National SCIENCE Challenges

A BETTER START

E Tipu e Rea

A Better Start

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Brief Evidence Reviews for the Well Child Tamariki Ora Programme

Report submitted to MoH on 11 December 2019

Whakapūpūtia mai ō mānuka,
kia kore ai e whati

Cluster the branches of the manuka,
so they will not break

Foreword

The Ministry of Health is responsible for the development of policy advice on children's health and the future direction of the Well Child Tamariki Ora (WCTO) programme. The WCTO programme is the universal health service in New Zealand, which is responsible for protecting and improving the health and wellbeing of children from birth to 5 years of age. This is achieved through health and development screening and surveillance, whānau care and support, and health education.

The current programme is based on the evidence available at the time of the last programme update in 2007. Therefore, the Ministry of Health is reviewing the current WCTO Framework and associated Schedule (developed in 2002) to ensure that WCTO services meet the current needs of children and their whānau, and address the issues they face. The present review was initiated in 2019 and is the second review of the programme, as the first was carried out in 2006. In preparation for this review, the Ministry of Health has commissioned an evaluation of the recent literature on some of the new and emerging issues for preschool children, as well as possible ways to address them.

The purpose of this review includes ensuring that the programme is underpinned by the latest research and evidence. This is particularly pertinent to the current Schedule of Universal Contacts delivered, and one of the work-streams of the review is to consider the timing, content, and intensity of the Schedule, and associated additional contacts. This work stream will support the development of an integrated framework of universal wellbeing contacts for the pregnancy to 24 years of age life course.

The Ministry of Health require the brief evidence reviews (BERs) to synthesise relevant evidence about what works in key areas for children, including development, vision, hearing, emotional and mental health, and growth. The BERs adopted the He Awa Whiria – Braided Rivers approach and include consideration of what will work for Māori tamariki and whānau, and Pacific children and families within each domain. The BERs have helped to identify any knowledge gaps where further work and research may be needed, to inform further development of the WCTO programme.

The WCTO review is a key health contribution to the Government's Child and Youth Well-being Strategy. It forms part of the Ministry of Health's work programme to transform its approach to supporting maternal, child, and youth well-being.

The Ministry of Health have commissioned A Better Start: E Tipu E Rea National Science Challenge to undertake 11 health related BERs that will inform the WCTO review and decision making on the future core service schedule, and additional health and social services for children in New Zealand. The aim of the BERs is to ensure that decisions are grounded in, and informed by, up-to-date evidence. BERs are intended to synthesise available evidence and meet time constraints of health care decision makers. Internationally health technology agencies have embraced rapid reviews, with most agencies internationally offering these alongside standard reviews. These 11 BERs that we have conducted have been performed in a very short time which was a very challenging task.

A Better Start is a national research programme funded by the Ministry of Business Innovation and Employment (MBIE). The objective of A Better Start is to improve the potential for all young New Zealanders to lead a healthy and successful life. To achieve this, A Better Start is researching methods and tools to predict, prevent, and intervene so children have a healthy weight, are successful learners, and are emotionally and socially well-adjusted. A Better Start consists of more than 120 researchers across 8 institutions.

The BERs cover 11 domains critical to the WCTO programme, which are: neurodevelopment (#1); parent-child relationships (#2); social, emotional, and behavioural screening (#3); parental mental health problems during pregnancy and the postnatal period (#4); parental alcohol and drug use (#5); excessive weight gain and poor growth (#6); vision (#7); oral health (#8); adverse childhood experiences (#9); hearing (#10); and family violence (#11). The BERs have synthesised relevant evidence about what works in key areas for children across these domains, which were assessed with careful consideration of what will work for Māori tamariki and whānau and Pacific children and families. They have also identified knowledge gaps where further work and research may be needed to inform further development of the WCTO programme.

Within each domain, a series of 6–14 specific questions were drafted by the Ministry of Health, and subsequently refined with input from the large team of researchers assembled by A Better Start. A Better Start established discrete writing teams to undertake each BER. These teams largely consisted of a post-doctoral research fellow and specialty expert, often in consultation with other experts in the field. Subsequently, each BER was peer reviewed by at least two independent experts in the field, as well as two Māori and a Pacific senior researcher. In addition, senior clinical staff from the Ministry of Health have reviewed each BER. These were then revised to address all the feedback received, checked by the editors, and finalised for inclusion in this report.

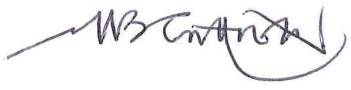
Whilst each of these domains are reviewed as discrete entities, there is considerably inter-relatedness between them. In particular, neurodevelopmental problems can be impacted by parent-child relationships, parental mental health, and pre- and postnatal drug exposure. Similarly, children who have problems with growth, vision, or oral health may also have neurodevelopmental disorders.

Most of the evidence available for these BERs comes from international studies with limited data from New Zealand, in particular there is limited information about Māori, Pacific, and disadvantaged families. These are the tamariki and whānau in whom the WCTO Programme services are more scarce, yet could potentially offer the greatest benefit.

The criteria for screening include the requirement for an effective and accessible intervention; the corollary is that screening should not be offered if there is no benefit to the individual being screened. The essential issue is therefore to identify those infants and preschool children and their whānau who would have better outcomes following intervention; this includes better outcomes for the whānau.

The current WCTO programme has had a greater emphasis on surveillance rather than screening. Many of the questions in the BERs address screening. A change in the WCTO programme that further extends into screening will require substantial upskilling of many WCTO providers, as well as redirection of resources. Importantly, Māori and Pacific iwi and community views must be considered before any new screening programmes are to be included.

It should be noted that a shift towards screening rather than surveillance may prevent health and behavioural problems. The economic benefits of prevention and early intervention are well documented, with early interventions showing that for every dollar spent there are substantial savings to health, social services, police, and special education resources.



Professor Wayne Cutfield
Director of A Better Start National Science Challenge
On behalf of the editors, authors and reviewers of the brief evidence reviews

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5 Parental alcohol, cannabis, methamphetamine, and opioid use during pregnancy

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Table of Contents

List of Tables

Disclaimer

This brief evidence review was commissioned by A Better Start National Science Challenge (the Challenge) on behalf of the New Zealand Ministry of Health. It was prepared over a relatively short time based on the evidence available to the authors at the time of its preparation. The authors have made considerable efforts to perform a comprehensive and balanced evaluation of the existing evidence. However, this brief evidence review cannot be considered an exhaustive analysis of the existing peer-reviewed and grey literature on the topic, and it may not reflect the potentially conflicting views of all experts in the field. There could have been important omissions, and additional evidence might have also come to light since completion of this final draft. Thus, this brief evidence review should be considered with the appropriate caution. A previous version of this document was peer-reviewed by Māori and Pacific researchers and by independent experts in the field. Peer reviewers were anonymous, unless they have otherwise been identified by name. Please note that this brief evidence review does not represent the views of the Challenge or the Ministry of Health; rather, it reports the independent conclusions of the listed authors.

Conflicts of interest: The authors have no financial or non-financial conflicts of interest to declare that may be relevant to this work.

Summary

Universal screening for maternal and paternal substance use should be undertaken at the first antenatal contact and subsequent antenatal visits to identify parents who may benefit from early brief interventions or require a referral to more comprehensive treatment.

Abbreviations

4P's Plus	Parents, Partner, Past, Present pregnancy: a substance use risk screening tool
ATS	Amphetamine type stimulants
AUDIT-C	Alcohol Use Disorders Identification Test (Consumption questions)
CNS	Central nervous system
FAS	Fetal alcohol syndrome
FASD	Fetal alcohol spectrum disorder
IDEAL study	The Infant Development Environment and Lifestyle study
IV	Intravenous
Meth	Methamphetamines
MIP study	Methadone in Pregnancy study
NZ	New Zealand
OST	Opioid substitution treatment
PCAP	Parent-Child Assistance Program
PUP programme	Parents Under Pressure programme
SCOPE study	Screening for Pregnancy Endpoints study
SURP-P	Substance Use Risk Profile-Pregnancy: a substance use risk screening tool
T-ACE	Tolerance, Annoyed, Cut down, and Eye-opener: an alcohol risk screening tool
THC	Delta-9-tetrahydrocannibinol: the psychoactive component of cannabis
TWEAK	Tolerance, Worried, Eye-opener, Amnesia, K/Cut down: an alcohol risk screening tool
US	United States of America

5.1 Introduction

5.1.1 Disclaimer

This review was prepared within a short timeframe. While efforts were made to comprehensively search and include relevant literature, high-yield search strategies were prioritised that may have missed some relevant research. There was no time to seek further expert guidance or feedback. TW is a prolific researcher in this field and is thus an author on many of the publications referenced. SM independently carried out initial literature search to reduce bias in publication inclusion.

5.1.2 Background

The personal, community, and treatment costs of substance use in New Zealand (NZ) is estimated to be close to 7 billion dollars[1]. However, the associated financial costs to children through prenatal exposure is unknown. This brief evidence review aims to focus on prenatal exposure to the more commonly abused drugs available in NZ including alcohol, cannabis or marijuana, amphetamine type stimulants (ATS), predominantly crystalline methamphetamine (street names, ice, pure, 'P'), and opioids which are predominantly converted over the counter drugs containing codeine or diverted pain relief prescription opioids such as morphine sulfate tablets (street name MISTI) or oxycodone and opioids used to treat opioid dependence, methadone and buprenorphine.

Consequences of maternal use of alcohol, cannabis, Meth and opioids

It is well recognized that the above drugs cross the placenta and impact fetal development, however, methodological limitations in much of the research hamper our understanding of developmental outcomes for the offspring. The conceptual framework that is used to study prenatal alcohol and drug use is neurobehavioral teratology. This framework addresses the effect of prenatal exposure to a teratogen in this case (common drugs of abuse) on a child's central nervous system (CNS) and behaviour. A teratogen is any agent that causes abnormalities when there is fetal exposure. Teratogens can have effects that range from mild to severe and may depend on the timing of exposure during the pregnancy, and duration and level of exposure or dose, as well as genetics, the health of the mother and the fetal environment. This means damage to the CNS during the prenatal period may continue to have effects throughout fetal, neonatal, infant and childhood development; and CNS injury may result in *behavioural impairments* rather than *physical birth defects*[2]. Therefore, the major challenges to determining the effects of prenatal exposure to alcohol and other drugs is the careful consideration of these moderating factors, particularly the timing and extent of exposure during pregnancy, and determining the intervening factors in the child's environment that may explain the long-term consequences of prenatal exposure.

Important, also, is the added stressors often associated with *illegal substance use* which includes abuse of a range of legal and illegal drugs prenatally, and other maternal characteristics that can result in fetal harm, including high stress, lack of prenatal care, sexually transmitted infections and infections as a result of needle sharing through intravenous (IV) drug use, and high-risk behaviours such as drug seeking and drug trading activities that expose mothers to violence[3-5]. Once the child is born, influences that may hinder development include low maternal IQ and verbal abilities, maternal mental illness, a chaotic lifestyle which may include ongoing drug seeking and involvement with child protective services.

At present, our knowledge of the effects of prenatal alcohol use are more extensive than for cannabis, Meth or opioids. This is largely due to the legal status of alcohol and the more recent increased use of cannabis, Meth and opioids by women in NZ and world-wide. Typically men have outnumbered women

in substance use, however, the gap is narrowing, particularly for stimulants such as Meth[6]. Evidence from the World Health Organization World Mental Health Surveys found female substance use and attitudes about the appropriateness of substance use have changed in cultures where gender roles are more equal, suggesting if these substances were equally available to men and women there would be no gap[7,8].

Alcohol

Alcohol is a known teratogen and prenatal alcohol exposure may affect the developing fetus in a dose-dependent manner, with heavier consumption leading to marked cognitive, social and emotional impairment, growth restriction, and the characteristic facial features of fetal alcohol syndrome (FAS)[9-11]. The research examining low-to-moderate consumption of alcohol during pregnancy and binge drinking (typically 5 drinks per occasion) is more equivocal[12-15], with some studies finding the risk for miscarriage increased with number of drinks per week[15], but others finding no association of mild-to-moderate exposure and miscarriage, stillbirth, impaired fetal growth, low birth weight, preterm birth or malformations commonly seen in high levels of alcohol exposure[14]. Evidence for moderate exposure to alcohol and binge drinking, but not low exposure has been associated with poorer neurodevelopment[12,13]. However, a recent study in NZ found low levels of exposure associated with infant and toddler temperament and behaviour[16].

The primary limitation of the alcohol literature and evidence from systematic reviews is the inconsistencies of the methodologies employed in the studies included in the reviews, the wide age range of the children under study and the diverse measures of child health and developmental outcomes employed. For instance, some studies measured alcohol exposure in the first trimester, while others considered exposure as any alcohol use across the duration of pregnancy[13]. Therefore, findings that report no effects should be interpreted with caution[12].

Cannabis

In recent years, cannabis use has become more pervasive among pregnant and breastfeeding women. This is due to increasing social acceptability, perceptions that it is safe, and reports that cannabis reduces nausea in pregnancy and depression in the postnatal period[17,18]. Although, cannabis use in pregnancy has been associated with still birth, fetal growth restriction, and neurodevelopmental consequences[19-21], much of this evidence suffers from the same methodological limitations of the alcohol research[22]. For instance, one meta-analysis found no detectable effects after controlling for tobacco and other environmental factors[23]. There are some well-designed longitudinal studies that found a range of long-term cognitive and neurobehavioural consequences associated with maternal use[24]. However, since the prenatal data in these studies was collected, the quantity of delta-9-tetrahydrocannibinol (THC), the psychoactive ingredient in cannabis, has increased and cannabis is being consumed more frequently in a variety of ways that may increase the level and frequency of exposure to the fetus. Different modes of cannabis consumption are smoking, vaporizing, dabbing (which consists of using small quantities of highly potent concentrates made from hash oil and vaporized), oral consumption such as candies and snacks, and infused through skin products and suppositories[21].

Methamphetamine ('P')

The problem of Meth in NZ is relatively new compared to alcohol and cannabis. Evidence from animal, cross sectional and neuroimaging studies have shown that Meth exposure may put the developing fetus and developing child at risk for restricted fetal growth and increased incidence of birth anomalies, and neurodevelopmental problems. However, much of the early evidence comes from retrospective studies

relying on hospital records, included only small numbers of cases, and lacked adjustment for other environmental factors[25]. More recent evidence from the United States (US) and NZ Infant Development Environment and Lifestyle (IDEAL) Studies, the only prospective, longitudinal studies world-wide, provide the best current evidence for the effects of methamphetamine exposure to child development. The IDEAL Studies were designed to look at maternal methamphetamine use in the context of other factors that have been shown to affect child development, such as multiple drug use, domestic violence, socioeconomic status, maternal mental illness, education and ongoing drug use. These studies have followed US and NZ infants exposed to Meth *in utero* from birth through to childhood and found atypical reflexes and behaviour at birth[26], delayed motor development over the first 3 years of age[27], an increase in externalising and internalising problems, poorer cognitive outcomes and structural brain changes at 6-7 years[28,29]. Yet, little is known about child outcomes beyond age 7 years[6].

Prenatal opioid exposure

Although opioid use and treatment for opioid dependence during pregnancy dates back to the 1970s, there has been a significant lack of recent evidence investigating the effects of the abuse of prescription opioids or the effects of prescribed opioids (methadone and buprenorphine) for the treatment of dependence[30]. In NZ the Methadone in Pregnancy (MIP) study, a prospective, longitudinal investigation of methadone maintenance treatment in the context of other environmental factors provides the best evidence for NZ children exposed to opioids and opioid treatment. When illicit opioids as well as the prescribed treatments for opioid dependence (methadone and buprenorphine) are used during pregnancy, neonates are at increased risk for atypical reflexes, disturbed regulatory behaviour, signs and symptoms of withdrawal (Wouldes & Woodward, under review), and altered brain development, which according to some reports may lead to ongoing cognitive and behavioural difficulties in childhood[6,24].

Of particular concern are women with alcohol or substance dependence, who are likely to continue to use substances throughout pregnancy, to use multiple substances, and to have a range of concomitant social problems that increase risks to their child's safety[4,5,25,31,32]. Evidence suggests that women who use methamphetamine may be more vulnerable to destructive patterns of drug use transitioning to regular use and dependence more quickly than men, and that ovarian hormones may influence stimulant (cocaine and Meth) drug seeking behaviour and relapse[6,33]. Illicit drug use, in particular of class A drugs such as Meth or opioids, is associated with a greater likelihood of domestic discord or abuse, poor mental health, unemployment, homelessness, poverty, and a history of criminal behaviour[4,5,32,34].

Consequences of paternal use of alcohol, cannabis, Meth and opioids

The consequences of paternal alcohol and drug use has largely been studied from the perspective of intergenerational addiction. Evidence is clear from twin, family and adoption studies that there is a major genetic component in alcohol, stimulant and opioid abuse with heritability estimates ranging from 39% to 72%. However, emerging evidence from animal and human studies suggest the father's substance use has a part to play in fetal and child health and development[35,36]. Evidence for paternal effects in human studies come largely from studies in alcohol-exposed pregnancies. A systematic review found evidence that paternal alcohol consumption during conception or during pregnancy has an impact on maternal health and alcohol consumption during pregnancy, fetal outcomes, and infant health[36]. The effects of paternal alcohol consumption occurred directly through lower sperm quality and spontaneous miscarriage, and through the impact of paternal alcohol consumption on facilitation of maternal drinking and the quality of relationship. Paternal drinking is also likely to impact child development through modelling of drinking and drug use in the home later in development.

5.1 Summary

- ***The effects of alcohol and other use in pregnancy are not well understood due to the methodological limitations of many of the studies for detecting the quantity, timing and frequency of drug use and factors in the fetal and postnatal environment that could worsen or protect the developing child.***
- ***Pregnant women with substance use disorders or who use illegal drugs, particularly Meth or opioids, are likely to have significant social, health and psychiatric problems that may affect their child's development.***
- ***Fathers' preconceptual drinking can have direct effects on pregnancy outcomes and increase the risk of their partner's use of alcohol during pregnancy.***

5.1.3 Aims of review

This brief evidence review aims to address six questions posed by the Ministry of Health as part of a review of the Well Child Tamariki Ora programme. These questions cover prevalence, screening, and intervention for parental use of alcohol and other drugs, as well as what is known from a Māori and Pacific knowledge base.

5.2 Methods for review

Systematic searches were conducted between 12 July 2019 and 26 July 2019 using PubMed, Ovid Medline, the Cochrane Library, Embase, and PsycINFO (EBSCO). Our search was also broadened to include grey literature reports, as well as searches using the Informit database, the New Zealand Ministry of Health and Statistics New Zealand websites, and Google. All searches were limited to English language publications, human subjects, and publication after 1 Jan 2000.

Searches varied slightly depending on the database, but all included the search terms 'pregnancy', 'pregnant', 'prenatal', 'antenatal', 'perinatal', 'fetal', 'foetal', 'fetus', 'foetus' AND 'substance-related disorders', 'alcohol', 'alcoholic beverages', 'ethanol', 'methamphetamine', 'cannabis', 'marijuana', 'opiate', 'opioid-related disorders'. All searches were initially conducted including 'New Zealand' as a search term, but with the exception of prevalence data, this limit was removed due to the low number of relevant results.

5.3 What is the prevalence of alcohol and other drug use in New Zealand during pregnancy and childhood?

The prevalence of alcohol and drug use during pregnancy in NZ and world-wide is difficult to estimate. Women who use alcohol and illegal drugs often do not report this behaviour due to the perceived stigma and/or fear of involvement by child protection services[37]. The few NZ studies that have reported the prevalence of alcohol use were based on self-report, which is widely believed to underestimate actual use[38-40]. Cannabis users are more likely to report use than users of other illicit drugs[41,42], with occasional users of any drug more likely to report use than frequent users[41]. Therefore, prevalence statistics in this section should be considered conservative estimates.

Alcohol

More than a quarter and up to half of pregnant NZ women report alcohol consumption at some point during their pregnancy[43-50]. Though many women either reduce or cease alcohol consumption on

recognition of pregnancy[48,50-52], around a quarter drink at levels likely to be harmful to the developing embryo before this point[11,48,49]. It is estimated that 22-28% of NZ women continue to consume alcohol after recognising that they are pregnant[44,47,51], and 12-13% consume alcohol from the second trimester onwards[48,49,51]. While some data indicate that few women drink more than one alcoholic drink per week in later pregnancy[51], other research indicates that high risk drinking might be more common in Māori or Pacific mothers, those who concurrently smoke or take other drugs[5], and those who were daily drinkers before becoming pregnant[44].

Cannabis

Cannabis is the most widely used illegal drug in NZ[1,53]. Our search identified only one published report of the prevalence of cannabis use during pregnancy in NZ, in which 4.5% of participants self-reported they were cannabis users[50]. Approximately half of these women stopped using cannabis prior to becoming pregnant, and a third of those who were still using cannabis quit in the first 15 weeks of pregnancy. As a result, at 20 weeks gestation only 0.5% of all women were still using cannabis[50]. However, frequency and amount of cannabis use was not reported.

Methamphetamine

An increase in Meth use by NZ women during pregnancy was first identified through referrals to the Alcohol Drug and Pregnancy Team at National Women's Hospital, where Meth-related referrals increased from 10% of total referrals in 2001 to 59% in 2003[54]. Since then, the best estimates of prevalence of maternal use of Meth come from ever-increasing reports by police, social workers, teachers and health practitioners, who are faced with treating the behavioural, social, and health problems of children exposed prenatally to Meth and living in environments where there is continued use. Although the SCOPE study reported that less than 0.6% of total participants had taken drugs (including Meth) in the three months prior to pregnancy or during pregnancy, it only included women who attended antenatal appointments prior to 15 weeks gestation[50]. On average, women who use Meth and other illegal drugs in NZ access antenatal care later in pregnancy than non-users[26].

No studies in NZ have reported the prevalence of opioid use by pregnant women or by women of child bearing age. However, it is estimated that approximately 9,980 people are opioid dependent in NZ with approximately half that number (5,500) receiving opioid substitution treatment (OST)[55]. The recommended OST treatment for women during pregnancy is daily doses of methadone and more recently buprenorphine. Women who are pregnant are given priority to OST, however, despite being enrolled in treatment services, two NZ studies have shown that women continue to use other opioids, cannabis, benzodiazepines and stimulants during pregnancy[3,4].

5.3 Summary

- ***Many pregnancies are affected by drug and alcohol use in NZ, but exact numbers are not known.***

5.4 What suitable test(s) are available to screen for alcohol and other drug use among pregnant people and caregivers?

5.4.1 Self-report screening tools

No screening tools to detect substance use during pregnancy have been validated in NZ. However, several screening questionnaires have been designed or adapted to identify high-risk alcohol use in pregnant populations. The AUDIT -C has been recommended by the NZ Ministry of Health and World Health Organisation, with a score of 0-3 indicating low risk drinking and a score 4 or higher indicating moderate-high risk of requiring referral to specialist services[56]. In one study the AUDIT-C was demonstrated to have the lowest sensitivity for identifying pregnant women who had recently consumed alcohol when using a cut-off score ≥3, despite being the only screener analysed that directly asks about frequency and volume of alcohol consumption[57]. This is consistent with a study of low income women in the US, where an indirect screen correlated more strongly with biological screens for illicit drug use than direct self-report[42]. The T-ACE and TWEAK both screen for risk of alcohol use. Each comprises four and five questions respectively, with a score of two or more on either typically used to identify people likely to be at-risk drinkers (Appendix I). A comparison of these two screeners, using a cut-off of ≥3 for the TWEAK and ≥2 for the T-ACE, suggested they are equally sensitive for identifying problem drinkers but the TWEAK has a lower false-positive rate[58]. These are generally completed by the patient on paper or electronically, meaning that no training and few resources are required. Other screening tools, such as the 4P's Plus and SURP-P screen for drug use as well as alcohol, and have been evaluated in pregnant populations[59]. The 5P's, an adaptation of the 4P's, additionally screens for intimate partner violence and emotional health and is in wide use in the US (Appendix I).

5.4.2 Biological markers of maternal substance use

The evidence is equivocal for biological markers of drug and alcohol use, and they have generally been shown to have low sensitivity for identifying use during pregnancy[60-62]. Maternal tests using blood and urine can be used to detect only recent substance use[60-62], while new born meconium and hair can only identify use in the last trimester of pregnancy, with some evidence suggesting low sensitivity for detecting alcohol, cannabis and methamphetamine use even when self-report indicates heavy use throughout pregnancy[11,25,62-64]. Because of the difficulty of validating biological screens when self-report is unreliable, it is unknown whether false positives are a significant concern for many of these methods. Despite evidence that biological markers may be useful in combination with self-report for detecting fetal exposure[25,65], until further research establishes their reliability in practice there are ethical and monetary constraints to using these at a population level[66].

5.4 Summary

- ***Standardised tools are better than self-report for substance use screening, but have not been validated in NZ populations.***
- ***Biological markers of maternal substance use are not currently recommended for detecting fetal exposure to substances due to low reported sensitivity and ethical challenges.***
- ***Some evidence suggests on-line questionnaires could provide an acceptable option for collecting alcohol and substance use in parents.***

5.5 What interventions or additional support for alcohol and other drug use are effective following detection of risk?

Due to the relationships between drug use, unintended pregnancy, and late recognition of pregnancy[26,44,67,68], increased access, education and encouragement to use effective contraception alongside advice about substance use is effective in reducing the likelihood of substance-exposed pregnancies in at-risk groups[69,70]. This approach includes improving engagement with family planning services for women who have already had one or more substance-exposed pregnancy, and has been incorporated into more comprehensive interventions discussed below.

Brief interventions and motivational interviewing are popular approaches for addressing mild-to-moderate substance use problems. However, while effectiveness has been established for brief interventions in middle-aged men, there is little research involving pregnant women. Existing studies are mostly of poor quality, with conflicting results about whether either technique is effective in reducing substance use by pregnant women[71-75]. These trials may be confounded by the effect that assessment can have in reducing substance consumption, particularly as the majority of parents who use substances casually are motivated to reduce the risk of harm to their child[76]. Conversely, those with substance use disorders likely need additional support to improve their offspring's outcomes. Similarly, motivational interviewing can lead to reductions in substance use, but effects in pregnancy are not as clear from existing data[77]. However, computer-based screening and brief interventions based on motivational interviewing principles have been associated with improved birth outcomes, and reduced alcohol and cannabis consumption in pilot studies[42,78].

Electronic screening has the potential to address some of the challenges of screening face-to-face or on paper. It can save time if administered before an appointment, is more acceptable to women who may be reluctant to report substance use, and can include audio and visual components to overcome literacy difficulties[42,79]. Further, it can incorporate personalised computer-based interventions, which reduce training needs and time commitment for health professionals and have the potential to reduce barriers to screening and intervention for communities where trained substance abuse specialists are not easily available. However, further development and research into cultural acceptability of such interventions in NZ is lacking at present.

Home visiting programs can incorporate a range of services and vary considerably in duration, content, and reported outcomes. These are multi-faceted interventions that aim to improve the home environment to encourage healthy child development, rather than simply addressing substance use issues. A meta-analysis suggested that many fail to reduce maternal substance use, though none of the included studies had any significant antenatal intervention[80]. However, among women with drug or alcohol problems, common outcomes of home visiting programmes included reductions in child injury (including non-accidental injury) and increased use of contraception[80]. The Family Spirit intervention in a high-risk group of Native Americans included seven antenatal visits and successfully reduced illicit drug use among parents, but had no effect on alcohol consumption[81].

The Parent-Child Assistance Program (PCAP) targets women in the postpartum period with significant intergenerational substance abuse and family dysfunction. Using paraprofessionals and an intensive case management model that extends over a 3 year period, mothers enrolled in the program had fewer drug-exposed babies, 92% had completed alcohol/drug treatment, 76% were abstinent from alcohol and drugs for 6 months or more during the program, 68% were using family planning, 57% had attended classes to extend their education and 80% of children were living with their own family[82-85].

5.5 Summary

- ***Improved access to long-acting contraceptives in high-risk groups may reduce the risk of substance-exposed pregnancies.***
- ***Brief interventions are effective for reducing substance use in some populations but evidence in pregnant women is more equivocal.***
- ***Home visiting programs can mitigate some of the effects of parental substance use on child development and safety, particularly for high-risk populations where there is a history of ongoing substance use in multiple pregnancies.***

5.6 Does early intervention lead to significant improvements later in childhood/ adolescence?

In general, intervention in early childhood has the potential to set lifelong trajectories toward better outcomes, with earlier intervention likely to offer greater economic benefits[86]. In the field of substance use during pregnancy, longitudinal studies are rare. Thus, little is known about the long-term effects of interventions designed to reduce substance use.

The Early Start program delivered home visits for up to five years to Christchurch families facing stress and difficulty. Visit frequency was weekly to monthly depending on the family's needs. Substance use was one of several indicators of stress specified by researchers. At 36 months of age, children in the Early Start group had increased engagement with healthcare, including dentists and well child visits, fewer hospital visits for injury and poisoning, and parents reported favouring a more positive parenting style over a punitive style[87]. At a 9-year follow-up, parents in Early Start reported less child problem behaviour and physical abuse. Outcomes were similar between Māori compared to non-Māori families, though there was a trend for program effects to be stronger for both Māori and families facing multiple disadvantage[87,88]. There were no apparent benefits to maternal well-being or family relationships[88].

Similarly, a comprehensive home visit intervention in the US reported few effects on family or maternal outcomes, but positive effects for child safety and development. Among other findings, children from the home visit group were less likely to have used alcohol, tobacco, or cannabis at age 12, and had fewer internalising disorders compared to children whose families did not receive home visits[89-91]. The Family Spirit intervention included mothers with multiple levels of disadvantage, and is one of few to report improvements in maternal mental health and drug use alongside positive effects on child psychological and behavioural outcomes[81]. Overall, home visits are resource intensive and are likely to be most effective when reserved for the most vulnerable families.

Parents Under Pressure (PUP), a programme developed in Australia aimed at supporting parenting and parenting-interactions has been shown to reduce child abuse potential, rigid parenting attitudes and child behaviour problems in substance using parents in Australia and the UK, and in an adapted version useful for parents of children with FASD[92].

5.6 Summary

- ***There are few intervention studies for parental substance use with long-term follow up.***
- ***Intensive early interventions have shown potential for improving some child outcomes through to age 12.***

5.7 Are there any known harms from screening for alcohol and other drug use?

The only harm from screening for alcohol and other drug use suggested in the literature is potential anxiety or guilt for parents following discovery of the harmful effects on their child's health[93]. Use of poorly validated biological screens could result in legal consequences for parents if misused.

5.8 What do we know from a Māori and Pacific knowledge basis about screening in this domain?

Similar to research in non-pregnant women, the prevalence of any alcohol consumption during pregnancy is similar between Māori and non-Māori, and low among Pacific women, but the likelihood of heavy or high risk drinking is higher for Māori women[44,52]. Little is known about the use of illegal substances during pregnancy among Māori or Pacific women, but results from the NZ Infant Development, Environment And Lifestyle (IDEAL) Study show that Māori women are more likely to use Meth intravenously, which predicts poorer neurobehavioural outcomes for infants at 24 months of age[94]. Māori boys are more at risk for motor and cognitive delay over the first 3 years of age[27], and Māori boys and girls exposed to methamphetamine in combination with alcohol do more poorly on measures of general and verbal IQ at 4.5 years of age (unpublished data, from NZ IDEAL Study).

Meth and cannabis use are both higher in Māori populations than other New Zealanders[53,95], and Māori women make up more than half of women accessing pregnancy and parenting services at the Waitemata District Health Board Community Alcohol and Drug Service[96]. Some evidence suggests that Māori may be less likely to seek help for substance use problems due to normalisation of use within whānau[97], but it is not clear from existing research whether this includes use during pregnancy.

It is therefore important that all research and interventions be guided by Māori in accordance with Te Tiriti o Waitangi. He Awa Whiria (Braided Rivers Model) acknowledges both Western Science and Kaupapa Māori as being important when developing programmes and interventions[98]. According to this model both Western Science and Kaupapa Māori methodologies have a bidirectional role and both are able to inform programmes developed in each domain.

5.8 Summary

- ***Māori women who drink alcohol during pregnancy are at risk for harmful use.***
- ***Children of Māori women may be at particular risk for adverse effects of prenatal substance exposure.***
- ***Programmes for reducing substance use should be guided by Kaupapa Māori alongside Western Science methodologies in accordance with Te Tiriti o Waitangi.***

5.9 Conclusion

Despite the methodological limitations of the available literature, it is clear that maternal drug use during pregnancy can have serious consequences for the fetus, the infant and the developing child. However, it is also important to recognize that paternal preconception use of alcohol and other substances and the home environment may have a part to play in pregnancy and child health outcomes[36]. Therefore, decisions about alcohol and other drug use during preconception and pregnancy are not the sole responsibility of women but occur within the context of the home and the broader social environment, and require more complex policy to assist in reducing alcohol and other drug-exposed pregnancies and increasing the potential for fetal health and infant and child outcomes.

Lacking is prevalence data for drug use during pregnancy and published outcomes of prevention or intervention studies completed in NZ. It is also unclear whether screeners are regularly used in practice to identify maternal alcohol and substance use. These research gaps are not unique to NZ, but those on the front line (educators, health care professionals, social workers, the police) increasingly report poor outcomes for children born to and/or living with parents who are substance dependent. Thus, it is time for research and policy to address these gaps.

5.10 Recommendations for further action

Policy and practice

- Introduce universal maternal and paternal screening for substance use and related problems (domestic violence, mental illness) at the first antenatal visit and continue to screen at subsequent visits and postnatally. This should be followed by a brief intervention for women screened to be at risk.
- Referral to secondary services should be considered for pregnant women screened to be at high risk for substance use.

Further research

- Determine whether interventions and/or health services that treat both psychiatric and substance use disorders together result in better outcomes for women and their children.
- Determine the proportion of women in NZ who are able to access substance use treatment, particularly treatment that is acceptable to Māori and Pacific women, and availability of services in rural areas.
- Determine whether universal screening can discriminate between high-risk and low-to-moderate risk use of alcohol and drugs and;
    - whether brief interventions can be effective in those women who report low-to-moderate alcohol and/or drug use; and
    - whether referrals to treatment after women are identified as high-risk actually seek treatment.
- Develop and/or support well-designed, prospective longitudinal studies that can inform interventions for children exposed prenatally to alcohol and drugs.

5.11 Graded evaluations and recommendations

Table 5.1. Graded evaluation of screening tools and associated recommendations for policy and practice.

Screening tool	Grade	Estimated net benefit	Level of certainty	Recommendation
TWEAK	B	Moderate	Moderate	TWEAK or T-ACE are the best screeners for screening for alcohol, however they do not screen for other drug use. A score of ≥ 2 is positive for problem alcohol use.
T-ACE	B	Moderate	Moderate	As above
4Ps	B	Moderate	Moderate	All parents should be screened for alcohol and drug use. 4Ps has been validated.
5Ps	B	Moderate	Moderate	Reworded adaptation of 4Ps not validated, but 5Ps used widely in clinical practice in a number of US states (Appendix I). Recommend all parents be screened for alcohol, drugs, well-being and interpersonal or domestic violence.
E-screening	B	Moderate	Moderate	Recommended all parents be provided this option using 5Ps
Biological Screeners	I	Low	Low	Only in cases where drug use is suspected and a caregiver is unavailable or unable to self-report drug use.

Grade: A, B, C, D, or I.
Estimated net benefit: substantial, moderate, small, nil or harmful, or insufficient (evidence).
Level of certainty: high, moderate, or low
For more detailed explanation see Supplementary Information - Grade definitions and levels of certainty.

Table 5.2. Graded evaluation of interventions and associated recommendations for policy and practice.

Intervention	Grade	Estimated net benefit	Level of certainty	Recommendation
Education	B	Moderate	Moderate	All parents should receive information about the effects of alcohol and drug use, parental mental illness and violence in the home at their first antenatal visit or through websites that provide latest evidence for the effects on their child.
Computer-based screening and motivational interviewing	B	Moderate	Moderate	Recommended for parents at low to moderate risk
Early Start Home Visiting	B	Moderate	Moderate	Recommended for high risk parents who report ongoing drug use during pregnancy or history of previous drug use pregnancies and multiple risks such as parental mental illness
Comprehensive Home Visiting such as Family Spirit Intervention	B	Moderate	Moderate	As above
Parents Under Pressure	B	Moderate	Moderate	As above
Parent-Child Assistance Programme	C	Moderate	Moderate	Recommended for high risk parents with intergenerational substance use disorders

Grade: A, B, C, D, or I.
Estimated net benefit: substantial, moderate, small, nil or harmful, or insufficient (evidence).
Level of certainty: high, moderate, or low.
For more detailed explanation see Supplementary Information - Grade definitions and levels of certainty.

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Appendix I – T-ACE, TWEAK, 4P's and 5P's

T-ACE Screener Questions and Scoring

T-ACE	QUESTIONS	POINTS
Tolerance	How many drinks does it take to feel the first effect?____	3 or more = 2 points
Annoyed	Have people ever annoyed you by criticizing you about your drinking?	Yes = 1 point
Cut down	Do you sometimes feel the need to cut-down on your drinking?	Yes=1 point
Eye-opener	Do you sometimes take a drink in the morning when you first get up?	Yes = 1 point

TWEAK Screener Questions and Scoring

TWEAK	QUESTIONS	POINTS
Tolerance	How many drinks does it take to make you feel high? ____	3 or more = 2 points
Worry	Have close friends or relatives worried or complained about your drinking in the past?	Yes = 2 points
Eye-opener	Do you sometimes take a drink in the morning when you first get up?	Yes = 1 point
Amnesia	Are there times when you drink and afterwards can't remember what you said or did?	Yes = 1 point
Kut-down	Do you sometimes feel the need to cut down on your drinking?	Yes = 1 point

TWEAK and T-ACE: Summary of sensitivity, specificity and postive predictive value (PPV)

	TWEAK			T-ACE		
	PPV	Sensitivity	Specificity	PPV	Sensitivity	Specificity
2 or more	0.54	100	36	0.48	100	19
3 or more	0.54	99	43	0.51	93	34

Score of ≥ 2 recommended cut-off for screening positive for risk drinking on either 4Ps Questionnaire

4Ps Questionnaire

DOMAIN	QUESTION	
Parents	Did any of your parents have problems with alcohol or other drug use?	Yes/No
Partner	Does your partner have a problem with alcohol or drug use?	Yes/No
Past	In the past, have you had difficulties in your life because of alcohol or other drugs?	Yes/No
Present	In the past month, have you drunk any alcohol or used other drugs?	Yes/No

Any "yes" should result in follow-up questions about educational material or referral

5Ps Questionnaire Adapted from 4Ps to include emotional well-being and interpersonal violence

DOMAIN	QUESTION	
Smoking	Have you smoked any cigarettes in the past 3 months?	Yes/No
Parents	Did any of your parents have a problem with alcohol or other drug use?	Yes/No
Peers	Do any of your friends have a problem with alcohol or other drug use?	Yes/No
Partner	Does your partner have a problem with alcohol or other drug use?	Yes/No
Past	In the past, have you had difficulties in your life due to alcohol or other drugs, including Prescription medications?	Yes/No
Present	In the past month, have you drunk any alcohol or used other drugs? 1. How many days per month do you drink?___ 2. How many drinks on any given day?___ 3. How often did you have 4 or more drinks per day in the last month?___	Yes/No
Well-Being	Over the last few weeks, has worry, anxiety, depression, or sadness made it difficult for you to do your work, get along with people, or take care of things at home?	Yes/No
Violence	Are you currently or have you ever been in a relationship where you were threatened, controlled, physically hurt, or made to feed afraid?	Yes/No

Adapted from 4Ps and used in a number of states in the US no charge for its use.
http://www.centerforchildwelfare.org/kb/subabuse/PregWomenW-SubAbuse2010.pdf#page=29

Supplementary Information - Grade definitions and levels of certainty

Table S1. Grade definitions for screening tools and interventions

Adapted with permission from the U.S. Preventive Services Task Force 2012.[i]

Grade	Definition	Recommendation for policy and practice
A	• The authors recommend this screening tool/intervention. • There is high certainty that the net benefit is substantial.	• This screening tool/intervention should be offered or provided.
B	• The authors recommend the screening tool/intervention. • There is high certainty that the net benefit is moderate, or there is moderate certainty that the net benefit is moderate to substantial.	• This screening tool/intervention should be offered or provided.
C	• The authors recommend selectively offering or providing this screening tool/intervention to patients based on professional judgment and patient preferences. • There is at least moderate certainty that the net benefit is small.	• This screening tool/intervention should be provided for selected patients depending on individual circumstances.
D	• The authors recommend against this screening tool/intervention. • There is moderate or high certainty that the screening tool/ intervention has no net benefit or that the harms outweigh the benefits.	• The authors discourage the use of this screening tool/intervention.
I	• The authors conclude that the current evidence is insufficient to assess the balance of benefits and harms of the screening tool/intervention. • Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.	• If the screening tool/intervention is offered, patients should understand the uncertainty about the balance of benefits and harms.

Table S2. Levels of certainty regarding net benefit

Adapted with permission from the U.S. Preventive Services Task Force 2012 [1].

Level Of Certainty	Description
High	• The available evidence usually includes consistent results from well-designed, well-conducted studies in representative populations. • These studies assess the effects of the preventive service on health outcomes. • This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	• The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by such factors as: – the number, size, or quality of individual studies; – inconsistency of findings across studies; – limited generalizability of findings to routine practice; – lack of coherence in the chain of evidence. • As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion(s).
Low	• The available evidence is insufficient to assess effects on health outcomes, because of: – the limited number and/or size of studies; – important flaws in study design and/or methods; – inconsistency of findings across individual studies; – gaps in the chain of evidence; – findings not generalizable to routine practice; – lack of information on important health outcomes. • More information may allow estimation of effects on health outcomes.

[i] https://www.uspreventiveservicestaskforce.org/Page/Name/grade-definitions