate of consumption by drug group and user type. These amounts were multiplied by street prices provided by the National Drug Intelligence Bureau to generate estimated revenue. Estimated revenue was multiplied by 56% to generate the revenue reinvested in crime and the result multiplied by 20% to provide an estimate of the amount invested in other crime types.

Drug type	Amphetamine-type stimulants	Cannabinoids	Hallucinogenic and psychedelic	Opioid and sedative	Total
Dependent consumption (kg)	131	16,186	3	255	
Casual consumption (kg)	163	11,255	21	245	
Price per kg	$260,000	$20,000	$75,000	$4,000*	
Income from dependent users	$33,972,331	$323,715,671	$189,275	$1,020,026	**$358,897,304**
Income from casual users	$42,417,964	$225,108,519	$1,599,117	$978,572	**$270,104,172**
Total income	$76,390,296	$548,824,190	$1,788,392	$1,998,597	**$629,001,475**
Dependent reinvestment	$3,804,901	$36,256,155	$21,199	$114,243	**$40,196,498**
Casual reinvestment	$4,750,812	$25,212,154	$179,101	$109,600	**$30,251,667**
Total reinvestment	**$8,555,713**	**$61,468,309**	**$200,300**	**$223,843**	**$70,448,165**
Reinvestment per dependent user	$1,247	$311	$12	$17	**$314**
Reinvestment per casual user	$210	$155	$3	$5	**$116**
Reinvestment per user	$333	$220	$4	$8	**$182**

*   The majority of these drugs are pharma-opioids and pharma-sedatives.

(d)   Reduced tax base

The estimate of GST and company tax avoided by organised crime used a similar method to that above. Previously calculated estimates of revenue were adjusted by estimated expenses to provide estimated profit. McFadden (2015) estimated expenses as 17% of revenue. The GST rate of 15% and company tax rate of 32% were applied. It should be noted that GST is normally calculated against revenue, not profit. However, it was not possible to estimate GST credits or the impact on revenue of adding GST to the sale price of illicit drugs. Basing GST on profit should yield a conservative estimate of GST lost.

Drug type	Amphetamine -type stimulants	Cannabinoids	Hallucinogenic and psychedelic	Opioid and sedative	Total
Income from dependent users	33,972,331	323,715,671	189,275	1,020,026	358,897,304
Income from casual users	42,417,964	225,108,519	1,599,117	978,572	270,104,172
Total income	76,390,296	548,824,190	1,788,392	1,998,597	629,001,475
Profit from dependent users	28,197,035	268,684,007	157,098	846,622	297,884,762
Profit from casual users	35,206,910	186,840,071	1,327,267	812,215	224,186,463
Total profit	63,403,946	455,524,078	1,484,365	1,658,836	522,071,224
GST avoided (dependent)	4,229,555	40,302,601	23,565	126,993	44,682,714
GST avoided (casual)	5,281,036	28,026,011	199,090	121,832	33,627,969
Total GST avoided	9,510,592	68,328,6112	222,655	248,825	78,310,684
Company tax avoided (dependent)	9,023,051	85,978,882	50,271	270,919	95,323,124
Company tax avoided (casual)	11,266,211	59,788,823	424,725	259,909	71,739,668
Total company tax avoided	20,289,263	145,767,705	474,997	530,827	167,062,792
All tax avoided (dependent)	13,252,606	126,281,483	73,836	397,912	140,005,838
All tax avoided (casual)	16,547,248	87,814,833	623,816	381,741	105,367,638
Total tax avoided	**29,799,854**	**214,096,317**	**697,652**	**779,653**	**245,373,475**