ORANGA WAHA

Oral health research priorities for Māori

Contents

Executive summary

This literature review is part of a research project funded by the Health Research Council of New Zealand and the Ministry of Health to identify oral health research priorities for three specific groups: low-income Māori adults; older Māori adults; and Māori with special needs, disabilities, or who are medically compromised. A comprehensive review of local and international literature identified past and current research, research gaps, and potential directions for research on Māori oral health.

Oral health research for specific population groups

KAUMĀTUA

There is considerable research on the oral health of elderly people, but little on kaumātua Māori. The numbers of kaumātua in Aotearoa New Zealand are rapidly increasing, and the current generation of elderly are more likely to be dentate than previous generations, needing continued oral health care. As oral health is affected by social factors and health throughout the life course (Jette et al 1993), it would be very helpful to have population projection data on the oral health status of pakeke, as well as data on kaumātua diet, smoking, access to fluoride, access to oral health care, and other risk or supporting factors. Research also shows the importance of understanding kaumātua values and beliefs about oral health, and identifying the knowledge and skills needed to provide effective support for kaumātua.

PEOPLE WITH DISABILITIES, OR HIGH HEALTH NEEDS

There are major gaps in research on the oral health of Māori with disabilities and high health needs. Māori have higher rates of many disabilities compared to non-Māori. Research is needed to establish baseline information on the numbers of Māori in these groups, and other research foci might include:

- what models of publicly funded dentistry will reach Māori with the highest needs?
- what services might be needed for Māori with disabilities (given the diverse nature of 'disability')?
- what is being provided for people with disabilities now, especially in community settings?
- how appropriate are current oral health services for Māori with mental illness?
- does the current oral health workforce have the training to give appropriate support?
- are Māori with health conditions receiving the knowledge and care they need, and what interventions/support are being provided (if any, how effective is that support)?

Workforce skills and knowledge are a key theme in the literature about people with special needs. Research is needed on the capacity of Special Needs oral health professionals to provide care to people in need of their services, as well as the ability of General Practising dentists to provide appropriate care. Research should also investigate how aware Māori are of what can be provided through Special Needs Dentistry services, and how easy it is to access such services.

The disability support workforce also has an important role in maintaining the oral health of people with special needs. A relatively small amount of oral health training for disability support workers can improve oral health outcomes for clients (Glassman & Miller 2009).

LOW-INCOME MĀORI ADULTS

The financial cost of dental services is often a major barrier to their use. International comparisons found New Zealanders the most likely of five nations studied (Australia, Canada, the UK, and the US) to defer seeing a dentist when needed (Schoen & Doty 2004).

Research on services for people on low incomes indicates that the common approach of providing only emergency oral care treatment is inefficient and long-term often ineffective (Chua 2009; Davis et al 2010; Simmons 2003). Crisis interventions which do not address underlying problems result in repeat visits, increasing secondary care costs (Clinical Practice Improvement Centre 2007). Economic analyses in intervention studies could help planners understand the efficiencies of different health interventions (Davis et al 2010).

Several studies assert that the best way to meet the needs of low-income people is by extending health coverage, and/or by integrating oral health with other community or primary health services (Fisher-Owens et al 2008; Jatrana et al 2009; Public Health Association of Australia 2009; Watt 2007). In Australia, Spencer (2004) argued for a package of actions, including expanding fluoridation of municipal water supplies, improving health promotion for disadvantaged groups, and expanding service coverage; while in New Zealand Jatrana et al (2009) argued for integrating oral health and other primary care services. These approaches are consistent with the World Health Organisation's (WHO) oral health strategy, and are similar to other international initiatives (Formicola et al 2004; Fisher-Owens et al 2008; Beetstra et al 2008) and, in Aotearoa New Zealand, Hauora Hokianga and some community health services (Jatrana et al 2009; Ministry of Health 2010b). Research could study how to ensure health services take a comprehensive approach (e.g. dietary counselling, tobacco cessation advice) (Phipps et al 2002).

Cross-cutting areas in oral health research

IMPROVING DATA ON MĀORI ORAL HEALTH

Good-quality data on Māori oral health, such as that collected in the 2009 New Zealand Oral Health Survey (2009 NZOHS), is essential for setting and monitoring oral health targets. The NZOHS found that Māori adults were less likely than non-Māori to have visited a dentist in the previous year; more likely to have gone without needed dental care in the past year due to cost; more likely to have reported negative oral health impacts; and more likely to have untreated dental caries and missing teeth (Ministry of Health 2010a). There is scope for detailed analysis of Māori oral health in the 2009 NZOHS data set, as well as

for Māori-specific research such as studies of oral health and access to dental care among Māori with disabilities, older Māori, and other groups.

ESTABLISHING HOW VALUES AND HEALTH BELIEFS AFFECT MĀORI ORAL HEALTH BEHAVIOURS

Many researchers argue that oral health care services must understand the meanings and values that social and ethnic groups ascribe to the teeth, or to the health of the mouth. Studies have reported on Indigenous perspectives on the meaning of oral health, and on the value of traditional diet, oral care practices, and treatments such as rongoā (Brondani et al 2007; Broughton 2006; Jamieson, Parker & Richards 2008). Further research might answer questions about Māori value/belief frameworks about oral health; what influences Māori beliefs; and which beliefs and practices may affect oral health practices, uptake and use of services. Research is also needed on how the values, beliefs and cultures of oral health institutions and oral workers affect the effectiveness of the care they provide for Māori.

REVIEWING THE EFFECTIVENESS OF INITIATIVES IN IMPROVING MĀORI ORAL HEALTH

Few initiatives to improve Māori oral health have been evaluated, either individually or by comparing types of services and their relative effectiveness. The research done has been mostly small-scale, and rarely carried out by independent evaluators. Evaluation and synthesis of local oral health initiatives could be a priority, along with a national programme or framework for evaluation.

IMPROVING ACCESS TO ORAL HEALTH CARE

People from Indigenous populations face many barriers to receiving oral health care. Some people are unable to access dental services due to health or disability problems, whether physical or mental. People who live in rural locations often have difficulty accessing dental care, with few dentists working in rural areas of New Zealand (Broadbent 2011), and the distance to services being a barrier for many Māori communities. Other concerns include high costs (both immediate and continuing) and fear about pain and discomfort (Broughton 2006; Sussex et al 2009), particularly in older people. Broughton and others suggest that the individualistic model of oral health policy, planning, and funding does not match the Māori approach of considering Māori oral health in the context of whānau health and well being (Broughton 2006; Koopu & Keefe-Ormsby 2007). The traditional focus of Aotearoa New Zealand's oral health systems on children may have particular disadvantages (Ministry of Health 2006a, 2008a). Health and disability problems add another layer of difficulties. Cunningham (2009) proposes developing 'intercultural health systems' for Indigenous peoples (2009).

PUBLIC HEALTH AND PREVENTIVE INTERVENTIONS

Sheiham (2001) suggested that public health interventions were necessary to improve oral health, as knowledge about how to maximise oral health has not translated into individual behaviour change. Sheiham instead proposed a preventive model focusing on common risk factors, and including dental public health in public health policy and services. The World Health Organisation says that 'public health research [on oral health] needs to be

strengthened.' (Petersen & Yamamoto 2005:81). We found little literature on public health or preventive interventions (e.g. diet, water fluoridation, smoking cessation). Research indicates that health promotion with Indigenous populations needs to be based in the oral health models of the target group (Jamieson, Parker and Richards 2008). Research questions for Aotearoa New Zealand might include how Māori get oral health information; the most effective ways to provide oral health education to Māori (e.g. to individuals or to the whole whānau); and how health promotion can reach Māori with physical or mental health problems.

1 Introduction

Oral health improvement for Māori is a priority. Māori have a high level of unmet need for oral health care, with low-income Māori particularly affected. Older Māori and Māori with special needs will also have specific needs and aspirations. To be effective, oral health research should contribute to each of these groups achieving whānau ora. This literature review was developed for a research project funded by the Health Research Council of New Zealand and the Ministry of Health, with the goal of identifying oral health research priorities for three specific groups: low-income Māori adults; older Māori adults; and Māori with special needs, disabilities, or who are medically compromised. We conducted a comprehensive review of local and international literature to identify past and current research, research gaps, and potential future directions for Māori oral health research or for research that might impact Māori oral health. Specifically, the review includes:

- research literature on Māori oral health (Section 2) and the oral health of other Indigenous groups (focusing particularly on Australia's Indigenous peoples, the First Nations and Inuit peoples of Canada, and the Indigenous peoples of the United States) (Section 3).

- literature on oral health and elders (Section 4), people who have disabilities or are "medically compromised" (Section 5), and low-income adults (Section 6), which may be relevant to research on Māori oral health needs.

- literature on themes arising from the consultation workshops for this project, including public health interventions (Section 7), oral health values, beliefs and practices (Section 8), and workforce development and cultural competence (Section 9).

- key points in the literature which identify or suggest research priorities for Māori oral health (Section 10).

1.1 Search strategy and search outcomes

The literature search focused first on Indigenous people and oral health; then these terms and terms relating to inequalities; people with high health needs and disabilities (this required multiple search terms); older people; and public health, oral health and health promotion. Initial searches linked 'oral health' and 'dental health' to search terms including Māori, indigenous, aboriginal, American Indian, Native American, Alaskan native and First Nations. For older people our search terms also included aged; elders; and residential care. A specific search on dementia used MeSH terms including dementia and oral health, mouth diseases, dentistry, and dental care for aged. In the section on people with high needs, we searched by conditions (e.g. stroke; mental illness; people with disabilities). It was hard to find research on 'low income' and oral health independent of the many other factors that contribute to social inequality, so our search in this area focused mainly on 'disparities', and 'inequalities'. Public health search terms included fluoride; smoking/tobacco and oral

health; health promotion; and oral health and oral health behaviours. The review's scope evolved with assistance from issues identified in the community and provider research discussed in Robson et al (2011).

The search for journals and technical literature included Medline, Cinahl and PubMed databases, and searches of specific journals that either related to Indigenous oral health or that had a high rate of hits from other searches, supplemented with searches using Google and Google Scholar. Government reports and strategies were located through searches of references in reports or articles, and searches of government department websites in the target countries. Secondary literature was accessed from references in the first set of literature. The review was supplemented by extensive 'gray literature', primarily located through references in other material, as well as material identified by New Zealand and other research collaborators, and by research participants.

1.1.1 SEARCH OUTCOMES − THE LITERATURE BASE

The great majority of research described the level and nature of oral health problems, with a small proportion describing interventions to reduce problems. Screening out material on children's oral health reduced the literature base significantly, although we included some research on Indigenous children as it related to 'whole family' or community services. It should be noted that publication bias means that in general only reports on successful interventions are published, so we cannot tell how many interventions were tried and found ineffective, or which interventions may have been effective for some sub-populations but not for the study population as a whole.

2 Oral health needs and services for Māori

A significant proportion of recent research on Māori oral health has been written by, or reviewed by, John Broughton (2000; 2006). Broughton's PhD thesis, *Oranga Niho: A review of Māori oral health service provision using a kaupapa Māori methodology* (2006) comprehensively reviews the history of Māori oral health, as well as key national and community-level interventions. This overview summarises some of Broughton's key points, supplemented by other research including the summary of Māori oral health by Koopu and Keefe-Ormsby (2007) and recently released key findings from the 2009 New Zealand Oral Health Survey (Ministry of Health 2010a).

2.1 Māori oral health status and needs

Broughton's (2006) detailed history of Māori oral health reviews historic records that indicate very low rates of dental caries before European contact, although in some areas of the country diet (particularly fernroot) or water sources contributed to wear on teeth or other damage. The Māori view of oral health had dimensions of tinana, or physical health, and wairua (spiritual), and traditional healing included remedies (rongoā and karakia) for toothache (Broughton, 2006). Broughton details the impact of European diet, particularly the introduction of sugar products. More recently, continued changes in Māori diet over the 20th century, in particular the increasing use of sugar, have led to the present situation where Māori have caries and periodontal disease at rates either similar to non-Māori, or worse (Brown & Treasure 1992; Koopu & Keefe-Ormsby 2007).

In the findings of the 1988 Study of Oral Health Outcomes (SOHO, the second national New Zealand oral health survey) Hunter et al (1992) reported that Māori were more likely to have serious periodontal disease and to have more dental extractions than non-Māori. Unfortunately, the 1988 SOHO Study included very few Māori, making it difficult to draw definitive conclusions about the level of oral health inequalities between Māori and non-Māori. Cuttress et al (1979) and Hunter et al (1992) showed that edentulism (the state of having no remaining natural teeth) follows the gradient of socio-economic disadvantage. Lawton et al (2008) found that among middle-aged women screened for a randomised controlled trial, Māori women were five times more likely than NZ Europeans to be edentulous, after controlling for age, education, smoking, diabetes, cardiovascular disease history, and BMI.

Contemporary data from the 2009 New Zealand Oral Health Survey (2009 NZOHS) shows that Māori adults are more likely than non-Māori to have significant oral health problems, including an increased likelihood of having tooth loss and untreated decay (Ministry of Health 2010a). Māori adults are almost twice as likely as non-Māori adults to have lost all

their natural teeth. Among dentate adults, on average, Māori adults are less likely than non-Māori to have a functional dentition (defined as '21 or more natural teeth'); have 60% more teeth missing due to disease; have nearly twice as many teeth with untreated coronal decay; 70% more teeth with untreated root decay; a higher prevalence of periodontal disease (50% more likely to have any pocketing and 30% more likely to have any loss of attachment); 10% fewer filled teeth; and a higher lifetime dental decay experience (10% higher DMFT) than non-Māori (Ministry of Health 2010a). Twenty-nine percent of Māori adults reported experiencing orofacial pain in the last four weeks (similar to non-Māori), and 23% reported often or very often experiencing one or more negative impacts on their quality of life due to oral health problems (60% higher prevalence than non-Māori).

The 2009 NZOHS identified significant access barriers to dental care for Māori adults: 75% reported not seeing a dental professional often enough, 57% reported a current need for dental treatment, just over 60% reported avoiding dental care in the last 12 months due to cost, and 38% reported forgoing recommended routine dental treatment due to cost. Only 27% reported that they usually visit a dental professional for a check-up rather than for a problem, and 53% reported usually seeing the same dental professional for care or advice. Disparities between Māori and non-Māori were significant for each of these access indicators (Ministry of Health 2010a). These findings are consistent with previous studies (Ministry of Health 2008b; Schoen el al 2002).

2.2 Māori oral health interventions

In most oral health services in Aotearoa New Zealand, relatively few interventions have been targeted at meeting the needs of Māori adults, or at reducing Māori oral health disparities (Koopu & Keefe-Ormsby 2007). One intervention that, while not targeted at Māori, has had significant Māori uptake is Waikato's '100 Healthy Smiles' pilot for low-income adults, described in Section 6.

2.2.1 MĀORI ORAL HEALTH SERVICES

Most oral health interventions for Māori have been led or carried out by Māori health providers. Broughton (2006) sets the development of these services in the context of Māori self-determination, and the recognition of the need for Māori leadership in health. Access to services is a critical issue for Māori oral health. A community study by Broughton and Koopu (1996) found that only 27.8% of the people studied had had regular dental care after leaving school although 99.7% had had dental care as a child. This general picture of a massive drop-off in use of, and access to, oral health services after leaving school is supported by the extensive anecdotal material cited by Broughton (2006).

Broughton (2006) described three Māori oral health services, to establish the issues that Māori services face in developing, implementing and operating Māori dental services. Most services were funded to provide care to children and adolescents. Broughton compared different models of Māori health provision, one in the mainstream, one partnership, and one iwi-based. He also reported in detail on the Ratana Pā/Whanganui river dental service initiatives. Key characteristics of the services Broughton and others describe are:

- whānau/community focus – as in the whānau outreach support provided by Tipu Ora
- efforts to break down barriers to access, such as the Ngāti Porou mobile service waka hauora

- workforce development – for instance, in the Northland oral health strategy a key element was development of the local oral health workforce through scholarships for dental therapy trainees, work experience and the Ngāti Hine/Otago University student internship (Croucher & Ackermann, 2006).

Broughton (2006) found that barriers to the services' effectiveness included lack of adequate and continuing funding, and racism. The Ratana Pā mobile service was one service funded for only a short period of time with no funding for detailed evaluation, no sustained funding, and no funding to follow up, so that oral health gains were unlikely to be sustained. This experience is consistent with the experience of many Māori health providers (Broughton 2000, 2004). Broughton found high interest among Māori providers in improving oral health, especially in reducing inequalities and providing access to under-served populations and areas. However, finding, developing, and retaining an appropriately skilled workforce was a challenge, as was sustaining funding.

2.2.2 BARRIERS FOR MĀORI ACCESSING ORAL HEALTH CARE

Distance is one barrier to service access for many Māori communities. Other concerns include high costs (both immediate and continuing) and fear about pain and discomfort (Broughton 2006; Sussex et al 2009) particularly for older people whose experience of oral health was of treatment with no pain relief, little information, and little follow-up.

Broughton and others suggest that the individualistic model of oral health policy, planning, and funding does not match Māori needs to consider oral health in the context of the whole whānau's health and well being (Broughton 2006; Koopu & Keefe-Ormsby 2007). The traditional focus of Aotearoa New Zealand's oral health systems on children's oral health may have particular disadvantages (Ministry of Health 2006a, 2008a.) A parent or elder's poor oral health may impact on tamariki in terms of modelling health behaviours (such as diet and oral hygiene) and their perceptions about the safety, effectiveness, and value of oral health services. In practice, many Māori oral health services already take this 'whānau-based' approach (Mauri Ora Associates 2004) and service providers who participated in other parts of this project talked about using the opportunity of tamariki coming in for treatment to discuss oral health with the caregiver, and in some cases to provide services to the caregiver. Croucher and Ackermann (2006) give an example of mainstream services extending their services in the same way.

3 Oral health of Indigenous peoples in Canada, Australia, and the United States

This section focuses on Indigenous people in developed nations, particularly Australia, Canada, and the United States, whose oral health experience is most relevant to Māori. Topics include oral health status, how oral services for these populations are organised, and the oral health research being done by and with those peoples. Health promotion for Indigenous peoples is detailed in Section 7.

3.1 Oral health status of Indigenous peoples

There is limited data available on the oral health of many Indigenous peoples. Their data may not be included in surveys, may be included but ethnicity information not collected, or they may be included in such small numbers that no useful data by ethnicity can be produced (Australian Institute of Health and Welfare [AIHW] Dental Statistics and Research Unit 2000; US Surgeon-General 2000). Overall, as with New Zealand Māori (Koopu & Keefe-Ormsby 2007) Indigenous populations have worse oral health status than their non-Indigenous counterparts and poorer access to oral health services.

Oral health for the Indigenous Aboriginal/Torres Strait Islander people of Australia is significantly poorer than that of non-Aboriginals (AIHW Dental Statistics and Research Unit 2000; AIHW Dental Statistics and Research Unit 2003a; Brennan et al 2007; Schamschula et al 1980; Williams et al 2011). This pattern is consistent across states, although there are some variations and some differences between different Aboriginal or Torres Strait Islander groups (Kruger et al 2008; Smith et al 2007). The rate of edentulism among Aboriginal people over 24 years was twice as high as their non-Indigenous counterparts and in those aged 25–64 years using public services, rates of periodontal disease and caries were more than twice as high (AIHW Dental Statistics and Research Unit 2000).

Rates of dental decay among Canadian Aboriginal peoples (also called 'First Nations') and Inuit are similar to those of low-income Canadians as a whole; recent immigrants; and people with compromised health conditions (Federal, Provincial and Territorial Dental Directors 2005; MacEntee et al 2001). Dental decay rates are three to five times higher for First Nations and Inuit people of all ages than for the non-Aboriginal population (Federal, Provincial and Territorial Dental Directors 2005). For example, a community study for the Sandy Bay First Nation of Manitoba (Brothwell & Ghiabi 2009) found periodontal disease in almost all study subjects. The researchers said they were unsurprised by the results, as the community had a single dentist providing service only one day each week. The study results were intended to help "redefine the community's oral health programs and form a basis from which to lobby for additional dental program resources" (Brothwell & Ghiabi 2009:24).

US Indigenous peoples are ethnically diverse, with Alaskan Native peoples (also known as Inuit), the American Indians/Native Americans of the continental US, and the Polynesian Indigenous people of Hawai'i all being distinct groups. However, these groups share common experiences of colonisation with loss of land, economic base and social structure. According to the Center for Native Oral Health Research (2010), nearly 25% of American Indians/Native Americans over 65 are completely edentulous. Oral health statistics for Hawai'i are among the worst in the nation, with 37% of the state's population having limited or no access to dental care, and Indigenous Hawai'ians having high rates of dental disease (Hawaiian Islands Oral Health Task Force 2001; Kanna 2004). Until recently, the Indigenous population's health needs were not given recognition or priority (Harrigan et al 2005).

The US Indian Health Service (IHS) has conducted three surveys since 1984 of the oral health status and treatment needs of American Indian and Alaska Native (AI/AN) dental patients served by the IHS, urban, and tribal dental clinics. These surveys report on adults and elders as well as on children and adolescents (Phipps et al 2002). Previous surveys had shown reductions in caries across the population, and reductions in numbers of edentulous elders (Niendorff & Jones 2000). However, the 1999 survey showed only a small reduction in the prevalence or severity of disease, compared to substantial reductions in the mainstream population. In some communities, rates of caries in young people had risen, which the report attributed to changes in diet, although among adults the survey found an "unexpectedly small proportion" with root caries (Phipps et al 2002:77). The report identified the need for research to establish the behavioural or environmental factors that may have contributed to this (Phipps et al 2002). Phipps et al (1991) found that among elders (65–74 years) years of education were associated with retaining more teeth. Education may be in part a proxy for other determinants such as urbanisation (which may improve access to health care), or income.

3.2 Contributors to Indigenous oral health problems

3.2.1 CHANGES TO DIET AND HEALTH BEHAVIOURS

Popat and Dinnage (2006) report on research from the 1970s and 1980s which linked differences in caries between Australian Aboriginals and non-Indigenous Australians to levels of sugar consumption. Jamieson and colleagues (2010) published a detailed study on risk factors for dental caries in young Aboriginal adults (aged 17–20) where soft drink consumption daily or several times a week; not owning a toothbrush; and being female was associated with greater odds of severe oral health issues. Martin-Iverson et al (1999) noted that interactions with other health problems – for instance, diabetes or rheumatic heart disease – can also contribute or exacerbate oral health problems.

3.2.2 BARRIERS TO ACCESS AND USE OF ORAL HEALTH SERVICES

While there are many commonalities between the oral health needs of Australian Aboriginal people and Māori, oral health for Aboriginal people has been complicated by the fact that many still live in 'remote' areas, sometimes thousands of kilometres from major centres (Jamieson, Armfield & Roberts-Thomson 2006; Kruger et al 2008; Simmons 2003). Many Canadian First Nations people live in similar remote communities (MacEntee et al 2001). Remoteness not only makes treatment hard to reach and maintain, but is also linked to other deprivations (Slater 2001). Oral health is worse in those areas, although this may be compounded by lack of fluoridation in rural areas, limited access to some foods including

fresh produce, and socio-economic disparities (Williams et al 2011). Services for people in rural/remote areas are extremely limited (Schwarz 2006). Australian Aboriginals had major problems with accessing services because of costs (AIHW Dental Statistics and Research Unit 2000; Brennan & Carter 1998), as did Indigenous Canadians (MacEntee et al 2001).

3.3 Oral health service models and funding

The Australian health insurance system excludes oral health care (Schwarz 2006). However, as will be discussed in Section 5, the Commonwealth (federal) government has supported some initiatives to improve oral health services, in particular the Commonwealth Dental Health Program (1994–1996) and a limited dental health service for people meeting special eligibility criteria. As a result, oral health care in Australia has been focused on treatment rather than prevention (Schwarz 2006). Oral health services for Aboriginal peoples include community-based services, and state and federal services and some tribe/nation-based services (Williams et al 2011).

Oral health services for Canadian First Nations and Inuit peoples are provided by tribal health providers; at provincial level (including in the Indigenous-governed Nunavut province); and at Federal government level (Federal, Provincial and Territorial Dental Directors 2005; Nash & Nagel 2005). However, this complexity can result in needs 'falling through the cracks': for instance, First Nations people need pre-approvals from Federal administrators for dental surgery and orthodontic treatment (Canadian Institutes of Health Research n.d.). Canada has an organisation of Indigenous dentists, and a national leadership position in the First Nations and Inuit Health Branch of the Federal government (Health Canada 2009). The Canadian Oral Health Strategy (Federal, Provincial and Territorial Dental Directors 2005) sets 'culturally sensitive' oral health promotion for Aboriginal peoples as a priority. The strategy says that "the burden of dental disease is now concentrated in less advantaged individuals, namely elderly, low income, transitional youth, Aboriginal, northern dwelling, and mentally and/or physically challenged individuals" (2005:22). In Canada, dental therapists are able to provide services on Federal crown lands and First Nation communities. The interventions we located were aimed at Indigenous children rather than adults (Harrison et al 2006; Nash & Nagel 2005). The Canadian Dental Hygienists Association has advocated strongly for improved oral health services for First Nations and Inuit people, particularly for preventive care (Ziebarth 2003).

In the US, poor oral health in Indigenous populations (Davidson et al 1996) has been accompanied by difficulties in providing oral care, partly due to structural problems and partly due to the lack of a national policy framework (American Dental Association 2008; US Surgeon-General 2000). In oral health service provision, the main distinction is between the sovereign nations/tribes with whom the federal government has treaty or similar relationships, and those with no relationship. For the first group, mainly nations with reservation lands, the federal government is responsible for health care (Martin 2000). The Indian Health Service (IHS) has provided most of the services, although in recent years some tribal nations have taken over health service provision (Reifel 2005). Many IHS dentists are employed as Commissioned Officers of the United States Public Health Service (USPHS); as a result IHS dental programmes have a strong public health focus, aiming to prevent as much dental disease as possible through organized prevention programmes and to limit existing disease through active clinical programmes (American Dental Association 2008; Martin 2000). The IHS service faces significant resourcing problems (Reifel 2005) and workforce shortages (Phipps et al 2002).

3.4 Interventions to improve Indigenous oral health

3.4.1 MAINSTREAM PRIMARY CARE INTERVENTIONS

One of the few interventions for Australian Aboriginal adults we located is Dental Health Services Victoria's (DHSV) dedicated Aboriginal Community Development Worker service. The workers' role is to "actively engage with and support members of the Aboriginal community in accessing oral health care" (DHSV, n.d.) with outreach services, help arranging appointments and supporting attendance (DHSV, n.d.). DHSV says that this service has led to a "significant increase in the number of indigenous patients accessing dental care" (DHSV, n.d.). The Royal Dental Hospital of Melbourne (part of DHSV) provides dental care treatment to Aboriginal and Torres Strait Islander people, whether or not they hold a services concession card. The service has also convened an Aboriginal Oral Health Reference Group to help improve oral health services for Indigenous peoples.

The Cairns Oral Health Service (Queensland) developed the "Crocodile Smiles 2" programme to improve the oral health of Indigenous children and their families living in Cape York and Cairns Health Service Districts. The programme originated with a pilot in which oral health staff, community members, and other allied health workers partnered to develop a whole-of-population approach to address the poor oral health status of children. The project provides support, advice, strategies, and resources for Indigenous Health Workers (IHWs). A 2005 evaluation (not available in full text) found that the approach had been successful in raising awareness of Indigenous children and families' oral health needs, and had supported capacity building (Clinical Practice Improvement Centre 2007).

In Canada, Macnab et al (2008) describe a school-based project for First Nations children in British Columbia which engaged with parents through meetings and presentations. Meetings with elders and community health workers identified oral health as an issue "with the potential to show positive results in a relatively short period of time, and have a significant impact on a wide range of First Nations issues – from self-esteem to long-term cardiac health." (Macnab et al 2008:2). The project used staff and students of the University of British Columbia, and an additional aim was to develop students' ability to work with Indigenous peoples. The project evaluation found both improved children's oral health behaviours, and increased community interest in oral health.

3.4.2 INDIGENOUS MANAGED OR OWNED ORAL HEALTH SERVICES

Australian Aboriginal-owned health services may use both modern Western approaches and traditional methods or interventions (Beare & Slough 2005; Jamieson, Parker & Richards 2008). According to Beare and Slough (2005) many Aboriginal people prefer traditional bush medicine delivered by ngangkari (trained spiritual healers). The Pika Wiya Indigenous-owned service (South Australia) has developed its own dental program (Parker et al 2005; Parker & Jamieson 2007; Pika Wiya Health Services 2010).

We found little information on Indigenous-owned oral health services in Canada. There were references to Indigenous oral health care development in the Indigenous-controlled province of Nunavut, but the material was not able to be retrieved.

Many US native tribes have elected to manage their own programmes, and have requested and received their share of IHS administrative funds to use in their programmes (Reifel 2005). However, only 1.5 million of 4 million American Indians have access to IHS services. People without access to IHS services are highly likely to be uninsured (Benjamin 2007). Reifel (2005) describes how the California Rural Indian Health Board developed its

own clinics. Tribes throughout California took advantage of 1975 legislation that allowed Indian tribes to contract with the Indian Health Service to manage their health care. As of 2005, 34 tribes and tribal consortia in California operated more than 60 dental clinics (both rural and urban), employed over 120 dentists, and treated around 42,000 adults and children a year. According to Reifel (2005) tribal services focus more on prevention than do state-funded or private services. Sekiguchi et al (2005) describe a similar model in Alaska, with each native tribe responsible for the dental care of its members, organised through the collaborative Alaska Tribal Health System. This model includes Dental Health Aides, a programme begun in 2001. Indigenous people are trained as community health aides, providing "overall health care, health promotion, and disease prevention" (Sekiguchi et al 2005:770) in Alaska Native villages. The health aides are supported through regular phone contacts with 'supervising physicians' in 'hub' locations.

3.5 Indigenous oral health research

Australia benefits from having a national oral health research centre, the Australian Research Centre for Population Oral Health (ARCPOH) at the University of Adelaide. This centre supports researchers to develop their skills, as well as supporting some Aboriginal oral health research and providing ways to disseminate research such as conferences and website reports. The Centre is also responsible for the Oral Health Promotion Clearinghouse, which lists relevant research and makes it available through a website. The Centre for Rural and Remote Oral Health at the University of Western Australia in Perth also carries out research and has supported Indigenous communities to develop oral health projects, in collaboration with Aboriginal groups (Pacza et al 2001).

A Canadian National Oral Health Planning Workshop (Canadian Institutes of Health Research 2002) discussed the need for research to improve Canadian Aboriginal people's health, and the summary discusses a proposal to ensure research was funded. The Manitoba Institute of Child Health organised a national research forum on 'Oral health and the Aboriginal child' in 2007. Many of the issues raised, such as "how to develop and conduct oral health research that honours and integrates traditional Aboriginal beliefs about health, disease and healing …. Strategies for incorporating the wisdom of elders into planning and conducting oral health research … the changing role of elders, revival of traditions and ceremonies, acknowledging each community's uniqueness and dissemination of information to communities" (Schroth et al 2008:430) are clearly applicable to the oral health of Indigenous adults as well as children. The forum also advocated that oral health be made a 'family issue' and a 'community issue' rather than being seen as individualised.

The US Center for Native Oral Health Research (CNOHR) is a collaboration based in the University of Colorado. It works with both the University's dental school and with the Colorado School of Public Health. The Center also collaborates with other centres for native/ American Indian health (Albino & Orlando 2010). Oral health care is strongly privatised and individualised in the US, which may have limited the amount of research on Indigenous peoples' oral health (US Surgeon-General 2000). In Hawai'i, tribal health services and the University of Hawai'i's local initiatives have partnered to develop community research capacity (Easa et al 2005; Shomaker et al 2005).

4 Oral health of elders

There is a significant amount of literature on oral health and older people, which is increasing as the populations of developing countries are ageing (McGrath et al 2009; Petersen & Yamamoto 2005). The World Health Organisation (WHO) programme 'Ageing and the Life Course' promotes oral health for the elderly. Programme policies are underpinned by the principles of health, social participation and security. Oral health is a key aspect of the programme, and is included in the health policy component (Petersen & Yamamoto 2005). However, Indigenous populations, or minority populations, are rarely mentioned in the literature (Jones, Niendorff & Broderick 2000).

4.1 Oral health status of elders

Age-related changes increase the risks of caries from factors such as gum loss and decay around previous dental work (Jablonski et al 2005). Petersen and Yamamoto (2005:84) describe studies finding that in older populations, dental caries is "a major public health problem" with higher occurrence in people who have a low income, have a history of irregular dentist visits and infrequent teeth brushing, have high sugar consumption, and who smoke. Similar factors shape periodontal disease risk, which is also increased by greater plaque formation from gingival recession. Caries and periodontal disease are the major factors contributing to tooth removal, with tobacco use another risk factor (Jette et al 1993; Petersen & Yamamoto 2005).

There is some evidence associating edentulism with lower oral health-related quality of life (Borrell 2008; Palmer 2004) but it is not clear whether this is a causative relationship. Edentulism is also associated with higher risk of cardiovascular disease (Dietrich et al 2008). Edentulous people have lower intakes of nutrients, and are more likely to eat an unhealthy diet even when socioeconomic status is taken into account (Joshipura & Dietrich 2009; US Surgeon-General 2000). Walls (2008) found that the fewer the teeth the lower the nutrient intake, and noted that people with partial plates reported high rates of problems with chewing and also had lower nutrient intake. Edentulism is strongly associated with social-economic factors: Joshipura and Dietrich (2009) state that in developed countries edentulism is becoming associated with lower socioeconomic status (SES), and Petersen and Yamamoto (2005) report epidemiological findings of a higher risk of edentulism for people with lower income, social class and education compared to people with higher income and greater education). A mix of factors contributes to this, including poor access to oral health care, and previous loss of teeth. There are also gender differences, with women more likely to have lost all teeth and have dentures (Joshipura & Dietrich 2009; Sussex at al. 2009), and there are substantially more women than men in the over 60 age group. Edentulism is decreasing in developed countries (Palmer 2004), but while keeping one's own teeth

improves nutrition, it also places older people at risk for caries and increases their need for oral health services (Joshipura & Dietrich 2009), including complex, expensive services (e.g. periodontal and endodontic treatment) which are generally not covered by private health insurance (Borrell 2008).

The 2009 NZOHS found 30% of people aged 65–64 years and 40% of those aged 75 years and over were edentulous* (Ministry of Health 2010a). The prevalence of having a functional dentition (21 teeth or more) among dentate New Zealand adults aged 65–74 years living in permanent private dwellings had more than doubled between 1976 and 2009 (from 23.7% to 54.9%) (Ministry of Health 2010a). Carter et al (2004) found in a Christchurch residential care study that 32% of participants were (at least partially) dentate, compared to 16–19% in the previous decade. Carter et al did not ask about participants' ethnicity of participants. Sussex et al (2009) found that edentulism in Aotearoa New Zealand was in part a response to poor access to dental services, especially in rural areas, as well as to high costs.

Oral cancers are the "most serious and potentially fatal condition among older adults" (Joshipura & Dietrich 2009:248; see also Crete Declaration on Oral Cancer Prevention, WHO 2005). Both incidence and mortality are highest among people aged 65 and older (data on oral cancers among Māori are discussed in the full research report, Robson et al 2011). At the same time, systemic diseases, including age-related ones, interact with oral health problems and may exacerbate them (Borrell 2008; Jablonski et al 2005; Pearson & Chalmers 2004). For instance, dependency for oral care and the number of decayed teeth are predictors for aspiration pneumonia (Carter et al 2004), and Joshipura and Dietrich (2009) identify chronic pain as one result of such interaction.

WHO supported research confirms that across countries, inequalities in oral health are even higher in older people than in younger age groups (Kandelmann et al 2008; Petersen & Yamamoto 2005). The US Surgeon-General's report (2000) also identified oral health as an issue for older people, and emphasised the need to reduce disparities including by race/ethnicity. Disparities in childhood and adulthood persist into old age (Borrell 2008; Borrell et al 2004). A small New Zealand study interviewed 19, mainly European, older people aged 65 to 87. It found that affordability of dental care shaped their decision-making, with some people opting for problem-focused dental care rather than preventative care at a time when they were experiencing many more dental issues (Giddings et al 2008). There may be unequal oral health care of old people by ethnicity – for instance, in the United States people from some ethnic groups were less likely to get major therapeutic treatment even when cost was not an issue (Borrell 2008; US Surgeon-General 2000).

As mentioned in the discussion of edentulism, nutrition is important not only for overall health, but for oral health; a diet high in vegetables and fruits reduces caries formation (Joshipura & Dietrich 2009) and is associated with lower tooth loss (Sheiham et al 2001). Interaction with medications can also contribute by reducing salivation (Joshipura & Dietrich 2009).

As discussed later in section 7, smoking is a significant contributor to oral disease linked to periodontal disease and to tooth loss (Jette et al 1993; Petersen 2003a; 2005b). Jette at al (1993) found that duration of tobacco use was linked to tooth loss, caries and periodontal disease, independent of other social and behavioural factors. Jette et al also aimed to find out whether the oral health effects of tobacco use persisted after quitting (whether quit-smoking interventions can improve oral health). Findings indicated that the effects were not reversible, and the authors concluded that for older people secondary prevention would

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*   Results for older Māori were not reported.

be the most important intervention. Smoking remains an issue for many Māori elders (Ministry of Health 2007b).

4.2 Oral health interventions for older people

Brondani et al (2007) reported on a developing Canadian model of oral health based on the International Classification of Functioning, Disability and Health (ICF), and tested with groups of Canadian elders (not including First Nations people). Elders considered that diet, economic priorities, personal expectations (of their level of oral health) and health values and beliefs were elements of a model relevant to them. Research has been done in other countries on elders' own views on oral health care. In one qualitative study older people described many negative experiences with dental care, especially in childhood (Borreani et al 2009). Similarly, Sussex at al (2009) in Aotearoa New Zealand found negative experience of school dental services had been imprinted strongly on many participants. Other perceptions, such as whether visiting a dentist is just 'putting off the inevitable' need for dentures, seemed to be strong among older non-Māori New Zealanders (Sussex et al 2009). Borreani et al (2009) concluded that just reducing costs or providing more oral care to older people would not be effective enough in encouraging elders to use services, and that services needed also to break down fears and support elders into oral health services.

4.2.1 HEALTH PROMOTION FOR OLDER PEOPLE

McGrath et al (2009) carried out a major review of evidence on the effectiveness of oral health promotion for older people. In the studies they reviewed, health promotion focused on the goals of preventing caries, improving periodontal health, and altering oral health behaviours. Activities were mainly individualised, and targeted at the older person, mainly elders living in the community. The review identified interventions that showed effectiveness in reducing periodontal disease (e.g. powered toothbrushes, acetate/xylitol chewing gum). Interventions involving fluoride, antimicrobial agents, and personal health education all reduced caries. None of the studies reported on interventions to improve access to services. McGrath et al noted that few studies had any longer-term follow-up to assess health outcomes, or process outcomes such as health behaviour maintenance. Lamster (2004) also argued for improving awareness among older people (and their families and caregivers) about the importance of oral health as part of overall health maintenance. Petersen and Yamamoto (2005) noted that the WHO has supported demonstration projects.

4.2.2 PRIMARY INTERVENTIONS TO IMPROVE ORAL HEALTH FOR ELDERS

Access, cost, and fear about oral healthcare services affect elders' use of primary oral health services. In countries with health insurance, insurance cover may include oral health care. However, this is often linked to previous employment (Canadian Dental Hygienists Association 2007; US Surgeon-General 2000), disadvantaging (among others) older people who have been without work, and those who have been casual workers.

Marshall et al (2009) describe the ElderSmile programme in the US, which was adapted from a similar programme for children. The programme had clear goals and evaluation. Services are located in areas with numbers of older people, especially vulnerable groups (low income, immigrants, and minority populations). ElderSmile runs in prevention

centres, senior centres and other locations where elders gather. The centres host health promotion activities – in particular recognising the needs of elders with languages other than English – demonstrations on care of teeth and dental prosthetics; oral health and oral cancer examination services, followed by support including transport to access dental care if needed. Dental care expertise is brought in by dental students. Slade (2007) reported on a South Australian project to provide oral health assessments (with care planning and referral) for older people, which included Aboriginals over 55. However, the evaluation of the project did not report ethnicity results for Australian Aboriginals.

The Australian federal government initiated a national *Better Oral Health in Residential Care Training* project in 2009, to "provide an increased awareness of oral hygiene issues for the staff in daily contact with residents" (Department of Health and Ageing 2009, n.p.). The initiative plans to train "up to two registered nurses or dedicated trainers" in each government-funded residential aged care facility, multi-purpose service and Indigenous flexible residential aged care service." The trained staff would then pass on training to others. According to the announcement of the initiative, nurses would also "be provided with the tools to enable them to undertake oral health assessments and oral health care planning" (Department of Health and Ageing 2009, n.p.). McKelvey at al. (2003) found that staff in New Zealand rest homes had received very little training in oral health and related issues, such as medication effects.

 Ahluwalia (2004) lists the steps needed to improve elders' oral health, including educating GPs and geriatricians about the links between oral health and other problems; training caregivers (including families) and ensuring that all organisations that work with elders have appropriate skills, knowledge and resources. A national review of US oral services for elders also supported the need for dentists to have skills in identifying elders' needs (Lamster 2004).

Characteristics of effective oral health programmes for elders include active interest by dental professional organisations; government commitment; and strong links with networks and advocacy groups for elders (Strayer 1989).

5 People with special needs, disabilities, or who are medically compromised

An action point of the Ministry of Health's national oral health strategy (2006a) is to develop appropriate definitions of distinct groups within the categories of people with special needs, disabilities and who are medically compromised. Ettinger et al (2004:803) cite Glassman and Miller's 1998 definition of "special needs" as referring to "medical, social, psychological, or physical conditions that make it necessary to modify the normal course of dental treatment. Examples of such conditions include medical and developmental disabilities, problems associated with ageing and psychological problems". Ettinger et al also note the Royal Australasian College of Dental Surgeons' (n.d.) definition: "that branch of dentistry concerned with the oral health of people adversely affected by intellectual disability, medical, physical, or psychiatric issues that require special methods or techniques to prevent or treat oral health problems or where such conditions necessitate special dental treatment plans".

While people with addictions have not been included in this review, they are also a vulnerable population with evidence of oral health problems (Reece 2009).

5.1 People with disabilities

Māori have higher rates of most disabilities than non-Māori. A recent survey found 95,700 Māori living in New Zealand households (17%) were estimated to have a disability (Office for Disability Issues and Statistics New Zealand 2010). The age-standardised disability rate for Māori was 19%, compared to 13% for non-Māori. People with disabilities are a very diverse population, and from an oral health perspective, disability support and treatment needs will vary by type and severity of impairment.

Workforce skills and knowledge are a key theme in the international literature on dental care to people with special needs. There are very few Special Needs Dentistry Specialists in New Zealand.

Glassman et al (1994) note that in the mid-20th century, when institutionalisation of people with intellectual disabilities was common in developed countries, there were many institution-based preventive dentistry programmes. With deinstitutionalisation, these services were not replaced with appropriate and accessible community services. Removing 'activities of daily living' programmes for people with intellectual disabilities eroded access to information and training. There was also evidence that family and other informal caregivers were not aware of the importance of oral health or how to achieve it. Many did not see treatment as beneficial or gave it a low priority compared to other needs. Similar

issues apply to people with physical disabilities in the move to community-based disability services (Glassman et al 1994; Glassman & Miller 2003; 2009; Pradhan 2008).

Scott et al (1998) found that 90% of people with developmental disabilities in an Australian survey needed dental treatment. Koneru and Sigal (2009) found in a Canadian survey that people with developmental disabilities, and most caregivers, believed that oral health was important for their overall health. Findings included high rates of access among respondents, but as the respondents were reached through service providers it is possible that people who do not have access to such providers may have differential access to appropriate oral health care. Fenton et al (2003) and Mouradian and Corbin (2003) noted the lack of initiatives to improve the oral health of people with intellectual disabilities.

Among the few interventions found were outreach programmes aimed at caregivers, both formal (e.g. agency home care workers, care workers in residential services) and informal (whānau), recognising that carers often have limited formal education (Glassman et al 1994; Glassman & Miller 2003). The programmes focused on preventive practice, with a practical focus on daily routines including modified oral hygiene tools, positioning, and ensuring participants understood why dental care is so important for a person's whole wellbeing. It was also essential to engage the person the carer worked with, and find ways to help break down fear or resistance. The programme was well evaluated by participants. The programme aimed at 'pyramid training' – training initial participants to train others.

A US study of people with spinal cord injuries found that physical barriers (related to the examination room and dental chair) and dental fear (fear or distrust of the dentist) were independent factors deterring people from visiting the dentist in the past year (Yuen et al 2010). Although the study did not investigate the underlying reasons for dental fear, the authors describe specific factors related to spinal cord injury, including access to dental care, difficulty clearing oral cavity secretions, and poor coughing ability due to the de-innervations or impairments of breathing musculature. They suggest that dentists use suctioning and pharmacological support, and implement guidelines for managing patients with mild dental fear. A Swedish qualitative study found that giving the patient an enhanced sense of control, and ensuring continuity of dental care provider, would improve the experience of dental care visits for people with disabilities (Halberg & Klingberg 2007). Dougall and Fiske (2008a) recommend aids to help with safe transfers between wheelchairs and dental chairs, or wheelchair reclining platforms that enable wheelchairs to tilt back so that people can remain in their wheelchair for the dental examination. Yuen and colleagues (2010) noted that the extent to which dental offices are accessible to wheelchair users in the United States is unknown, and recommend that dental providers make public whether they are wheelchair accessible.

Visual impairment may impact on access to dental care and oral health information and oral hygiene (Mahoney et al 2008). To improve access to dental services for people with visual impairment, services are encouraged to optimise physical access (e.g. keeping passages clear, providing well-lit areas), have large print signs, use contrasting colours, tactile maps and paths, modify communication styles to ensure the person knows what is happening, and provide oral health information in appropriate modes such as large print, Braille, or audio. Having a regular practitioner may also be helpful, as routes and building layouts become familiar (Mahoney et al 2008).

5.2 People with mental illness

The high prevalence of mental illness among Māori is well recognised (Oakley Browne et al 2006). Studies in developed countries have consistently shown very high rates of tooth loss and edentulism among people with mental illness (Almomani et al 2006; Broughton 2006; Kandelmann et al 2008). Not only do symptoms of mental illness such as avolition and apathy, loss of memory and perception disorders raise risks for poor oral health, but some anti-psychotic medications can cause xerostomia (dry mouth) (Almomani et al 2006). Other factors such as high smoking rates (see Section 7 on public health interventions) may also contribute to poor oral health (Almomani et al 2006; Robbins 2004). As well, people with mental illness are more likely to have low income compared to those without mental illness. This can create financial barriers to accessing services and good nutrition. Dental services in the community can be reluctant to treat people with mental illness (Almomani et al 2006). Broughton (2006) similarly argues that there is a relationship between oral health and mental health. The whakamā which many people suffer when they have visibly missing teeth is not only psychologically painful in itself, but may contribute to mental illness (Broughton 2006).

Almomani et al (2006) state that oral health programmes for people with mental illness are rare. They do cite small scale (50 participants) studies of people with serious mental illness which randomised participants to receive electric toothbrushes, education and reminders, or the toothbrush alone. The studies found improvement in plaque scores for all participants, with slightly more improvement in those who received the full intervention. Almomani et al argue that their findings are consistent with other research, and with studies showing that appropriate 'adaptive education' services can support people with severe mental illness to develop new personal skills. They emphasise the importance of appropriate training for the dental health workforce.

5.3 People with chronic medical conditions

Māori have high rates of rheumatic heart disease, coronary heart disease, diabetes, and asthma (Robson & Harris 2007) all of which have implications for clinical oral health treatment (Broughton 2006; Popat & Dinnage 2006). "Medically compromised" people include those with Hepatitis B and C, and people with HIV/AIDS (Petersen 2005a; Petersen & Kwan 2004), as HIV can cause oral mucosal lesions and oral diseases. While a significant number of Māori have Hepatitis B (Robinson et al 2005) we were unable to locate any research on implications for oral health services other than the need for infection prevention (Broughton 2006; Mahboobi et al 2010).

Lamster (2004:699) said that "… oral infection is now recognised as a risk factor for a number of systemic diseases, including cardiovascular and cerebrovascular diseases, diabetes mellitus, and respiratory disorders". Popat and Dinnage (2006) say that people who have had rheumatic fever can contract bacterial endocarditis from a range of oral bacteria, and that oral health practitioners need to ensure patients are screened and given antibiotic prophylaxis where appropriate. One study found that oral hygiene services to people in long-term care reduced fevers and deaths due to pneumonia (Adachi et al 2002).

5.3.1 CARDIOVASCULAR DISEASE

There is evidence for a connection between poor oral health and cardiovascular diseases (Dietrich et al 2008; Kandelmann et al 2008) although a causal relationship has not yet been established. A number of meta-analyses show an association between periodontal disease and cardiovascular disease (Cullinan et al 2009). There are also indications of a 'modest' link between periodontal disease and fewer teeth, and stroke (Joshipura et al 2003), possibly mediated in part by diet and infection. Baseline tooth loss was a significant risk factor. However, a review commissioned by the United States Preventive Services Task Force to evaluate whether periodontal disease was a novel risk factor for coronary heart disease found that periodontal disease was independently associated with CHD (Humphrey et al 2008). Ylöstalo et al (2006) found only some relationship between angina and caries, tooth loss, and gingivitis, and argue that the associations found in other studies may be (at least partly) because of confounding factors, particularly smoking but also alcohol use, stress, diet and the presence of inflammatory diseases. Tran and Mannen (2009) emphasise the value of oral health in improving the health of people who have had strokes, particularly training general healthcare workers to understand the relationship between oral health and reducing systemic diseases.

Some studies have found that loss of life, and disability from cardiovascular disease, may be reduced with preventive oral health and appropriate treatment of periodontal disease (Canadian Dental Hygienists Association 2004). Ylöstalo et al (2006) also cite studies in which treating periodontitis reduced inflammatory markers for CVD.

Broughton (2006) notes that people need to be 'dentally healthy' to have cardiac surgery. In Aotearoa New Zealand, patients are assessed by District Health Board dental departments and treatment done before surgery. For some patients, the need for dental treatment may be a factor in being able to get timely cardiac surgery.

5.3.2 DIABETES

Loë and Genco (1995:501) describe periodontal disease as the most "prevalent complication of diabetes". Indigenous people, including Māori, have high rates of diabetes. For example, Native American Indian rates are up to three times that of the US population as a whole (American Public Health Association 2001). Skrepcinski and Niendorff (2000) found that Canadian tribal nations with highest rates of diabetes had the highest rates of periodontal disease, and in Australia Endean et al (2004) found higher rates of both periodontal disease and tooth loss among Anangu Pitjantjatjara people with diabetes.

Researchers believe that there is a two-way interaction between diabetes and periodontal disease (Kandelmann et al 2008). Treating periodontal disease is shown to improve metabolic management of diabetes (Lamster 2004), while the American Public Health Association, in an official statement on oral health complications in minority populations due to diabetes, concludes that "much of the vision loss, periodontal disease, and lower extremity amputation in diabetes mellitus is preventable through early detection and timely treatment" (2001:478). Kandelmann et al (2008:228) state that the "risk and severity of periodontal of disease are dependent upon the diabetics patient's glycemic control".

Esmeili et al (2010) found that while 61% of dentists surveyed thought addressing diabetes was important as part of oral health care, only 42% felt prepared to provide appropriate interventions, and Yuen et al (2009) found a similar situation for dental hygienists. Kunzel et al concluded that dental professionals need training in how to actively involve people with diabetes in their oral health care: "Patients should be educated so that they expect

more active management of both their systemic and oral health from their dentist as a component of appropriate dental care and inquire about or request it if they do not receive it" (2007:730).

5.3.3 OTHER HEALTH IMPACTS

Kandelmann et al (2008) cite several studies indicating associations between poor oral hygiene and respiratory infections. This is particularly so for older people in residential care, who are generally more at risk of respiratory infections, chronic bronchitis, and aspiration pneumonia. One hypothesis, not yet confirmed, is that oral bacteria may exacerbate COPD and aspiration pneumonia (Kandelmann et al 2008).

5.4 Dementia and oral health

5.4.1 ORAL HEALTH STATUS AND NEEDS OF PEOPLE WITH DEMENTIA

'Dementia' is the term used for a group of symptoms caused by illnesses such as Alzheimer's disease, vascular dementia and Lewy body dementia. Symptoms include progressive memory loss, disorientation and problems with cognitive functioning in areas such as reasoning and comprehension (American Psychiatric Association 2000). Dementia prevalence is related to increasing age, doubling five-yearly from ages 65–85 and older. In Aotearoa New Zealand at least 22 percent of people over 85 years have dementia (Ferri et al 2005). In 2008 it was estimated that 1,483 Māori had dementia (3.6% of a total population of 40,746 New Zealanders) expected to increase to 4,338 or 5.8% of the total population with dementia in 2026 (Access Economics 2008). Currently there are few specific services for Māori with dementia (New Zealand Council of Christian Social Services 2009).

Many studies and reviews have identified that dementia is associated with poorer oral health status. Seven studies in residential care services found people with dementia had a higher incidence of caries, reduced saliva flow and poor oral hygiene compared to controls without dementia (Rejnefelt et al 2006). In community settings, an Australian study of 116 dentate people with dementia compared to a similar group without dementia found that people with dementia experienced significantly more oral diseases, a notable decrease in denture use over one year; increased denture related ulcers, and increased caries (Chalmers et al 2003). Significantly fewer people with dementia saw a dentist in the year before the baseline examination and the one-year examination, compared to the group without dementia. The number of people requiring assistance with teeth cleaning increased from 24% at baseline to 58.2% at one year.

Some medications for the management of behaviour symptoms for dementia, and some antidepressants cause hyposalivation (or salivary gland hypofunction) or xerostomia (the feeling of dry mouth) (Friedlander et al 2006; Lam et al 2009). Dry mouth increases the accumulation of plaque, and can cause a severe growth in the rate of dental caries. Sugar-based medications may also increase the potential for dental caries (Dougall & Fiske 2008b). Issues for oral health professionals centre on the gradual loss of ability of people with dementia to communicate symptoms such as pain, uncertainty about the future outcomes of not treating apparently asymptomatic oral conditions, and the continuing loss of ability to provide oral self-care, tolerate dental treatments and understand and consent to treatment (Ettinger 2000). Safety of the patient is also an issue (Ocasio et al 2000). An American study

of 21 nursing home residents found significant under-detection and under-treatment of dental problems in people with dementia (Cohen-Mansfield & Lipson 2002).

5.4.2 ORAL AND GENERAL HEALTH ASSESSMENT

The literature stresses the need for detailed oral and general health assessment. The dental health professional may be the first health professional to recognise an issue with dementia, so it is important that they have knowledge of dementia (Ghezzi & Ship 2000; Little 2005). Research recommends treatment plans tailored to meet individual needs in terms of cognitive ability, management of activities of daily living, social functioning and level of oral health and dentition (Ettinger 2000). Including dentists in multidisciplinary teams may also improve planning and avoid crises (Dougall & Fiske 2008). Extensive work should be done as early as possible (Ghezzi & Ship 2000; McCann 2000) along with planning for future issues. Prevention strategies such as using saliva substitutes and stimulants, topical fluoride, good oral hygiene, and regular dental visits are also important (Ghezzi & Ship 2000; Little 2005).

5.4.3 ENABLING ORAL HEALTH CARE

Contemporary approaches to caring for people with dementia are informed by the concept of personhood, recognising that people live within relationships created through their personal history and interactions (Frenkel 2004; Kitwood 1997). While the term 'person-centred care' is commonly used to recognise a focus on respecting personhood, conceptualising care as 'family/whānau-centred care' draws attention to the central role of whānau in providing care and support to people with dementia (New Zealand Council of Christian Social Services 2009). The main carer of the person with dementia acts as the key decision-maker, and is "usually the single most important factor in determining if dental treatment will be sought or in deciding the extent of care" (Henry 1999:715).

Best practice evidence for maintaining the oral health of people with dementia living in residential care includes (i) regular dental assessments by a dentist and oral health assessment by trained nurses and caregivers; (ii) oral health care including appropriate teeth and denture cleansing; and (iii) practical education for caregivers on oral health care for people with dementia (Pearson & Chalmers 2004). These guidelines are also appropriate in home settings. Caregiver education on providing oral care includes regular timing for oral care, explanations, breaking up the task into small steps, putting a list of the steps in the bathroom, keeping equipment labelled and in the same place and not assuming the person has remembered to clean their teeth (Henry & Smith 2004).

Oral health assessment and dental treatment are challenging. The person with dementia should always be "a part of, rather than the object of, any discussion" (Gitto et al 2001:224). Experienced dentists stress developing positive relationships with patients and caregivers, only wearing a mask when necessary, and scheduling appointments early in the day (McCann 2000). Other suggestions include minimal noise and activity, clear simple communication, and continuity of health professionals (Little 2005; Friedlander et al 2006; Sacco & Frost 2006). Chalmers (2000) suggests behaviour management and communication techniques including 'chaining' based on task breakdown (the carer starts an activity such as putting toothpaste on the brush, then puts it in the resident's hand for that person to complete the activity). As dementia progresses and treatment becomes difficult, maintenance of teeth and existing dentures is promoted (Ghezzi & Ship 2000). The literature stresses the need to adapt to the person's needs according to the severity of the dementia. In the early stages,

while there may be the need to repeat questions and allow for time for decision-making, "most restorative and rehabilitative dental care can be provided with minimal modification in technique" (Friedlander et al 2006:1247). When there are more substantial issues with communication and cooperation the focus shifts to preventing pain and infection through scaling by hand and controlling caries (Friedlander et al 2006) along with maintaining rather than replacing dental prosthetics. Minimal intervention dentistry is a philosophy of managing caries focusing on assessment, early detection and prevention of problems, and in challenging circumstances with restorative treatments using carefully chosen materials (Chalmers 2006). In the end stages of dementia, dental practice will focus on treating sources of pain (which can be difficult to interpret) and infection. Issues with impaired swallowing and higher risk of aspiration require adaptation of usual practices (Friedlander et al 2006).

5.5 Women in pregnancy

The substantial body of literature on this topic is summarised in a review commissioned by the Ministry of Health (Murdoch Children's Research Institute 2009). Poor oral health affects the health of both a pregnant woman and her fetus (Hajikazemi et al 2008; Moua 2006; Murdoch Children's Research Institute 2009). However, most studies have focused on effects on the fetus (Xiong et al 2006). According to some studies, high bacterial loads resulting from periodontal disease increase risk of miscarriage, premature birth and low birth weight (Murdoch Children's Research Institute 2009; Xiong et al 2006). Other health behaviours, notably smoking, may be an interacting contributor, or a partial confounder (Xiong et al 2006). The strongest associations are found in women from economically disadvantaged families, and in countries which do not offer universal health care during pregnancy, indicating that "the effects of periodontal disease on adverse pregnancy outcomes may be different according to socio-economic status and access to dental care" (Xiong et al 2006:141).

US studies found that neither maternity carers nor dental carers adequately recognised or addressed the link between periodontal disease and problems in pregnancy (Lydon-Rochelle et al 2004; Morgan et al 2009). Women who had not received oral health advice during pregnancy were also those most likely not to have received advice on smoking cessation or other health needs (Lydon-Rochelle et al 2004). While pregnancy is seen as an opportunity to address multiple health needs, this relies on all health professionals connecting and sharing information (Lydon-Rochelle et al 2004; Murdoch Children's Research Institute 2009). Morgan et al (2009:738) say that "A large step towards improving oral health during pregnancy could be as simple as having [maternity carers] inform all pregnant patients of the importance and safety of oral care during pregnancy, advise all pregnant patients to receive routine dental care, and provide all patients with a list of preferred dentists."

There is some evidence for the effectiveness of interventions to improve the oral health of women when pregnant. A systematic review by Xiong et al (2006) found three clinical trials in which treatment led to a 57% reduction in preterm low birthweight and a 50% reduction in premature births. However, three recent US trials found no evidence of decreased rates of preterm birth from active periodontal treatment during pregnancy (Macones et al 2010; Michalowicz et al 2006; Offenbacher et al 2009) with one study indicating a possible greater risk of preterm birth from scaling and root planing (Macones et al 2010). However, these

studies showed that periodontal treatment improves the oral health of pregnant women (Boggess 2010).

Oral health interventions for mothers may also have long-term benefits for children (Meyer et al 2010). Meyer et al (2010) report on a health promotion programme targeted at women in pregnancy. The intensive intervention included examinations, personal education and preventive treatment. The researchers followed women through pregnancy, then followed the women and their children until the children were 13 to 14. They compared outcomes to those in a control group, finding that the intervention group had significantly higher rates of caries-free teeth. Meyer at al assert that their results are similar to those from intensive primary care interventions in other countries.

Makowharemahihi (2006) found that Māori pregnant women faced considerable barriers to accessing dental care, revealing inequities even in government-funded 'safety net' services. There were few opportunities for preventive care, and poor links between dental and midwifery professions.

6 People on low incomes and oral health

Relatively little research addresses low income and oral health, independent of other factors that contribute to social inequalities. This section therefore discusses 'reducing inequalities' in a broader sense. The British Dental Association (2009:2) says that "Socio-economic factors are recognised as being key determinants of oral health inequalities. These include deprivation, age, gender, ethnicity, environment, psycho-social, poverty and lifestyle."

6.1 Oral health status of low-income people

The literature reviewed found that cost was a key factor in service use, including for kaumātua and people with disabilities. International comparisons found New Zealanders the most likely of five nations studied (Australia, Canada, the UK, and the US) to defer seeing a dentist when needed (Schoen & Doty 2004). The 2009 NZOHS found large disparities in oral health status between people living in high deprivation areas compared with people in areas of low deprivation, including higher levels of edentulism, missing teeth, untreated coronal decay, and periodontal disease, and significantly higher levels of unmet need for dental care due to cost (Ministry of Health 2010a).

The British Dental Association (2009) refers to surveys showing that people in more deprived areas were less likely to have retained some of their own teeth than people in less deprived areas, and were more likely to "have some teeth with cavitated decay" (2009:2); findings in common with those of Celeste et al (2009) in Brazil, and Jamieson and Thomson (2006) in NZ. Mason et al (2006) reported on a large-scale UK longitudinal study which showed that people from a 'more advantaged social class' at birth and during childhood, and with better housing conditions at birth, had the lowest negative impact on oral heath on their daily activities; however, these effects were stronger for men, while factors during adulthood had more effect on women. An Australian survey found that "distribution of population [oral health quality of life] follows a socioeconomic gradient", and that "personal control, stress, and social support were linked to income, dentally relevant behaviours" and oral health quality of life (AIHW Dental Statistics and Research Unit 2003b:6).

Sabbah et al (2009) studied the relationship between socioeconomic disparities and health-related behaviours, to assess if behaviours eliminated socioeconomic disparities in oral health. They found that health-related behaviours lessened but did not eliminate socioeconomic disparities in oral health. Sabbah and colleagues concluded that the determinants were more complex, and needed to be addressed in a public health context. Sanders (2007:vii) supports this, saying that "despite the wealth of evidence for the primacy of social determinants of health, public policy does not generally take action on them. Somewhere between recognition of their role and the setting of public policy, attention to the social determinants is lost".

Explicit causal links have been made in studies such as Thomson et al (2002) who found that rising rates of dental caries among Māori children in one region matched the rise in parental unemployment. This relationship could have been mediated through changes in diet, costs being a barrier to service access, and/or other factors.

In Australia, oral health difficulties are often linked to the very low overall socioeconomic status of the Indigenous people which includes remote location – although around 70% of Aboriginal people live in urban centres (Fredericks et al 2008) – serious housing problems; problems with access to clean water and fresh or healthy food; low education; and generally poor access to health services (AIHW Dental Statistics and Research Unit 2000; 2003a; Roberts-Thomson et al 2008; Pacza et al 2001).

In the US, Jones (2006) discusses the persistence of health disparities between Native American Indians and the mainstream population. Jones concludes that the "existence of disparities regardless of the underlying disease environment is actually a powerful argument against the belief that disparities reflect inherent susceptibilities of American Indian populations. Instead, the disparities in health status could arise from the disparities in wealth and power that have endured since colonization" (2006:2131–2132).

6.2 Low income and deprivation

The life course perspective is promoted as a useful explanatory approach for oral health inequalities because it can account for material, behavioural and psychosocial explanations (Sisson 2007). Modelling within the life course approach includes (i) the critical period, where disease origins are linked to exposure at sensitive developmental stages, (ii) accumulation, where disadvantage through life course has a cumulative impact and (iii) the pathway, where disadvantage indirectly impacts on social trajectories such as educational restrictions affecting social economic opportunity (Graham 2002). Thomson et al's (2004) New Zealand longitudinal cohort study provides evidence to support life course explanations, finding significant risk profile differences for dental caries and periodontal disease for adults who were socioeconomically disadvantaged at five years of age.

Chaves and Vieira-da-Silva (2008) use Bourdieu's concept of *habitus* – social positioning shaped by practices informed by the elements of cultural (education and family resources) and economic capital and social pathways – to frame their qualitative study of 22 participants' oral health practices and dental care access in Brazil. Findings included those with less cultural and economic capital visiting the dentist according to need for treatment, rather than for maintenance and prevention purposes. All participants wanted an attractive smile, but extracting teeth rather than restoration was the preferred treatment for those with less cultural and economic capital – though for several it was the only option offered. The study noted that dental education was not tailored for those living in poverty but was rather "formal, empty and devoid of any meaning for the clients" (Chaves & Vieira-da-Silva 2008:125). There is comment internationally that people with limited material means view dental care, particularly restorative dentistry, as a non-essential item (Chaves & Vieira-da-Silva 2008; Exley 2009; Nations & Nuto 2002).

Sanders and Spencer (2005) studied why 'poor adults' in Australia rated their oral health poorly. They found that psychosocial factors explained variation within the study population, particularly high stress and 'personal constraint', and were more strongly associated with low self-rated oral health than tooth loss (in age-adjusted analyses). Women rated their oral health higher than men.

6.3 Interventions to improve oral health of low-income people

The majority of research studied recommended addressing the needs of low-income people either by extending health coverage and/or by integrating oral health with other community or primary health services (Fisher-Owens et al 2008; Jatrana et al 2009; Public Health Association of Australia 2009; Watt 2007). Spencer (2004) argues for a package of actions including expanding fluoridation (in an Australian context), improving health promotion for disadvantaged groups, and expanding service coverage. However, we found little evidence of these approaches being tried in practice.

The Australian Commonwealth Dental Health Programme (Slater 2001) aimed to reduce inequalities in access and oral health outcomes. The programme targeted people with Commonwealth high need status (Senior Card holders, Health Benefit and Health Care Card holders). Australian Aboriginal and Torres Strait Islanders were also target groups (Queensland also included a category called "South Sea Islanders"). The programme was intended to "promote the use of general services over emergency services, the provision of teeth restorations over extractions and prevention over treatment (Slater 2001:122). Slater's review of the programme in Queensland found that relatively high rates of Aboriginal and Torres Strait Islanders had accessed these services. Interestingly, the review also found that high numbers of Aboriginal and Torres Strait Islanders did not meet eligibility criteria for cards. The programme reduced waiting time for Aboriginal and Torres Strait Islanders, and was most successful in remote areas, although reports from services indicated this may have been due in part to Indigenous people being reluctant to place themselves on long waiting lists. Services perceived that Indigenous people tended to present when they needed a problem fixed immediately, but were likely not to return for follow-up treatment. Slater was not able to find reasons for this (e.g. lack of access to transport, being given needed information). Staff in services recognised this situation, and responded by trying to do as much treatment as possible in one session, which contributed to high rates of dental extractions for Indigenous people (Slater 2001).

Another model is the UK's NHS-funded dental access centres for people in need. The centres provide emergency treatment and follow-up. Chua (2009) cites research by Milsom et al (2009) showing that these centres reach people who are young, are more socially disadvantaged than the ordinary population, and have worse oral health. Chua suggests that this and other research indicates that services that only focus on immediate needs (such as pain relief) are not ideal. As people cannot access treatment which would stop oral health problems, they return regularly to crisis services.

A US initiative called 'Community Voices' (supported by the W.K. Kellogg Foundation) supports projects to improve access to oral health care for "uninsured and under-served populations" (Formicola et al 2004:702). The projects recognise growing ethnic/racial disparities. One project is New Mexico's 'Health Commons' model, which provides neighbourhood care sites where health services, including oral health, are co-located. The health commons model recognises that people with low SES often have multiple, chronic and interacting health problems, which are likely to have gone untreated for some time. The sites attempt to provide integrated services, such as diabetes management, oral health, and mental health, using interdisciplinary teams (Beetstra et al 2008; Formicola et al 2004). The project is supported by the University of New Mexico Health Science Center. All the 'Community Voices' projects are based on a local committee or working group to "build consensus on the problems and potential solutions" (Formicola et al 2004:703).

Waikato's '100 Healthy Smiles' pilot was aimed at low-income adults who needed oral health treatment, particularly Māori and Pacific adults (Horvath 2008). It was funded at up to $1000 per person, for 100 people. The first evaluation found financial savings of NZ$82,087 as a direct outcome of the pilot, taking into account that 12.5% of service clients had found employment following treatment. Participants also reported positive outcomes on some qualitative measures, including improved sleep; no pain; improved diet; and greater comfort with dentists and dental treatment (Horvath 2008). A final evaluation found benefit savings of $77,000, and savings of $53,000 from the change to a new funding model rather than Work and Income's 'standard emergency dental payment', bringing total savings to $130,000 (Waikato Primary Health 2008).

Jatrana, Crampton and Filoche (2009) reviewed inequalities in oral health care in Aotearoa New Zealand from a public health perspective. They note the distinction between funding subsidies for ordinary primary care and the 'user pays' model for oral health care. The result of this model is that "use of services is often prompted by symptoms, and services are mostly oriented towards relief of pain" (2009:43) rather than prevention. This in turn increases oral health inequalities. The authors contend that this contravenes the commitment to 'equitable access to health care' in the Alma-Ata Declaration on Primary Health Care. The solution Jatrana et al propose is to integrate oral health care into primary health care, within the framework of Aotearoa New Zealand's primary care strategy.

Watt (2007) and Watt and Sheiham (1999) have advocated for an 'upstream' approach to reducing oral health inequalities, moving from approaches which they describe as implicitly victim blaming. They argue that UK oral health policies focus on treatment, and do not address differences in access to healthy food, costs of toothbrushes and fluoridated toothpaste, and preventive care.

6.4 PRISONERS

> Last year I filled in a form in July. I didn't get seen till just before Christmas. But by then I'd already pulled it out myself. They'd given me Panadol, cloves, no good. It was too painful. I couldn't eat I was in so much pain. I was losing weight. It's not uncommon. I've pulled three out myself so far." – Research participant in the National Health Committee's investigation of the health of prisoners and their whānau (NHC 2010:86).

The recent investigation of the health of prisoners and their whānau by the National Health Committee identified oral health as one of the problem areas that lack "*systematic* identification, assessment, and treatment services" (NHC 2010:12). It found that there was "no coherent national vision for oral health services" in New Zealand prisons, and urged a review of oral health services in prisons (NHC 2010:85–86).

New Zealand imprisons 180 out of 100,000 people – one of the highest rates in the OECD (NHC 2007a). The number of people in prison has risen by a third over the past decade (from around 6,000 in 2001 to over 8,000 in 2009), and is projected to keep rising to over 10,000 by 2017 (a 16% increase in sentenced prisoners and a 47% increase in those on remand) (Ministry of Justice 2009). Māori incarceration rates are even more extreme – 568 per 100,000, compared to 98 per 100,000 for non-Māori. Māori are eleven times more likely than Pākehā to be remanded in custody awaiting court appearances or sentencing (Carr 2007). Remand prisoners are less likely to get dental care, except for emergency treatment for a serious problem.

The National Health Committee recommended that all prisoners be given basic oral self-care tools, including toothbrushes, dental floss, toothpaste, and education. The report also recommended an oral health education resource ('Time for your teeth') that includes information on the damaging effects of drug use on gums and teeth, and which has been shown to improve oral health knowledge among prisoners in the United Kingdom (NHC 2010).

The 2005 Prisoner Health Survey found that two-thirds of male sentenced prisoners had seen a dentist in the previous two years, with no difference between Māori and non-Māori (Ministry of Health 2006b). Around 40% of Māori males rated their oral health as better than two years ago (compared with 22% of non-Māori males), while 27% reported it was worse (similar to non-Māori males). Around 40% reported some discomfort when eating or drinking in the last four weeks (Ministry of Health 2008c).

The National Health Committee observes that inmates are legally entitled to the same sort of dental care they were receiving while in the community, with the result that health disparities in general society are maintained within prisons. The NHC recommends access to dental care for prisoners regardless of sentence length or 'previous dental responsibility'. However, because the oral health status of prisoners reflects the limited public funding for adult dental services, the Committee "sees the provision of oral health services as a whole as an issue that deserves attention from policy makers. Until then, oral health is an area in which a standard of equivalence with current services to the community needs to be surpassed" (NHC 2010:86).

The National Health Committee (2007b) previously noted that there is very little research on the oral health impacts of imprisonment, which extend beyond that of the individual inmate to their partners, children and whānau. In many cases, an already economically stressed family suffers further impacts from lost income and additional costs. Stresses do not necessarily lessen when a family member returns home, as their work opportunities are diminished (NHC 2007b).

> Those individuals, families and communities whose lives are affected by imprisonment tend to already be among the most disadvantaged in this country. If we mean it when we say we are committed to reducing inequalities then we cannot continue to ignore the needs and experiences of this population (NHC 2007b: 41).

7 Public health interventions including health promotion

> Sometimes, too, the public, policymakers, and providers may consider oral health and the need for care to be less important than other health needs, pointing to the need to raise awareness and improve health literacy (US Surgeon-General 2000:4).

This section takes a different approach to the previous sections, focusing on interventions rather than on populations. In reviewing research, we focused on interventions which could reduce inequalities.

7.1 Framework for public health interventions

Watt (2007:5) argues that oral health programmes are generally delivered separate from other health programmes, and that this "narrow and compartmentalized approach, which essentially separates the mouth from the rest of the body, has led to a duplication of effort, is wasteful of limited resources and can lead to contradictory information being given to an increasingly sceptical public." Sheiham (2001) suggests that public health interventions are necessary to improve oral health status. He contends that as years of knowledge about how to maximise oral health have not translated into individual behaviour change, what is needed is to change the environment. Sheiham refers to his earlier research which found that "Dental services explained 3% of the variation in change in 12-year-old dental caries levels in 18 industrialised countries, whereas broad socioeconomic factors and fluoridated toothpastes explained 65%" (2001:105). He proposes a preventive model similar to that used for cardiovascular diseases, focusing on common risk factors, and says that dental public health should be included in public health policy and services. Oral health literature promotes the common risk factor approach for chronic diseases, rather than focusing on individual diseases and conditions (Petersen & Yamamoto 2005; Watt 2007) to enable synergies with the many communities of interest working towards health improvement. Strategies to reduce the effects of social determinants of oral disease include public health policy supporting healthy nutritional and safety standards, and local initiatives such as schools, communities and institutions adopting a 'health promoting settings' approach (Fisher-Owens et al 2008; Petersen & Yamamoto 2005; Watt 2007). This approach is used, at least in part, in Aotearoa New Zealand (Ministry of Health 2006a; 2008a). The British Dental Association (2009) also argues for public health strategies to reduce relative oral health disadvantage.

The US Surgeon-General's review of oral health (2000) included an extensive review of scientific data. The report's final recommendations emphasise public health interventions, notably fluoride. They also highlight the importance of addressing the contributing problems of tobacco, "excessive alcohol use" and what the report calls "poor dietary choices"

(US Surgeon-General 2000:283) (this latter discourse implies that Americans, including Indigenous ones, have unconstrained choices). The report describes disparities relating to ethnicity as well as age, gender and socioeconomic status, and says that the lack of adequate data on disparities, especially on cost-effective treatments, is a barrier to systemic improvement.

The WHO's oral health strategy emphasises public health approaches, saying that "healthy public policies are fundamental to improving access and creating supportive environments" (Peterson (2003b:22). In Aotearoa New Zealand, Broughton (2006) extensively discusses public health approaches to improving oral health, including fluoridation and oral health promotion. Mouradian at al (2004), reviewing dental-medical collaborations to improve oral health, argue strongly that prevention should be prioritised.

There is consistent agreement across the research on the main oral public health interventions:

- fluoride in water supplies, toothpaste or food
- reducing/stopping tobacco use
- improving diet

In general, research reports and strategies link environmental interventions to reducing social and economic disparities. They also highlight the need for better health promotion (British Dental Association 2009; Indigenous Dentists' Association of Australia 2009). The development and evaluation of such interventions should be assessed using an 'equity lens', so that they do not disproportionately benefit the advantaged.

7.2 Public health interventions to improve oral health

7.2.1 FLUORIDATION

Fluoridation of public water supplies is internationally recognised as effective in reducing dental caries by reducing demineralisation of dental enamel, and promoting remineralisation (Broughton 2006; Ministry of Health 2009a). It appears to be particularly valuable to disadvantaged people, or to 'at-risk' groups (among them the population groups discussed elsewhere in this report) (Baillie et al 2009; Indigenous Dentists' Association of Australia 2009; Koopu & Keefe-Ormsby 2007; Ministry of Health 2006a:15). Armfield (2005) specifically studied differential effects of fluoridation on Indigenous compared to non-Indigenous Australian children, and found greater benefits for the Indigenous children. Aotearoa New Zealand official policy is to support fluoridation "to promote the oral health of both children and adults" (Ministry of Health 2006a:15), and the World Health Organisation strongly promotes the value of fluoride (Petersen & Lennon 2004). Apart from continued opposition to fluoride in some sections of the community (Ministry of Health 2009a) the main limitation to the fluoridation of public water is that it can generally only be used in urban centres with a central water supply. This places Māori in rural areas at a disadvantage (Koopu & Keefe-Ormsby 2007).

7.2.2 TOBACCO CONTROL/CESSATION

A key oral health intervention is reduction or cessation of tobacco use. Petersen (2003a:311) states that "Tobacco is a risk factor for oral cancer, oral cancer recurrence, adult periodontal diseases, and congenital defects such as cleft lip and palate in children whose

mother smokes during pregnancy". Researchers have found a direct linear dose-response relationship between the level of smoking, assessed by pack years (number of cigarettes smoked per day times years smoked), and destructive periodontitis (Joshipura & Dietrich 2009). Smokers do not heal as well as non-smokers after periodontal disease therapy, and experience less reduction in levels of periodontal pathogens. However, after 10 years, former smokers appear to be no more likely than non-smokers to have severe loss of periodontal attachment. Mason et al (2006) found in a longitudinal study that smoking rates and length of tobacco use were associated with lower oral health quality of life in middle age. Tobacco use is linked to tooth loss, which affects nutrient intake, so can have significant effects on other aspects of oral health (Moynihan 2005; Moynihan & Petersen 2004).

The World Health Organization (WHO) identifies tobacco control as a priority in its Global Oral Health Programme (Petersen 2003a) and has an international strategy related to the Framework Convention on Tobacco Control. The strategy does not mention the needs of Indigenous peoples, although it does identify the need to reduce population disparities (Petersen 2003a). WHO identifies the importance of linking oral health and cancer control, given both the increasing rates of oral cancers (Petersen 2003a), and the interaction of cancer-causing substances (notably tobacco and alcohol) with effects on oral health.

Indigenous peoples in the countries whose literature we reviewed generally have significantly higher rates of smoking than non-Indigenous counterparts. For instance, tobacco use in Canadian First Nations people is around 59% nationally, and as high as 77.4% in one community study (Brothwell & Ghiabi 2009). In Aotearoa New Zealand, 46% of Māori smoke regularly compared to 21% of non-Māori. Among Māori, 49.5% of those living in the most deprived areas smoke compared to 25.9% in the least deprived socio-economic areas (Ministry of Health 2009b). In Broughton and Lawrence's (1993) survey on Māori women and smoking, participants made a strong link between oral health and smoking. Cessation services for Māori have some evidence of effectiveness (McRobbie 2009), and research could explore whether cessation advisors address oral health (e.g. as another motivating factor).

The importance of oral health professionals in promoting cessation, giving advice and supporting the patient's efforts is well recognised (Petersen 2003a). Barriers to promoting smoking cessation included lack of training; lack of time; and lack of appropriate support materials (Rosseel et al 2009). Rosseel et al (2009) found that in the Netherlands dental hygienists provided more general cessation advice and counselling than dentists, although dentists actively provided cessation advice to patients with oral complaints. Rosseel et al recommended that services focus on "creating a supportive culture in and around the dental team" (2009:5). Ziebarth (2003) suggests supporting hygienists and dental therapists to provide anti-tobacco campaigns and give individual cessation advice.

7.2.3 DIET AND ALCOHOL

The oral health of Indigenous peoples has been affected by the loss of traditional foods, hunting practices and access to particular foods (e.g. seafoods) (Simmons 2003; US Surgeon-General 2000) with patterns of very low rates of dental caries and periodontitis, giving way (often in a very short period of time) to high rates of oral health problems. Broughton (2006) has described traditional Māori diet, which he calls a critical element of oral health, along with oral hygiene. Dietary changes to refined foods are associated with increased risk of dental caries (Endean et al 2004; Simmons 2003).

Alcohol is a significant contributor to oral cancers (Petersen 2003a; Walls 2008). Walls (2008) adds that alcohol erodes tooth enamel; sugar and acid in many alcoholic drinks

contribute to dental caries (a problem in young people but likely to increase with an ageing population). Increasing alcohol use by young Māori could be another risk factor for poor oral health (Ministry of Health 2007a).

There may also be an association between obesity and periodontitis. Increasing body fat may act as a reservoir for inflammatory cytokines (Joshipura & Dietrich 2009). Burt et al (2006) found strong association between obesity, high sugar intake, poor oral hygiene, and caries in a low-income urban population. Burt and colleagues argue that interventions cannot simply address one factor, but must include changes to the social and physical environment. A diet high in vegetables and fruits may reduce dental caries (Joshipura & Dietrich 2009). Calcium intake and Vitamin D also reduce the risk of dental caries as well asand gum inflammation (Joshipura & Dietrich 2009).

7.3 Oral health promotion

In this section we looked particularly for research on oral health promotion for/with Indigenous peoples. While we found relatively little, it is probable that (as in Aotearoa New Zealand) initiatives have been carried out but not evaluated, or descriptions or evaluations have not been published. The Ontario Public Health Association (2007) carried out a PubMed review on oral health promotion, and found only a few published examples.

Research about oral health promotion often describes one-to-one teaching or demonstration, what in Aotearoa New Zealand is more usually called health education. Broughton (2006) cites the Ministry of Health's Oral Health Toolkit (2004) as saying that traditional health education is "ineffective and inefficient", and likely to fail without the support of appropriate oral health promotion (see also Kay & Locker 1996). Broughton (2006) describes the emergence of Māori oral health promotion in the context of other Māori health development as a whole. He argues that Te Pae Mahutonga's health promotion model (Durie 1999) is appropriate for Māori oral health, partly because it provides the broader framework recommended by the Ministry of Health which "makes the access and application of knowledge culturally relevant and meaningful" (Broughton 2006:310).

Australian health promotion resources focus on reducing the difficulties of remoteness, as well as on addressing language and literacy barriers, and using community health workers for support. For instance, the Australian Indigenous Health InfoNet (2011) service maintains a database of Indigenous oral health resources and the Rural Health Education Foundation (2010) has a resource site aimed more at clinical workers ('Open wide: oral health in the bush'). Resources for adults include the 'Strong Teeth' interactive CD, aimed at educating teenagers, young adults, and new mothers about oral health (Department of Health and Community Services & Australian Research Centre for Population Oral Health 2008). The resource uses animation and personal stories, and can be accessed in the Arrernte and Warlpiri languages as well as English. Jamieson, Parker and Richards (2008) report on Indigenous-owned health promotion initiatives involving social research teams working with the community to clarify community models of the causes of poor oral health, beliefs and values about oral health. The research team were able to develop a "context-specific, oral health promotion initiative … focused on key issues raised in the focus groups" (2008:52).

In the US, New York University has led an oral cancer prevention initiative (Mouradian et al 2004). A key element of the project was to increase awareness of oral cancers among 'minority groups'. According to Mouradian et al the University's dental training school played an important role in "bringing together key constituencies" (2004:508).

8 Values, beliefs, and practices

The influence of values and beliefs on oral health practices emerged as a strong theme from both the literature reviewed, and from discussions at consultation hui. The 2000 US Surgeon-General's report on oral health (2000:134) said that:

> Different population groups differ in the way they think about health, and in how they define a health problem, determine its seriousness, and decide whether to seek care. In one cultural setting a painful tooth may be enough to motivate care seeking. In another, bleeding, swelling, or fever may be necessary before care is sought. Similarly, decisions about whether to comply with a suggested treatment regimen, whether to engage in self-care, and whether to return for a follow-up appointment are also culturally influenced.

8.1 Values, beliefs and practice

Blaxter (1983; 1990) has been influential in developing theory to explain how ordinary people's health beliefs may affect their actual health behaviours (Popay & Williams 1996). Blaxter's model, based on research into lay models of health behaviour and illness causation conceptualises a process in which *beliefs* ("what people know or think to be true") determine *attitudes*, which in turn influence *behaviour (*Blaxter 1990:147). Broadbent et al (2006), in a NZ study of the oral health related beliefs of a cohort of young people, found that those with stable and positive beliefs had better oral health than those in the study who did not. Other research has added the connection between *values* and health beliefs and practices (US Surgeon-General 2000). In the context of oral health, values might include the value placed on losing or retaining teeth, or the relative value given to getting treatment compared to other priorities.

Values are linked to the health beliefs shared by particular cultures and communities. Beliefs can influence preferences for treatment, such as use of traditional oral health medicines or healers (Beare & Slough 2005; Charbonneau et al 2009). Strauss (1996) reviewed the role of 'culture' and oral health values in geriatric oral health research and education. He defined 'culture' as "shared patterns, knowledge, meanings and behaviours of a social group" (1996:82). Quandt et al (2009) found that oral health disparities in older adults in a multiethnic rural area were largely associated with ethnicity rather than socioeconomic status. In a study of rural people over 65 years (of different ethnic groups, not including Indigenous people) Strauss (1996:87) concluded that "race and culture remain powerful variables in understanding health … stratification and that dentists needed to understand the 'motivational systems' of their populations. Strauss noted that ethnicity is not the only way to define "diversity" and that other variables include age, region, or social class.

Johnston (1993:506) states that data from the New Zealand ISCII study:

clearly illustrate that poorer health status overall and poorer dental health status are experienced by certain sections and groups within the population … members of lower socio-economic status groups, different ethnic groups and those with different cultural affiliations experience different health status and use the health services at differential rates. Some of the factors that appear to influence this are clearly related to cultural beliefs and attitudes.

Broughton (2006) quotes Blinkhorn (1993) as saying that dental patients bring with them the values and norms of their own community, so that if those communities place low value on oral health patients may not value messages. The question that follows is *why* those communities place low value on oral health. Another possibility is that communities see oral health providers solely as providers of pain relief and tooth extraction (Simmons 2003). Broughton quotes a participant in a Māori oral health hui on how the common experience of tooth loss has become normalised in many Māori communities: "For them, having no teeth was okay" (2006:327). Another Aotearoa New Zealand example is the culture of dentures, which until recently has been normalised. Sussex et al (2009) show how the rationale for this normalisation derived to a large extent from the dental profession's own conceptual base, and became absorbed into community health beliefs. One value rarely mentioned in the literature is the 'cosmetic' aspect of tooth loss which has impacts on confidence and self-esteem, as well as on real or perceived problems with finding work, or developing relationships. Broughton (2006) describes the huge changes in self-esteem among pakeke who received treatment, and argues for a relationship between oral health and mental health.

The US Surgeon-General's report on oral health highlights the importance of increasing understanding of culture, citing as an example that researchers "studying high rates of infant caries among some cultural groups are exploring the extent to which traditional means of soothing crying babies or handling bedtime routines [such as giving bottles of juice or sweetened tea] play a role, as well as investigating prenatal nutrition and transmission of infection from caregiver to child" (2000:135). As one example, Hajikazemi et al (2008) found that widespread Iranian traditional beliefs about the effects of pregnancy on oral health had led to women normalising loss of teeth during pregnancy, and actively avoiding dental services in the belief that treatment was bad for the fetus.

Finally, the values, beliefs and cultures of oral health workers also affect the care they provide, to whom, and how. The work of Sussex et al (2009) outlined above is one example of how professionals' beliefs can shape the behaviours of patients. Health professionals who understand the cultural contexts of oral health beliefs may be able to support their clients to incorporate "elements from various healing systems" (US Surgeon-General 2000:135). This 'cultural competence' approach is discussed further in the section on workforce development.

8.1.1 DENTAL FEAR

Research among Aboriginal Australians and other Indigenous populations finds a high degree of 'dental fear'. Armfield et al (2006) researched dental fear in the Australian population as a whole, finding that people in low SES groups had high rates of "dental fear". Anxiety was highest in middle-aged groups, which the researcher believed was linked to high levels of stress. There was a strong link to oral health status, but dentate people had higher levels of fear than edentulous people.

However, research would be needed to better tease out different types of dental fear: for instance, fear resulting from previous negative experiences (Sussex et al 2009); fear linked to concerns about costs; fear of pain, or openness to expressing pain (Charbonneau et al 2009; Simmons 2003); or fear related to whakamā (Broughton 2006).

8.2 Models of oral health

Corrigan et al (2001) studied conceptual models of oral health in several different ethnic groups in the UK. The researchers found two general models of disease: one more 'traditional' (health as absence of disease); and a broader model which included social and psychological wellbeing, as well as the ability to carry out everyday functions. Research participants also had two models of the oral health-general health relationship: one where oral health and general health were seen as "separate but related" and another in which they were "inseparable" (Corrigan et al 2001:42). Both ethnicity and gender were determinants of the models within which an individual operated. Corrigan at al concluded that while ethnic and cultural factors explained variations in understandings of oral health only in part, they should be seen as important in the design of health promotion materials. McConnel (2003) discusses the medical concept of 'compliance' in treating Indigenous peoples, and proposes instead a model of 'concordance', or reaching common understanding.

An appropriate model of oral health for Indigenous peoples would need to articulate "physical, mental, spiritual and emotional elements, from both individual and communal points of view, and involves political, economic, social and cultural aspects", shaped by the nation's historical experiences and worldviews (Cunningham 2010:157).

9 Workforce development and cultural competence

Workforce development also emerged as a key theme in the research. For instance, the WHO urges member countries to "scale up capacity to produce oral-health personnel, including dental hygienists, nurses and auxiliaries, providing for equitable distribution of these auxiliaries to the primary-care level, and ensuring proper service backup by dentists through appropriate referral systems" (Petersen 2008).

9.1 Developing an Indigenous oral health workforce

The need for more diversity in the oral health workforce was a repeated theme (Charbonneau et al 2009; Mitchell & Lassiter 2006; Williams et al 2011). The reasons cited include giving people from specific ethnic groups access to someone with common language and understandings to encourage them to use oral health services, as well as increasing the skill base and capacity of ethnic groups and communities (Charbonneau et al 2009; Mitchell & Lassiter 2006). Mouradian et al (2004) also stressed the need to improve training to work with elders and people with 'special needs'. Pacza et al (2001) emphasised the importance of Aboriginal community health workers trained in oral health. However, there were few reports of initiatives to train Indigenous dentists and dental therapists. The 'Crocodile Smiles 2' project plan (Clinical Practice Improvement Centre 2007:6) describes the Indigenous health worker as critical for community health promotion projects, with roles that include "screening and assessment, treatment and/or referral, management and administrative duties and of foremost importance their role as an educator and interpreter of health information." Canada's federal government has adopted Aotearoa New Zealand's dental therapist model to provide services for First Nations children in remote areas, with training provided by the First Nations University of Canada (Nash & Nagel 2005).

9.2 Developing skills in the oral health workforce

Formicola et al (2003) argue that oral health professionals should understand the reasons for health disparities, and should be educated on their role in reducing disparities. Mouradian, Berg and Somerman (2003), Mouradian and Corbin (2003) and Mouradian et al (2004) have published a series on "Addressing health disparities through dental-medical collaborations." Mouradian and colleagues argue that innovative ways are needed to reduce oral health disparities, and that dental professionals must increase their collaboration with other health workers. Lévesque et al (2009) have developed the 'Listening to Each Other' programme to improve interaction between underprivileged people and Canadian dental care providers by increasing providers' understanding of the realities of their underprivileged patients.

Beetstra et al (2008) and Formicola et al (2004) describe the creation of interdisciplinary teams. In New Mexico, this approach was supported by legislation which allowed dentists and dental hygienists to collaborate. Some attention has been given in the literature to the Alaskan 'oral therapist' model, used by, among others, the Alaska Native Tribal Health consortium. This aimed to improve service to Alaskan natives, who have high rates of oral health problems, and who often live in remote communities. The model is based on Aotearoa New Zealand's dental therapist programme (Jordan 2008; Nash & Nagel 2005). The training emphasises cultural competence as part of core professional skills. The programme appears to be effective in reaching people in remote communities, and it is estimated that more than 7000 previously un-served Alaskan natives are now receiving regular care (Jordan 2008). Bolin (2008) researched the quality of care therapists provided, and the incidence of 'reportable' events during or after dental treatment. No differences were found in the "consistency of diagnosis and treatment or postoperative complications as a result of primary treatment" (Bolin 2008:1530).

The American Dental Association has provided support for the introduction of the Community Dental Health Coordinator (CDHC) training programme. The coordinator role is modelled on community health workers. The coordinators have an 18 month training programme with a focus on the "root causes of disease – the lack of adequate prevention and oral health literacy among underserved populations" (American Dental Association 2010:3). Coordinators give limited preventive dental care such as screening, fluoride treatments, sealants and teeth cleaning.

Another key element of workforce development is engaging with communities, especially for students. Beetstra et al (2008) emphasise the value of linking services for rural/remote or "under-served" communities with training schools, finding that trainees were more likely to practice in sites where they had received training

9.3 Increasing cultural competence in the existing oral health workforce

Charbonneau et al (2009) discuss the need for cultural competence in dental professionals, focusing on the Canadian situation. Canadian dental health training does not consistently include cultural competence, and Charbonneau and colleagues propose that it be a requirement. The literature identifies two main ways of increasing competence: as part of a formal curriculum (Bazen, Paul, & Tennant 2007); and through practical (supervised) exposure to communities (Bazen, Kruger, Dyson & Tennant 2007; Charbonneau et al 2009). Bazen, Kruger, Dyson and Tennant (2007) report on an Aboriginal and Torres Strait Islander oral health curriculum in development at the University of Western Australia while Bazen, Paul and Tennant (2007) report on examples of supervised student programmes in Australian Indigenous communities. Broughton (2010) describes how the University of Otago incorporates opportunities for dental students to engage with Māori patients in student clinics supervised by a Māori dentist and in placements with Tipu Ora, a Māori health service provider.

9.4 Developing oral health knowledge and skills in the health workforce

Projects to increase knowledge and skills in people working with elders in residential care, and with people with disabilities, are discussed in earlier sections of this review. We also found references to the need for medical practitioners to understand oral health impacts on their patients, for instance in regard to pregnant women (Morgan et al 2009; Moua 2006). Mouradian, Berg and Somerman (2003) describe a US oral health curriculum developed for non-dental health providers and others.

The integrated oral health/general health model proposed by some writers requires extensive training of other health workers (Beetstra et al 2008; Formicola et al 2004). There are some examples of medical practitioners being trained to provide some dental care in areas where there has been a shortage of dentists (Simmons 2003). Pacza et al (2001) describe the development of a culturally appropriate oral health training programme for Aboriginal health workers in Western Australia.

9.5 Developing oral health research capacity within the workforce

Dental training schools often take leadership in research and developing innovative community projects to reduce disparities in oral health care (Broughton 2006; Easa et al 2005; Shomaker et al 2005). Conversely, according to Easa et al (2005) and Shomaker et al (2005), in areas where there are no such schools it can be hard to develop and evaluate community oral health programmes without a pool of trained researchers. Recognising this, a partnership was set up between the University of Hawai'i's School of Medicine, the University of North Carolina's School of Dentistry, a local Indigenous health centre, and Hawai'i's Department of Health (Easa et al 2005). The partnership involved training and mentoring researchers (including community researchers) and regular meetings, and led to collaborative research projects.

10 Summary of themes

10.1 Introduction

Key themes have emerged across the diverse topics reviewed. Indigenous oral health services share common problems, including significant gaps between resources and need (Jordan 2008; Martin 2000; Niendorff & Jones 2008; Reifel 2005; Ziebarth 2003). A lack of trained professionals (Martin 2000; Phipps et al 2002; Reifel 2005) and disconnections between preventive care, primary care and secondary care due to the complex system of responsibilities and funding (Ziebarth 2003) were also cross-cutting themes. In Canada and the US, researchers found low awareness among communities (including tribal structures) of the connection between oral health and general health (Phipps et al 2002; US Surgeon-General 2000). On the positive side, there were some initiatives focused on improving Indigenous oral health. Most of these published initiatives were small-scale/local programmes, driven at least in part by highly motivated researchers or academics, which generally came into existence in partnership with Indigenous communities or with their support. Most of these programmes were pilots, and did not become part of the mainstream oral health funding system.

The National Center for Cultural Competence (n.d.) conducted an Internet-based search of 'juried literature' on Indigenous, natural and alternative practices in oral health care. The search found very little information addressing the beliefs and practices of diverse racial, ethnic and cultural groups. The Center concluded that "the research agenda will need to be expanded in order to respond to the call to eliminate oral health disparities." (n.d, n.p.)

10.2 Frameworks for research needs

We were particularly interested in locating oral health research strategies, or frameworks which might help identify research priorities. We found few oral health research strategies or plans that addressed the needs of Indigenous peoples, or the other population groups discussed in this review. Those which did included Canada's national oral health research strategy (Canadian Institutes of Health Research 2002), the US Indian Health Service (Phipps et al 2002) and the University of Hawai'i Medical School's strategy (Easa et al 2005; Shomaker et al 2005). Broughton (2006) also identifies a number of research questions, as well highlighting as the need for Māori (evaluation and research) frameworks to evaluate the success of Māori oral health provision.

The US Surgeon-General's oral health report (2000) sets out a research agenda. The principal components of the plan include building the science and evidence base; understanding the "complex diseases caused by the interaction of multiple genes with

environmental and behavioural factors"; and translating "research findings into health care practice and healthy lifestyles" (2000:12).

The Canadian Dental Hygienists Association (2003) has also developed a research agenda focusing on preventive oral care. The agenda linked to the priority framework of the Canadian Institute of Health Research. The agenda's guiding principles included cultural and linguistic sensitivity; participatory and empowering research; and considering vulnerable populations as a "cross-cutting theme" (2003:17).

Petersen (2005a) and Petersen and Kwan (2004) identify global oral health priorities for research. The World Health Organisation (WHO) reports emphasise that oral cancers and trauma broadly affect oral health and well-being (Petersen 2005a). According to WHO, "the solutions to control oral disease are to be found through shared approaches with integrated disease prevention" addressing risk factors related to diet, smoking and alcohol use (Petersen 2005a:71). WHO also emphasises the need to develop appropriate research capacity (Petersen 2005a). Research priorities include:

- modifiable common risk factors to oral health and chronic disease, particularly the role of diet, nutrition and tobacco
- oral health/general health interrelationships
- psychosocial implication of oral health/illness and quality of life
- inequity in oral health and disease and the impact of socio-behavioural risk factors
- the burden of oro-dental trauma … and related risk factors
- translation of knowledge into clinical and public health practice and operational research on effectiveness of alternative community oral health programmes
- health systems research on reorientation of oral health services towards prevention and health promotion (Petersen 2005a:73).

Sgan-Cohen and Mann (2007) have suggested an oral health and poverty research agenda, including:

- are there specific and effective interventions that could mitigate some of the dental health and dental health care disparities?
- are simple and affordable clinical procedures–such as atraumatic restorative treatment – optimally effective, appropriate and potentially accessible for poorer communities?
- which preventive modalities are most effective for poorer communities (sealants, fluoridated dentifrice, fluoridated water)?
- what are the significant cultural, political, economic, environmental, social and behavioural variables related to oral health status among the poor?
- can preventive dentistry be effective in narrowing oral health disparities according to socioeconomic status?
- what is the motivation of poorer communities, as far as oral health promotion and self-care are concerned?
- what is the amplitude of oral health effect on quality of life among the poor?
- what are the economic, political and professional obstacles that potentially hinder closing the oral health social gap?
- how might oral health advocates promote the need for more oral health care legislation for all, or at least poorer, communities? (Sgan-Cohen & Mann 2007:1441).

10.3 Cross-cutting research themes

10.3.1 IMPROVING DATA ON MĀORI ORAL HEALTH

The World Health Organization Oral Health Programme says that continuing, regular surveillance is important to help governments formulate policy, and to measure "progress, impact and efficacy of preventive efforts" (Petersen 2005a:72). Data is essential to setting and monitoring targets (such as the WHO Millennium Development Goals targets to improve health outcomes, including oral health, of the poor) (Petersen 2005a). Chua (2009) referred to the need for New Zealand's Ministry of Health to hold policy and funding decisions till the 2009 national oral health survey was completed.

However, national surveys do not always produce the level of detail needed to understand Māori health, or recognise variations within the Māori population. Te Puni Kōkiri's (1996) report from the 1995 Oranga Niho hui identified the need for "Māori-specific research". Oral health variations can be influenced by age, cultural background, gender and other factors (Mason et al 2006).

An effective way to identify differential generational/cohort effects (e.g. diet; beliefs about oral health and dental care) is life course studies, such as that by Jamieson and Sayers (2008) on the oral health of Aboriginal teenagers and young adults. The study collected information on metabolic, cardiovascular and other health indicators, as well as indicators of social and emotional well-being. Jamieson and Thomson (2006) also argue strongly for the value of focusing on community-level deprivation, not just individual deprivations. Newly established longitudinal studies such as the 'Growing up in New Zealand' study (Morton et al 2010), which have larger samples of Māori than earlier studies, may be able to collect data relevant to oral health and a range of interrelated issues.

10.3.2 REVIEWING THE EFFECTIVENESS OF INITIATIVES IN IMPROVING MĀORI ORAL HEALTH

Broughton (2006) has described a number of initiatives, mainly local community projects. More recent initiatives are described in other sections of the full *Oranga Waha* research report (Robson et al 2011). However, few of these initiatives have been evaluated, either individually, or by comparing types of services and their relative effectiveness in improving Māori oral health. The research done has been mostly small-scale, and rarely carried out by independent evaluators, although a report on an independent evaluation of six Māori oral health service providers was released in 2011 (Ministry of Health 2011). Evaluation and synthesis of local oral health initiatives could be one priority. This is mentioned in the Ministry of Health's 'Promoting oral health toolkit' (Ministry of Health 2008b), but as yet there is no national framework for evaluation.

10.3.3 ESTABLISHING HOW VALUES AND HEALTH BELIEFS AFFECT MĀORI ORAL HEALTH BEHAVIOURS

Strauss (1996:87) concluded that "positive reinforcement related to patients' salient health beliefs is the most effective mechanism to influence dental health behaviours". A significant body of literature argues that providers need to understand the meanings and values attached to teeth and to the health of the mouth. Most research found focused on contemporary oral health practice within a medical model. However, there is some research on Indigenous perspectives on the meanings of oral health, and on the value of traditional

diet, oral care practice and treatment (such as rongoā) (for example Brondani et al 2007; Broughton 2006; Jamieson, Parker & Richards 2008). Research might establish Māori value/belief frameworks about oral health (for instance, compared to Corrigan et al's [2001] models); what influences Māori beliefs; whether there is a single 'Māori' model, and which values, beliefs and practices may affect oral health practices, uptake and use of services (e.g. dental fear, or beliefs about efficacy of treatment).

10.3.4 IMPROVING ACCESS TO ORAL HEALTH CARE

People from diverse under-served populations face many barriers to accessing oral health care. Those barriers include (but are not limited to) geographic locations; service times and access logistics; availability of skilled oral health providers; knowledge of effective oral care practice; language access; financial resources; and lack of adequate health care coverage (e.g. insurance). Health and disability problems add another layer of difficulties. Geographic location was not one of the objectives set out for this research project, but emerged strongly from the literature (both explicitly and implicitly) as a major determinant of oral health (Brothwell & Ghiabi 2009; Sekiguchi et al 2005; Simmons 2003). Ziebarth (2003:2) quotes Jose Kusagak, president of the Inuit Tapiriit Kanatami as saying that:

> I believe that…the success of our health care system as a whole will be judged not by the quality of service available in the best of urban facilities, but by the equality of service Canada can provide to its remote and northern communities.

An international review of health status of Indigenous peoples supports the development of 'intercultural health systems' as a way to improve access to effective health care for Indigenous peoples – "where Western and indigenous health systems are practiced with equal human, technological and financial resources, with spaces for exchange of knowledge, methodologies and practices that ensure the ongoing development of both systems" (Cunningham 2009:177).

10.4 Research on population groups

10.4.1 KAUMĀTUA

Kaumātua oral health is a priority area, both in the present and in the future. There is a relatively large international body of research on the oral health of elderly people; however, there is a dearth of oral health research relating to kaumātua Māori. The population in the elderly age group is rapidly increasing, and the current generation of elderly is more likely to be dentate than previous generations. Kaumātua oral health is the sum of social and family factors, access to previous health care, access to preventive services, and oral health behaviours over the life course (Jette et al 1993). Mason et al (2006) present a conceptual framework of how fetal, infant, childhood and adult influences contribute to oral health related quality of life in middle age, which could be extended into old age. In Aotearoa New Zealand, it would be useful to have population projection data based on the oral health status of pakeke, and information on kaumātua diet, smoking and other risk or supporting factors. In addition, overseas research, as well as the work of Sussex at al (2009) in Aotearoa New Zealand, supports the value of understanding kaumātua values and beliefs around oral health, as well as the importance of oral health workers having the cultural competence skills needed to provide oral health support for kaumātua.

Petersen and Ueda (2006), reporting on WHO's meeting on 'Oral health in ageing societies: integration of oral health and general health', identify research needs for the ageing population as a whole. They refer to a 2004 'Elder's Oral Health Summit' which identified the priorities as:

- overcoming barriers to providing care for underserved people
- developing an evidence base to identify appropriate dental services for frail and functionally dependent older adults
- increasing knowledge about disparities in oral health and access to dental care among the poor and racial and ethnic minorities (Petersen & Ueda 2006:22).

Petersen and Yamamoto (2005) say that research needs to include elders' socio-behavioural data (e.g. wellbeing, quality of life) as well as clinical data. Research should identify and focus on 'high risk' groups; and research on health promotion with older people, especially those living in the community is urgently needed (Jamieson, Parker & Richards 2008). Petersen and Yamamoto (2005:89) say that "apart from a few intervention studies conducted in some industrialized countries, research on community-based oral health promotion activities among older adults is totally lacking".

The Indian Health Service recommended research on elders to:

- identify characteristics of American Indian elders that contribute to the maintenance of good oral health
- test and evaluate interventions to facilitate good oral health of elders
- identify characteristics of AI/AN [American Indian/Alaskan Native] elders that contribute to the absence of root caries in susceptible individuals (Phipps et al 2002:83).

10.4.2 PEOPLE WITH DISABILITIES, OR HIGH HEALTH NEEDS

Workforce skills and knowledge emerged as a theme across the literature. Special needs or special care dentistry is a specialist area of the profession. There are very few Special Needs Dentistry Specialists in New Zealand. Research may be needed on the capacity of special needs/special care oral health professionals to work with Māori patients, as well as whether Māori who could benefit from special care dentistry (and their whānau) are being advised on what can be provided, and how they can access it. The disability support workforce also has a critical role, with evidence that training them can improve oral health outcomes for clients (Glassman & Miller 2009).

As well as establishing a base of information on the numbers of Māori with special oral health needs, other research foci might include:

- what models of publicly funded dentistry will reach Māori with the highest needs?
- what services might be needed for Māori with disabilities (given the diverse nature of 'disability')?
- what is being provided for people with disabilities now – especially in the community?
- how appropriate are current oral health services for Māori with mental illness?
- does the current oral health workforce have the training needed to give appropriate support for people with disabilities?
- are Māori with health conditions receiving the knowledge and care they need, and what interventions/support are being provided (if any, how effective are these measures)?

10.5 OTHER THEMES IN THE LITERATURE

Two final themes that emerged across a range of different literature were the need to refocus oral health from clinical intervention towards preventive care, especially away from repeated emergency treatment; and a related theme, the value of integrating oral health and general health care.

The "public health and preventive interventions" theme was most strongly expressed by Watt (2005; 2007) and Watt and Sheiham (1999), writing in the UK; but Mouradian and Corbin (2003) and Mouradian, Huebner and DePaola (2004) show that similar ideas are becoming part of the discussion among US oral health professionals. The Canadian Dental Hygienists Association (2004; 2007) summarises many of the arguments for moving the focus to prevention. The who's oral health programme (Petersen & Yamamoto 2005:81) says that 'public health research [on oral health] needs to be strengthened.' This view is supported by the small amount of literature we found on public health or preventive interventions (e.g. diet, fluoridation, smoking cessation), except at the local, community level. However, research on health promotion with Indigenous populations such as Jamieson, Parker and Richards (2008) indicates that interventions need to be based in the oral health models of the target group. Emerging from such research, relevant questions for Aotearoa New Zealand might include how Māori get their information about oral health; the most effective ways to provide oral health education to Māori – for instance, at individual compared to whānau level, including the role of kaumātua; and how best to extend health promotion to vulnerable groups such as Māori with diabetes.

A repeated theme in research on services for people on low incomes is the ineffectiveness and inefficiency of providing only emergency oral care treatment (Chua 2009; Davis et al 2010; Simmons 2003). An extreme example of the costs of funding "emergency" interventions rather than preventive treatment is discussed by the developers of Queensland's Crocodile Smiles 2 project for Indigenous families. They note that "indigenous children are frequent recipients of general anaesthetics for the purpose of extensive dental treatment …. The financial burden which the health system must bear to provide this form of treatment is considerable" (Clinical Practice Improvement Centre 2007:6). This suggests that intervention research should include economic analysis (Davis et al 2010) so that service planners better understand the economic efficiencies of different health interventions.

Jatrana et al (2009) argue for the need to integrate oral health and other primary care services. The approach they recommend for Aotearoa New Zealand is consistent with the who's oral health strategy, New Zealand's oral health strategy (Ministry of Health 2006a), and is similar to the approach discussed by Formicola et al (2004) and Fisher-Owens et al (2008). Existing examples are the New Mexico health commons model described by Beetstra et al (2008) as well as, in Aotearoa New Zealand, the approach of Hauora Hokianga and some community health services (Jatrana et al 2009). Integration would need to be based on research, including finding out how to ensure the whole workforce takes a comprehensive approach (e.g. dietary counselling, tobacco cessation advice) (Phipps et al 2002).

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ORANGA WAHA

Oral health research priorities for Māori

LITERATURE REVIEW

Good oral health is not equally available to all citizens of Aotearoa. Dental services for adults remain largely outside the system of public subsidy for health care. Preventive, restorative, and rehabilitative dental care is available for the affluent but often unattainable for the less well-off.

A partnership — of academics, oral health professionals, community groups and Māori health service providers — have used a variety of approaches to develop a research agenda toward the right to good oral health for *all* Māori. This review of local and international literature identifies past and current research, research gaps, and potential future directions for Māori oral health research. Māori adults with low incomes, kaumātua, and Māori with disabilities, special needs or chronic health conditions are prioritised in this report.

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