Improving Health and Wellbeing: A Public Health Perspective for Local Authorities in the Auckland Region 2006
Working with the people of Auckland, Counties Manukau and Waitemata
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Historically, there has been a strong relationship between local government and public health, with the traditional focus being on the prevention of infectious disease and management of environmental health risks. More recently, the relationship has strengthened through a range of new opportunities, most significantly with the introduction of a broadened purpose for local authorities to promote the social, economic, environmental and cultural wellbeing of communities.

The Auckland Regional Public Health Service welcomes these new opportunities to work in greater collaboration with the local authorities in the Auckland region. This report has been prepared to provide a public health perspective on the invaluable work carried out by local authorities to improve the health and wellbeing of the diverse communities in the Auckland region.

The first part of this report provides some contextual discussion to facilitate better understanding of the public health approach. Three focus areas have been chosen, as they have been identified as priority areas pertaining to the Auckland region in central and local government agencies’ strategic plans. Firstly, urban development was selected because it covers a broad range of issues including housing, air quality, access to recreation space, provision of water, wastewater and other infrastructure required for growth and intensification. The report argues that urban planning and design that explicitly considers public health will go a long way towards ensuring the positive public health impacts of future urban development. Secondly, transport was chosen as a focus area because it has significant direct and indirect impact on individuals’ and communities’ health, and it is interconnected to urban development. To make a contribution to health and wellbeing, the transport system needs to be organised to encourage further physical activity, reduce dependence on motor vehicles and improve safety, especially with an increased focus on vulnerable and at-risk road users. The last focus area addresses food, drink and tobacco consumption as primary determinants of health that require sustained attention from those involved in policy and programme implementation, including regulatory roles, as well as individual action.

The second part of this report outlines a series of health and wellbeing indicators that provide a benchmark for future monitoring and give a snapshot of key public health data regionally and, where possible, locally. The indicators provide the best available data and highlight a number of areas for improved monitoring by central and local government.

We recommend this report to the elected representative, the senior manager and the practitioner. We hope it will be a useful resource to inform population-wide planning and assist our collaborative efforts to improve the health status and reduce health inequalities of the people of Auckland.

Monica Briggs & Dr William Rainger
Joint Service Managers
Auckland Regional Public Health Service
Executive Summary

The Auckland region faces a number of public health challenges through population growth and ageing, increasingly diverse communities, outstanding infrastructure needs, the balancing of transport needs, and the reconciliation of urban design, planning and urban intensification issues. This report identifies public health priorities relevant to local authorities in the Auckland region and provides a starting point for discussion and collaborative action towards improving the health and wellbeing of the region’s residents.

Specifically, this report aims to achieve the following:
- Identify public health priorities in relation to regional and local government.
- Provide a review of the health of the population in the Auckland region using key health and wellbeing indicators that are of potential significance to local government.
- Provide a tool for monitoring public health trends in the Auckland region that is useful for the community outcomes processes required of local government.
- Provide a strategic planning resource for use by local authorities, Auckland Regional Public Health Service, the district health boards and the Ministry of Health.

A shared responsibility and clear leadership

Fundamental to the report is the acknowledgement that the activities of the health sector, local authorities and central government agencies all contribute to public health and can help to advance population health and wellbeing. There is a need to foster stronger partnerships that work collaboratively to improve the health of the people of the Auckland region.

The broadening of the purpose of local authorities under the Local Government Act 2002 has provided an increased imperative for local authorities to be concerned about community health and wellbeing. Within this context, this report is intended to provide support for local authorities and others in prioritising resources to improve wellbeing of communities based on current public health understanding and evidence. The challenge for local government and the health sector is to provide clear leadership across their diverse roles that influence population health and wellbeing.

Public health priorities linked to urban development, transport and broad environmental issues

Public health priorities for the Auckland region range from broad determinants of health and sustainable development, including environmental concerns, through social and behavioural factors including healthy and safe nutrition and encouraging physical activity, to specific health issues such as reducing obesity and diabetes, cancer control, and a range of other individual factors.

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1. A public health approach takes a broad view that encompasses all aspects of health and wellbeing. Public health focuses on communities and populations rather than individuals, and is concerned not only with diseases but also the wider determinants of health that include the environment, housing, employment, education and other factors.

2. The terms ‘local authorities’ and ‘local government’ are used as they cover the Auckland Regional Council and the seven territorial authorities (TAs or city/district councils) within the Auckland region.
This report is divided into two parts. Part I outlines the complexity of public health issues by discussing three focus areas:

- urban development
- transport
- food, drink and tobacco.

In each of these areas there are many and complex links between the natural and physical/built environment, the social environment, individual behaviours and risk factors, and health outcomes. Action points are suggested for each focus area, which are intended to provide a starting point for discussion between local authorities, ARPHS and other organisations.

Part II of this report compiles data pertaining to forty-five indicators of health and wellbeing for the Auckland region. It is envisaged that the indicators will provide a baseline for monitoring population health and wellbeing into the future.

Together, Parts I and II provide a valuable resource to aid strategic and programme planning by identifying key public health priorities, issues, trends, and actions.

**Attention to urban planning and design required to harness positive public health impacts**

Urban development can have positive and negative impacts on the health and wellbeing of communities, and much of the balance hinges on the planning and design of urban environments. Good urban design considers access to open space, opportunities for physical activity in normal daily life (for example in travel to work and amenities), housing and infrastructure quality, safety and the minimisation of exposure to hazards for residents.

Possible causes of negative health outcomes include exposure to environmental hazards (e.g. excessive noise and poor air quality), low quality housing, traffic injuries and inadequate infrastructure (e.g. wastewater systems). On the other hand, good urban development, especially in areas of intensification or growth, can avoid or mitigate negative health outcomes and promote good health through, for example, encouraging exercise and community cohesiveness. Urban development can also influence other determinants of health including employment, social support and access to food.

Collaborative strategies relating to urban development that are advocated by ARPHS focus on the establishment of a regional framework for coordinating health and sustainable development planning and decision making. This would include the use of urban design criteria to achieve specific health and wellbeing goals such as:

- Address exposure to environmental hazards.
- Ensure adequate access to open space.
- Ensure provision of sufficient infrastructure.
- Define appropriate housing quality.
- Provide affordable housing.
- Avoid household crowding.
- Provide opportunities for physical activity.
- Ensure crime prevention and safety design considerations are implemented.
Transport system needs to encourage active modes and improve safety

Transport is a key issue in the Auckland region as it has many broad impacts, including economic development, safety and security, mobility, land use patterns, environmental sustainability and the protection and promotion of public health. Some of the health impacts of transport, which contribute significantly to the number of preventable deaths, hospitalisations and other health costs are well recognised, for example air quality and road crashes. The direct and indirect impact of land transport systems on public health through levels of physical activity, noise, and social cohesion are also increasingly being acknowledged. Balancing these health impacts from transport against other factors, such as economic development and regional growth, requires a new way of thinking and decision making. This new approach has emerged in recent national and regional strategic planning and policy documents, and requires translation into regional and local implementation. A more environmentally sustainable approach is supported from a public health perspective.

Collaborative strategies relating to transport that are advocated by ARPHS include an increased use by local government planners and decision makers of tools that assess the health and wellbeing impacts, for example transport-related policy- and project-level health impact assessment. Other priority strategies include a sustained and increased investment in active transport (including walking, cycling and public transportation) and continued road safety initiatives, especially an increased focus on vulnerable (including children, and people with disabilities) and at-risk road users.

Policies related to food, drink and tobacco require sustained attention

The use of food, water, tobacco, alcohol and other drugs can promote or reduce health and wellbeing in a variety of ways. Sufficient quantities of food and water for consumption are prerequisites for good health, But their quality and composition are also important. For example, excessive consumption of fat, salt, sugar, and alcohol causes poor health. Fluoride in drinking water prevents dental decay. Food or water that is contaminated with chemicals or organisms can cause illness. Some infectious illnesses that are caused by food- and water-borne organisms can also be passed on by poor hygiene practices or through contaminated recreational water.

It is unlikely that reductions in obesity, diabetes and heart disease will occur without changes in physical and social environments to promote an increase in physical activity (particularly influenced by urban design and the transport system) and better nutrition (influenced by food regulations, food technology, access and cost).

Tobacco and alcohol are known to increase the risk of many health problems. Minimising the harm they cause requires a wide range of actions at all levels of the determinants of health.

Collaborative strategies relating to food, drink and tobacco that are advocated by ARPHS include a focus on urban design
features and improved control of tobacco and alcohol consumption, both of which have the potential to reduce a range of health issues, for example:

- Improving nutrition through urban planning and resource consent processes such as by ensuring access to appropriate food shops by means other than driving long distances in private cars, restricting the location of high fat (primarily ‘fast’) food outlets from close proximity to schools, and requiring walking or cycling infrastructure that facilitates safe access to shopping centres.

- Making adequate hand washing and drying facilities and adequate supplies of clean water widely available.

- Increasing the coverage of smoke-free areas, including the grounds as well as the buildings in all local authority facilities and properties.


Regional and local differences highlighted where possible

Data on forty-five indicators of health and wellbeing are provided in this report. Where possible, a discussion is provided about how the indicators relate to health outcomes that may be influenced by broad environmental and social factors, and individual behaviours. The Auckland region has a unique population (especially the ethnic mix, growth rate and size) and this makes it difficult to compare with other regions or the country as a whole. Territorial authority differences for many indicators could be the result of social, economic, ethnic or other population differences rather than differences in the provision of environmental and social initiatives. However, where differences are apparent, these are highlighted and warrant further investigation as a means of reducing health inequalities.

In summary, natural environment indicators included in this report are air quality, access to open space, water resources and drinking quality. Physical and built environment indicators included are household crowding, geographic access to health risks (liquor licenses, gaming machines and fast food/takeaway outlets), and geographic access to fruit and vegetable retailers. Social and economic environment indicators included are the NZDep01 (deprivation index), geographic access to health services, safety, household access to motor vehicles, and food safety. Healthy behaviour and risk factor indicators included are smoking prevalence, hazardous alcohol consumption, physical activity, fruit and vegetable consumption, breastfeeding rates and modes of travel. Health state indicators included are selected communicable disease rates and selected hospitalisation data. The indicators highlight the following points:

Improved regional data collection required

Reviewing the health and wellbeing of the region using key indicators that have potential significance for local government has been a difficult task and has been limited by numerous data gaps. Many of the data sources for potential indicators of health and wellbeing and their determinants derive from national surveys and collections, which do not break the data down to territorial authority level. As
Air pollution is an important cause of death in the Auckland region and increased efforts are required to reduce a range of pollutants, mainly from motor vehicle use.

Water quality (drinking and recreational) is generally of a good standard but improved monitoring systems are required to ensure population health is not compromised, especially in vulnerable populations.

Household crowding is a significant concern particularly for people living in high deprivation areas and is likely to contribute to a range of communicable diseases and other illnesses.

Geographical access to primary health care is generally high in the Auckland region although no measure of affordability has been included.

Reported crime rates are generally higher in the Auckland region than other regions.

People living in areas with high deprivation scores (NZDep01) have associated poor health outcomes.

It is critical that population risk factors (e.g. levels of overweight and obese people) decrease and healthy behaviours (e.g. levels of physical activity) show improvement over time to address a range of serious health conditions and improve wellbeing.

Generally, adult hospitalisations for heart disease and selected cancers show a downward trend in their age-standardised rate in the Auckland region while childhood injuries and poisonings, childhood respiratory hospitalisations, and all-age motor vehicle-related hospitalisations are increasing.

Improvement in the monitoring of diabetes and obesity data is an important area for future development nationally and regionally.

The indicators highlight the following points:

- Air pollution is an important cause of death in the Auckland region and increased efforts are required to reduce a range of pollutants, mainly from motor vehicle use.
- Water quality (drinking and recreational) is generally of a good standard but improved monitoring systems are required to ensure population health is not compromised, especially in vulnerable populations.
- Household crowding is a significant concern particularly for people living in high deprivation areas and is likely to contribute to a range of communicable diseases and other illnesses.
- Geographical access to primary health care is generally high in the Auckland region although no measure of affordability has been included.
- Reported crime rates are generally higher in the Auckland region than other regions.
- People living in areas with high deprivation scores (NZDep01) have associated poor health outcomes.

Conclusion

This report provides a range of baseline indicators for monitoring population health and wellbeing trends in the Auckland region that could be useful for local authorities. It is hoped that this report will provide a valuable resource to aid strategic and programme planning by identifying key public health priorities, issues, trends, and actions. By assisting agencies, particularly local government, to focus resources, it is hoped that this report will contribute to improved community health and wellbeing.
1. Introduction
1. Introduction

This report, Improving health and wellbeing: A public health perspective for local authorities in the Auckland region, is the second in the State of Public Health in the Auckland Region series of reports produced by the Auckland Regional Public Health Service (ARPHS). The first report in the series is, He pūrongo Hauora o ngā Iwi Māori i te Rohe o Tamaki Makaurau – a report on Māori Public Health in the Auckland Region (Auckland Regional Public Health Service, 2005b).

This report aims to achieve the following:
- Identify public health priorities in relation to regional and local government.
- Provide a review of the health of the population in the Auckland region using key health and wellbeing indicators of potential significance to local government.
- Provide a tool for monitoring public health trends in the Auckland region that is useful for the community outcomes processes required of regional and local government.
- Provide a strategic planning resource for use by local authorities, ARPHS, the district health boards and the Ministry of Health.

Underpinning these aims, ARPHS has sought to foster partnerships with regional and local government that acknowledge a shared responsibility and provide a means to strengthen collaboration to improve the health of the people of the Auckland region. The report is intended to provide support for regional and local planners (at the Auckland Regional Council and territorial authorities) to advance population health and wellbeing.

1.1 National and regional public health priorities

This report assists the implementation of the New Zealand Health Strategy, Achieving Health for All People, New Zealand Primary Care Strategy, and He Korowai Oranga by compiling pertinent public health information, identifying Auckland regional and local public health priorities, and building support for public health strategies across agencies.

The New Zealand Health Strategy (Ministry of Health, 2000) places particular emphasis on improving population health outcomes and reducing disparities (inequalities in health) between all New Zealanders. The New Zealand Health Strategy highlights thirteen population health objectives:

1. Reduce smoking.
2. Improve nutrition.
3. Reduce obesity.
4. Increase the level of physical activity.
5. Reduce the rate of suicides and suicide attempts.
6. Minimise harm caused by alcohol and illicit and other drug use to both individuals and the community.
7. Reduce the incidence and impact of cancer.
8. Reduce the incidence and impact of cardiovascular disease.
9. Reduce the incidence and impact of diabetes.
10. Improve oral health.
11. Reduce violence in interpersonal relationships, families, schools and communities.
Public health priorities for the Auckland region are consistent with the New Zealand Health Strategy and range from broad determinants of health and sustainable development, including environmental concerns, through social and behavioural factors including healthy and safe nutrition and encouraging physical activity, to specific health issues such as reducing obesity and diabetes, cancer control, and a range of other individual factors.

This report includes direct information pertaining to eleven of the thirteen New Zealand Health Strategy objectives listed above and indirect commentary on the other two objectives (i.e. suicide and severe mental illness). Suicide and severe mental illness have not been discussed in more depth because of the limited role ARPHS plays in addressing these issues, and not because they are of lesser priority for the region (refer to Section 1.5 for report limitations).

1.2 How to use this report

The report is divided into two parts. Part I illustrates the complexity of public health issues by discussing three focus areas:

- urban development
- transport
- food, drink and tobacco.

In each of these areas there are many and complex links between the natural and physical/built environment, the social environment, individual behaviours and risk factors, and health outcomes.

Action points are suggested for each focus area. These are intended to provide a starting point for discussion between local authorities, ARPHS and other organisations. ARPHS recommends that identified actions be further developed by reviewing evidence to assist formulation of best-practice interventions, then if possible, piloting, evaluating, and rolling out interventions where evaluations show that positive outcomes are being achieved.

Part I also provides an overall discussion of the key public health issues in the region that are then further expanded within Part II.

Part II of the report compiles data pertaining to forty-five indicators of health and wellbeing for the Auckland region. Where possible, a discussion has been provided about how the indicators relate to health outcomes that may be influenced by the natural, physical/built and social environments. It is envisaged that the indicators will provide a baseline for monitoring population health and wellbeing into the future.

Together, Parts I and II provide a valuable resource to aid strategic and programme planning by identifying key public health priorities, issues, trends, and actions.

It is hoped that this report will assist agencies,

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4 The choice of focus areas was informed by a review of national, regional and district public health priorities and regional community outcomes (as identified by the Auckland Regional Council and the seven Auckland TAs) in relation to the potential public health roles of local authorities.
particularly regional and local government to focus resources on improving the health and wellbeing of communities. In particular, it is hoped that this report will help in the prioritisation of resources and provide a means to monitor health and wellbeing, both of which are increasingly important processes in managing public concerns about health and wellbeing.

1.3 The importance of addressing inequalities in health

Reducing inequalities in health is fundamental to the New Zealand Health Strategy and other health strategies.

In New Zealand, as elsewhere, inequalities in health exist among socioeconomic groups, ethnic groups, people living in different geographic areas, and males and females. These inequalities are not random: in all countries more socially disadvantaged groups have poorer health, greater exposure to health risks and poorer access to health services. (Ministry of Health, 2002, p.3)

In particular, those of low socioeconomic status, Māori and Pacific peoples have consistently poorer health outcomes in comparison with the rest of the population (Ajwani, Blakely, Robson, Tobias, & Bonne, 2003).

This report provides a means to address some of the inequalities in health status by assisting local authorities to identify where needs are greatest and where and how resources might best be targeted. The use of instruments such as the Health Equity Assessment Tool (Equity Lens) for Tackling Inequalities in Health (Ministry of Health, 2004a), would assist local authorities and others to more explicitly consider and address inequalities in health.

Key issues pertaining to inequalities in health have been highlighted in the three focus areas.

1.4 Approach taken to develop this report

During mid-2005, a draft framework and report outline was used as a basis for discussion with key audiences. This ensured that the report was developed in a way that would be relevant and useful to readers, assist in promoting a public health agenda within local government, and identify opportunities for the report to inform key local government and health planning processes. Planners and other representatives from the Auckland Regional Council, the seven territorial authorities (TAs), the three district health boards (DHBs) and others were consulted on the nature and scope of the report. Feedback during this phase was integrated into initial development of the report and was continued by establishing a list of key stakeholders that were regularly kept informed of the report development.

The original report concept underwent some transformation during development, moving from a focus on being a health atlas for the region to become a report outlining particular issues and associated indicators. This was predominantly because of the limited availability of data that could be mapped and an interest in highlighting areas where collaborative action to improve public health and wellbeing can be further strengthened. Efforts were also made to avoid reproducing readily available data (although sometimes this has been necessary to provide a well-
rounded picture), to overlay a new level of analysis for data already available and to draw out implications for regional and local government, rather than simply presenting a series of health and wellbeing indicators alone.

1.5 Report limitations

The use of existing data limits the range and types of indicators that can be reported. For example, there are few data available that adequately capture mental health issues, impacts on those with disabilities, impacts of long-term, low-level environmental hazards or complex social and physical environmental changes, aspects of cultural identity, overall safety or community belonging. The hospitalisation and notification data that are used for some indicators do not give a full picture of the impact of the health issue on the community. It was not possible to collect new data for this report, but in future it may be possible for TAs, the ARC and ARPHS to work together to collect data to monitor aspects of health and wellbeing that are currently not measured. Key data gaps identified during the development of this report are described in Section 7.2.

This report provides some interpretation of indicators, trends over time, links with health and wellbeing, and some suggestions of possible actions in relation to the priority health public health areas presented. These discussions are informed by the published literature and the professional judgements of the contributors to the report. Comprehensive, systematic literature reviews were not performed to support each discussion and the quality and quantity of the evidence to support suggested links or actions is variable. Where the evidence is less robust, this is noted in the text and Appendix 1 gives some detail about the data used for each indicator, and any specific limitations to their use.

Where possible, national or other benchmarks have been noted in relation to the indicators to provide a guide as to whether the Auckland region or TA area is doing better or worse than could be expected. The quality of some data along with complex interactions between most indicators (e.g. deprivation and cultural factors) limits interpretation and some caution is required when comparing indicators to these benchmarks or between areas. Similarly, comparisons highlighted in the health inequalities discussions usually have complex contributing factors and are presented to highlight potential issues requiring further investigation.

1.6 Future developments

ARPHS intends to produce other reports in the State of Public Health in the Auckland Region series. ARPHS also plans to update this report approximately every three years in relation to the review and monitoring of long-term council community plans (LTCCPs) required of local authorities.

ARPHS welcomes feedback on the format of this or other State of Public Health reports (see page 12 for contacts).
2. Background
2. Background

2.1 The Auckland region and its people

The Auckland region is the largest urban area in New Zealand, containing the largest, most ethnically and socially diverse regional population. These characteristics present challenges for maintaining and improving the health and wellbeing of residents.

The key planning issues that will arise over the next twenty years are as follows:

- Population growth leading to pressure on infrastructure.
- Changing demographics (ageing population, more refugees and migrant groups) requiring changes to health and social services.
- Infrastructure to cope with growth, intensification and replacement or upgrading of old services.
- Transport planning (including planning for new roads and public transport) to encourage a move to more active transport modes and addressing environmental and safety concerns.
- Urban design to harness benefits of intensification and reduce negative health impacts.
- Urban development (e.g. location of growth) to control negative impacts on environment.

At 30 June 2005, the population of the Auckland region (and the region covered by ARPHS)\(^5\) was projected to be 1.35 million (Statistics New Zealand, 2004). The Auckland region population is projected to have the highest growth of all regions in the country, with the regional population expected to reach 2 million by 2040. The region includes seven TAs: Rodney District (estimated population 89,100 at 30 June 2005), North Shore City (212,200), Waitakere City (191,900), Auckland City (425,400), Manukau City (332,900), Papakura District (43,700), and Franklin District (57,400). The population is, on average, younger than that of most other regions in New Zealand, and it is also more ethnically diverse than the New Zealand population as a whole. The TA populations vary in ethnic makeup (Figure 1, next page).

Within the fifteen years from 2001, the population of the region is expected to grow by about 2% per year, with TA growth ranging from about 1% per year in Papakura, to 2.2% in Manukau City and 2.6% in Rodney District (Statistics New Zealand, 2005b). Statistics New Zealand also project that the ethnic diversity of the Auckland region population will further increase. Nationally, all areas are expected to have an increasingly ageing population structure.

More detailed descriptions of the population of the Auckland region and TAs are available from a number of sources\(^6\).

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\(^5\) Note: the Auckland Regional Council covers almost the same geographic area as ARPHS, but excludes part of Franklin District. The geographic boundaries pertaining to the Auckland region is generally that of the Auckland Regional Council. When data are presented for individual TAs, the whole of Franklin District is included unless noted otherwise.

\(^6\) For example: the State of the Auckland Region report (Auckland Regional Council, 2004b). Also, the Auckland Regional portal [www.aucklandregion.com](http://www.aucklandregion.com) provides direct links to the region’s eight local authority websites in addition to displaying news items from each council. The whole of government portal [www.govt.nz](http://www.govt.nz) provides information at central, regional and local levels.
2.2 Improving public health and community wellbeing

The Local Government Act 2002 provides a broad remit for TAs and regional councils to promote the social, economic, environmental and cultural wellbeing of their communities, consistent with the principles of sustainable development. ‘Health’ is sometimes considered as a component of social wellbeing. Public health, however, takes a broad view that encompasses all aspects of health and wellbeing. Public health focuses on communities and populations rather than individuals, and is concerned not only with diseases but also the wider determinants of health that include the environment, housing, employment, education and other factors.

Public health is a responsibility shared across multiple agencies that have an influence on groups of people and how they live, work, and play. Regional and local government has a long history of protecting and monitoring aspects of the public health of residents. Within the health service, the Auckland Regional Public Health Service is the largest single provider of integrated public health services in the region. Its purpose is to improve health and wellbeing through promotion, protection and preventive strategies (Auckland Regional Public Health Service, 2004).

**What is Public Health?**

The science and art of preventing disease, prolonging life and promoting health through the organised efforts and informed choices of society, organisations, public and private, communities and individuals.

(Wanless, 2004, p.27)
Local authority role in improving health and wellbeing

Local authorities importantly influence public health through both the range of services they provide to their local communities and their role as a regulator. Public health roles for local authorities are included in a number of pieces of legislation. For example, the Local Government Act 2002, the Resource Management Act 1991, the Building Act 2004, the Food Act 1981, the Hazardous Substances and New Organisms Act 1996, the Sale of Liquor Act 1989 and the Health Act 1956. The Health Act 1956 states that it is the duty of every TA to improve, promote and protect public health within its district.

Under the Local Government Act 2002 the purpose of local government has been broadened and is now “to promote the social, economic, environmental and cultural well-being of communities, in the present and for the future” (Part 2, Section 10(b)).

As part of these recent changes to the Local Government Act 2002, local authorities are required to undertake a more formalised process of planning and decision making that more actively involves the community and other stakeholders than was previously required. The result of this process is the establishment of a long-term council community plan (LTCCP).

The LTCCP achieves the following goals:

- Identify the outcomes that the local community seeks.
- Establish local authority work programmes to achieve the outcomes.
- Identify who else will contribute to the outcomes and how the local authority will work with those entities.
- Assess the resources (financial, physical, human etc) the local authority requires to deliver its work programmes.

Each LTCCP is underpinned by an annual plan, which sets out more short-term issues and programmes.

Qualities of a healthy city:

1. A clean, safe physical environment of high quality (including housing quality).
2. An ecosystem that is stable now and sustainable in the long term.
3. A strong, mutually supportive and non-exploitative community.
4. A high degree of participation and control by the public over the decisions affecting their lives, health and well-being.
5. The meeting of basic needs (for food, water, shelter, income, safety and work) for all the city’s people.
6. Access to a wide variety of experiences and resources, with the chance for a wide variety of contact, interaction and communication.
7. A diverse, vital and innovative city economy.
8. The encouragement of connectedness with the past, with the cultural and biological heritage of city dwellers and with other groups and individuals.
9. A form that is compatible with and enhances the preceding characteristics.
10. An optimum level of appropriate public health and sick care services accessible to all.
11. High health status (high levels of positive health and low levels of disease).

(Hancock & Duhl) quoted in (Barton & Tsourou, 2000)
All local authorities are required to carry out a process of working with communities and key stakeholders to identify community outcomes for the immediate and long term at least once every six years. The purpose of doing this, among other things, is to open up the democratic process to include community input into identifying what they want for the future of their region (city or district).

By early 2006, local authorities had established a set of draft outcomes. These outcomes are used to inform and guide priority setting. Many of the outcomes, such as planning Auckland’s long-term growth, planning and funding a regional transport network, environmental protection and providing open and green spaces, are key responsibilities for the Auckland Regional Council. Other identified outcomes require organisations other than local authorities to take a lead role.

By the middle of 2006, local authorities will have adopted their first long-term council community plans. These plans identify the outcomes towards to which each local authority will be working over the next decade. Each outcome will be supported by a range of work programmes designed to help achieve the outcome sought. Local authorities are then required to monitor the progress made by the community in achieving the outcomes in relation to their LTCCP.

Local authorities have an ongoing role in a number of specific public health issues. Many of these roles are outlined in Table 1 below and are discussed in the three focus areas of this report.

**ARPHS role in improving public health and wellbeing**

ARPHS provides public health services on behalf of the three DHBs operating in the Auckland region (i.e. Auckland, Counties Manukau and Waitemata District Health Boards). ARPHS is funded by the Ministry of Health and works across a range of national, regional, and district health priorities including:

- infectious disease
- obesity, diabetes and cardiovascular disease
- tobacco and alcohol related harm
- cancer
- environmental inequalities
- environmental hazards.

ARPHS uses a range of public health strategies to improve health and wellbeing. These strategies are not implemented in isolation. Local authorities and environmental and other agencies often lead the implementation of activities that protect and promote public health (e.g. food safety and mitigation of environmental hazards). Some activities, such as smoke-free environments and disease investigation, are led by public health services.

As well as fulfilling its regulatory role, ARPHS is also committed to delivering a number of strategic projects to improve health and wellbeing across the region including:

- Working with Waitemata District Health Board and the National Heart Foundation on the School Beverages Project.
- Implementing the Healthy Kai project in town centres by collaborating with local businesses, community groups,
local authorities, primary healthcare organisations and nongovernmental organisations.

- Implementing the Healthy Housing project with Housing New Zealand and Counties Manukau District Health Board.
- Conducting emergency management planning with local authorities, district health boards and other key stakeholders.
- Carrying out injury prevention activities, with a physical environments focus, across a range of local authorities
- Working in partnership with Auckland City Council on a health impact assessment on the Avondale Liveable Communities Plan.
- Working with Manukau City Council, Counties Manukau District Health Board and School of Population Health on the urban design component of the ‘Let’s Beat Diabetes’ Plan.
- Promoting workplace health in businesses across the region.
- Working in partnership with Hapai te Hauora Tapui Ltd., the regional Māori public health provider, on a range of public health issues.
- Planning with various agencies for a pandemic.

New opportunities for public health providers and local authorities to work together

New opportunities have emerged over the last few years for joint action between the health and local government sectors. In summary, key developments include the following:

- the identification of community outcomes and the development of LTCCPs under the Local Government Act 2002
- a requirement to consider the protection and promotion of public health in the development of regional land transport strategies
- an increased awareness of the importance of intersectoral action, particularly in areas such as obesity, diabetes, and cardiovascular disease
- the inclusion of health input into the development of water and sanitary services assessment (WASSA) schemes
- requirements for the integration of land use and transport planning
- an acknowledgement that safety, health and wellbeing are important considerations for housing provision and building legislation
- the identification of health and wellbeing as an important component of urban design under the New Zealand Urban Design Protocol
- a requirement for the development of national environmental standards
- the potential role of the health sector in supporting the implementation of the Sustainable Development Programme of Action
- the release of guidelines on health impact assessment.

2.3 Framework

The first State of Public Health in the Auckland Region report (Auckland Regional Public Health Service, 2005b) used a health promotion framework called Te Pae Māhutonga (Durie, 1999). The report presented quantitative indicators pertaining to Māori in the Auckland region across the six dimensions of Te Pae Māhutonga and disease incidence and prevalence.
This report, *Improving health and wellbeing: A public health perspective for local authorities in the Auckland region* (i.e. the second *State of the Public Health in the Auckland Region* report) includes information on all residents of the Auckland region and focuses on health in the different cities and districts that make up the region. A different but complementary framework is used, which includes cultural identity as part of the social environment. Many different models have been used to categorise the myriad determinants of health and wellbeing, to illustrate the complex relationships between them, and to guide the selection and presentation of data. The model used in this report as a framework for discussion and for presentation of indicators is similar to one developed by Dahlgren and Whitehead in 1991 (Dahlgren & Whitehead, 1991). It is shown graphically in Figure 2.
The framework illustrates different levels of influence on health and wellbeing. Health states and diseases are represented by the middle circle; they are the result of the combined effects of all the other levels of the framework. Each successive circle exists within the context of the next circle out; health promoting or damaging behaviour exists within a social context; communities exist within the natural and built environments. While aspects of each level may also have an effect on the outer levels (communities can have an impact on their built environment, individual behaviours can affect the natural and the social environments), the circles are concentric to illustrate that, in general, actions at an outer level will have effects on all the levels within. For example, changes in the physical environment will tend to affect whole communities, the behaviour of many individuals within those communities and the health and wellbeing of members of the community, and thus may be the most efficient way of improving community wellbeing.

Medical care can prolong survival after some serious diseases, but the social and economic conditions that affect whether people become ill are more important for health gains in the population as a whole. Poor conditions lead to poorer health. An unhealthy material environment and unhealthy behaviour have direct harmful effects, but the worries and insecurities of daily life and the lack of supportive environments also have an influence


A sense of connection with and guardianship of the land is an important aspect of wellbeing for many New Zealanders. For example, as noted in the ARPHS report on Māori public health (Auckland Regional Public Health Service, 2005b):

Māori link whakapapa, or genealogy, with the natural environment including whenua (land), maunga (mountains), moana (harbours, beaches and the sea), wai (water), and ngahere (native flora and fauna).(p.35)

Protecting the natural environment has intrinsic value for this reason. While in this report the focus is on measurable aspects of the environment that are likely to affect human health and wellbeing, it is acknowledged that action to improve and protect environments is often justified whether or not there are human health or wellbeing impacts.

Much of local government action occurs within the two outer circles of the framework: the natural and physical/built environment, and the social/economic environment, but there are examples of local authority roles pertaining to individual behaviours (e.g. regulatory or enforcement activities) and health states/diseases (e.g. an advocacy role regarding the provision of social and health services). Table 1 shows key examples of various local authority roles across the framework.
### Table 1: Framework categories in relation to determinants of wellbeing and local government activities

<table>
<thead>
<tr>
<th>Framework/indicator category</th>
<th>Common local government activities/responsibilities</th>
</tr>
</thead>
</table>
| Natural, physical and built environment                         | • Land use planning  
• Resource management  
• Environmental/hazard and waste management  
• Biosecurity  
• Transport (all modes)  
• Roads  
• Urban design and planning  
• Housing/building consents  
• Liquor licensing, gambling controls, etc  
• Amenities such as parks, street lighting, footpaths, shops, etc  
• Recreational facilities  
• Natural and cultural heritage |
| Social, economic and cultural environment                        | • Community development  
• Economic development  
• Libraries and other community facilities  
• Recreation programmes  
• Lifelong learning  
• Housing  
• Community safety and crime prevention  
• Injury prevention |
| Individual behaviours                                            | • Local government not usually involved in acting directly on these determinants, although sometimes is involved in promoting healthy behaviours and specific enforcement activities, for example:  
  o Enforcement of the Sale of Liquor Act  
  o Enforcement of noise controls |
| Health states/diseases across physical, mental, family and spiritual dimensions | • Local government has a limited direct role, but could advocate for the provision and access of social and health services |
Part 1: Health and wellbeing focus areas

Urban development
Transport
Food, drink & tobacco
3. Urban development
This section focuses on aspects of the design, construction and overall planning of the built environment in urban areas that may have an impact on health and wellbeing. Good urban design considers access to open space, opportunities for physical activity in normal daily life (for example in travel to work and amenities), housing and infrastructure quality, and the minimisation of exposure to hazards for residents. Good urban design will also enhance people’s safety and personal security (through injury and crime prevention).

Every day the Auckland region grows by at least fifty people and twenty-one new homes are needed. At current growth rates, the population is projected to grow to two million by around 2040. Approximately 90% of the region’s population live in the urban area.

To ensure that growth and development is planned carefully, the Auckland Regional Growth Strategy: 2050 was prepared and adopted by the Auckland Regional Council and the seven Auckland TAs in 1999. It seeks to provide for population growth in a sustainable way by emphasising urban consolidation, by managing the extent of urban expansion and by integrating land use and transport development.

The Auckland Regional Growth Strategy specifies that intensification areas should meet the following criteria:
- be served by an effective and efficient passenger transport system
- be within walking distance of a commercial or employment centre
- be located in a manner that maintains identified residential character areas
- be located and developed in a manner that provides adequate open space for the needs of local residents

Most of the new growth (70%) is planned to occur within the existing urban area, focused around centres of varying sizes and major passenger transport routes. Some growth is to be accommodated in new suburbs (‘greenfield’ development) and some in rural and coastal settlements. Development is to be prevented in the most highly valued and sensitive natural areas.

Certain locations in the Auckland region have been selected as growth nodes (see Figure 127) where mixed use, higher density development is being encouraged. This means there will be an increase in intensive housing and development such as terraces, town houses and apartments. Thirty percent of the estimated two million population of the region could be living in multi-unit housing by 2050 compared to around 15% currently. Changes to the region’s planning documents (the Regional Policy Statement and individual TA district plans) to identify these areas and better integrate land use and transport, are underway.

The strategy’s vision is for the Auckland region to prosper in a sustainable manner that does the following:
- promotes strong, supportive communities
- ensures a high quality living environment
- creates a region that is easy to get around
- protects the coast and surrounding natural environment.
have access to appropriate and affordable education, health, community, recreation, social services and facilities

provide a range of dwelling types and densities including mixed use development activity where appropriate.

**Urban development and health**

Urban development can have positive impacts on the health and wellbeing of communities. However, urban development that is not appropriately designed or located may have negative health impacts. Exposure to environmental hazards (e.g. excessive noise and poor air quality), low quality housing resulting from poor construction and maintenance practices, traffic injuries and inadequate infrastructure (e.g. wastewater systems) can all pose a threat to health. Urban development can also impact on other determinants of health including employment, access to education and health services,

![Table 2: Health and wellbeing related benefits of good urban design*](image)

<table>
<thead>
<tr>
<th>Design feature</th>
<th>Benefits for which there is conclusive evidence</th>
<th>Benefits for which there is strong evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity</td>
<td>• Enhancing natural surveillance and security.</td>
<td>• Encouraging walking and cycling, mainly for nonwork trips, leading to health benefits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shortening walking distances, encouraging people to walk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reducing vehicle emissions through fewer nonwork trips.</td>
</tr>
<tr>
<td>Density**</td>
<td>• Reinforcing green space preservation if linked into clustered form.</td>
<td>• Can contribute to social cohesion.</td>
</tr>
<tr>
<td></td>
<td>• Reducing run-off from vehicles to water.</td>
<td>• Tends to encourage greater physical activity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reducing emissions to air and atmosphere.</td>
</tr>
<tr>
<td>Mixed Use</td>
<td>• Improving access to essential facilities and activities.</td>
<td>• Encouraging walking and cycling.</td>
</tr>
<tr>
<td></td>
<td>• Reducing car use for local trips and hence emissions (but minor impact on commuting).</td>
<td>• Increasing personal safety.</td>
</tr>
</tbody>
</table>

*Adapted from The Value of Urban Design (Ministry for the Environment, 2005c)

**Some benefits can be difficult to disentangle from the benefits of mixed use and other factors**
social support and access to food, and control access to potentially harmful activities (e.g. intoxication, problem gambling, etc). Some negative health outcomes can be avoided or mitigated through good urban design. The benefits of good urban design are well discussed in *The Value of Urban Design* (Ministry for the Environment, 2005c). Table 2 (previous page) provides an overview of these benefits, which include ‘walkable communities’ and improved air quality.

Raising the quality of urban design and development is one of the most pressing issues facing the Auckland region. Market-led intensification and greenfield development, along with the deregulated development process, have not always delivered the quality development that communities generally want.

Local authorities in the Auckland region are committed to improving urban design outcomes by increasing skills and expertise, making changes to plans and rules, demonstrating and championing good urban design and using new tools such as Auckland City’s Urban Design Panel. The Auckland Regional Council, the seven Auckland TAs and the Auckland Regional Public Health Service are signatories to the *New Zealand Urban Design Protocol* (Ministry for the Environment, 2005a).

There is a limited amount of information specific to New Zealand on the potential positive and negative impacts of the built environment on the health and wellbeing of communities. Therefore the following discussion relies mainly on data from overseas.

**Summary of actions**

The Auckland Regional Public Health Service, TAs and the Auckland Regional Council, along with other agencies whose roles can affect public health, could consider collaborating on strategies to improve health and wellbeing including the following:

- Develop a regional framework for coordinating health and sustainable development planning and decision making, which could include the following:
  - urban design criteria specific to health and wellbeing that address exposure to environmental hazards, open space, infrastructure, housing quality, affordable housing, crowding, opportunities for physical activity, crime prevention and safety
  - infrastructure development that improves population health
  - improvements to housing that enhance population health
  - mitigating impacts of urban intensification on existing communities.

- Collect baseline health information in identified areas of urban intensification/growth and undertake a programme of monitoring to identify health and wellbeing impacts of urban intensification/growth in the Auckland region.

A range of actions involving local authorities is required to address current and future health and wellbeing concerns pertaining to urban development in the Auckland region. These are summarised below:

- Enhance assessment and monitoring of drinking water supplies and sanitation measures.
- Regionally coordinate the upgrade and
development of infrastructure, including drinking water, stormwater and wastewater networks.

- Establish walkable communities where amenities such as shops, health services, social and recreational facilities are accessible by safe, attractive walking or cycling routes (including safe road crossing points).
- Encourage and promote physical activity, especially for children.
- Increase access to public transport and ensure safe access.
- Maintain and improve quality of open space and where possible increase access to open space.
- Improve the quality of housing and ensure housing is more affordable for specific populations.
- Develop strategies to counteract increasing motor vehicle use as a key means to reduce the health impacts of poor air and water quality.
- Create more smoke-free environments.
- Continue to control noise and seek improved noise standards for high density housing.
- Develop public health risk management plans for drinking water supplies and recreational water.
- Ensure adequate buffer zones between facilities with hazardous substances and housing and schools, maintain a collaborative emergency response and provide facilities for the safe disposal of hazardous waste.
- Avoid creating breeding habitats for disease vectors (e.g. mosquitoes and rats) and enhance surveillance.
- Consider the needs of children in local authority planning processes.

3.1 Physical Infrastructure

Health issue
Increased population growth and intensification is placing stress on the region’s infrastructure and utility networks including drinking water, wastewater and electricity. Good quality drinking water, wastewater systems and facilities for personal hygiene are important in preventing water-borne diseases, which are discussed in the Food, Drink and Tobacco focus area (Chapter 5).

Determinants
New infrastructure will be needed for development on greenfield sites. An increase in the use of ‘low impact’ design features for sustainability reasons, such as on-site water collection, stormwater collection and re-use of wastewater, needs to be balanced against potential health implications.

Infrastructure will need to be upgraded in some established urban areas to accommodate growth through infill housing and intensification. For example, in Manukau City the current drinking water and wastewater systems were designed for a population density of 30 people per hectare. Over the last thirty years the population density in some areas has increased to 40–45 people per hectare (see indicator on page 101) and it is anticipated to increase to 150 people per hectare in some areas through infill development and intensification (Manukau City Council, 2005). Local authorities also play an important role in monitoring recreational water quality and ensuring wastewater and stormwater infrastructure are adequate to
avoid contamination of beaches, rivers and lakes.

TAs are required under the Local Government Act 2002 to complete a water and sanitary services assessment (WASSA) for communities in their district. These assessments (i.e. a range of information compiled by each TA) are reviewed by ARPHS to determine the degree to which public health issues pertaining to the provision of water and sanitary services are being addressed. Assessments include information on water supply, treatment and disposal of sewage, stormwater drainage, and provision of cemeteries, crematoria and public toilets. This process helps to ensure that public health is protected through the provision of adequate infrastructure. The most recent assessments have been completed and reviewed by ARPHS with each TA receiving a list of recommendations. General recommendations include the following advice:

- That assessments be repeated when significant development occurs, or changing public health, environmental or community conditions warrant a review.
- That complaints or requests for service from the public should be used to help identify any patterns that may be of concern to public health.
- Depending on the TA, that more comprehensive data be provided.

**Action**

A more integrated approach (i.e. the Auckland Regional Council and TAs working in a more planned and coordinated manner) to the upgrading and development of infrastructure, including drinking water, stormwater and wastewater networks, is required to ensure that current and future demands for these services can be met. ARPHS could then provide public health input into regional planning, rather than working with individual TAs and network operators on an ad hoc basis. The Watercare Services (2005) document, *Three Waters Vision*, is a step towards a more integrated approach.

The provision of good quality public facilities supports good hygiene. Adequate supplies of clean water are also required in community facilities such as schools, marae, public toilets, sports and recreation clubs and other community locations, to enable thorough washing and drying of hands and food preparation and serving equipment. TAs need to address issues and recommendations identified in the ARPHS review of the current WASSA. Future assessments of water and sanitary services should consider adding criteria such as the availability of hygienic facilities for breastfeeding and hand washing.

### 3.2 Opportunities for physical activity

**Health issue**

Urban planning and design can influence opportunities for physical activity. The benefits of physical activity have been well researched and the maintenance of moderate levels of physical activity is important for people’s health and wellbeing. If more people were physically active, there would be a reduction in the rates of chronic diseases and overall mortality. Regular physical activity is linked with reduced rates of obesity, cardiovascular disease, certain cancers and diabetes. Regular physical activity also has mental
health benefits through relieving symptoms of depression and anxiety, and improving mood (United States Department of Health and Human Services, 1996).

**Determinants**

The configuration of areas of urban intensification can facilitate and encourage physical activity. Traditional low-density developments are often reliant on motor vehicles to access employment, education, leisure activities and shopping.

**Action**

The establishment of walkable communities where amenities such as shops, health services, social and recreational facilities are accessible by safe, attractive walking or cycling routes (including safe road crossing points) are important in encouraging residents to choose to use active transport in their normal daily lives (Ministry of Transport, 2005). Design characteristics that encourage people to walk include open space, trees and shade (Pikora, Giles-Corti, Bull, Jamrozik, & Donovan, 2003). Aspects of the urban area can also act to discourage people from being physically active. For example, older people may be discouraged from walking if footpaths are uneven (Davey & Nimmo, 2003) and safety is often cited as a barrier to children walking and cycling to school in the Auckland region (Neuwelt, 2005). Local authorities play an important role in enhancing the walkability of communities and providing infrastructure for cyclists.

Encouraging children to be physically active as part of developing healthy lifestyles (along with choosing healthy food) can also help to avoid future health, social and economic costs (World Health Organization, 2005). For example, children who have low levels of physical activity are more likely to develop cardiovascular disease, diabetes and hypertension as adults (Tamburlini, 2002b).

Safe access to public transport is required for the diverse needs of the community (e.g. those with disabilities or those supervising small children). Readily available public transport can reduce private motor vehicle use providing potential benefits in terms of improved air quality, reduced injury rates, and increased physical activity (since use of public transport is often accompanied by increased walking at either end of the journey). For example, in the Smart Growth America Study of 448 counties in the USA, people who lived in more dense urban areas had lower average blood pressure, lower average body mass index and an increased average amount of time spent walking (Ewing, Schmid, Killingsworth, Zlot, & Raudenbush, 2003).

### 3.3 Open space

**Health issue**

Attractive, safe areas of public open space that are accessible to residents may be beneficial to health and wellbeing in a number of ways. While robust evidence of the impact of availability of open space on ‘quality of life’ is unlikely to become available, there is much research that is suggestive of physical, mental and spiritual benefits (Morris, 2003).

**Determinants**

The availability of recreational open space, if it increases the level of physical activity
of residents, will contribute to reductions in obesity, diabetes and cardiovascular disease. A systematic review of available evidence found that people exercised more if places for physical activity were made available or access was enhanced (Kahn et al., 2002). Important characteristics of the open space include its accessibility and quality, which includes size, contour, vegetation, visual amenity and safety. One recently published study found that the likelihood of obesity was decreased and the level of physical activity increased in people living in areas with high levels of greenery and those with low levels of graffiti (controlling for sex, age, socioeconomic status and city of residence) (Ellaway, Macintyre, & Bonnefoy, 2005).

Action

Open space issues are likely to vary for different age groups. For example, older people will be concerned about slip-resistant footpaths as a means of avoiding fall injuries while children and young people will want access to play equipment, skateboarding and other recreational facilities (Accident Compensation Corporation, 2005). Playgrounds need to be protected from the sun and have seating for caregivers (Auckland Regional Growth Forum, 1998). Open space also needs to be accessible for people with limited mobility and sensory impairments. As well as having positive benefits for health and wellbeing, open space can also form important linkages to other facilities or destinations for people encouraging people to walk.

The challenge in the Auckland region will be maintaining current access and, where possible, increasing access to open space (see indicator on page 95). Local authorities have an important role to play in creating and maintaining open space and thus improving the health and wellbeing of communities. Region wide implementation of the Regional Open Space Strategy (Auckland Regional Growth Forum, 2005) will help to ensure that communities continue to have access to open space and its associated benefits. There is also a need to understand what constitutes open space in a more intensified environment and how it is used. A wider definition of open space (to include urban plazas, streets and squares, coastal walkways, etc.) and the sharing of facilities (e.g. use of school grounds by other people) will become increasingly important. Providing new urban open space in areas that are intensifying is likely to be costly and may require new approaches by local authorities.

3.4 Housing

Health issue

Internationally, several health conditions have been associated with substandard housing conditions including respiratory infections, asthma, lead poisoning in older houses painted with lead-based paint, injuries and mental illness (Krieger & Higgins, 2002). Many of the aspects of housing that have been linked with health are most likely to occur in (often older) homes that do not meet current building standards.

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Further information on the links between housing and health and wellbeing can be accessed from the ARPHS publication Housing and Health in Auckland (Rankine, 2005) http://www.arphp.govt.nz/publications/HealthyHousing/Healthy_Housing.asp.
The prevention of injuries in the home is important, even though evidence for the effectiveness of interventions is limited, as injuries are a significant cause of death and hospitalisation in New Zealand (Bennett, Wong, & Coggan, 2003). Unintentional injury is a leading cause of death and hospitalisation for New Zealand children (Safekids, 2005a) and children along with older people suffer the highest incidence of home injuries (Bennett et al., 2003).

**Determinants**

Housing is an important determinant of health and wellbeing. Factors that impact directly or indirectly on health and wellbeing include: location (e.g. access to employment and facilities), physical quality, level of crowding (measured by number of people per bedroom), construction and maintenance, and cost (percentage of household expenditure). Links between housing conditions and health and wellbeing are summarised below in Table 3.

*Reproduced from (Rankine, 2005)*

<table>
<thead>
<tr>
<th>Affordability</th>
<th>Substandard housing</th>
<th>Crowding</th>
<th>Cold</th>
<th>Damp and mouldy</th>
<th>Faulty heating sources</th>
<th>Pollutants and pests</th>
<th>Noise</th>
<th>Monocultural housing</th>
<th>Lack of shelter</th>
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Table 3: Links between housing conditions and health and wellbeing*
respiratory disease and infectious diseases such as tuberculosis, acute rheumatic fever, and meningococcal disease (Statistics New Zealand, 2003). Houses built in New Zealand prior to 1978 were not required to have insulation. A phone survey in the Auckland region found that 57% of houses had ceiling insulation and 44% had wall insulation, while an estimated 23% had no insulation (Wilton, 2005). This lack of insulation makes houses difficult to heat. Many New Zealand houses are colder than WHO recommendations (Public Health Advisory Committee, 2002). A study of New Zealand homes (Howden-Chapman, Crane, Baker, Cunningham, & Matheson, 2004) found that insulating houses improved people’s health. Children and adults in insulated homes reported fewer general practice visits, fewer sick days off work or school and were admitted to hospital for respiratory conditions less frequently than people who lived in noninsulated homes (P Howden-Chapman et al., 2004).

Housing-related injuries can be caused by a range of factors (Rankine, 2005) that include the following: poor maintenance, lack of fences, exposed heating sources, unprotected high windows, balconies and stairs, faulty wiring and appliances, poor storage, breakable window glass, flammable materials, and a lack of working smoke alarms.

Newer houses can be airtight with inadequate ventilation, which allows toxic fungi to grow (Public Health Advisory Committee, 2002). Issues with some high-rise apartments in Auckland include inadequate ventilation, insufficient storage space, lack of kitchen space and noise (Heslop et al., 2004). A survey of medium-density residential developments identified the following potential issues: privacy, location of rubbish collection and location of laundries and toilets (Turner, Hewitt, Wagner, Su, & Davies, 2004). Concerns have also been raised regarding the small size of some apartments (Martin, 2003).

There is some limited evidence linking household crowding and health outcomes. However, crowding is usually associated with other health determinants including low income (Baker, Milosevic, Blakely, & Howden-Chapman, 2004). There is good evidence linking crowding and infectious disease rates (particularly infectious respiratory illnesses). Among infectious diseases in New Zealand, infectious respiratory illnesses account for the highest proportion of hospitalisations and deaths (Mills, Tobias, & Baker, 2002). An association between household crowding and rates of meningococcal disease has been demonstrated in New Zealand (Baker et al., 2000). Other diseases linked to household crowding in studies internationally include rheumatic fever and tuberculosis (Baker, Goodyear, & Howden-Chapman, 2004).

The high cost of housing in the Auckland region impacts on health and wellbeing through reducing the amount of income households can spend on food, heating, health services, education and transport (Rankine, 2005). Housing needs to be affordable and it has been estimated that 23% of households in the Auckland region are paying in excess of 40% of their net income on housing costs (DTZ Research, 2004). The high cost of housing means that some people are sharing houses resulting in crowding. A lack of affordable
houses suitable for large or extended families may also contribute to crowding in households. 2001 Census data showed that houses tended to have three bedrooms and 80% of inner city multi-unit dwellings had two or fewer bedrooms (Statistics New Zealand, 2005a). A report on the social implications of intensive housing in the Auckland region found that to date, intensification in the Auckland region has made housing more accessible for some groups but has not reduced the housing costs of those most in need (Syme, McGregor, & Mead, 2005).

Recent commentary from Australia (Randolph, 2005) has raised two issues that may need to be considered for housing developments in Auckland. The first issue is that given that much of the higher density housing has been sold into the investment market, the developments may have been designed to suit the needs of an investor rather than the prospective tenants. Information from New Zealand suggests that people living in higher density dwellings tend to be tenants rather than owner-occupiers (Dixon & Dupuis, 2003; Statistics New Zealand, 2005a; Vallance, Perkins, & Moore, 2003). Secondly, higher density housing needs to be made more suitable for families than is currently the case.

Rapid urban development also has an impact on existing communities (Parliamentary Commissioner for the Environment, 1998; Vallance et al., 2003) and there is a need to consider their health and wellbeing as well as that of the future residents when assessing the impacts of urban development. For example, urban intensification may increase the level of noise that a residential community is exposed to and increase traffic, thus contributing to a range of negative health impacts. Additionally, concerns have been raised by existing communities that urban intensification will create slums (Dixon & Dupuis, 2003; Syme et al., 2005; Vallance et al., 2003).

A recent literature review (Syme et al., 2005) concluded that social problems would be less likely to occur if intensive housing is well designed (internal and external living spaces), well located (i.e. accessible to a range of services and activities), and meets the needs of a diverse range of households in terms of income and demographics and is not associated with one particular group in society. Connected communities are more likely to develop if there are opportunities for people to meet and interact. In higher density developments, this interaction may be encouraged and facilitated by the provision of common areas and shared facilities (Randolph, 2005).

**Action**

Ensuring that houses are insulated (P Howden-Chapman et al., 2004), are not crowded, and have adequate facilities for cooking and hygiene will help to prevent the spread of infectious disease. Examples of interventions to reduce injury include fencing of swimming pools (drownings), appropriate design and supervision of driveways (drive-over deaths) and a range of design considerations to prevent falls, which commonly occur at home (Accident Compensation Corporation, 2005).

Possible actions local authorities could take to address affordable housing include implementing the *Auckland Regional*
Affordable Housing Strategy (Auckland Regional Growth Forum, 2003) and the creation of ‘inclusionary zoning’. Inclusionary zoning would require developers to incorporate affordable housing within new housing developments (Brown, 2001).

There is some concern that there may not have been enough regulation of the quality and design of some of the intensive housing built to date (Dixon & Dupuis, 2003; Heslop et al., 2004). For example, in a report prepared for the Building Industry Association, Heslop et al. (2004) observed that “there has been little direct control by territorial authorities of design and durability aspects of this new form of housing (p. 1)”. Some of the issues identified with construction methods in higher density housing also occur in single dwellings (Hunn, Bond, & Kernohan, 2002).

Some of the concerns related to higher density dwellings and building quality generally are being addressed through amendments to the Building Act 2004, the Building Code, and through district plan changes, which provide guidance for internal noise control, size, provision of facilities such as kitchens and bathrooms, building setback and height, and outdoor living areas. Minimum standards for residential apartments in central Auckland have recently been proposed (Clinton Bird Urban Design Limited, 2005). The Auckland Regional Council has recently prepared a discussion paper that identifies the key building quality issues associated with apartments and multi-unit housing which need to be addressed through review of the Building Code (Auckland Regional Council, 2005c). Other local authority-led initiatives, such as Auckland City Council’s urban design panel, also have potential to improve the quality of future intensive housing developments. There may need to be monitoring of the existing housing stock to identify and mitigate impacts on the health and wellbeing of residents.

3.5 Environmental hazards

Urban development has the potential to expose people to environmental hazards including noise, poor air quality, poor water quality, hazardous substances and disease vectors. Demand for land means that urban development may occur on former industrial sites, which can be contaminated from previous activities.

It is particularly important to address environmental hazards to protect the health and wellbeing of children. Children have longer to develop chronic diseases than adults making the prevention of exposure to hazards during childhood important (Landrigan et al., 1998).

Air quality

Health issue

Poor air quality occurs through environmental pollutants, and in the Auckland region, this is predominantly from motor vehicles. Other sources of poor air quality include home heating and industry. Poor air quality contributes to the incidence and severity of respiratory conditions and heart disease (see the Transport focus area, Chapter 4, for more discussion on the health effects of poor air quality).
Determinants
Exposure to unacceptable air quality is likely to occur if housing is built adjacent to industrial facilities, main transport routes or within industrial airsheds. In the Auckland region, the main ambient air pollutants are particulate matter ($\text{PM}_{10}$ and $\text{PM}_{2.5}$), carbon monoxide (CO), nitrogen dioxide ($\text{NO}_2$), ozone and volatile organic compounds (VOCs). These contaminants are produced by vehicles, home heating and industry with vehicles being the predominant source of ambient air pollutants in the Auckland region (Auckland Regional Council, 2004b).

Action
Reversing the trend of increasing motor vehicle use is the most important action required to reduce the health impacts of poor air quality. The impacts and possible actions of transport on air quality and health and wellbeing are further discussed in the Transport focus area (Chapter 4).

Indoor air quality
Health issue
One of the health effects associated with poor indoor air quality is a worsening of respiratory conditions such as asthma (Public Health Advisory Committee, 2002). In addition, exposure to certain types of moulds can cause eye and respiratory tract irritation (Department of Labour, 2002).

Determinants
Indoor air quality is important because people spend about 90% of their time inside (Public Health Advisory Committee, 2002; Scoggins, Fisher, Xie, & Bluett, 2004). Indoor air pollutants include CO, $\text{SO}_2$, $\text{PM}_{10}$, $\text{NO}_2$, water vapour, moulds and volatile organic chemicals (VOCs) (Desai, Mehta, & Smith, 2004; Public Health Advisory Committee, 2002).

Sources of poor indoor air quality include smoking, cooking, home heating, inadequate ventilation, insufficient insulation, use of unvented gas appliances, as well as volatile emissions from building materials and furnishing (Desai et al., 2004; Fisher et al., 2002; Public Health Advisory Committee, 2002). Inadequate or poorly maintained heating, ventilation and air conditioning systems can be a contributing factor to poor air quality in larger buildings (Lee, De Biasio, & Santini, 1996). Outdoor air quality also contributes to indoor air quality (World Health Organization, 2000).

Smoking inside is a major contributor to poor indoor air quality and children’s exposure is of particular concern as exposure to second-hand smoke has been linked with respiratory illness including chest infections in children (Woodward & Laugesen, 2000).

There is currently limited information available on indoor air quality in New Zealand (Public Health Advisory Committee, 2002) and little or no monitoring is routinely carried out in the Auckland region (Hahn, Scoggins, & Fisher, 2004). New Zealand studies have shown that unflued gas appliances can expose people to levels of nitrogen dioxide that exceed World Health Organisation recommendations (Bettany, Chauval, & Edmunds, 1993; Yu, 2000). Benzene levels in indoor air are higher in homes with smokers and/or internal garages (Stevenson & Narsey, 1999).
Action
Local authorities have a potential role relating to indoor air quality through ensuring that building standards are maintained and promoting awareness to the issues pertaining to poor indoor air quality. Indoor air quality, and its impact on health and wellbeing, needs to be further investigated, including the feasibility of establishing appropriate monitoring and intervention or mitigation strategies.

As is discussed in the Food, Drink and Tobacco focus area (Chapter 5), local authorities have a potential role in creating more smoke-free environments in council-run facilities.

Water quality
Urban development can impact on recreational water (e.g. beaches, lakes and rivers) and drinking water quality. Water-borne disease is discussed in more detail in the Food, Drink and Tobacco focus area (Chapter 5).

Hazardous substances

Health issue
There is a wide range of hazardous substances used in industry and other human activities (e.g. solvents, pesticides, paints, adhesives, petroleum products, heavy metals). Hazardous substances can take many forms including liquids, solids, vapours, gases, fumes or dusts. The health effects from exposure to hazardous substances can be significant and long term, and can lead to cancers and other diseases.

Determinants
During an industrial accident, discharges to air are likely to occur close to the ground and any buffer zone around industries that use potentially polluting materials needs to be large enough to allow the contaminants to disperse without exposing people nearby to unacceptable levels (EPA Victoria, 1990). Industrial discharges can expose people to a number of contaminants, such as solvents and other organic compounds, metals, chlorine and ammonia gases, acids and alkalis. A range of potentially toxic combustion products can be produced during fires.

The creation of mixed use zones and the location of housing adjacent to industrial zones, while providing access to employment opportunities, can also expose residents to hazardous substances. The transportation and storage of hazardous substances pose significant potential health risks if these substances are discharged through leakage, spills, fires or other accidents.

Action
Adequate buffer zones between facilities using and storing hazardous substances (e.g. areas containing heavy and noxious industries) and housing and schools are required, to prevent people from being exposed to hazardous substances from industrial discharges or accidents. Emergency response is also important and relies on the collaboration of a range of agencies including local authorities. The Auckland Regional Policy Statement identifies industrial Air Quality Management Areas and the Auckland Regional Council is working on ways to address these issues (Auckland Regional Council, 2005b).

It is also important to ensure that there are facilities for the safe disposal of hazardous waste. For example, there are currently no facilities in the Auckland region where the
community can dispose of asbestos.

**Noise**

**Health issue**

The health effects of noise include impaired communication, disturbed sleep, difficulties with mental performance, annoyance, increased aggression, heart disease, hypertension, and hearing impairment (World Health Organization, 2000). Exposure to noise can impair children’s learning (Tamburlini, 2002b).

**Determinants**

Noise is known to have an adverse impact on health for communities close to major traffic routes, airports or noisy industries (World Health Organization, 2000). Noise from neighbouring dwellings may also be a concern in more dense housing developments. Several surveys in the Auckland region have found noise to be a problem in residential settings (Quality of Life in New Zealand’s Eight Largest Cities, 2003; Syme et al., 2005; Thompson-Fawcett, 2004). People living in high to medium density housing were more likely to be bothered by noise than those living in single, stand-alone dwellings (Lyne & Moore, 2004). Noise affecting apartments includes noise from adjacent tenants (stereos, TVs etc), noise from adjacent buildings (pubs, clubs, businesses), transportation noise and services noise (fans, plumbing, lifts etc).

**Action**

Local authorities have two main roles in reducing the health impacts of noise: noise control, especially responding to complaints from the public, and ensuring that planning and other controls are considered, for example, the proximity of dwellings to noise sources such as busy roads and industry. With increased urban intensification there is potential for improved noise-reduction building standards to be developed. Clause G6 of the New Zealand Building Code (Airborne and Impact Sound), which addresses inter-tenancy and environmental noise, has been under review for some time and should be completed with urgency.

3.6 **Disease vectors** and **biosecurity**

**Health issue**

The presence of exotic mosquitoes in New Zealand indicates the potential for the vectors of diseases such as dengue fever to become established in New Zealand. It is also important that other disease vectors or pests of public health significance do not become established, as the health effects and economic costs of this could be enormous.

**Determinants**

The Auckland region contains several potential points of entry for insect and animal pests of public health significance including 1,500 kilometres of coastline, two seaports and two international airports. It is important that exotic mosquitoes, which can carry disease, do not establish in New Zealand as diseases such as dengue fever could then spread within the

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8 Organisms or other mechanisms by which disease can be spread (e.g. mosquitoes, rats, etc).

9 Activities to prevent unwanted pests and diseases entering the country and controlling, managing or eradicating them if they have entered the country.
population.

**Action**

Care needs to be taken with the design and construction of urban areas to avoid the creation of breeding habitats for disease vectors including mosquitoes and rats. Risk areas include areas in proximity to ports and locations where cargo is unloaded. The Auckland region has a favourable environment\(^{10}\) for many mosquito species, especially during the summer months of January through to March, and enhanced surveillance for the presence of exotic mosquitoes is warranted by local authorities as an adjunct to the central Government’s biosecurity activities.

### 3.7 Inequalities

**Health issue**

Indicator data presented in Part II of this report highlights that people living in areas with higher deprivation decile values tend to have worse health outcomes than people living in areas with lower deprivation decile values. Differences exist across a range of indicators between urban and rural areas and between people living in lower decile and higher decile areas.

The negative health effects of urban development tend to be greater for vulnerable populations, in particular children, the elderly, people with disabilities and people with existing respiratory conditions. Hospitalisation data for the Auckland region (see indicators in Part II) show that childhood injuries and poisonings, childhood respiratory hospitalisations, and all-age motor vehicle hospitalisations are all increasing over time. Many of these health impacts are directly or indirectly related to urban development.

**Determinants**

The planning processes underway that allow for increased growth and urban intensification in the Auckland region provide an opportunity to address inequalities that impact on health and wellbeing such as the following:

- adequate and affordable housing
- access to transport and employment
- access to health services
- injury and crime prevention.

Household crowding is a significant concern particularly for people living in high deprivation areas and is likely to contribute to a range of communicable diseases and other illnesses.

Problem gambling is at least partially the result of ready access to gaming machines. Problem gambling can impact on the health and wellbeing of individuals and communities (particularly impairing mental health, family relationships, and increasing violence, crime and deprivation on families). Higher rates of problem gambling occur in Māori, Pacific and Asian communities. The concentration of gaming machines and gambling venues is consistently higher in areas of lower household income and higher economic deprivation (see indicator on page 110).

As a population group, children may be more likely to suffer the negative impacts

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\(^{10}\) The risk of the environment (especially in Auckland and Northland) becoming more suitable for some species of exotic mosquito through climate change is discussed in Climate Change: Potential Effects on Human Health in New Zealand, a report prepared for the Ministry for the Environment as part of the New Zealand Climate Change Programme (available from: [http://www.climatechange.govt.nz/resources/reports/effect-health-sep01.pdf](http://www.climatechange.govt.nz/resources/reports/effect-health-sep01.pdf)).
of urban development, especially resulting from changes in the urban environment that can occur through urban intensification. Protecting children’s health and wellbeing is important as it determines their health for the rest of their lives (Tamburlini, 2002a; World Health Organization, 2005). Currently four out of five New Zealand children live in urban areas (Statistics New Zealand, 1999) with approximately one third of NZ children living in the Auckland region (Ministry of Social Development, 2005).

Children’s health and wellbeing is influenced by their home and learning environments, with high quality environments helping to prevent illness and injury (Cummins & Jackson, 2005). The number of children attending early childhood education and the number of hours spent there are increasing (Education Counts, 2005), making the health and safety of early childhood education environments increasingly important.

**Action**

Providing people with good quality housing located in safe neighbourhoods will help to reduce health inequalities and improve quality of life (P Howden-Chapman et al., 2004). Addressing inequalities will need to be a collaborative effort involving both central and local government and the wider community.

The introduction of the Gambling Act 2003 required TAs to adopt a policy pertaining to gambling venues and for the first time to consider formally the social impacts of gambling within their geographic boundaries. TAs have an ongoing role in monitoring and controlling access to gaming machines that can result in problem gambling, particularly within at-risk communities.

It is important that local authority planning processes consider the needs of children. One example is ensuring that early childhood education centres and schools are appropriately located to avoid exposing children to poor air quality, contaminated land or premises, environmental noise, or transport-related issues (especially road safety).

Local authorities have a key role in ensuring that their community is a safe place for children to live. For example, Safekids (2005b) has developed a checklist for councils to ensure child safety within their communities which could be used to assess new developments. Local authorities hold information on potentially high-risk areas for childhood lead poisonings. This information could be used to target health promotion activities to assist families prevent lead poisoning. Local authorities could also improve child safety by working to reduce numbers of poisonous and noxious plants.

**3.8 Indicators relevant to urban development**

Table 4 outlines key factors that are likely to improve population health and wellbeing across environmental determinants, individual behaviours and specific health states. Indicators that have been selected to illustrate these factors are listed in the table and are further discussed in Part II of this report.
### Table 4: Urban development—key factors that improve health and wellbeing, and reported indicators

<table>
<thead>
<tr>
<th>Framework/indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
</tr>
</thead>
</table>
| **Natural, physical and built environment** | • Continued efforts to ensure drinking water meets standards  
• Provision of reticulated fluoridated water and reticulated wastewater or mitigating strategies occurs in all areas  
• Open space access maintained or enhanced  
• Household crowding avoided and access to affordable and safe housing is increased  
• Housing is dry, adequately heated and cooled, maintained in good condition, and includes adequate cooking and washing facilities  
• Amenities (shops, public transport, community facilities) made accessible to pedestrians (including elderly and mobility impaired) and cyclists, are smoke free, breastfeeding friendly, and healthy food vendors encouraged  
• Controlled access to known health risks (e.g. alcohol, gambling, fast food outlets, etc)  
• Safe and accessible walking and cycling facilities for local transport  
• Provision of sufficient infrastructure for population growth | • Water resources and quality (drinking water grade; access to fluoridated water, wastewater treatment)  
• Open space  
• Housing (household crowding)  
• Access to health risks (alcohol availability, number of fast food/takeaway retailers)  
• Access to healthy food (number of fresh fruit and vegetable retailers) |
| **Social, economic and cultural environment** | • Continued development and implementation of safety programmes  
• Improved access (location and affordability) to health care  
• Sustained support for cultural activities  
• Slums and ‘ghettoisation’ avoided possibly through mixed income housing developments  
• Improved access to education, especially early childhood facilities  
• Improved community ‘connectedness’  
• Smoke-free built environments extended | • Access to health services (access to GPs, PHO enrolment numbers)  
• Safety (reported crime) |
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<th>Framework/indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
</tr>
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<tr>
<td>Individual behaviours</td>
<td>• Reduced rates of injury</td>
<td>• Risk factors (smoking prevalence)</td>
</tr>
<tr>
<td></td>
<td>• Increased physical activity at all ages</td>
<td>• Protective factors (physical activity levels)</td>
</tr>
<tr>
<td></td>
<td>• Minimise social isolation</td>
<td>• Levels of overweight and obese people</td>
</tr>
<tr>
<td></td>
<td>• Reduced smoking in all groups</td>
<td>• Selected communicable diseases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Preschool injury and poisoning hospitalisations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Child (five- to fourteen-year-olds) unintentional injury respiratory disease hospitalisations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Adults (twenty-five- to sixty-four-year-olds) ischaemic heart disease mortality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Older adults (over sixty-five year-olds) ischaemic heart disease, falls hospitalisations</td>
</tr>
<tr>
<td>Health states/diseases across physical, mental, family and spiritual dimensions</td>
<td>• Reduced incidence of serious skin infection, gastrointestinal illness, rheumatic fever, respiratory infections, reduced spread of TB, reduced obesity, diabetes, cardiovascular disease, lung cancer, falls, traffic-related injuries, respiratory disease</td>
<td></td>
</tr>
</tbody>
</table>
4. Transport
4. Transport

Transport is a key issue in the Auckland region with a significant impact on many issues including economic development, safety and security, mobility, land use patterns, environmental sustainability and the protection and promotion of public health.

The vehicle fleet is relatively old and contains a high proportion of vehicles that emit excessive pollutants. There is generally low use of public transport services, associated with the high level of mobility brought about by the development of a motorway system during the 1950s and 1960s and high motor vehicle ownership (Auckland Regional Council, 2005a).

Some of the negative health impacts of transport are well recognised, for example air quality and road crashes, both of which contribute significantly to the number of preventable deaths, hospitalisations and other health costs. The direct and indirect impact of transport systems on public health through levels of physical activity, noise, and social cohesion are also increasingly acknowledged. Balancing these health impacts from transport against other factors, such as economic development and regional growth, requires a new way of thinking and decision making. Traditionally, the different impacts of transport have been dealt with in isolation. However, a more environmentally sustainable approach is supported from a public health perspective. For example, significant transport improvements are currently underway in the Auckland region and there is an opportunity to influence their positive impact on public health through improved land use planning, the promotion of public transport and active transport modes, slower vehicle speeds, equity for vulnerable road users (including people with disabilities) and at-risk groups, and improved vehicle emissions. This will require strong regional and national leadership.

Ways to protect and promote health have been outlined in the Auckland Regional Land Transport Strategy (Auckland Regional Council, 2005a). This strategy has considered how to protect and promote public health in the region and influences the actions of the region’s transport agencies. The policies in the strategy provide a context for the issues and actions discussed in this section. Central government strategies, for example the New Zealand Health Strategy (Ministry of Health, 2000) and the New Zealand Transport Strategy (Ministry of Transport, 2003), mirror a commitment to protecting and promoting health within the transport sector.

Summary of actions

The Auckland Regional Public Health Service, TAs, the Auckland Regional Council, and transport agencies, could consider collaborating on strategies to improve health and wellbeing including the following:

- Develop and implement procedures for assessing environmental and human health risks and impacts of transport policies and projects.
- Encourage the government to introduce New Zealand-wide standards for transport noise and vibration, and support initiatives to achieve the standards.
- Provide public transport fare concessions to appropriate target groups.
- Develop and implement a travel planning programme that ensures that individuals
are aware of, and encouraged to use, alternatives to private motor vehicles.

A range of actions involving local authorities is required to address current and future health and wellbeing concerns relating to transport in the Auckland region. These are summarised below:

- **Identify, implement and evaluate strategies to ensure that reductions in emissions from new and existing transport sources comply with the National Environmental Standards and regional targets for air quality.**

- **Ensure that transport and land use planning takes into account the needs of, and impacts on, all users—including those with disabilities—especially in relation to commercial traffic, public transport, pedestrians and cyclists.**

- **Design transport connections within high density centres and corridors in order to give priority to pedestrians, cyclists and public transport, and to enable improved urban amenity and land use integration, rather than to provide for the free flow of vehicle traffic.**

- **Further develop work with schools on fostering travel plans that increase travel choices and reduce dependence on motor vehicle travel for trips to and from school.**

- **Continue implementation of the key road safety priorities identified in the Regional Road Safety Plan 2004–2010.**

4.1 Air quality

**Health issue**

There is increasing evidence that exposure to unacceptable levels of pollutants in air can shorten life expectancy and contribute to a range of health problems. Studies of the Auckland region estimate that over 250 deaths per year can be attributed to vehicle air pollution, approximately three times the number of people who die in crashes or other transport-related injuries. Motor vehicle emissions in the Auckland region are also estimated to be responsible for 435,000 restricted activity days every year (Ministry for the Environment, 2003a).

Exposure to poor air quality can contribute to chest infections, worsening of asthma and heart disease, which in turn limit activities of daily living and require medical treatment. Some groups within the population e.g. unborn children, infants and children, the elderly, people with existing respiratory and cardiovascular disease and people with asthma are more susceptible to the health effects associated with poor air quality. Overseas research suggests that air pollution can contribute to sudden infant death syndrome and impaired lung development in infants and children (Clean Air Task Force, 2005).

**Determinants**

Air quality is monitored throughout the Auckland region by Auckland Regional Council as part of the Resource Management Act 1981. The monitoring sites have been chosen to be typical of the locations where people might be exposed (roadside, urban, rural and industrial). The levels of air pollutants are compared with either the Ministry for the Environment’s national air quality guidelines (Ministry for the Environment, 2005b) or the regional air quality targets set by the Auckland Regional Council.

Airborne pollutants of concern in the Auckland region are particulate matter (PM), carbon
monoxide (CO), nitrogen dioxide (NO₂), ozone and volatile organic compounds (VOCs) (including benzene and 1,3 butadiene). Peak concentrations of CO, NO₂ and PM can exceed air quality guidelines (Auckland Regional Council, 2003). In 2004, the Ministry for the Environment introduced national environmental standards for ambient levels of CO, NO₂, SO₂, ozone and PM₁₀. It is important to note that the Air Quality National Environmental Standard only has only a short-term twenty-four hour standard designed to protect the public from acute effects, whereas chronic exposure reflected by an annual standard has a much greater public health effect (K. Mahon, Principal Advisor Air Quality, Auckland Regional Council, personal communication, February 13, 2006).

The pollutant PM₁₀ (i.e. particulate matter less than ten micrometers in diameter) is of particular concern. Health effects associated with exposure to PM₁₀ include irritation of the nose and mouth (e.g. coughs, asthma symptoms and bronchitis), hospitalisation and premature mortality (Ministry for the Environment, 2003a). A report prepared for the Ministry for the Environment (2003a) on the health effects of PM₁₀ in New Zealand estimated that in the Auckland region there are 200 extra hospitalisations each year. This is likely to be an underestimate. It has been calculated that PM₁₀ causes a 4% increase in deaths for every ten micrograms per cubic metre increase in its average annual concentration (above the baseline level of 7.5 µg/m³) (Kunzli et al., 2000). Although there is only a relatively small increase in the risk of death for each individual, the cumulative effects are important because of the large numbers of people exposed to air pollution.

A study carried out for the Ministry of Transport (Fisher et al., 2002) applied these known effects of different levels of PM₁₀ to the situation in New Zealand in order to calculate the number of deaths per year that can be attributed to this type of air pollution. The study showed that 970 people above the age of thirty years already die prematurely each year from exposure to PM₁₀ and 436 of these deaths occur in the Auckland region. In Auckland, almost six out of every ten deaths related to air pollution (253 deaths per year) are due to pollution from motor vehicles.

Another recent study (Scoggins et al., 2004) examined the association between air pollution and deaths in the Auckland region, using nitrogen dioxide as the marker of pollution. The methods used were different, but the estimated number of deaths (268) associated with the levels of pollution currently seen in Auckland was in the same range as that found in the Ministry of Transport study.

**Action**

Reducing ambient levels of air pollutants (see page 94 for a discussion on the main categories of pollutants) is important as health effects can be caused by exposure to some contaminants at levels below air quality guidelines.

Current health and wellbeing considerations can be addressed by identifying and evaluating strategies to ensure that reductions in emissions from new and existing transport sources comply with the National Environmental Standards and regional targets for air quality.
Environmental objectives are grounded in central and regional government policy. This requires that ongoing strategies mitigate the adverse effects of air (and water) pollution within the Auckland region and a range of transport strategies will be required, including the increased provision of passenger transport, promotion of active transport, and improved vehicle emissions initiatives. Central government, local authorities and other key agencies have a vital role in promoting environmental management policies, including fewer and cleaner vehicle emissions.

4.2 Water quality

Health issue

Transport can have an impact on water quality in recreational water ways as well as in shellfish habitats. The health effects of contaminated waters ways and shellfish are unclear.

Determinants

Pollutants from motor vehicles (notably heavy metals and polyaromatic hydrocarbons) that collect in the run-off from roads are a major source of water contamination in harbour and estuarine areas. Stormwater from roads in most locations contains contaminants from motor vehicles and other activities (e.g. industrial or agricultural) that typically surround roads, and these other activities influence on the nature of run-off (Moncrieff & Kennedy, 2004).

Although there have been developments in the understanding of the environmental effects of transport on water quality, there is a limited ability to quantify the contribution that transport makes to environmental health effects via water pollution (e.g. contamination of recreational water and seafood, etc.).

Action

Local authorities, environmental and health agencies have a key role in identifying and implementing processes to improve water quality and reduce sediment contamination in freshwater and marine ecosystems caused by run-off from the transport network. Improvements in stormwater infrastructure are important and have been discussed in the Urban Development focus area (Chapter 3).

4.3 Noise

Health issue

Communities close to major traffic routes may be adversely affected by noise. Excessive noise creates well-documented negative health and wellbeing impacts, which are more fully discussed in the Urban Development focus area (Chapter 3).

Determinants

Some examples of transport-related noise include construction of new roads, increasing road or public transport noise as a result of urban development, and major roads or rail corridors. While local authorities have an important role to play in controlling the effects of noise, there is currently no formal monitoring system for transport-related noise. The information available is limited to some studies carried out on behalf of local government departments or occasional community surveys (Kjellstrom & Hill, 2002).
Action
Local authorities, the health sector, and other agencies have an important role in encouraging the government to introduce New Zealand-wide standards for transport noise and vibration, and to support initiatives to achieve the standards. These proposed standards, in addition to the noise monitoring and management work already undertaken by local authorities, would contribute to improved health and wellbeing in the region.

4.4 Crashes, injuries and deaths
Health issue
One of the most obvious health impacts of land transport is road traffic injuries and deaths (Kjellstrom & Hill, 2002). Road crashes continue to be a major cause of death and disability in New Zealand, with approximately eighty deaths per year in the Auckland region. New Zealand has a high road traffic mortality rate compared with other countries in the OECD (Auckland Regional Council, 2004a).

The number of road-related deaths in the Auckland region has steadily declined over the last three decades and over the last ten years the Auckland region has generally experienced a decrease in crashes per 10,000 people, casualties per 10,000 people and crashes per 100 million vehicle kilometres travelled (Auckland Regional Council, 2004a). For example, in 1999, there were forty casualties per 10,000 people recorded in the Auckland region compared to thirty casualties per 10,000 people in 2004.

Conversely, motor vehicle-related hospitalisations have had an upward trend going from 14.6 per 10,000 people in 1997 to 19.2 per 10,000 people in 2004 (see indicator on page 156).

Determinants
A comprehensive review of road safety literature carried out by the World Health Organisation (2004) concluded that

Good transport and land use policies offer a means of reducing the exposure to risk for road crash injury. Safety-conscious planning and design of the road network can minimize the risk of crashes and crash injury. Crash-protective features on a vehicle can save lives and reduce injuries for road users, both inside and outside the vehicle. Compliance with key road safety rules can be significantly increased using a combination of legislation, enforcement of the laws, and information and education. The availability of good quality emergency care can save lives, and greatly reduce the severity and long-term consequences of road injuries (p.143).

Land Transport New Zealand produces annual crash reports for territorial authorities, regional councils and others (e.g. Transit New Zealand), which highlight key crash factors and road safety issues. The Auckland Regional Council monitors road safety as part of the Regional Land Transport Strategy and the Auckland Regional Transport Authority oversees a regional road safety plan.

Engineering, enforcement and education interventions are typically targeted at the road network, vehicles and road users. A sustainable safety approach also acknowledges that significant safety benefits can be gained through travel demand management initiatives by reducing vehicle trips and, therefore,
exposure to risk. Research has shown that a 1% reduction in vehicle use on a transport system equates to a 1.8% reduction in road casualties. Whether measured by the time spent travelling or by the number of trips, travel by bus and train is many times safer than other modes of transport.

In Auckland active transport modes, especially cycling, carry a higher risk of injury than motor vehicle travel. This increased risk can be addressed through safer infrastructure and other initiatives but remains an important barrier to physical activity, particularly for children. Childhood pedestrian deaths and injuries are a particular concern for the Auckland region.

**Action**

Strategies to increase the use of public transport will have a positive effect in reducing road casualties. Regional and local government have committed (through the Regional Land Transport Strategy) to provide safer infrastructure for walking and cycling on arterial roads, in town centres and around schools. These engineering initiatives need to be actively supported and integrated with education, encouragement and enforcement actions, particularly through speed management and community development. Local authorities, the health sector, and other agencies also have a key role in implementing the Regional Road Safety Plan, which aims to reduce the burden of road accidents in the region. Safety and security issues also need to be addressed more broadly in roading, public transport, ridesharing, motorcycling, walking and other transport projects and programmes. Strategies need to ensure that children are a key focus for action.

One initiative to support travel behaviour change among children is the use of school travel plans (Auckland Regional Transport Authority, 2005), which aim to identify and remove practical and attitudinal issues attached to walking, cycling, and other environmentally friendly modes of travel to and from the schools in a particular community. Plans include specific programmes such as walking school buses or cycle training as well as infrastructure changes such as pedestrian crossings. There is some indirect evidence about the effects of school travel plans on health outcomes, including benefits in the areas of road traffic injury and children’s development through promoting independent mobility (Hosking, 2005).

**4.5 Physical activity**

**Health issue**

Physical activity along with an appropriate diet (see Chapter 5, the Food, Drink and Tobacco focus area, for more information) is a key means of improving health and wellbeing (Ministry of Health, 2003). In New Zealand, as elsewhere, there has been a trend for people to rely more on private vehicles as a means of transport, and less on walking and cycling (Kjellstrom & Hill, 2002; Ministry of Transport, 2005). This trend has contributed to an increase of health issues such as cardiovascular disease, diabetes and obesity to epidemic proportions (Wen, Orr, Millett, & Rissel, 2006).

**Determinants**

For decades, public health agencies emphasised vigorous exercise as the way to
achieve improved health. During the 1990s, agencies changed these recommendations, asserting that moderate forms of physical activity might be as effective in producing long-term health outcomes as more vigorous forms (Frank & Engelke, 2004). Recent international literature suggests that a focus on moderate forms of activity that can be worked into daily life is one of the most promising ways to increase physical activity for large segments of the population (Frank & Engelke, 2004).

Increased motor vehicle trip distance harms public health in two ways. Firstly, it increases air pollution through increased trip lengths, usually by private car. Secondly, it reinforces separation of activities in land use and contributes to low population levels of physical activity (Sallis, Frank, Saelens, & Kraft, 2004).

Furthermore, rural populations who have significantly less access to transport and physical activity opportunities are likely to face issues such as a lack of footpaths for people to walk safely on.

**Action**

Strategies that increase walking, cycling and public transport (i.e. ‘active transport’) use will help build greater levels of physical activity in everyday life and promote safety. A wide range of urban planning and transport policies and practices may influence walking and cycling (Ministry of Transport, 2005; Pikora et al., 2003). In 2005, the Ministry of Transport released a national strategy for walking and cycling. Underpinning this strategy, among other things, is the need for effective local action by regional and local road controlling authorities. For the Auckland region this includes the Auckland Regional Transport Authority, the seven TAs, and Transit New Zealand. These agencies, and the health sector, have a role to play in the following areas:

- Develop and implement a travel-planning programme that ensures that individuals are aware of, and encouraged to use, alternatives to private vehicles.
- Further develop the work with schools on fostering travel plans that increase travel choices and reduce dependence on motor vehicle travel for trips to and from school.
- Work with tertiary institutions, hospitals, public authorities, businesses and communities to develop travel plans that identify existing travel choices and opportunities for reducing the level of vehicle travel needed.
- Incorporate national guidelines and standards for walking and cycling into transport planning, design and management activities.
- Promote walking in the context of improved safety through a comprehensive assessment of safety and security impacts, and the implementation of appropriate infrastructure to both encourage walking and ensure the safety and security of users.
- Design transport connections within high density centres and corridors in order to give priority to pedestrians, cyclists and public transport, and to enable improved urban amenity and land use integration, rather than to provide for the free flow of vehicle traffic.
4.6 Community severance

Health issue

There has been increasing attention in recent years on the relationship between health and social cohesion. Although the influence of transport on social cohesion is complex, higher levels of social support are associated with better health outcomes (Kjellstrom & Hill, 2002).

Access to services, including health services, can be poor for those most in need, as the reorientation of retail and service industries around car travel has made it difficult for those without a car to participate fully in the community.

Determinants

Contact between family members, friends and members of voluntary organisations and communities is enhanced by private and public modes of transport. However, roads and traffic act as a physical and psychological barrier to social contact (Kjellstrom & Hill, 2002), i.e. ‘severance’11. Social cohesion for urban and rural communities is an important issue in the Auckland region. Although there is only limited evidence available, community severance is a plausible, but unproven, cause of health inequalities. Social isolation may be increased by lack of car access, especially in areas with poor public transport.

Action

The transport planning process is crucial to ensuring that negative effects of community severance are mitigated. There are some important issues for urban and transport planners to consider during both short-term and long-term planning:

- How social severance might impact on vulnerable population groups such as children, elderly, new migrants, rural populations, and people with disabilities.
- Whether high levels of car use among affluent adults creates barriers to the mobility of vulnerable population groups (e.g., children) and those without access to a car, by contributing to weaker public transport systems and creating risks for pedestrians and cyclists.
- Whether social isolation may be increased by lack of car access, especially in areas with poor public transport.

4.7 Inequalities

Health issue

Indicator data presented in Part II of this report highlights that there are differences between the different population groups affected by the health effects of transport. These differences can be expressed geographically (for example motor vehicle-related hospitalisations) or through levels of deprivation (for example households without access to a car). The transport indicators in this and other reports (see, for example, Kjellstrom & Hill, 2002) suggest that there are health inequalities that arise out of the effects of transport. Some of these inequalities are discussed below.

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11 Community severance can be defined as the separation of residents from facilities and services they use within their community, from friends and relations, and perhaps, from place of work as a result of changes in road patterns and traffic levels.
Determinants

The negative health effects of transport tend to affect vulnerable populations, in particular children, the elderly, people with disabilities and people with existing respiratory conditions. In addition, deaths from road traffic injury have decreased nationally during the 1990s, but rates are higher in Māori compared to Pacific and other non-Māori for both males and females, with Māori males having approximately twice the death rate of Pacific, non-Māori and Māori females (Ajwani et al., 2003). A report on Asian public health in the Auckland region (Asian Public Health Project, 2003) found that diabetes and motor vehicle crashes were leading causes of death for Asian, Pacific and Māori residents.

Children are particularly vulnerable to the transport system. For example, children who live near roads with heavy vehicle traffic are at greater risk of respiratory disease (World Health Organization, 2000) and hospitalisation data for the Auckland region appear to indicate a similar pattern (see indicator on page 172). Children are also vulnerable to deaths and injuries as passengers, pedestrians or cyclists with transport-related deaths being the leading cause of death for children. Parental fears of traffic and other safety concerns have contributed to less walking and cycling by children, especially on the journey to and from school. It is likely that this is contributing to increasing levels of childhood diabetes and obesity.

Unequal distribution of walking school buses across the Auckland region, generally favouring more well-off areas has been identified as a potential issue (Collins & Kearns, 2005). A challenge for providers of initiatives such as the walking school bus and school travel plans is to ensure that children most at risk of poorer health outcomes (usually those from more deprived areas) are provided access to these programmes.

Action

Internationally and locally, addressing health inequalities is crucial in improving population health and wellbeing. The transport sector is now required to consider, among other things, how transport policies protect and promote public health. Understanding how health inequalities can be addressed, or made worse, is a current and future challenge for this type of decision-making. Some ways in which local authorities, the health sector, and transport agencies can address health inequalities are shown below:

- Develop and implement procedures for assessing environmental and human health risks and impacts of transport policies and projects. There are a number of tools for this including guidelines on health risk and impact assessment and the health inequality assessment tool.

- Ensure that transport and land use planning takes into account the needs of, and impacts on, all users (including those with disabilities) especially in relation to commercial traffic, public transport, pedestrians and cyclists.

- Provide public transport fare concessions to appropriate target groups.
4.8 Indicators relevant to transport

Table 5 outlines key factors that are likely to improve population health and wellbeing across environmental determinants, individual behaviours and specific health states. Indicators that have been selected to illustrate these factors are listed in the table and are further discussed in Part II of this report. The air quality indicators reported in Part II summarise more descriptive analysis undertaken by the Auckland Regional Council.

Table 5: Transport—key factors that improve health and wellbeing, and reported indicators

<table>
<thead>
<tr>
<th>Framework/ indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
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</table>
| Natural, physical and built environment | • Sustained implementation of national, regional and local air quality strategies that improve the health of people and the environment  
 • Mitigation of the negative health effects from noise and vibration  
 • Integrated transport and land use planning  
 • Development of built environments that support public transport and active transport (walking, and cycling) and that reduce the risk of motor vehicle crashes | • Summary of air quality measures included—refer to the Auckland Regional Council for more and other transport-related indicators, especially monitoring of the Regional Land Transport Strategy |
| Social, economic and cultural environment | • Provision of a sustainable public transport infrastructure including increased opportunities for accessing employment, recreation, and health and social services  
 • Increased public awareness of the negative health and environmental effects of poor air quality  
 • Use of tools for assessing public health risks and impacts of transport policies and projects, including consideration of the needs of specific population groups | • Households without access to a motor vehicle  
 Note: this needs to be balanced by public transport access, especially to employment and health and social services. Again, some indicators are included in the monitoring carried out by the Auckland Regional Council |
<table>
<thead>
<tr>
<th>Framework/indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual behaviours</td>
<td>• Increased physical activity at all ages</td>
<td>• Physical activity levels</td>
</tr>
<tr>
<td></td>
<td>• Decreased reliance on private vehicle use</td>
<td>• Travel mode to work</td>
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<tr>
<td></td>
<td>• Increased public transport patronage</td>
<td>Note: further indicators available from the Auckland Regional Council</td>
</tr>
<tr>
<td></td>
<td>• Improved driver and pedestrian road safety behaviour</td>
<td></td>
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<tr>
<td>Health states/diseases across physical, mental, family and spiritual dimensions</td>
<td>• Reduced impact of the negative health effects from land transport including air and water quality, reduced physical activity, community severance, transport-related crashes, and noise and vibration</td>
<td>• Motor vehicle-related hospitalisations</td>
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<td></td>
<td></td>
<td>• Early childhood respiratory hospitalisations</td>
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5. Food, drink and tobacco
5. Food, drink and tobacco

This section focuses on the many ways that the use of food, water, tobacco, alcohol and other drugs can promote or reduce health and wellbeing.

Sufficient quantities of food and water for consumption are prerequisites for good health. In New Zealand, not all households find it easy to obtain an adequate quantity of food. Of the households with a child in the 2002 National Children’s Nutrition Survey, about one in five reported that they could not always afford to eat properly, with one third reporting that the variety of foods that they are able to eat is sometimes or often limited by a lack of money (Parnell, Scragg, Wilson, Schaaf, & Fitzgerald, 2003).

Not only is the quantity of food and water vital, but their quality and composition are also important. For example, excessive consumption of fat, salt, sugar, and alcohol causes poor health. Fluoride in drinking water prevents dental decay. Food or water that is contaminated with chemicals or organisms can cause illness. Some infectious illnesses that are caused by food- and water-borne organisms can also be passed on by poor hygiene practices or through contaminated recreational water.

Breastfeeding provides the necessary nutrients for most babies in the first four to six months of life, and also reduces the risk of a number of infectious and allergy-related diseases and may have other protective health factors into childhood and adulthood.

Tobacco is known to increase the risk of many diseases. Minimising the harm it causes requires a wide range of actions at all levels of the determinants of health.

An improvement in the health and wellbeing of the population could be expected if more people’s consumption comprised the following:

- food and water uncontaminated by harmful chemicals or organisms
- the recommended five or more servings of fruit and vegetables a day
- amounts of fat and energy appropriate to each person’s levels of physical activity
- salt intake at the recommended level
- fluoridated water
- small to moderate amounts of alcohol, in low risk patterns (drinking with meals and avoiding binge drinking)
- full breastfeeding to at least six months of age where possible
- avoidance of tobacco and other harmful drugs.

There are barriers to the realisation of this ideal at all the levels of determinants of health. Some of the ways in which these determinants interact are described in this section.

Summary of actions

The Auckland Regional Public Health Service, TAs and the Auckland Regional Council, along with other agencies whose roles can affect public health, could consider collaborating on strategies to improve health and wellbeing including the following:

- Advocating for the inclusion of design features in urban planning and resource consent processes that have the potential to reduce obesity by improving nutrition. Examples of possible innovative
approaches include the following:

- ensuring access to appropriate food shops by means other than driving long distances in private cars
- restricting location of high fat (primarily ‘fast’) food outlets from close proximity to schools
- requiring walking or cycling infrastructure that facilitates safe access to shopping centres.

- Advocating for the removal of vending machines selling sugary drinks and high-energy snacks from schools and other places that are easily accessible to children, including sports centres.
- Increasing the coverage of smoke-free areas, including the grounds as well as the buildings in all local authority properties, and advocacy for increased smoke-free areas in and around all sports and music venues.
- Making adequate hand washing and drying facilities, and adequate supplies of clean water, available in public toilets in buildings such as schools, marae, public toilets, and sport and recreation clubs.
- Expanding collaborative programmes to improve nutrition into areas with high proportions of people at risk from obesity and its related diseases.
- Achieving better compliance with, and enforcement of, the Sale of Liquor Act 1989, including controlled purchase operations to identify breaches of the Act, particularly sales to minors.
- Implementing community programmes to reduce high-risk alcohol use.

A range of actions involving local authorities is required to address current and future health and wellbeing concerns pertaining to food, drink and tobacco in the Auckland region. These are summarised below:

- Take a leadership role in normalising healthy eating by setting good nutrition policies for local authority facilities and events.
- Remove vending machines that sell unhealthy snacks from local authority premises, especially those easily accessible by children, such as sports centres.
- Require improved drinking water quality monitoring in all community supplies.
- More actively promote guidelines for the design and operation (including water treatment) of roof and bore water collection systems.
- Take action to minimise risks associated with on-site wastewater disposal.
- Improve drinking water and wastewater infrastructure in rural communities.
- Implement public health risk management plans for drinking water and recreational water.
- Limit the density of liquor outlets.
- Focus food, drink and tobacco interventions on those with the greatest need.

5.1 Obesity, diabetes and heart and vascular disease

Health issue

It has been estimated that approximately 40% of all deaths in New Zealand can be attributed to a combination of high blood pressure (strongly related to nutrition, especially excessive salt intake), elevated total blood cholesterol (a marker for saturated fat intake), low vegetable and fruit intake, and being overweight or
obese (which indicates excess energy intake over expenditure) (Egger & Swinburn, 1997). Overall, about 56% of New Zealand adults were overweight or obese in 2003 (Ministry of Health, 2004c) and rates for Pacific people are particularly high (see indicator on page 159).

The proportion of people who are overweight and obese is increasing internationally, both among children and in adults. This trend is evident in New Zealand (Parnell et al., 2003) and also likely in the Auckland region, but there are currently limited data available to monitor trends at a regional or local level. The increase in numbers of overweight and obese New Zealand children is of particular concern, as obesity in childhood strongly predicts obesity in adulthood and therefore has significant health consequences. Obese children are also at greater risk of asthma, diabetes, and psychological problems, and show poorer social and economic outcomes in young adulthood (Barnfather, 2004).

**Determinants**

The physical and social environment of countries like New Zealand has been called ‘obesogenic’ (Egger & Swinburn, 1997), i.e. it tends to increase the likelihood of people becoming obese. Obesogenic environments exist wherever avoiding physical activity and eating a poor diet are the easier options. The following factors in a society all influence the level of physical activity undertaken by the population:

- the affordability of petrol and private cars
- the availability of roads
- the availability and cost of public transport
- the availability and quality of open space, cycleways, and walkways
- school and societal attitudes to sport and exercise
- mechanisation of domestic chores.

In addition, the following are examples of factors which influence the dietary choices people make:

- food regulations
- food technology (leading to the creation of ‘fast foods’ for restaurant or home)
- food cost to consumer, such that high fat, high sugar food and sugary drinks are cheaper and more available than healthier food
- the abundance and ease of eating opportunities, e.g. high fat, ‘fast’ food, vending machines in schools, hospitals, and offices.

If these factors make a sedentary lifestyle with an unhealthy diet easier and cheaper than a lifestyle that includes significant exercise and a healthy diet, the prevalence of obesity will rise.

It is unlikely that reductions in obesity, diabetes and heart disease will occur without changes in physical and social environments to promote an increase in exercise and better nutrition. Urban design that encourages physical activity has been discussed above in the Urban Development focus area (Chapter 3). This section focuses on nutrition.

**Action**

Improving nutrition is a focus of the Ministry of Health’s *Healthy Eating – Healthy Action* plan, which includes objectives and actions at all levels of the determinants of health and wellbeing (Ministry of Health, 2003, 2004b). In Auckland, a number of initiatives to improve
nutrition are currently being carried out by health services (i.e. district health boards, a range of nongovernmental organisations (NGOs), ARPHS and TAs). Most do not have specific objectives to reduce or prevent people from being obese or overweight, but might be expected to contribute to weight reduction (Barnfather, 2004). Examples include the following:

- The Healthy Kai Project, a collaboration between ARPHS, the National Heart Foundation, community health providers and retailers in the Mangere, Otara and Glen Eden town centres, which aims to promote and extend ready-to-eat healthy food choices and to encourage shoppers to buy them.
- The Adolescent Obesity and Diabetes Prevention Programme, a collaboration between the Ministry of Education initiative AIMHI (Achievement in Multicultural High Schools) and the Diabetes Projects Trust. This programme aims to encourage healthy lifestyles in year nine children (thirteen to fourteen years of age) in several South Auckland high schools. It includes education, physical activity, healthy tuck shops and the removal of vending machines containing unhealthy snacks.
- Collaboration between ARPHS and the Auckland Regional Council to help south Auckland communities create vegetable and fruit gardens in Pacific early childhood centres.
- Provision of some school breakfasts and a preschool gardening programme by Ta Pasifika primary healthcare organisation.
- Training for Māori community workers on nutrition and physical exercise provided by Te Hotu Manawa Māori and Te Whanau o Waipareira Trust.
- The Food in Schools Programme, coordinated by Manukau City Council, that provides healthy lunches and breakfasts to schools and preschools in Manukau City.
- The Waitemata District Health Board Beverage Project, which aims to remove sugary beverages from schools.

The majority of these programmes operate at the level of individual behaviour, with some addressing aspects of the social, economic and cultural environment, but they are limited to particular settings and geographic areas.

Although the evidence for the effectiveness of interventions to prevent obesity is sparse (Barnfather, 2004), action is urgently required to halt the obesity epidemic and the associated rise in diabetes and cardiovascular disease. Comprehensive and effective action would include national and local policies to reduce the obesogenic effects of the physical, socioeconomic and cultural environments. Local authorities have a key role in initiatives affecting the natural and built environments (e.g. encouraging walking and cycling, providing access to open space and opportunities for recreation) that could lead to improved health and wellbeing through reducing overweight

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12 A number of programmes targeting childhood obesity in the Auckland region at July 2004 were described in detail in the ARPHS document Childhood Obesity Prevention Programmes in Auckland (Barnfather, 2004).

13 Note that a number of programmes in the region that aim to improve nutrition have not been evaluated, in particular on their effect on weight related outcomes (Barnfather, 2004).
and obesity (see the Urban Development focus area in Chapter 3). They could also take a leadership role by setting good nutrition policies for their own facilities and by removing vending machines that sell unhealthy snacks from council premises. Planning and consent processes could consider the proximity to schools of proposed outlets selling high fat ‘fast food’ as well as the availability of other high fat foods and healthier alternatives in the local area.

5.2 Food- and water-borne disease

Health issue

During 2000 it was estimated that there were 119,000 cases of food-borne infectious disease, leading to 497,000 days of ill health (Lake, Baker, Garrett, Scott, & Scott, 2000) and costing New Zealand $55 million, mainly through lost productivity (Scott, Scott, Lake, & Baker, 2000). For the Auckland region this could mean 59,000 cases, resulting in 149,000 days of ill health, and costs of $16.5 million annually. If all food- and water-borne infectious diseases and other infectious intestinal diseases are included, the Auckland region figures could be as high as 247,000 cases per year (Lake et al., 2000), with costs of $64.5 million (Scott et al., 2000).

Children under the age of five have the highest rates of food- and water-borne communicable illnesses across all ethnicities. Children are at particular risk for person-to-person spread compared with adults, due to hygiene issues such as ineffective hand hygiene of the children and inadequate hygiene of their caregivers when nappy changing. Auckland children aged zero to five years have higher rates of hospitalisation for gastroenteritis than the rest of New Zealand, with the highest rates being among Pacific children (see indicator on page 144).

Determinants

The environmental determinants of food-borne diseases include the availability of safe food, both cooked and requiring preparation, as well as the adequacy of facilities for food storage, preparation and serving (see indicator on page 130). Education to ensure that those preparing and serving food do so hygienically is also important, as their individual actions are the final important determinant.

Good personal hygiene continues to be an important measure for preventing the spread of infectious diseases (including the potential influenza pandemic). Both hand hygiene (washing and drying hands for twenty seconds each before preparing or eating food, and after using the toilet or changing nappies) and cough etiquette (covering your mouth and nose with a tissue, then washing and drying hands) are critical and basic to preventing the spread of pathogens.

While the actual figures given above for all intestinal infectious diseases are less reliable than those for food-borne diseases, water-borne diseases are nonetheless also important in the region. As well as the risk of microbial contamination, both recreational water and drinking water can also become

Assuming that the cases are distributed evenly around the country, and given that about 30% of the national population was resident in the Auckland region in 2000, this provides a crude indication of the size of the problem.
contaminated with chemicals. Heavy metals (from a variety of sources, e.g. transport, roof paints, plumbing) such as lead and copper are of particular concern. Depending on the contaminant a range of health effects can occur, including intestinal infectious diseases, organ damage and developmental delay in children. Gastroenteritis was considered the predominant health risk associated with contamination of water by sewage and excreta, but it is now suspected that respiratory health effects are also important, and may even be more common than gastroenteritis (Ministry for the Environment, 2003b).

Drinking water supplies are generally managed by TAs, although there are a number of community supplies in the Auckland region. Additionally, in some areas of the region (particularly the Gulf Islands and parts of Rodney and Franklin Districts), reticulated water is not available and communities rely on untreated roof collected water and groundwater bores for their drinking water supply. Generally, New Zealand has a very high standard of drinking water (see indicator on page 97). However, roof and groundwater supplies sometimes contain bacteria such as *Salmonella* and *Campylobacter*, and chemicals may also contaminate some supplies. Sources of chemical contaminants in roof water include roofing materials, poorly maintained systems, air pollution and the use of treated timber in either the water collection or storage systems. In some rural areas an increase in the number of houses and/or the establishment of a permanent rather than holiday community means that individual on-site water collection and on-site wastewater treatment and disposal systems may no longer be optimal for protecting public health.

A survey of domestic drinking water supplies sourced from roof water in the Auckland region found that 56% of the supplies tested exceeded microbiological contamination standards and found some supplies contained metal contamination (14% of supplies exceeded the maximum acceptable value for arsenic and 2% for copper in drinking water) (Simmons, Hope, Lewis, & Whitmore, 2001). An Auckland study of *Giardiasis* in adults found that about a third could be attributed to consumption of nonmains supply water, such as roof water, river water or other nonreticulated supplies (Hoque, Hope, Kjellstrom, Scragg, & Lay-Yee, 2002).

The quality of recreational water is primarily determined by the management of wastewater and stormwater flows to beaches, lakes and rivers. Most TAs regularly monitor the quality of selected recreational water areas and if unacceptable levels of pathogenic organisms are found, or a chemical spill occurs, then the public is notified (e.g. through signage at the water area) of the hazard.

**Action**

Most of the key activities that ensure that food and water are safe cannot be carried out by individuals, but are the responsibility of statutory bodies that act on behalf of the community to prevent chemical and microbiological contamination. Inspection of food premises to ensure appropriate handling of food prepared for sale, requiring and providing training for food service staff, testing of imported foods and foods offered for sale, testing and grading of water supplies,
monitoring water quality at bathing beaches and swimming pools all contribute to an environment where the incidence of food- and water-borne diseases is minimised. However at present, despite these measures being carried out, they continue to be a common cause of ill health and generate significant costs to society.

Actions related to the urban water and wastewater infrastructure are noted in the Urban Development focus area (Chapter 3). Some assistance is available for improving drinking water and wastewater infrastructure in smaller rural communities. The Ministry of Health has programmes to provide assistance to drinking water suppliers in order to improve drinking water supplies, and a sanitary works subsidy scheme (SWSS) available to small- to medium-sized communities to upgrade or build new sewerage systems or sewage treatment plants.

Rodney District Council has introduced a warrant of fitness scheme for household on-site wastewater treatment and disposal systems and Waitakere City Council is proposing an inspection scheme for septic tanks. Rodney has also placed a limit on the size of developments that can be served by private wastewater systems; all developments of twenty-five properties or more will require a public wastewater system. These two measures are worthy of consideration by other TAs to minimise risks associated with on-site wastewater disposal.

The development of public health risk management plans for drinking water supplies is recommended by the Ministry of Health (Ministry of Health, 2005a). A similar risk management approach using Ministry for the Environment (Ministry for the Environment, 2003b) water quality guidelines has recently been applied to recreational water by North Shore City Council. The Council’s overall risk management framework comprises four key components including targeted wastewater infrastructure improvements, continued weekly summer monitoring (Safeswim Programme), continued immediate public health protection measures, and community awareness raising activities (North Shore City Council, 2004).

Where drinking water supplies are obtained from collection systems such as roof collection or bores, local authorities must ensure that systems are designed appropriately, upgraded and maintained as necessary. It is also important that householders are informed of the necessity of regular cleaning, maintenance and treatment of these nonreticulated supplies (World Health Organization, 2003).

5.3 Alcohol-related harms

Health issue

The regular consumption of small to moderate amounts\(^{15}\) of alcohol from middle age onwards has been shown to prevent some deaths from cardiovascular disease and diabetes in older people. However, the net effect of alcohol use in New Zealand is an excess of death and disability, with an estimated net 12,000 years of life lost in New Zealand due to alcohol in a single year (Connor, Broad, Rehm, Vander Hoorn, & Jackson, 2005).

\(^{15}\) Refer to www.alcohol.org.nz for safe/healthy drinking guidelines.
Those disproportionately affected include Māori, males and the young, mostly due to injuries (through drink driving, interpersonal violence and intentional and unintentional injuries). Cancers and chronic alcohol use conditions in the elderly also contribute to overall health impacts.

**Determinants**

The determinants of alcohol-related harm are complex but include social and cultural norms, which are partially influenced by policy and regulations pertaining to the sale of liquor, host responsibility practices and many other factors such as family or genetic histories. In addition, there is a growing body of evidence that links alcohol-related harm to the physical environment, in particular the density of licensed premises (Auckland Regional Public Health Service, 2005a).

**Action**

National policies, for example on taxation and minimum purchasing ages, combined with enhanced enforcement at a local level, have been shown to prove most effective at reducing alcohol-related harm (Babor et al., 2003). Local government has a clear role in liquor licensing and the promotion of responsible behaviour towards alcohol consumption through regulation of opening hours, monitoring of intoxication and sales to minors, and introduction of liquor bans. In addition TAs could consider limiting the density of liquor outlets through planning processes (see indicator on page 108).

For a fuller examination of the alcohol-related issues relevant to the Auckland region, see *Alcohol in Auckland: Reducing associated harm* (Auckland Regional Public Health Service, 2005a). This report attempts to develop some indicators of alcohol-related harm for the region, as well as describe what actions have been shown to be effective at reducing this harm.

### 5.4 Tobacco

**Health issue**

Smoking is a contributing risk factor, together with unhealthy diet and excessive alcohol consumption, for a number of chronic diseases. Around 4500 deaths in New Zealand each year are directly attributed to smoking (Ministry of Health, 2005b). The rate and pattern of smoking varies in different groups; it is more common among young people, those with lower incomes, Māori and Pacific peoples (see indicator on page 131).

**Determinants**

The determinants of tobacco smoking-related harm are complex. New Zealand has implemented a comprehensive range of interventions aimed at many of the known determinants of smoking:

- the built environment (through the implementation of smoke-free environments)
- the social environment (through tobacco taxes, laws to prevent selling cigarettes to children, availability of nicotine replacement and programmes to support quitting, reductions in the social acceptability of smoking in many social groups)
- individual behaviours (the prevalence of smoking has reduced in most population groups in New Zealand over the last fifteen years (Ministry of Health, 2005b)).
However, smoking will remain an important contributor to illness and premature death into the future. It will also continue to contribute significantly to health inequalities between different groups in New Zealand.

Action

Wider implementation of existing effective strategies to minimise smoking uptake and facilitate quitting, and a move towards a society where nonsmoking is the norm in all social groups, are important for the future wellbeing of the population. For example, TAs could introduce outdoor smoking bans at all TA facilities and events.

5.5 Inequalities

Health issue

In New Zealand, population groups that are already disadvantaged economically and socially also tend to have diets that are higher in fat and lower in fresh fruit and vegetables. Children’s health is also particularly vulnerable to poor diets and exposure to tobacco smoke. They are more likely to have greater proportions of obese people and to experience smoking- or alcohol-related problems. Rates of cardiovascular disease and some cancers, and poor oral health are higher in people living in more disadvantaged areas (Ministry of Health, 2003). Māori and Pacific rates of obesity, diabetes and cardiovascular disease are higher than those for non-Māori and non-Pacific people (see indicators on pages 159,180 and 186).

Determinants

The determinants pertaining to inequalities in health depend on specific food, drink, and tobacco (and other drug) issues, which are briefly discussed below.

Of the households with a child in the 2002 National Children’s Nutrition Survey, about one in five reported that they could not always afford to eat properly, with one-third reporting that the variety of foods that they are able to eat is sometimes or often limited by a lack of money (Parnell et al., 2003). There were differences between social groups in their ability to obtain sufficient food for their families. Households were more likely to report that the variety of foods that they are able to eat is sometimes or often limited by a lack of money if they had more people, lived in areas of high deprivation, or were of Māori or Pacific ethnicity. Pacific households with more than five children were the most adversely affected.

Breastfeeding provides a positive nutritional start to life. Nationally, approximately 65% of New Zealand babies are fully breastfed at six weeks old, and 50% at three months (The Paediatric Society of New Zealand, 2006). The data, which are collected by Plunket, show lower proportions of Māori or Pacific women breastfeeding at each age (see indicator on page 137). However, the data are not collected on all New Zealand babies, and are most incomplete for Māori babies.

The majority of children aged five years living in the Auckland region have access to fluoridated drinking water (i.e. fluoride is added as part of the water treatment process for reticulated supplies), which may explain Auckland children having, on average, better oral health than children in the rest of
the country (The Paediatric Society of New Zealand, 2006). However, if the more recent indicator of dental health, the significant caries (SiC) index, is used (see indicator on page 170), then more work is required in order for five-year-olds in the seven TAs to meet World Health Organization targets.

There is no consistent pattern of differing access to fast food outlets and to fruit and vegetable retailers for people living in areas with different levels of deprivation, suggesting that access alone is not responsible for the differences in intake of fruit and vegetables (see indicator on page 116).

There is evidence of ethnic inequalities in the disease patterns for certain communicable diseases that result in vomiting and diarrhoea in the Auckland region for the years 2000–2004 inclusive. While the proportion of Māori in the greater Auckland region was 11.1% (NZ Census 2001), there were a disproportionate number of Māori notified for those illnesses which lead to hospitalisation, such as paratyphoid (72.3% of all cases), typhoid (20%) and perinatal listeriosis (16.7%). However, Māori were underrepresented in the notification of self-limiting communicable enteric disease, such as campylobacteriosis (2.0%), giardiasis (2.1%) and salmonellosis (0.6%), suggesting that they may be less likely to access medical attention for these conditions.

The pattern for Pacific peoples in the Auckland region during 2000–2004 was similar, but with some striking differences. Pacific peoples made up 13.2% of the population of the greater Auckland region in the 2001 census, yet had disproportionately high rates of certain communicable illnesses which lead to hospitalisation. For perinatal listeriosis, 60.0% of the Auckland cases were Pacific, and for typhoid, 45.6%. Different from Māori, Pacific peoples had high rates of hepatitis A (32.5% of Auckland cases) and shigellosis (34.7%). Pacific children have the highest rates of hospitalisation for rotavirus gastroenteritis in the Auckland region, unlike the rest of the country (see indicator on page 144).

Tobacco control activities in New Zealand have been more effective for non-Māori than for Māori, and continued higher smoking rates in Māori may contribute to widening inequalities in health between Māori and non-Māori in the future (Shaw, Blakely, Sarfati, Fawcett, & Hill, 2005). Smoking is also more prevalent among people who live in higher deprivation neighbourhoods (see indicator on page 134).

As shown in Figure 17 on page 109, off-licence liquor outlets are more geographically accessible in neighbourhoods that have higher NZDep01 scores (i.e. higher levels of deprivation or poverty), even after accounting for the fact that such neighbourhoods are more often close to commercial areas.

**Action**

All interventions to increase healthy consumption should, if possible, be targeted at those groups with the greatest need. Where community-wide programmes are implemented it is important to ensure that their effects do not further widen disparities (which can occur where the impact of a programme is greatest in those groups that already had better health).
5.6 Indicators relevant to food, drink and tobacco

Table 6 outlines key factors that are likely to improve population health and wellbeing across environmental determinants, individual behaviours and specific health states. Indicators that have been selected to illustrate these factors are listed in the table and are further discussed in Part II of this report.

Table 6: Food, drink and tobacco—key factors that improve health and wellbeing, and reported indicators

<table>
<thead>
<tr>
<th>Framework/indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
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| Natural, physical and built environment | • Continued efforts to ensure drinking water meets standards  
• Provision of reticulated fluoridated water and reticulated wastewater or mitigating strategies occurs in all areas.  
• Clean water for recreation  
• Safe imported food (biosecurity).  
• Controlled access to known health risks (e.g. alcohol, gambling, fast food outlets, etc)  
• Amenities (shops, public transport and community facilities) are smoke-free, breastfeeding friendly, and healthy food vendors encouraged  
• Healthy food highly accessible.  
• Smoke-free built environments extended | • Water resources and quality (drinking water grade, access to fluoridated water, wastewater treatment)  
• Access to health risks (alcohol availability, number of fast food/takeaway retailers)  
• Access to healthy food (number of fresh fruit and vegetable retailers) |
| Social, economic and cultural environment | • Shellfish monitoring prevents food poisoning outbreaks  
• Food premises comply with food safety requirements  
• Smoking socially unacceptable  
• Healthy food is affordable to all  
• Healthy eating is acceptable, policies in place to encourage healthy eating (e.g. school-based programmes)  
• Drinking culture where risky alcohol consumption unacceptable | • Deprivation (NZDep 2001)  
• Safe food (premises registered in a food safety programme, premises with 'A' grading) |
<table>
<thead>
<tr>
<th>Framework/indicator category</th>
<th>Factors that improve health and wellbeing</th>
<th>Indicators</th>
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| Individual behaviours         | • People (especially parents) have skills and time to prepare healthy food safely  
                                 • Reduced smoking in all groups  
                                 • Eating a balanced, healthy diet  
                                 • Increased physical activity at all ages  
                                 • Low risk patterns of alcohol intake | • Risk factors (smoking prevalence)  
                                 • Protective factors (physical activity levels) |
| Health states/diseases across physical, mental, family and spiritual dimensions | • Reductions in levels of obese and overweight people, diabetes, cardiovascular disease, cancers, injuries, alcohol-related harms, food- and water-borne disease (e.g. campylobacter, cryptosporidium, giardia), tooth decay | • Levels of overweight and obese adults and children  
                                 • Selected food- and water-borne diseases  
                                 • ‘Population preventable’ hospitalisations  
                                 • Childhood (five- to fourteen-year-olds)—significant caries (SiC) index  
                                 • Adults (twenty-five- to sixty-four-year-olds)—ischaemic heart disease mortality, lung and colorectal cancer incidence  
                                 • Older adults (over sixty-five-year-olds)—ischaemic heart disease, lung and colorectal cancer incidence, fall-related hospitalisations |
6. Discussion & conclusions
6. Discussion and conclusions

The Auckland region is expected to undergo significant change in the next twenty years and face a range of planning issues such as population growth, changing demographics (ageing population structure, increased ethnic diversity), significant infrastructure needs, transport planning (including planning for new roads and public transport), and further urban development.

Currently, there are over 1.3 million people in the Auckland region and the population is on average younger than that of most other regions in New Zealand. The region’s population is more ethnically diverse than the New Zealand population as a whole and there are differences between local authority areas. These and other population factors provide ongoing challenges for agencies working to improve public health and the wellbeing of the region. For example, these changes will impact across a range of health and wellbeing issues such as pressure on infrastructure, the requirement for different health and social services, increased efforts to address environmental and safety concerns, and coordinated efforts to harness the benefits of intensification while reducing negative health impacts.

Priorities and partnerships for public health and local authorities

The Local Government Act 2002 encourages local authorities to adopt a partnership approach and to monitor community outcomes. Local Government New Zealand has stated that an emerging role for local authorities is participation and support of partnerships for public health action with public health agencies. Further, the focus of this partnership approach should be “on reducing inequalities in health status and addressing social determinants of health and wellbeing, in a manner that contributes to the sustainable development of their communities" (Local Government New Zealand, 2004, p.5).

Historically, there was a strong relationship between public health and urban planning, but during the twentieth century this relationship became separated. More recently, new opportunities have arisen for public health and local authorities to work together to improve the health and wellbeing of their populations. Examples include the Regional Growth Strategy, the community outcomes process, long-term council community plans (LTCCPs), and the Sustainable Cities Project. Public health requirements within transport planning and new health threats (e.g. biosecurity, avian influenza, etc) are further factors that have driven a need to strengthen the relationship once more.

This report identifies public health priorities that have bearing on local authorities in the Auckland region. There are numerous ways to determine and categorise public health priorities. Nationally, both the Ministry of Health (i.e. through the New Zealand Health Strategy and a range of other strategies) and the Ministry of Social Development have defined objectives or critical issues for health and wellbeing. At a regional level, ARPHS, the DHBs, and the local authorities have also identified priorities through strategic plans, health needs assessments and LTCCPs.

Part I of this report grapples with the complex relationships of broad environmental and social factors, individual behaviours and
health outcomes. This has been achieved through discussing three focus areas, namely: urban development; transport; and food, drink and tobacco. The focus areas included in this report provide an overview of significant relationships between the natural environment, physical and built environment, social and economic environment, behavioural factors and representative health states.

The issue of childhood respiratory hospitalisations provides a good example of these complex relationships. The rate of hospitalisation is affected by the rate of illness in the community and the way in which respiratory diseases are managed in primary and secondary health care services. A range of factors can in turn affect respiratory disease incidence, including socioeconomic factors, environmental and housing quality influences (such as outdoor air, indoor air, and allergens) and smoking. Access to primary health care services is affected by transportation availability and cost, and the distance to the service, which may be affected by the urban planning and design. Therefore, a wide range of factors about transport and urban development will affect the level of hospitalisations for childhood respiratory disease.

ARP
t is currently developing a new framework for its service delivery plan and has identified six public health outcomes that it sees as vital to improving the health and wellbeing of the region:
1. Reduction in the incidence and impact of infectious diseases.
2. Reduction in the incidence and impact of obesity, diabetes and cardiovascular disease.
3. Reduction in the incidence and impact of tobacco and alcohol related harm.
4. Reduction in the incidence and impact of cancer.
5. Reduction in the incidence and impact of environmental inequalities.
6. Reduction in the adverse effects of environmental hazards.

It is within these areas that ARPHS seeks to foster further partnerships with the local authorities of the Auckland region. Collaborative actions between local authorities, the health sector and others have been identified in each of the three focus areas in this report. In addition, specific actions for consideration by local authorities have been identified.

Health impact assessment is a key public health tool for local authorities

An example of how ARPHS can work in partnership with local authorities is the use of health impact assessments (HIAs). HIAs can provide an important tool for local authorities to review health impacts and address issues during the planning stages of urban development and other social or physical infrastructure projects.

There are two guidelines on HIA in New Zealand. The first focuses on the provisions of sustainable management planning under the Resource Management Act 1991 (Public Health Commission, 1995) and the second is targeted more broadly at a range of policies that are likely to impact on health and wellbeing, and looks at the distribution of those policies among different population groups (Public Health Advisory Committee, 2005).
In late 2004, ARPHS commissioned a policy-level HIA of the Avondale Liveable Communities Plan. The HIA was a partnership project with the Auckland City Council and it followed the Public Health Advisory Committee’s guidelines. The report produced from the HIA process included a number of recommendations to the Council about the implementation of the Avondale plan. These recommendations included enhancing the wording in the policy around community facilities, safety and crime prevention, and transport planning. New issues such as waste management and business travel plans were also addressed. This is the first HIA in New Zealand to be reported back to the Council, with the majority of recommendations approved. This work has also led to the integration as part of the planning process for community planning in the Mt Albert area.

**Indicators of health and wellbeing**

Part II of this report provides data pertaining to forty-five indicators of health and wellbeing for the Auckland region. There is a wealth of data and related discussion presented in Part II that will be useful for monitoring purposes, along with strategic and programme planning, but there are limitations to these data and significant gaps have been identified. It is important for agencies to work to improve data and ensure gaps in monitoring are eliminated. For example, many of the data sources for potential indicators of health and wellbeing and their determinants are from national surveys and collections, which do not break the data down into territorial authorities. Data for some potential indicators are not collected sufficiently frequently or consistently to allow meaningful reporting. Advocacy for improved data collection in national surveys, sufficient to provide results broken down to territorial authority level, is required to better assess and monitor the health and wellbeing of the population of the Auckland region and other regions.

Natural environment indicators include data for air quality, access to open space, and water resources and drinking quality. Air pollution kills more people in the Auckland region than transport-related injury, and increased efforts are required to reduce a range of pollutants, mainly from motor vehicle use. Water quality (drinking and recreational) is generally of a good standard but improved monitoring systems are required to ensure population health is not compromised, especially with vulnerable populations.

Physical and built environment indicators include household crowding, geographical access to health risks (liquor licenses, gaming machines and fast food/takeaway outlets), and access to fruit and vegetable retailers. Household crowding is a significant concern particularly for people living in high deprivation areas and is likely to contribute to a range of communicable diseases and other illnesses.

Social and economic environment indicators include the NZDep01 (a proxy measure for an area’s level of socioeconomic deprivation), geographical access to health services, safety, household access to motor vehicles, and food safety. Geographical access to primary health care is generally high in the Auckland region although no measure of affordability has been included. Reported crime rates are generally higher in the Auckland region than...
other regions. High deprivation is associated with a number of poor health outcomes. Data that can be used to monitor the social and economic environment are least adequate and this is an area for future development nationally and regionally.

Healthy behaviour and risk factor indicators include smoking prevalence, hazardous alcohol consumption, physical activity, fruit and vegetable consumption, breastfeeding rates and mode of travel. People in the Auckland region have generally higher physical activity rates than the national average and there are no statistical differences between different ethnicities. It is important that population risk factors decrease and healthy behaviours show improvement over time to address a range of serious health conditions and improve health and wellbeing.

Health state indicators include data on selected communicable diseases and selected hospitalisation data. Generally, adult hospitalisations for heart disease and selected cancers show a downward age-standardised rate in the Auckland region while childhood injuries and poisonings, childhood respiratory hospitalisations, and all-age motor vehicle-related hospitalisations are increasing. Inadequate data on diabetes and obesity is another important area for future development nationally and regionally.

Conclusions
Fundamental to the report is the acknowledgement that the activities of the health sector, local authorities and central government agencies all contribute to public health and can help to advance population health and wellbeing. The identification of community outcomes embedded in the requirement for local authorities to prepare long-term council community plans has provided an increased imperative for local authorities to be concerned about community health and wellbeing. Within this context, the report is intended to provide support for local authorities and others in prioritising resources to improve health and wellbeing of communities based on current public health understanding and evidence.

There is much room for enhancement in the collaborative activities of the health sector, local authorities and others to improve the health and wellbeing of the diverse population of the Auckland region.

In terms of urban development, attention to urban planning and design is required to harness positive public health impacts. The establishment of a regional framework for coordinating health and sustainable development planning and decision making is advocated. This would include the use of urban planning and design criteria, such as the following, to achieve specific health and wellbeing goals:

- Address exposure to environmental hazards.
- Ensure adequate access to open space.
- Ensure provision of sufficient infrastructure.
- Define appropriate housing quality.
- Provide affordable housing.
- Avoid household crowding.
- Provide opportunities for physical activity.
- Ensure crime prevention and safety design considerations are implemented.
The transport system needs to encourage active modes and improve safety, especially with an increased focus on vulnerable and at-risk road users. An increased use by local authority planners and decision makers of tools that assess the health and wellbeing impacts of transport-related policies and projects is advocated.

Policies around food, drink and tobacco require sustained attention. A focus on urban design features and improved control of tobacco and alcohol consumption that have the potential to reduce a range of health issues is advocated. Some examples include the following:

- Improving nutrition through urban planning and resource consent processes such as by ensuring access to appropriate food shops by means other than driving long distances in private cars, restricting the location of high fat (primarily ‘fast’) food outlets from close proximity to schools, and requiring walking or cycling infrastructure that facilitates safe access to shopping centres.
- Making adequate hand washing and drying facilities and adequate supplies of clean water widely available.
- Increasing the coverage of smoke-free areas, including the grounds as well as the buildings in all local authority facilities and properties.

Better data and monitoring of a range of indicators is also important for this work.

In conclusion, this report provides a tool for monitoring public health trends in the Auckland region that could be useful for monitoring aspects of community outcomes contained within long-term council community plans. It is hoped that the report will be a useful strategic planning tool for use by local authorities, the health sector and others. By assisting agencies, particularly regional and local government, to focus resources, it is hoped that this report will contribute to improved community health and wellbeing.
Part II: Indicators of health & wellbeing for the Auckland region
7. Introduction to indicators

A range of health and wellbeing indicators have been selected to illustrate health priorities across the Auckland region and these are presented in Chapter 8. This chapter provides an introduction to how the indicators were selected, key limitations, data gaps and an overview of indicator data methodologies. Appendix 1 provides a summary table of indicator data definitions, source and specific data limitations.

7.1 Selection of indicators

An initial list of over 100 indicators was reviewed and reduced to forty-five in an iterative process. The indicators were initially screened by selecting only those indicators that highlighted public health priorities, assessing those that were likely to provide a useful monitoring tool over time, and determining indicators that would have direct or indirect relevance to local government and public health.

Data were excluded if they were considered particularly incomplete or inaccurate. Data were also excluded if they showed similar patterns to other, more pertinent, data. The exclusion of data does not mean that the issue they reflect is not a priority for the region. A manageable number of indicators was considered more important than including a full list of all possibly relevant indicators.

As with any data there are limitations, and compromises were required in the final selection and presentation of the following indicators. As a general rule, if other agencies regularly compile or present detailed summaries of data, then wholesale reproduction of these summaries has been avoided. For example, the Auckland Regional Council regularly presents a range of transport-related data as part of the Regional Land Transport Strategy.

The aim then has been to bring together key indicators across a broad range of issues that will illustrate important areas of concern for the health sector, local authorities and others in the Auckland region.

Some of the following indicators have been broken down to district health board (DHB), territorial authority (TA) and census area unit (CAU) level as a means of identifying geographic or other disparities. Other breakdowns such as by ethnicity, deprivation index or age, have also been provided where this highlights implications for public health action.

7.2 Indicator limitations and data gaps

It is important to read the following indicator summaries in the context of the overall report limitations included in Section 1.5. A number of key indicator data limitations and gaps have been identified and are outlined below. Other more specific limitations are included with the indicator discussions or within Appendix 1.

Most importantly, the quality of some data along with complex interactions between indicators (e.g. socioeconomic deprivation affects the likelihood of being exposed to a number of different health risks) limits interpretation, and caution needs to be applied when comparing indicators to national and regional benchmarks or between areas.

Caution must also be applied when interpreting ethnic-specific data, as ethnicity reporting and coding are known to be inconsistent. Refer to He purongo Hauora o nga Iwi Māori i te Rohe o Tamaki Makaurau - a report on Māori Public Health in the Auckland Region (Auckland Regional Public Health Service, 2005) for a discussion on this issue.
A number of environmental health indicators are limited or are absent:
- Representative information on levels of exposure to noise in the Auckland region is a current gap.
- Recreational water quality could not be reported. The results of the monitoring programmes undertaken by each local authority cannot currently be directly compared as each local authority applies the guidelines differently and the frequency and duration of monitoring also varies.
- There is only limited information available on the geographic spread of some environmental exposures (e.g. monitoring for some air pollutants).
- The effects of aspects of urban design on health in New Zealand are poorly researched.
- The links between physical and social environments, access to amenities, and their effects on health in Auckland are poorly monitored and researched.
- Up-to-date information on urban density is needed and its relationship in the Auckland region to access to amenities and services requires further investigation.
- The transport needs of those in the Auckland region with different disabilities or needs (e.g. those with small children) require further investigation.
- Food safety data are limited and only the number and proportion of food premises involved in a food safety programme have been included. The grading of different licensed food premises varies across TAs and data cannot be compared in a meaningful manner. Different grading mechanisms combined with the absence of a standardised reportable food complaints database means there is limited reporting on food safety.

A number of key health risk factors have inadequate monitoring:
- At present no data on diet or levels of overweight and obesity are available specifically for the Auckland region’s TAs. DHB data are the only geographic level available.
- Type II diabetes data are not included as reliable figures for the region are not readily available. There is no regional or national register of people with diabetes. The New Zealand Health Survey self-reported data are the best available, however the margins of error are so large that it was not possible to discern any differences between groups in the three Auckland DHBs. A picture of type II diabetes in the region may be ultimately available from data gathered in the Get Checked diabetes programme presently underway through primary health organisations (PHOs), however these data too will have limitations as there are likely to be both GPs and people with diabetes who choose not to engage with this free diabetes check programme.
- The best tobacco smoking data are from the census, but at present the most recent available is from the 1996 Census. Data from other surveys in the future are expected to be available at DHB but not TA level, except for data from the Year 10 Survey.
- The New Zealand Health Survey (and indeed many national surveys) currently does not collect data that can be used to report TA level information, which limits planning and monitoring of changes at this important implementation level.

Public Health Intelligence, in the Ministry of Health, is currently addressing some of these issues through an integrated programme of population health surveys (including the New Zealand Health Survey) and record linkage studies called the New Zealand Health Monitor.
However, as already noted above, these are limited to DHB-level comparison only, limiting applicability for local government.

Health state (e.g. mortality and hospitalisation) data have a number of limitations. Hospitalisation data must be interpreted bearing in mind that a number of factors contribute to hospital admission, including the severity of the injury/illness, but also the relative accessibility of hospitals compared with general practice or emergency clinics, and whether it is appropriate for the family to care for the person at home. This report only includes a small number of health state data and more comprehensive reports are available from relevant DHBs and the Ministry of Health.

A small number of child health indicators are included in this report. However, a recent report contracted by ARPHS presents a more comprehensive series of indicators of child and youth health in the Auckland region, and compares the rates of injury and illness of Auckland children and youth with national rates (The Paediatric Society of New Zealand, 2006).

7.3 Indicator methodologies

The following provides an overview of key methodologies used in relation to the indicator data. A summary of indicator data sources, definitions and limitations are included in Appendix 1.

**NZDep01**

The 2001 New Zealand Deprivation index (NZDep01) is the standard measure of neighbourhood socioeconomic status used in the health sector (Salmond & Crampton, 2002a). The index is calculated from nine 2001 Census variables at the meshblock level and is most commonly displayed as an ordinal scale (percentiles). A higher score on the index, and thus a higher percentile (usually decile), for a neighbourhood reflects a higher degree of socioeconomic deprivation in that area.

There are many cautionary notes for interpreting this index, the principal of which relates to neighbourhood heterogeneity—that is within any neighbourhood, a variety of individual and household characteristics can be found. This means that the index is not a measure of the socioeconomic status of an individual, since their personal characteristics may not be the same as the average characteristics of the area in which they live.

Though the percentiles (deciles and quintiles) displayed in this report were calculated nationally, the overall distribution of NZDep scores for neighbourhoods in the Auckland region matches the national distribution quite closely.

Throughout this report comparisons have been described using the terminology of higher and lower deciles, rather than more or less deprived areas. The reasons for this are complex but relate to the fact that NZDep01 is only a proxy or partial measure of deprivation (Salmond & Crampton, 2002b).

**Denominator and standard populations**

Three sets of denominator populations have been employed through this report. Population estimates matched to the numerator year have been used whenever possible, thus time trends will account for the estimated growth in the region. The estimates used are the Ministry of Health’s Public Health Intelligence census area unit figures, which are then scaled up to TA estimates. Year-matched live births are used as the denominator for the infant mortality indicator. For all ethnicity breakdowns Statistics New Zealand (SNZ) 2001 Census populations have been used.
The ethnicity groupings used generally correspond to the SNZ level-one grouping of Asian, European, Māori, Pacific and Other (not all data records ‘other’ as a separate classification and in these cases they are grouped with European).

This geographic region for this report includes the three DHB areas and seven TAs, including all of Franklin District, and therefore is slightly larger than the Auckland Regional Council boundaries. Age groups are based on the Statistics New Zealand five-year groupings (0, 1–4, 5–9...80–84, 85+).

Confidence intervals
All confidence intervals in this report are 95% intervals calculated using a normal distribution assumption.

Rates and ratios
All health state rates are directly age-standardised and presented as events per 10,000 resident population. On maps, a ratio is also displayed, this is variously referred to as a standardised rate ratio, a comparative incidence / mortality / morbidity ratio, or a comparative incidence / mortality / morbidity figure, and most simply is the local rate divided by the overall regional rate. With 100 representing the regional rate the ratio provides an easy means of assessing rate consequence as anything above 100 is higher than the regional average.

CAU rate smoothing
In order to map small area (CAU) rates without encountering small number/area instability problems, CAU rates have been smoothed for all health state indicators. Smoothing also offsets the risk posed by geocoding errors for health events acknowledged to exist in historical New Zealand Health Information Service data.

The smoothing technique employed is an adaptive spatial filtering method. This technique is appropriate where both numerator and denominator figures vary across a region. Smoothing only occurs where numbers are sufficiently small to produce an unstable rate, such as in sparsely populated rural areas. Areas that are still considered unstable (i.e. have insufficient numerator and/or denominators) and high rates are overlaid with a grey/white hatch. These areas should be interpreted with caution.

Map classifications and schemes
Health state maps are classified according to their ratios, where the middle classification is centred around the regional rate. The classification then extends either side at fixed symmetrical ratio intervals. For other maps, percentiles are generally used as the classification. The colour schemes employed are adopted from the Pennsylvania State University ‘Color Brewer’ tool. The New Zealand Deprivation Index scheme is a divergent scheme centred on the mid quintile, with all other colour schemes logically sequential.

Access measures
All facility access measures in this report are calculated by road distance to the closest facility. The points of termination are those of the LINZ 2005 Core Record System address points rather than a meshblock or census area unit centroids. Additionally, all address points are allocated populations as interpolated from the 2001 Census meshblock figures.

Indicators relating to access to various sources of potentially harmful activities (i.e. alcohol intoxication, problem gambling, and unhealthy food) and access to fruit and vegetable outlets and GPs have been further analysed to control for the deprivation score-
commercial association. The deprivation-commercial association is simply due to the fact that neighbourhoods in close proximity to commercial and industrial zones are likely to have higher NZDep01 scores. Although outputs from this work have not been presented visually, findings are described under the appropriate indicator.

While this does not mitigate the fact that more deprived areas will inevitably have greater access to any commercial services (harmful or otherwise), an ability to examine relative access beyond this association has the ability to provide us with a better understanding of deprivation related service provision. This has been achieved in a relatively crude way by using the most localised (ubiquitous) services as a baseline (in this case dairies, local stores, and service station convenience stores). Here, access is measured relative to these ‘ideally’ localised services, and the outcome ratios enable access to be examined outside the constraints of the deprivation-commercial association.

The green activity space index was developed using three Cartesian measures of accessibility: proximity, opportunity, and alternatives. Proximity simply refers the distance to the closest green space. Opportunity is the size of that open space, and alternatives the number of other open spaces available. The index is grid based rather than address/network based and is scalable to meshblock and census area unit level.

Use of maps

The maps presented in this report are presented using a variety of thematic techniques including point (e.g. Figure 63 pertaining to childhood tuberculosis cases), surface (e.g. Figure 7 showing population density), and choropleth (all other maps that are based on data grouped to census area units and shaded accordingly). All maps in the report are presented using the same regional extent and layout for ease of interpretation. The relative position of the suburbs and towns along with growth nodes (i.e. areas of planned growth under the Regional Growth Strategy) in this region are provided in the foldout on the inside back cover (Figure 127).
### 7.4 List of indicators

**Table 7: Indicators used in this report**

<table>
<thead>
<tr>
<th>State</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natural, physical and built environment</strong></td>
<td>Air quality</td>
</tr>
<tr>
<td></td>
<td>Levels of fine particles, carbon monoxide, nitrogen oxide, sulphur dioxide and benzene as reported by the Auckland Regional Council</td>
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<tr>
<td></td>
<td>Open space</td>
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<tr>
<td></td>
<td>Access to green activity space</td>
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<tr>
<td><strong>Water resources and drinking water quality</strong></td>
<td>Proportion of population receiving 'a' grade reticulated water</td>
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<tr>
<td></td>
<td>Proportion of population with access to fluoridated water</td>
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<tr>
<td></td>
<td>Proportion of the population living in houses with on-site wastewater treatment and disposal systems</td>
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<tr>
<td><strong>Housing</strong></td>
<td>Population density</td>
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<tr>
<td></td>
<td>Household crowding</td>
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<tr>
<td><strong>Access to health risks</strong></td>
<td>Locations of alcohol off-licensed premises</td>
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<tr>
<td></td>
<td>Locations of gaming machines</td>
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<tr>
<td></td>
<td>Locations of fast food/takeaway retailers</td>
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<td></td>
<td>Access to safe, healthy food</td>
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<tr>
<td></td>
<td>Locations of fresh fruit and vegetable retailers (including supermarkets)</td>
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<tr>
<td><strong>Social and economic environment</strong></td>
<td>Neighbourhood socioeconomic status</td>
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<td></td>
<td>New Zealand Deprivation Index 2001</td>
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<td></td>
<td>Access to health services</td>
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<td>Location of general practices (GP practices)</td>
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<td>PHO enrolment numbers</td>
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<td><strong>Safety</strong></td>
<td>Reported crime</td>
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<td>Transport</td>
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<td>Households without access to a motor vehicle</td>
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<td><strong>Food safety</strong></td>
<td>Number of premises registered in a food safety programme</td>
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<td><strong>Healthy behaviour and risk factors</strong></td>
<td>Risk factors</td>
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<td></td>
<td>Smoking prevalence of youth</td>
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<td>Smoking prevalence of total population (over fifteen-year-olds)</td>
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<td></td>
<td>Hazardous drinking (over fifteen-year-olds)</td>
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<td><strong>Protective factors</strong></td>
<td>Participation in sport and active leisure</td>
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<td>Fruit and vegetable consumption</td>
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<td>Breastfeeding rates</td>
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<td>State</td>
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<td>Infants and early childhood (zero- to four-year-olds)</td>
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<td>Children (five- to fourteen-year-olds)</td>
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<td>Youth (fifteen- to twenty-four-year-olds)</td>
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<td>Adults (twenty-five- to sixty-four-year-olds)</td>
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<td>Older adults (over sixty-five-year-olds)</td>
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8. Indicators
8. Indicators

8.1 Natural environment

**Air quality**

Poor air quality (air pollution) in the Auckland region is primarily the result of motor vehicle use. Refer to the Auckland Regional Council\(^\text{16}\), particularly reports pertaining to the *Regional Land Transport Strategy*, for detailed monitoring data on air quality. Motor vehicles contribute to air pollution through either exhaust emissions or evaporation of fuel. The Auckland Regional Council estimates that vehicles produce over 80% of the nitrogen oxide and carbon monoxide emissions and approximately 60%\(^\text{17}\) of the fine particulates in the region. Levels of carbon monoxide and nitrogen dioxide are highest at roadside monitoring sites (Auckland Regional Council, 2004b). In comparison industry contributes 2% of carbon monoxide and 12%\(^\text{18}\) of particulate matter emissions. Other sources of air pollutants include home heating and open burning. In 2005, a new national design standard for new, small-scale domestic wood burning appliances in urban areas was introduced, which will over time assist to reduce fine particle concentrations in urban areas (Ministry for the Environment, 2005b).

In 2004, the Auckland Regional Council (Auckland Regional Council, 2004b) reviewed their air quality monitoring data and made several conclusions based on data up to 2003. More recent data show that several of these conclusions are incorrect and regional targets have changed due to an appeal of the *Air Land Water Plan* (K. Mahon, Principal Advisor Air Quality, Auckland Regional Council, personal communication, February 13, 2006):

- Fine particle levels have decreased over the past five years and met the regional targets as at 2004. This decrease is due to an increased awareness of the effects of smoky vehicles, improvements in vehicle technology and a reduction in sulphur levels in Auckland’s diesel. The national standard was exceeded twice in 2004 and four times in 2005. The change of targets also means there are a considerable number of occasions when regional targets were exceeded. The Auckland Regional Council is in the process of recalculating these targets.
  - Carbon monoxide levels have decreased over the past five to ten years to 2004. This is thought to be a result of an increasing numbers of cars fitted with catalytic converters (due to replacement of older vehicles in the fleet).
  - Average nitrogen dioxide levels and the number of times air quality guideline levels have been exceeded, have not significantly changed over the past five years to 2004. i.e. Concentrations of nitrogen dioxide at Khyber Pass (the roadside monitoring site used to measure peak levels) exceeded the regional targets more than 1% of the time, and the national standard was exceeded sixteen times in 2004 and twenty times in 2005.
  - During the time period 1995–1999 sulphur dioxide levels increased due to a corresponding increase in diesel vehicles. Since the introduction of lower sulphur fuel in the Auckland region, sulphur dioxide levels have been decreasing.
  - Only limited monitoring has been undertaken in the Auckland region for benzene, and results to date indicate that benzene levels may exceed air quality guidelines at roadside sites but comply with the guidelines in other areas. Benzene levels are expected to decrease as the limits for benzene in petrol will be lowered from 4% to 1% in 2006. ESR studies suggest that most exposure to benzene occurs where garages are linked indoors to the rest of the house or where smokers smoke indoors.
Open space
Green activity space indicator

Figure 3: Green activity space access by CAU for urban zones in the Auckland region

16 www.arc.govt.nz.
17 To be revised down to 50%.
18 To be revised up to 14%.
Green activity space is public or quasi-public space that invites the possibility for physical activities in ‘green’ environments. Such spaces include local and regional parks, sports fields and zoned open space, but exclude privately owned farmland. This concept of open space is, by design, applicable only in urban or suburban environments, defined here as the Statistics New Zealand Urban Areas from the 2001 Census boundaries. Accordingly, only the four urban TAs are reported here except for the map in Figure 3, which includes data pertaining to Papakura District, and urban parts of Franklin and Rodney Districts.

Accessibility is assessed here on a geographical metric only and does not include any measure of amenity, quality or other intangible value. Also, beaches and other space around rivers or lakes have only been included nominally (by calculating a given area), which is likely to under represent the true space and has not included any allowance for swimming or other water recreational activities. Accessibility is calculated using three measures: proximity (distance to nearest), opportunity (size of nearest), and choice (alternative within distance). The index has been designed to be sensitive to neighbourhood variations in accessibility.

There are both considerable local and regional variation in accessibility, with Auckland City and Manukau City having localised pockets of high access areas but lower overall regional access. Conversely, North Shore City and Waitakere City both have more uniform access to green activity space, though some low access areas are present. This is again reflected in the regional population access

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19 Region here refers to a combination of the four territorial authorities only.
20 A continuous measure was developed, which was then resampled to census geographies.
(see Figure 4) with Auckland City displaying the smallest population proportion in areas with high access. North Shore City and Waitakere City again have the largest populations in high access areas.

When comparing green activity space access with neighbourhood deprivation scores\(^{21}\) (by resident population) a strong gradient can be seen for the highest access areas, with a higher proportion of neighbourhoods with low NZDep deciles having good access to green activity space than that of neighbours with high deciles. The better access of the better off is likely to be compounded by the fact that these are also the neighbourhoods whose residents are more likely to have both more private land and also better access to other opportunities for exercise (e.g. gyms and regional parks that are assessed by driving).

### Water resources and drinking water quality

Proportion of population receiving ‘a’ grade reticulated water

Access to safe drinking water is an important measure for public health. Nationally, processes are in place to grade community drinking water supplies. Grading is a standardised tool for assessing a range of quality assurance measures of drinking water supplies that will give a high probability that the water is safe to drink. Monitoring results are used to measure conformity with the drinking water standards, and a range of other information about the supply is used to assess the overall level of risk. The grading is a measure of confidence that a drinking water supply system will not become contaminated, rather than an absolute indication of quality at a specific time (Ministry of Health, 2003b).

\(^{21}\) NZ Dep01.
There are approximately 300 registered drinking water supplies in the Auckland region. Most supplies listed on the national register are publicly owned, but some are private. For example, country motor camps or motels serving twenty-five people or more are expected to be registered. Registration of smaller supplies is voluntary. Each year between January and March the Drinking Water Assessment Unit within ARPHS collects information for each registered water supply in the Auckland region on the quality of drinking water and its compliance with the New Zealand Drinking Water Standards.

Water supplies serving more than 500 people are graded according to Ministry of Health criteria. An estimated 90+% of the population in the Auckland region receive their drinking water from a reticulated water supply owned by a TA, and 97% of people on a reticulated supply receive drinking water from a distribution zone with an ‘a’ grade. However, the quality of treatment of some smaller reticulated water supplies in rural areas needs to be improved. Some reticulated supplies have an ‘e’ grade indicating that there is a very high level of risk of the drinking water supply becoming contaminated.

The Ministry of Health publishes the national Register of Community Drinking Water Supplies in New Zealand around July each year, which shows the results of the previous year’s grading of drinking water supplies (e.g. ‘A’ pertains to treatment plant grade, ‘a’ pertains to zone grade). At the time of writing this report, the following grades were published in the 2005 register:

- Auckland City—all zones Aa* (population=379,586).
- Manukau City—all zones Aa* (population=316,500).
- North Shore City—all zones Aa* (population=207,714).
- Waitakere City—all zones Aa* (population=170,720).
- Papakura District—all zones Aa* (population=40,260).
- Rodney District—the grades for different zones vary from ‘a’ to ‘c’.
- Franklin District—the grades for different zones vary from ‘b’ to ‘e’.

Note: These grades relate to the supplies owned by TAs only and an * beside the grade indicates old grades. However, Auckland City, Manukau City, North Shore City, Waitakere City and Papakura District are most likely to retain their Aa grade for the year 2005. Rodney District and Franklin District grades are likely to improve their grades for the year 2005.

Proportion of population with access to fluoridated water

The Ministry of Health supports the fluoridation of water supplies as a measure to improve children’s oral health by preventing tooth decay. The fluoridated water distribution zones are shown in Figure 6. An estimated 95% of the population receiving reticulated water have a fluoridated water supply and overall 86% of the Auckland region’s population have access to fluoridated water. The water supplies in Onehunga and some of the smaller centres in rural areas are not fluoridated. Nonreticulated areas (i.e. tank or bore sources) are not fluoridated and cover much of Rodney and Franklin Districts, parts of Papakura District, Waiheke Island and rural parts of Waitakere City and Manukau City.
An estimated 6% of people in the Auckland region live in houses with on-site wastewater treatment and disposal systems (i.e. septic tanks). The proportion of people who live in houses with on-site wastewater systems ranges from 0% on the Auckland City isthmus to 100% on the Hauraki Gulf Islands. The proportion of the population with on-site wastewater systems reflects the availability of a reticulated system.

Numbers outlined in Table 8 (next page) are based on the permanent population and in some areas of the region, especially the Hauraki Gulf islands, there is a much higher population during peak holiday periods (e.g. Waiheke Island’s population increases...
threefold over summer). These increased populations place greater strain on the ability of on-site wastewater systems to function properly, particularly if the systems have not been designed to cope with fluctuating loads.

On-site wastewater treatment and disposal systems that are not properly designed or maintained pose a health risk as they can expose people to raw or poorly treated sewage effluent, potentially causing illness (predominantly infectious diseases).

People can be exposed to pathogens (e.g. viruses, protozoa, bacteria and parasites) present in the effluent by direct contact with effluent that has formed a pond on the surface, and through contamination of groundwater drinking supplies and contamination of recreational water. Failing on-site wastewater systems can contaminate the property on which they are located as well as adjoining properties and waterways. In some areas, an increase in the size of the permanent population or an increase in the number of systems can overwhelm the ability of the soil to dispose of wastewater adequately. Surveys of on-site wastewater systems undertaken by TAs as part of the water and sanitary services assessments (WASSAs) required under the Local Government Act 2002 have identified failing on-site wastewater systems and resulting contamination of waterways in some areas of the Auckland region. New on-site wastewater systems are required to comply with the Auckland Regional Plan and the Auckland Regional Council guideline TP 58. On-site wastewater systems: design and management manual.

Table 8: Estimated percentage of the population in the Auckland region (including all Franklin District) living in houses with on-site wastewater treatment and disposal systems

<table>
<thead>
<tr>
<th>Territorial Authority</th>
<th>Estimated number of people with on-site wastewater</th>
<th>Percentage of usually resident population with on-site wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rodney</td>
<td>29,000</td>
<td>33%</td>
</tr>
<tr>
<td>North Shore</td>
<td>2,700</td>
<td>1%</td>
</tr>
<tr>
<td>Auckland Isthmus</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Hauraki Gulf Islands</td>
<td>8,300</td>
<td>100%</td>
</tr>
<tr>
<td>Manukau</td>
<td>5,000</td>
<td>2%</td>
</tr>
<tr>
<td>Waitakere</td>
<td>17,000</td>
<td>9%</td>
</tr>
<tr>
<td>Papakura</td>
<td>5,300</td>
<td>12%</td>
</tr>
<tr>
<td>Franklin</td>
<td>12,000</td>
<td>21%</td>
</tr>
<tr>
<td>Auckland region including all of Franklin District</td>
<td>80,100</td>
<td>6%</td>
</tr>
</tbody>
</table>
8.2 Physical and built environment

Housing

Population density

Figure 7: Population density
Figure 8: Population density distribution

Figure 9: Resident population density by neighbourhood deprivation
Population density has been calculated by proportionally attributing 2001 Census meshblock populations to each dwelling in the region as defined using the LINZ 2005 Core Record System address database (flats and apartments are treated as separate dwellings). These populated addresses are then used to create a continuous density surface highlighting neighbourhood variations in population density. This surface was also sampled at the meshblock level to enable an overlay with Census variables.

High-density areas are most widespread in Auckland City and Manukau City. With green space overlaid it is also apparent green space is distributed throughout urban Auckland occurring equally in high and low-density areas. When neighbourhood deprivation is examined with respect to population density, it shows that neighbourhood populations with higher deprivation scores have higher densities than do neighbourhoods with lower deprivation scores. Very low-density areas (i.e. farmland) are dominated by neighbourhoods with the lowest deprivation scores. European/other groups dominate the low density areas and their proportion falls as density increases. Pacific and Māori people comprise the majority of people living in the highest density areas.

22 Using NZDep01 scores.
Figure 11: Household crowding by CAU (household crowding is indicated using the Canadian National Occupancy Standard)
Figure 12: Total number of crowded households by TA, 1986–2001 time trend

Figure 13: Distribution of crowded households by neighbourhood deprivation
Crowding is represented here by the Canadian Occupancy Standard, an internationally recognised standard, as applied by Statistics New Zealand. A household is deemed crowded if the dwelling the household resides in needs one or more additional bedrooms (after accounting for couples, children, and other factors). The map depicts crowding as overwhelmingly a suburban issue with the highest rates occurring in the Mangere and Otara-Flatbush areas (suburbs of Manukau City). Auckland City is the only other TA area with highly localised (CAU) rates.

While the proportion of households in the region remains static (not shown) the actual number of crowded households has increased for a number of TAs. Manukau City in particular has shown a marked growth in crowded households between 1986 and 2001. Crowding appears strongly associated with high deprivation scores at a neighbourhood level with almost 60% of crowded households occurring in deprivation deciles eight to ten. Ethnicity is also clearly associated with crowding with Pacific peoples in particular identified as living in crowded households, peaking at nearly 40% in Manukau City. People of European ethnicity are least likely to live in crowded houses with no TA area reaching 5%. Although the magnitude of crowding varies between TAs, the ethnic pattern is relatively consistent across the region.

Figure 14: Crowding by TA and ethnicity

![Crowding by TA and ethnicity](image)

23 NZDep01.
Access to health risks

The following three indicators (access to off-licensed liquor premises, gaming machines and fast food/takeaway outlets) all exhibit a similar pattern and can be interpreted in a similar manner.

Figure 16, Figure 19 and Figure 23 all present the number of people that live within a certain distance of various sources of potentially harmful activities (i.e. alcohol intoxication, problem gambling, and unhealthy food consumption). It is important to note that the numbers in these figures are not cumulative. That is to say, it is necessary to add the number shown as living within 500 metres to the number shown as living within 1,000 metres from the type of premises in question to gain the full total (in effect, the 1,000 metre numbers indicates how many live within 501–1,000 metres). Therefore, it is also not possible to extrapolate what proportion lives within any distance not explicitly marked on the graph, for example 1,500 metres.

The data highlight the access differences that exist between urban and rural areas. In the urban TAs such as Auckland, North Shore and Manukau Cities, most of the population are within 2,000 metres of a licensed premise, gaming machine facility or fast food takeaway outlet. In the more rural TAs access tends to be more spread out. This empirically suggests that localised services (i.e. nonspecialised neighbourhood amenities) have an access limit of around 2,000 metres. Having facilities outside this range may be considered a barrier to access in urban areas. Urban GP facilities tend to fall well within this limit signifying a relatively well-provisioned service geographically.

Figure 17, Figure 20 and Figure 24 outline what proportion of the population in higher\textsuperscript{24} (eight to ten) and lower (one to three) decile areas live within 1,000 metres of the selected premises. In almost all cases, across all TAs, a larger proportion of those in higher decile areas live within 1,000 metres of health risks. These data must be interpreted with caution as this access to health risks does not necessarily imply that poorer people are targeted to have better access. More likely, the data are confounded by the fact that people living in lower socioeconomic areas tend to live closer to commercial centres and industrial zones, rather than rural or less commercial zones. The reasons for this are many and complex. Nevertheless, urban planners should consider the effect that increased access can have on health and wellbeing of the population.

Further analyses of access indicator data have been carried out whereby the localised deprivation-commercial association has been controlled for, enabling more valid access comparisons between neighbourhoods with higher and lower deprivation scores. This was achieved by creating accessibility ratios using local general stores/dairies as the baseline access measures. These analyses have not been presented, but a brief description is provided at the end of each access indicator. See Section 7.3 for a description of this methodology.

\textsuperscript{24} That is, higher NZDep01 scores.
Figure 15: Off-licence accessibility—road distance from street address to closest off-licence liquor outlet
Figure 16: Distance to closest off-licence liquor outlet by TA

Figure 17: Proportion of populations in higher and lower decile areas within 1,000 metres of an off-licence liquor outlet by TA
Waitakere City has low levels of access for both the higher and lower decile groups\textsuperscript{25}, whereas in other TAs, over 50% of the higher decile groups and many of the lower decile groups have a liquor outlet within 1,000 metres of their residence. This is most likely explained by the presence of licensing trusts, which has led to Waitakere City having the lowest number of off-licensed premises per capita in the Auckland region.

In all TAs, with the exception of Rodney District, off-licence liquor outlets are more accessible in higher decile neighbourhoods compared with lower decile neighbourhoods, once the deprivation-commercial proximity effect is controlled for (data are not shown).

Figure 18: Gaming machine accessibility—road distance from street address to closest gaming machine premises

\textsuperscript{25} That is, neighbourhoods with higher and lower NZDep01 scores.
Figure 19: Distance to closest gaming machine premises by TA

Figure 20: Proportion of populations in higher and lower decile areas within 1,000 metres of a gaming machine premises by TA
The introduction of the Gambling Act 2003 required TAs to adopt a policy pertaining to gambling venues and to consider formally for the first time the social impacts of gambling within their geographic boundaries. During 2003 the seven TAs in the Auckland region worked together on this issue and engaged the Centre for Gambling Studies at the University of Auckland to carry out an impact assessment, which was completed in January 2004 (Adams et al., 2004).

Adams et al (2004) note that there has been a rapid growth of gambling over the last two decades and that this growth has provided community benefits and harms. Key benefits from gambling include personal enjoyment and recreation, increased economic development (though there is little or no evidence of the latter), and allocation of funding to community activities (grants). Key harms from gambling noted in the assessment include “impacts on health and mental health, family relationships, violence, crime and deprivation effects on families” (p. 7). Further, they note that estimates of the proportion of problem gamblers in a community vary from less than one percent to over five percent, but that the negative impacts often include others, including family members.

Data analysed by Adams et al (2004) showed that the gaming machine concentration per TA varies from a high of one gaming machine per 178 people in Papakura and Rodney Districts to a low concentration of one gaming machine per 343 people in Waitakere City. More recent data included in Figure 20 reinforce the observation that the concentration of gaming machines and gambling venues is consistently higher in areas of lower household income and higher economic deprivation. Further analysis of data on access to gaming machines shows that gaming machines are more accessible in areas with higher deprivation scores compared with areas with lower deprivation scores (after controlling for the deprivation-commercial association) within all TAs except Papakura District (data are not shown).
Locations of fast food/takeaway retailers

Figure 21: Fast food and takeaway outlets by CAU
Figure 22: Takeaway and fast food outlets by TA

Figure 23: Distance to closest takeaway and fast food outlet by TA
After controlling for deprivation-commercial proximity (data are not shown), different TA areas show differing levels of access between higher and lower decile neighbourhoods. Manukau City shows lower access to takeaway and fast food outlets for lower decile areas, North Shore City shows no effect, Rodney District and Waitakere City show minor increases among higher decile neighbourhoods compared with lower decile neighbourhoods. Auckland City, Papakura District and Franklin District show much higher access among higher decile neighbourhoods compared with lower decile neighbourhoods.

Figure 24: Proportion of populations in higher and lower decile areas within 1,000 metres of a takeaway and fast food outlet by TA

That is, higher and lower NZDep01 scores.
Access to safe, healthy food

Locations of fresh fruit and vegetable retailers (including supermarkets)

Figure 25: Fruit and vegetable retailers by CAU
Figure 26: Fruit and vegetable retailers by TA

Figure 27: Distance to closest fruit and vegetable retailer by TA
The data here can be interpreted in the same way as for the access to health risks indicators (see page 107). As with other access indicators, most people living in the predominantly urban TAs are within 2,000 metres of a fruit and vegetable retailer (see Figure 27). However, over 20% of Franklin District residents live more than ten kilometres away from such retailers.

Figure 28 is noteworthy because in all of the TAs populations in higher decile areas\textsuperscript{27} have better access to fruit and vegetable retailers, substantially so in many areas. It is well established that Māori and Pacific populations are overrepresented in low socioeconomic groups. However, the consumption of fruit and vegetables indicator (see page 137) shows these groups have lower levels than the European/other grouping. This would suggest that proximity alone is not sufficient to ensure healthy behaviour.

Residents of Waitakere City, Manukau City, Papakura District and Franklin District have greater access in neighbourhoods with higher deprivation scores compared with neighbourhoods with lower deprivation scores after controlling for deprivation-commercial activity clustering (data are not shown). Auckland City and Rodney District data show little correlation, and North Shore City data show a higher access in neighbourhoods with lower deprivation scores compared with neighbourhoods with higher deprivation scores.

\textsuperscript{27} That is, higher NZDep01 scores.
8.3 Social and economic environment

Deprivation

New Zealand Deprivation Index 2001

Figure 29: Neighbourhood deprivation scores by meshblock
Figure 29 shows that high-deprivation score areas tend to cluster into larger neighbourhoods. In urban and suburban regional Auckland, high-deprivation score areas more frequently occur around commercial and industrial zones and areas of traditional state housing (now New Zealand Housing Corporation). Rural townships within...
the Auckland region tend to have higher deprivation scores than open farmland.

Rodney District and North Shore City show the smallest proportion of populations living in areas with the highest deprivation scores. For all TAs, people of European ethnicity have the lowest, and those of Pacific ethnicity the highest (except Rodney District), proportion of their population living in areas with the highest deprivation scores (see Figure 30). Across the region, people of European ethnicity show a moderate downward trend in population proportion with increasing deprivation scores, Māori a stronger increasing trend, and Pacific a near exponential trend above decile seven (see Figure 31).

Access to health services

Location of general practices

![Figure 32: General practice accessibility—road distance from street address to closest general practice facility](image)
Figure 33: Distance to closest general practice facility by TA

Figure 34: Proportion of populations in higher and lower decile areas within 1,000 metres of a GP facility by TA
Data for this indicator can be interpreted in the same way as for the access to health risks indicators (see page 107). As with other access indicators, most people living in the predominantly urban TAs are within 2,000 metres of a general practice facility (see Figure 33). However, over 25% of Franklin District residents live more than ten kilometres away from such facilities.

After controlling for the deprivation-commercial activity association (data are not shown), there is not a clear association of deprivation decile with access to a GP in all TAs except North Shore City. There, neighbourhoods with high NZDep01 deciles tend have greater physical access than do lower decile neighbourhoods.

Figure 35: Primary health organisation enrolments by CAU (fourth quarter 2005)
Primary health organisation (PHO) enrolments are depicted here by the number of Auckland region residents enrolled in any Auckland region PHO. Omitted are those that are enrolled in an Auckland region PHO but have registered addresses outside of the region.

There are large variations in enrolment rates of PHOs locally and regionally. Uptake has been greatest in neighbourhoods categorised as more deprived by the New Zealand Deprivation Index (NZDep01). There have also been very high, localised (CAU), enrolment rates in much of South Auckland and along the Tamaki River (irrespective of neighbourhood deprivation). Regionally, Rodney District and North Shore City have the lowest enrolment rate, while Papakura District and Manukau City have the highest.

All TAs have seen PHO enrolment growth over the period in which data are available, with Papakura and Franklin Districts sustaining the highest growth.
Figure 37: Total reported crime by police station boundaries 2000–2005 (rate per 1,000 persons)
Figure 38: Total reported crime by TA 2000–2005 (aggregated from police station boundaries)

Figure 39: Total per capita reported crime by TA, 2000–2005 time trend (aggregated from police station boundaries)
Despite limitations and underreporting, the best available indicator for crime in New Zealand is the data recorded by the New Zealand Police. Data include the total level of reported offending (sum of the seven major categories recorded) in the three Police Districts that make up the Auckland region between July 2000 and June 2005. Nationally, the recorded offence rate rose steadily from 550 per 10,000 population in 1970 to an all-time peak of 1,320 per 10,000 population in 1992. Since then it has fallen to 1,110 per 10,000 population in 2000, with further decreases since to 970 per 10,000 population in 2005. Nationally, there was little change in the offence rates for violent crime (approximately 10% of all crimes) between 1994 and 2000. Sexual offences accounted for less than 1% of all recorded crime between 1994 and 2000. There was little change in the volume of sexual offences over the period.

Auckland, Manukau and Waitakere Cities have significantly higher reported crime than other TAs in the region and the average regional rate of reported crimes is greater the overall national average.

**Transport**

Households without access to a motor vehicle

![Figure 40: Households without access to a motor vehicle by CAU](image)
Figure 41: Proportion of differently sized households without access to a motor vehicle by TA

Figure 42: Households without motor vehicles by resident number and NZDep01
Information about household access to a motor vehicle is collected by Statistics New Zealand each census year. While almost half the population has access to two or more vehicles, 8.1% of New Zealanders have no access to a car or other vehicle. This highlights potential inequalities of access to transport, which in itself is important for health (Kjellstrom & Hill, 2002). Availability of transport enhances social relationships, and it may also be very important for access to health services and other amenities.

The Auckland Regional Council (2005c) reports that people living in areas with the highest level of deprivation generally have the lowest levels of access to good public transport services. Improving access to public transport is important to reduce dependence on cars for all people, but particularly for those in low and medium deprivation areas (i.e. areas that currently have less access to private motor vehicles) as improved access will have other benefits such as greater access to jobs and community resources, including health services.

One of the key limitations of the indirect health impacts of transport (such as social exclusion and impact on inequalities) is that methods for the quantification are still in their infancy (Kjellstrom & Hill, 2002).

Figure 40 shows that household access to motor vehicles ranges across the region with more rural and/or areas with lower deprivation scores having more access and areas close to dense populations having less access. Some areas of North Shore City, Waitakere City, Auckland City and Manukau City have higher than 14% of households without access to a motor vehicle.

Figure 41 shows that the more rural areas of Rodney and Franklin Districts have a lower percentage of households (especially with one or two residents) that do not have access to a motor vehicle. Conversely, more urban TA areas have a higher percentage of households that do not have access to a motor vehicle.

Figure 42 shows that there is a relationship between an increase with NZDep01 scores and households without access to a motor vehicle, particularly for households with three or more residents.
Food safety

Number of premises registered in a food safety programme

Table 9: Proportion of registered food premises exempt from the Food Hygiene Regulations 1974 due to having approved food control plans, by TA (February 2006)

<table>
<thead>
<tr>
<th>Territorial authority</th>
<th>Number of exempt premises</th>
<th>Total registered food premises</th>
<th>Percentage of exempt food premises in the region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>178</td>
<td>3,385</td>
<td>5.3</td>
</tr>
<tr>
<td>Papakura</td>
<td>14</td>
<td>193</td>
<td>7.3</td>
</tr>
<tr>
<td>Rodney</td>
<td>15</td>
<td>458</td>
<td>3.3</td>
</tr>
<tr>
<td>Manukau</td>
<td>121</td>
<td>1,324</td>
<td>9.1</td>
</tr>
<tr>
<td>North Shore</td>
<td>63</td>
<td>898</td>
<td>7.0</td>
</tr>
<tr>
<td>Waitakere</td>
<td>52</td>
<td>837</td>
<td>6.2</td>
</tr>
<tr>
<td>Franklin</td>
<td>16</td>
<td>262</td>
<td>6.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>459</td>
<td>7,357</td>
<td>6.2</td>
</tr>
</tbody>
</table>

In 1996 the Food Act 1981 was amended to recognise food premises with appropriate food safety programmes (also termed food control plans) and allow exemption from the requirements of the Food Hygiene Regulations 1974 (i.e. premises are not required to undergo annual inspection and licensing by their local authority). Those food premises in the Auckland region whose food control plans have been approved by the New Zealand Food Safety Authority (NZFSA) are listed in Table 9 as exempt. The number of exempt premises is derived from Food Net, a computerised database of the NZFSA. Table 9 also lists the total number of food premises registered in each territorial authority in the Auckland region. These totals include small to very large businesses. Due to the complexity and cost of introducing food safety programmes, it has largely been bigger producers, processors and retailers that have adopted them. Therefore, in interpreting the data in Table 9, it is important to recognise that the regional variation in proportions of exempt premises will be partly explained by the number of larger premises in a local authority’s area. Recently there has been a move towards the introduction of industry-wide codes of practice and food safety templates for smaller operators, so that the proportions of smaller exempt premises is likely to increase in the future.

Since 1996, under contract to the NZFSA, ARPHS has been responsible for promoting the introduction of food safety programmes, assisting food premises to prepare programmes and, ultimately, recommending their approval by the NZFSA. ARPHS also plays a role in reviewing annual audit reports relating to exempt premises. Roles and responsibilities may change as an outcome of the domestic food review presently being undertaken by the NZFSA. However, the commitment by the NZFSA to food safety programmes (in future, to be called food control programmes) will remain.
8.4 Healthy behaviour and risk factors

Risk factors

Smoking prevalence of youth

Figure 43: Youth smoking prevalence by CAU (fifteen- to twenty-four-year-olds)
The Ministry of Health (2005b) states that smoking is the leading cause of preventable deaths in New Zealand. There is a clear association between high smoking prevalence, ethnicity and low socioeconomic position in New Zealand, which makes it a contributing factor to the health inequalities seen between Māori and non-Māori.

Youth smoking is an important indicator as it reflects the uptake or initiation of new smokers. Many interventions target the prevention of uptake by young people, especially at-risk populations including Māori, young women (see Figure 44) and those from lower socioeconomic areas (Ministry of Health, 2004a).

Data for the geographic distribution of smoking (see Figure 43) come from the 1996 Census (the 2001 Census did not collect these data) and show that Manukau City has many areas with a high prevalence of smoking, as well as many areas with a low prevalence. However, as smoking is closely matched to socioeconomic status, the pattern is not surprising. It should also be noted that the data are ten years out of date and that when the 2006 Census data are available, changes are likely.

All other data come from the Year 10 Surveys (these generally include students aged thirteen to sixteen) carried out between 2001 and 2004 by Action on Smoking and Health (ASH). Not all schools take part in the survey and students are supervised by teachers while filling the survey in. The level of supervision may vary between schools.

The prevalence of smoking among Māori is almost three times than that of non-Māori in the Auckland region.

Females have a higher level of smoking than males.

There has been a general downward trend in smoking prevalence among females and males. However, Franklin District and Waitakere City have seen flat or increasing levels among males.
Figure 45: Female smoking prevalence among year ten students by TA, 2001–2004 time trend

Figure 46: Male smoking prevalence among year ten students by TA, 2001–2004 time trend
Figure 47: Prevalence of current smokers by DHB and ethnicity (over fifteen-year-olds, 2003)

Figure 48: Smoking prevalence by NZDep96 (1996)

Figure 47 is drawn from the 2002/03 New Zealand Health Survey. It shows that Māori have higher levels of smoking than non-Māori do, though in Auckland DHB and Waitemata DHB areas, Pacific peoples have a similar prevalence. Figure 48, based on data from the 1996 Census, demonstrate how closely linked smoking and socioeconomic status are.
Alcohol is estimated to be responsible for around 1,040 deaths each year (Connor et al., 2005), with rates highest among the young, males and Māori. These groups exhibit higher levels of hazardous drinking in the Auckland region (see below) and given that there is a positive relationship between excessive alcohol consumption and injury (Brewer & Swahn, 2005) they tend to have high injury rates.
Protective factors
Participation in sport and active leisure

According to the Ministry of Health (Ministry of Health, 2004d), physical activity is protective against chronic diseases such as heart disease, stroke, certain cancers and type II diabetes. Physical activity also helps lower risk factors for these diseases, such as high blood pressure and high cholesterol (p.79).

Data for Table 10 come from Sport and Recreation New Zealand (SPARC) activity surveys whilst information in Figure 51 is derived from the 2002/03 New Zealand Health Survey. Both measure the proportion of people that were physically active for at least 2.5 hours in the preceding seven days.

It should be noted that for the SPARC data, only one statistically significant change was seen. This was the increase in the proportion of active adults in the Waitemata District Health Board area from 65% in 1997/98 to 72% in 2000/01.

Within each ethnicity, there are no statistically significant differences between the three Auckland DHBs in the proportion that are active. There are no differences between Māori, Pacific and European/other groups within each of the three Auckland DHBs. Asian populations have a lower proportion that is active, but this is statistically significant only in the Auckland DHB area.

<table>
<thead>
<tr>
<th>Proportion of young people (seventeen years and under) active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1997/98</td>
</tr>
<tr>
<td>1998/99</td>
</tr>
<tr>
<td>2000/01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proportion of adults (eighteen years and above) active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>1997/98</td>
</tr>
<tr>
<td>1998/99</td>
</tr>
<tr>
<td>2000/01</td>
</tr>
</tbody>
</table>

*Only the 1997/98 adult result for WDHB is significantly different to the 2000/01 result.
Eating fruit and vegetables has a protective effect against many diseases such as cardiovascular disease, stroke and some cancers (Ministry of Health, 2004c). It is currently recommended that people eat at least two servings of fruit and three servings of vegetables daily.

European/other was the group with the highest level of attainment for the five plus a day recommendation, though this was only statistically significantly different in the Auckland DHB region and nationally. Māori, Pacific and Asian populations have lower levels of fruit and vegetable consumption, but no statistical difference exits between these groups.

Breastfeeding rates

Breastfeeding provides a range of benefits for infants and their mothers (Ministry of Health, 2001). Breastfeeding supplies an infant’s nutritional needs in a hygienic and cost effective way for the first four to six months of life. Breastfeeding also protects against some infectious diseases and illnesses during this time and possibly beyond as the individual develops.

New Zealand’s rate of breastfeeding immediately after birth compares favourably with other OECD countries, and has increased slightly over the last five years. However, breastfeeding rates decline after three months of age, which may in part be due to women returning to the workforce. To help counter this, the Department of Labour (2005) launched an employer’s guide on supporting women returning to the workforce to continue breastfeeding.

Breastfeeding data have been compiled by The Royal New Zealand Plunket Society (Inc.) for many years. Plunket enrols approximately 85% of the new baby population and may under-report Māori and Pacific children (The Paediatric Society of New Zealand, 2006). Plunket collects breastfeeding rates for babies aged six weeks, three months and six months. The accuracy of these data for the whole population depends on whether the women who enrol, and then stay in contact,
with Plunket are typical of all new mothers. Because it is likely that women who do not enrol have different breastfeeding patterns than those who do, the data may either over-estimate or under-estimate the population rates of breastfeeding. However, the patterns across the region in these data are probably a reasonable reflection of the true patterns.

The Ministry of Health has set national, all-ethnicity targets for breastfeeding, which are outlined in the tables below along with current breast feeding rates (full/exclusive) for the three DHB areas in the Auckland region. In summary, the data show that there are ethnic and geographic differences in breastfeeding rates in the Auckland region. Only the European/other ethnic category of women in the Auckland DHB area meet the national target for 2005. Rates are generally higher in the Auckland DHB area than the national rate and the rate of the other two DHB areas. Rates in Waitemata follow the national pattern, while rates in Counties Manukau are lower than the national rates. The European/other ethnic category of women tend to have higher rates while Asian women have lower rates than Māori and Pacific women.

### Table 11: Breastfeeding rates (full/exclusive) at six weeks of age by DHB (June 2004 to June 2005, Plunket)

<table>
<thead>
<tr>
<th></th>
<th>WDHB</th>
<th>ADHB</th>
<th>CMDHB</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targets (whole country/all ethnicities)</td>
<td></td>
<td></td>
<td></td>
<td>2005: 74% 2010: 90%</td>
</tr>
<tr>
<td>Māori</td>
<td>61%</td>
<td>68%</td>
<td>47%</td>
<td>59%</td>
</tr>
<tr>
<td>Pacific</td>
<td>62%</td>
<td>60%</td>
<td>55%</td>
<td>60%</td>
</tr>
<tr>
<td>Asian</td>
<td>55%</td>
<td>57%</td>
<td>41%</td>
<td>57%</td>
</tr>
<tr>
<td>European/other</td>
<td>71%</td>
<td>77%</td>
<td>62%</td>
<td>71%</td>
</tr>
</tbody>
</table>

### Table 12: Breastfeeding rates (full/exclusive) at three months of age by DHB (June 2004 to June 2005, Plunket)

<table>
<thead>
<tr>
<th></th>
<th>WDHB</th>
<th>ADHB</th>
<th>CMDHB</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targets (whole country/all ethnicities)</td>
<td></td>
<td></td>
<td></td>
<td>2005: 57% 2010: 70%</td>
</tr>
<tr>
<td>Māori</td>
<td>51%</td>
<td>51%</td>
<td>35%</td>
<td>46%</td>
</tr>
<tr>
<td>Pacific</td>
<td>51%</td>
<td>51%</td>
<td>44%</td>
<td>49%</td>
</tr>
<tr>
<td>Asian</td>
<td>51%</td>
<td>54%</td>
<td>34%</td>
<td>51%</td>
</tr>
<tr>
<td>European/other</td>
<td>61%</td>
<td>67%</td>
<td>52%</td>
<td>61%</td>
</tr>
</tbody>
</table>

### Table 13: Breastfeeding rates (full/exclusive) at six months of age by DHB (June 2004 to June 2005, Plunket)

<table>
<thead>
<tr>
<th></th>
<th>WDHB</th>
<th>ADHB</th>
<th>CMDHB</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Targets (whole country/all ethnicities)</td>
<td></td>
<td></td>
<td></td>
<td>2005: 57% 2010: 70%</td>
</tr>
<tr>
<td>Māori</td>
<td>21%</td>
<td>22%</td>
<td>10%</td>
<td>18%</td>
</tr>
<tr>
<td>Pacific</td>
<td>18%</td>
<td>26%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Asian</td>
<td>17%</td>
<td>29%</td>
<td>7%</td>
<td>23%</td>
</tr>
<tr>
<td>European/other</td>
<td>26%</td>
<td>33%</td>
<td>18%</td>
<td>28%</td>
</tr>
</tbody>
</table>
Transport
Modes of travel

Figure 53: Active travel to external workplace by CAU (2001)
Figure 54: Public travel to external workplace by CAU (2001)
Figure 55: Private travel to external workplace by CAU (2001)
Figure 56: Mode of travel to external workplace by TA

Figure 57: Number of persons using public transport or undertaking active transport to external workplace by TA
Information about the mode used for people to travel to work is collected by Statistics New Zealand each census year. Key trends from this information include the dominance of car use, which accounted for approximately 80% of all work trips, the increasing share of car use for all journeys, and the low and declining share of public transport (Auckland Regional Council, 2005a). A key feature of the Auckland region is that most population growth will be in areas outside the growth centres. Many of these areas are difficult to service by public transport, with few destinations within walking and cycling distance (Auckland Regional Council, 2005a).

Approximately 64% of all trips less than two kilometres during the morning peak are by car and most of these are to drop children off at school. Many of these trips could be made by more active modes such as walking and cycling. This would result in healthier children, reduced fuel use and less air pollution, especially around schools (Auckland Regional Council, 2005a).

Regular, moderate physical activity is known to produce significant health benefits. There are no New Zealand data directly examining the relationship between transport and levels of physical activity. It is likely that promotion of walking, cycling and public transport will encourage greater levels of physical activity in everyday life. However, the ‘obesogenic’ environment that encourages car use, instead of walking and cycling, needs to be better described and its health impact better quantified (Kjellstrom & Hill, 2002).

Figure 53 (active modes) shows that there are higher levels of active transport modes (walking, cycling, or running) in the Auckland central city area.

Figure 54 (public transport) shows a relatively low use of public transport (including bus, train, and ferry) across the region. The exceptions to this are North Shore City, Auckland City, and Manukau City areas that have moderate use of public transport.

Figure 55 (private motor vehicles) shows that across the Auckland region there is a high percentage of people who use a private vehicle for travel to work. The exceptions to this are the central Auckland city suburbs.

Figure 56 shows the mix of private vehicle use against public transport and active transport modes by each territorial authority and the relatively low proportion of active/public transport modes. A higher proportion of people use public transport or active modes in Auckland City compared to other territorial authorities. North Shore City, Waitakere City and Manukau City have moderate use of public and active transport modes.

Figure 57 shows that relatively few people use active or public transport modes, with Auckland City having a higher level of public and active transport modes than other areas. Moderate levels of public and active transport modes are found in North Shore City, Waitakere City, and Manukau City.
8.5 Health states

Communicable diseases

Rotavirus gastroenteritis (zero-to four-year-olds)

Figure 58: Age-standardised paediatric (zero-to four-year-olds) gastroenteritis hospitalisation rates by DHB and ethnicity (2004)

Figure 59: Community-confirmed paediatric (zero-to four-year-olds) rotavirus gastroenteritis rates for the Auckland region, 2004–2005 time trend
As Figure 58 demonstrates, there are high rates of hospitalisation for gastroenteritis among Auckland children compared to the rest of New Zealand, with regional rates being highest in south and central Auckland. Ethnic disparities are also apparent, with Pacific children having the highest hospitalisation rates.

Of the many causes of gastroenteritis, rotavirus infection is believed to have the most serious impact on the health of young children in New Zealand, even causing some deaths each year (Adern-Holmes et al., 1999). Rotavirus gastroenteritis is viral in origin, can cause severe diarrhoea leading to dehydration, and has the most serious impact on children under the age of two. It is a seasonal illness, with outbreaks typically occurring in the winter (see Figure 59). The virus is spread between people primarily by inadequate hand hygiene, and can be prevented by the careful washing and drying of hands. Day care centres, and other places where children gather, need to be particularly vigilant in terms of hand hygiene to prevent outbreaks of rotavirus infection.

The full impact of rotavirus infection on children in the Auckland region is difficult to ascertain, and is one aspect of a gastroenteritis study underway at present, led by Auckland Regional Public Health Service (Simmons et al., 2006). Community laboratory test results, as in Figure 59, significantly underestimate the true rate of disease in a population. Only those children who visited general practitioners (GPs) and then had faecal testing performed would be included in the dataset. There is evidence that for every person with rotavirus infection who presents to a general practitioner, there are between three and nine cases that remain undiagnosed in the community (Wheeler et al., 1999). Those families with lower access to GPs, for geographic or financial reasons, would be unlikely to be represented in this data, but might appear in the hospitalisation data as children may present to the emergency department with more advanced disease.
Meningococcal disease incidence

Figure 60: Meningococcal disease, 2000–2004 aggregated (age-standardised meningococcal incidence among zero- to nineteen-year-olds)
Figure 61: Meningococcal trends (three-month moving average), January 1996 to January 2006 time trend

Figure 62: Meningococcal disease incidence by TA, 2000–2004 aggregated
An epidemic of meningococcal disease has been occurring in New Zealand since mid-1991 (Sneyd & Baker, 2003). The determinants of meningococcal infection are complex. It is seasonal, with peak rates occurring in winter, and is principally a disease of young children (with age-specific rates being highest among those children less than one year old, followed by those between one and four years of age) (Institute of Environmental Science and Research Limited, 2005). Its incidence is most likely determined by a number of factors, including carriage rates in the local population, the number of contacts a child has with caregivers and possibly the prevalence of upper respiratory viral infection.

Deprivation is related to crowding and crowding will increase transmission rates of upper respiratory infections. In-house transmission may be reduced by improving ventilation and reducing the number of families living in a single household. If families are large or there is there is a large extended family network, then rates of childhood infections are likely to remain higher.

Rates of meningococcal disease are disproportionately high among people of Pacific ethnicities and among Māori (Institute of Environmental Science and Research Limited, 2005). An association has been found between household crowding and meningococcal disease in Auckland children (Baker et al., 2000).

Rates of meningococcal disease vary throughout the Auckland region, with age-standardised rates being highest in Papakura District, Manukau City and Auckland City respectively. As is the case nationally, the highest rates of disease are among children, in particular very young children, and a large proportion of the disease burden falls on children of Pacific ethnicities and Māori children. Thus, meningococcal disease increases ethnic disparities in health.

Meningococcal disease is on the decline in the region, especially among those less than twenty years of age. The meningococcal trend data are based on notified cases of confirmed meningococcal disease in the Auckland region over the past ten years. The decreasing case numbers are most evident when comparing peak rates in July of each year.

Meningococcal disease in the Auckland region is associated both with an index of household crowding (that is, the higher the level of household crowding, the higher the rates of disease) and with the NZ Dep01 score (that is, the rate of disease increases with increasing degrees of neighbourhood deprivation).

Childhood tuberculosis outbreak data
The dots on the map (Figure 63) represent childhood cases of tuberculosis (TB) notified to the Medical Officer of Health in the Auckland region, over a nine-year period. In total, there were 204 childhood (under fifteen-year-olds) cases of tuberculosis during this period.

The graph (Figure 64) of the age-standardised rate demonstrates the impact of TB outbreaks on overall rates in the region. There were significant outbreaks or clusters of tuberculosis disease peaking in 1999 and 2003.

There is a strong association between high deprivation scores and childhood tuberculosis, with a majority of cases living in high decile census areas (deciles seven to ten).
Figure 63: Childhood (zero- to fifteen-year-olds) tuberculosis disease, 1996–2004 aggregated (new cases of childhood tuberculosis disease, overlaid with an index of crowding by CAU)
Figure 64: Childhood (zero- to fifteen-year-olds) tuberculosis disease incidence, 1996–2004 time trend

Figure 65: Childhood (zero- to fifteen-year-olds) tuberculosis disease incidence by TA, 1996–2004 aggregated
Tuberculosis (TB) is a communicable disease that is having a resurgence in New Zealand (Howie et al., 2005; Turnbull, 2003). The declining postwar rate of TB in New Zealand stalled in the late 1980s and there is some evidence of a subsequent increasing trend (Turnbull, 2003). Of the 356 new cases of TB in New Zealand in 2004, 27 (7.6%) of them were children less than fifteen years old (Institute of Environmental Science and Research Limited, 2005). As children are more likely than adults to have contracted their TB in New Zealand, they are a marker of disease transmission or spread.

Interpreting data on TB is often challenging, especially when trying to understand the factors that are leading to the current transmission of infections. There is often a long time interval between becoming infected with TB and subsequent development of active disease, so cases of disease occurring in adults are often either a reflection of disease rates long ago or in overseas countries where people with TB have come from. Childhood TB is different, however. Children develop TB disease more rapidly than adults, so rates of TB in children often reflect the conditions in which they are living at the time of disease diagnosis. Children generally contract TB from adults with whom they share accommodation or other close social contact. TB is most efficiently transmitted between household members, so focusing on conditions that lead to household crowding can be important in reducing TB transmission. A recent study has demonstrated a resurgence of TB among NZ children between 1992 and 2001 (Howie et al., 2005). The rising rate was linked to poverty, immigration from countries with high rates of TB, and to specific TB outbreaks, although unrecognised adult disease is also likely to be a factor.

The major public health role of ARPHS in TB control is to prevent spread of the disease.
Prevention of spread focuses on four principal areas:
1. Ensuring that people diagnosed with TB disease take their entire course of treatment (to avoid recurrent disease).
2. Tracing and investigating contacts of people with infectious TB disease.
3. Giving preventive treatment to contacts found to be infected.
4. Providing vaccination to prevent TB (BCG vaccination) to newborn children in specific high-risk groups.

Auckland has the highest notification rates of TB in New Zealand, with central and South Auckland having the highest regional and national rates (Carr, Baker, Kieft, Calder, & Reid, 2001; Turnbull, 2003). Immigration from countries with a high prevalence of TB is a contributing factor to the higher rates in the Auckland region. Rates of TB in the Auckland region are not declining, with continued new cases being reported among children. Cases of TB tend to cluster in areas of socioeconomic deprivation and, in particular, household crowding is associated with an increased risk of contracting TB.
Whole of life

Preventable hospitalisations

Figure 67: Preventable hospitalisations by CAU (zero- to seventy-four-year-olds), 2000–2004 aggregated (hospitalisations potentially avoidable through population-targeted interventions)
Figure 68: Preventable hospitalisations (zero- to seventy-four-year-olds), 2000–2004 time trend

Figure 69: Preventable hospitalisations by TA (zero- to seventy-four-year-olds), 2000–2004 aggregated
This indicator reports hospitalisations that could theoretically be prevented by effective population based interventions such as improving physical activity and reducing obesity or injuries. Rates have been increasing nationally and regionally for some years, and the higher Māori and Pacific rates of these preventable admissions are consistent with other health inequalities.
Motor vehicle-related hospitalisations

Figure 71: Motor vehicle-related hospitalisations by CAU, 2000–2004 aggregated
Figure 72: Motor vehicle-related hospitalisations, 1997–2004 time trend

Figure 73: Motor vehicle-related hospitalisations by TA, 2000–2004 aggregated
Motor vehicle-related injuries are a significant and obvious health impact of land transport. New Zealand has a high road traffic mortality rate compared with other countries in the OECD. Although road fatalities provide a useful indication of the health burden of transport-related crashes, they do not tell the whole story. For every person killed in a road crash, an estimated seven people suffer serious but nonfatal injury resulting in hospitalisation (Kjellstrom & Hill, 2002).

While the New Zealand population has doubled in the last fifty years and the number of vehicles has increased nearly six times, the crash statistics first began to decline in 1970 and have continued to decline with the year 2000 numbers half those of 1970 (Kjellstrom & Hill, 2002). Similarly in the Auckland region, the number of road related deaths has steadily declined over the last three decades and fatality rates are generally lower than other regions in New Zealand (Auckland Regional Council, 2005a).

Motor vehicle hospitalisation data and reported crash numbers are limited by under reporting. For instance, hospitalisations capture only the serious portion of crash injuries (Kjellstrom & Hill, 2002) and consequently the rates reported in this indicator do not reflect the full impact of motor vehicle hospitalisations in the region.

Overall, motor vehicle crash rates in the Auckland region are slightly less than the national rates and the rates in Northland and Waikato (Auckland Regional Council, 2004a). Figure 71 shows that Franklin and Rodney Districts show high rates of motor vehicle hospitalisation with lower levels in North Shore City, Auckland City and Manukau City.

Figure 72 shows motor vehicle hospitalisation rates between 1997 and 2004 in the Auckland region. Regionally there has been a steady increase in rates until 2002 where there was a gradual decline in rates. TAs have seen varying rates over time (data are not shown).
North Shore City, Auckland City, and Manukau City show relatively similar rates to the regional picture. Franklin District has the highest rate across the region, which peaked in 2003 but has seen a significant reduction since then. Rodney District experienced a significant increase in 1998 and has had high rates of hospitalisation since 2001. Waitakere City’s rates saw a significant increase between 1997 and 2002, but with rates decreasing from then. After a peak and decline in 1998/99, Papakura District has seen as steady increase until 2003.

Figure 73 shows that Franklin and Rodney Districts have the highest motor vehicle hospitalisation rates in the region followed by Papakura District and Waitakere City. North Shore City, Auckland City and Manukau City hospitalisation rates are close the regional average.

Figure 74 shows that Māori have the highest rate for motor vehicle hospitalisation in the region. Motor vehicle hospitalisation rates are known to be higher in Māori males than females (Auckland Regional Public Health Service, 2005b). This chart also shows that Pacific populations have slightly higher hospitalisation rates than European/other populations.

Overweight and obese people (over fifteen-year-olds)

![Bar chart showing proportion of overweight and obese people by DHB and ethnicity](image)

*Figure 75: Proportion of overweight and obese people (over fifteen-year-olds) by DHB and ethnicity (2003)*
The National Health Survey 2003 (Ministry of Health, 2004d) data are the only available regional data (reported to DHB level) on the proportions of people that are obese or overweight. The National Health Survey found that overall about 56% of New Zealand adults were overweight or obese. The proportion of people who were overweight but not obese was similar in different ethnic groups, but the proportion of people who were obese was highest for Pacific people, followed by Māori, European/other, and Asian groups. Similar proportions of men and women were obese, but men were more commonly overweight.

In simple terms, obesity and being overweight are caused by an excess of calorie intake over the calories needed by the body. They tend to reflect both overconsumption and insufficient physical activity. Being overweight or obese increases the risk of many important diseases such as diabetes, cardiovascular disease, and some cancers. The proportion of people who are overweight or obese has been increasing in New Zealand as elsewhere in the world, and Figure 75 above shows the alarming levels in the Auckland regional population, particularly among Pacific people. There are no significant differences between the different DHB populations.

Being overweight or obese is a physical manifestation of a number of the unhealthy aspects of a modern, particularly an urbanised, lifestyle, which are part of all three pathways discussed in this report. Urban design, transport and the nature, quality and quantity of food all influence the balance of ‘calories in’ to ‘calories out’, and action in all three pathways has the potential to positively influence health and wellbeing through reducing the proportion of people who are overweight or obese. Reversing the ‘epidemic’ of obesity will require fundamental changes to eating and physical activity. Societal influences along with individual choices are important, and collaborations between health, local authorities and other agencies to develop wide-reaching and innovative interventions will be necessary.
Infants and early childhood (zero- to four-year-olds)

Infant (under one-year-olds) mortality rate (per 10,000 births)

Figure 76: Infant (under one-year-olds) all-cause mortality by CAU, 1998–2002 aggregated
Infant mortality (deaths in children up to the age of one year) is one of the basic indicators of child health monitored by UNICEF, and is used internationally as an indicator of countries’ levels of health and development. Globally the most common causes of mortality are diarrhoea and respiratory infections, but in developed countries the main causes are congenital problems and sudden unexpected death in infancy (SUDI).
Deaths in under one-year-olds can be split as follows (Child and Youth Mortality Review Committee, 2004a):

- **Neonatal mortality**: Deaths in the first 28 days of life (four weeks), which is considered to be a reasonable overall measure of maternal health, midwifery, obstetric and neonatal intensive care services.

- **Post-neonatal mortality**: Deaths from 29–365 days of life. This is considered to be a measure of preventative work done with mothers and families before and after birth, and including the psychosocial environment they live in. The majority of post-neonatal deaths occur outside hospital. Nationally 48% of these deaths have medical causes, with 15% attributed to congenital malformations and chromosomal abnormalities. SUDI causes 37% of post-neonatal deaths nationally.

- For this report, it was not possible to separate infant mortality into neonatal and post-neonatal measures.

Nationally, infant mortality has been decreasing over time—the rate in 2003 was less than half the rate in 1979. While the rate in the Auckland region (which in 2002 was about the same as the national rate) has varied over the seven years from 1996, there appears to have been a trend to a slight reduction (Figure 77). The different TAs show some variation in infant mortality rates (Figure 78), but the wide confidence intervals mean that the differences could be due to chance. Similarly, small numbers of deaths in small geographic areas mean that the map (Figure 76) should be interpreted with caution, although it appears that areas with higher NZDep01 deciles have higher infant mortality rates. The differences between ethnic groups are striking, with Māori and Pacific rates at least twice those of other ethnic groups (Figure 79). National overall infant mortality rates rank somewhere between the United Kingdom (52 per 10,000) and the United States (65 per 10,000). Māori and Pacific infant mortality rates are similar to those reported from Chile and Hungary (Central Intelligence Agency, 2006).
Figure 80: Early childhood (zero- to four-year-olds) injury and poisoning hospitalisations by CAU, 2000–2004 aggregated
Figure 81: Early childhood (zero- to four-year-olds) injury and poisoning hospitalisations, 1997–2004 time trend

Figure 82: Early childhood (zero- to four-year-olds) injury and poisoning hospitalisations by TA, 2000–2004 aggregated
In each of the five years from 2000 to 2004, approximately 4,600 children aged under five were hospitalised for injuries, including poisoning, in the Auckland region. The most common cause of hospitalisation for injury in this age group is falls (46% nationally), with poisonings the next most common (13%) (SafeKids, 2005a). As shown here, the rate of hospitalisation for injury and poisoning has been gradually increasing over the period 1997 to 2004. There are ethnic and geographic differences in rates of hospitalisation for injury. Pacific children have the highest rate of these hospitalisations, then Māori, European/other, and Asian the lowest.

Hospitalisation data must be interpreted bearing in mind that a number of factors contribute to hospital admission, including the severity of the injury but also the relative accessibility of hospitals compared with general practice or emergency clinics, and whether it is appropriate for the family to care for the child at home.

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28 Includes both intentional (e.g. injuries from violence) and unintentional injuries (e.g. falls, motor vehicle-related, etc), or ICD-10 definitions S00-T98.
Children (five- to fourteen-year-olds)

Unintentional injury hospitalisations

Figure 84: Unintentional injury hospitalisations by CAU (five- to fourteen-year-olds), 2000–2004 aggregated
Figure 85: Unintentional injury hospitalisations (five- to fourteen-year-olds), 1997–2004 time trend

Figure 86: Unintentional injury hospitalisations by TA (five- to fourteen-year-olds), 2000–2004
In each of the five years 2000 to 2004, approximately 3,850 children aged between five and fourteen were hospitalised for unintentional injuries in the Auckland region. The most common cause of hospitalisation for injury in this age group is falls (60% nationally), with transport related injuries (pedestrian, cyclist and motor vehicle crashes combined) the next most common (21%) (Safekids, 2005b). Within the age group, five- to nine-year-olds are more likely to be hospitalised for falls (70% of hospitalisations) while 25% of ten- to fourteen-year-olds' hospitalisations for injury are transport related. As shown in Figure 85, the rate of hospitalisation for injury and poisoning has been gradually increasing over the period 1997 to 2004. There are ethnic and geographic differences in rates of hospitalisation for injury. In contrast with injury hospitalisations for under five-year-olds, the only significant difference between ethnic groups is that Asian rates are about half the rates of all three other ethnic groups.

Hospitalisation data must be interpreted bearing in mind that a number of factors contribute to hospital admission, including the severity of the injury but also the relative accessibility of hospitals compared with general practice or emergency clinics, and whether it is appropriate for the family to care for the child at home.
Significant caries index

**Figure 88:** Significant caries index for five-year-olds by TA (2005)

**Figure 89:** Significant caries index for year eight students by TA (2005)
The significant caries (SiC) index is a relatively new measure developed by the World Health Organization (WHO) as a means of monitoring dental health. The previous standard has been the mean decayed, missing or filled teeth (DMFT) score for a population. A DMFT score is simply a count of the number of teeth a child has that are decayed, missing or filled, so a lower score is better. The WHO goal for the population-wide mean DMFT score is three or less, which is currently being met in all the Auckland TAs (data are not shown).

The SiC index is calculated by sorting data pertaining to individuals by the DMFT score that they have, taking the highest third and calculating the mean to give a population score. The advantage of this technique over a simple mean DMFT score is that it highlights inequalities among a population and allows a focus on those population groups of the greatest need.

The accompanying WHO goal is that populations have a SiC index of less than three (shown by the red line in the graphs). Figure 88 shows that, overall, five-year-olds in each TA in the Auckland region are yet to reach that goal. Similarly, for year eight students (generally aged eleven to thirteen), only children in Rodney and North Shore have achieved the target. However, this may be confounded by the ethnic makeup of those areas as Figure 90 shows that European and Asian populations have better SiC index scores than Māori, Pacific and Other groups.
Figure 91: Respiratory hospitalisations by CAU (five- to fourteen-year-olds), 2000–2004 aggregated.
Figure 92: Respiratory hospitalisations (five- to fourteen-year-olds), 1997–2004 time trend

Figure 93: Respiratory hospitalisations by TA (five- to fourteen-year-olds), 2000–2004 aggregated
Rates of early childhood respiratory infection hospitalisations in the Auckland region increased over the time period 1997 to 2004 (see Figure 92). The data for each territorial authority (Figure 93) clearly shows geographic differences in the rates of hospitalisation, and Figure 94 demonstrates substantial ethnic variability, both of which imply that a considerable proportion of admissions are potentially preventable. Respiratory hospitalisations in children are affected by the rate of illness in the community and the way in which respiratory diseases are managed in primary and secondary health care services. A range of factors can in turn affect either or both of these. These include socioeconomic factors and environmental influences (such as outdoor air, indoor air, and allergens). Estimates of the number of deaths and hospital admissions caused by exposure to particulate air pollution have been made for Auckland and for New Zealand for adults over the age of thirty years (see the Transport focus area in Chapter 4). Less information is currently available on the impacts on children at either the population or the individual level. The degree to which the various factors contribute to avoidable morbidity is likely to vary by TA.
Youth (fifteen- to twenty-four-year-olds)

Teenage birth rate (live and stillbirths)

Figure 95: Teenage births by CAU, 2000–2004 aggregated (age-specific birth rate among fifteen- to nineteen-year-olds)
In the years from 2000 to 2004, 5,419 young women aged fifteen to nineteen from the Auckland region were admitted to hospital to give birth (an average of about 1,080 per year). During the whole five-year period there were also forty-eight births to twelve- to fourteen-year-olds. There has not been any noticeable time trend over the period, with a stable rate of about 250 per 10,000 throughout. However, there are dramatic variations between TAs, with the teenage birth rate in Papakura District more than twice that of Rodney District and Auckland City, and more than four times that of North Shore City. In Manukau City, there are high rates in many of the areas shown on the map (Figure 95), but low rates in some eastern suburbs, giving an overall rate that is the second highest of the TAs.
Figure 98: All-cause mortality by CAU (fifteen- to twenty-four-year-olds), 1998–2002 aggregated
Figure 99: All-cause mortality (fifteen- to twenty-four-year-olds), 1996–2002 time trend

Figure 100: All-cause mortality by TA (fifteen- to twenty-four-year-olds), 1998–2002 aggregated
About 110 young adults (fifteen- to twenty-four-year-olds) die per year in the Auckland region. The most common causes of death in this age group are injury (nationally, 39% of deaths in fifteen- to nineteen-year-olds, 34% of deaths in twenty- to twenty-four-year-olds) and suicide (25% and 26% respectively) (Child and Youth Mortality Review Committee, 2004b). Interpretation of the apparent geographic differences is limited by the relatively small numbers and therefore wide confidence intervals, although Franklin District’s rate does appear significantly higher than the regional average (see Figure 100).
Adults (twenty-five- to sixty-four-year-olds)

Ischaemic heart disease mortality

Figure 102: Ischaemic heart disease mortality (twenty-five- to sixty-four-year-olds), 1996–2002 time trend

Figure 103: Ischaemic heart disease mortality by TA (twenty-five- to sixty-four-year-olds), 1998–2002 aggregated
Ischaemic heart disease risk is strongly related to nutrition and exercise. It is the most common single cause of death (second if all cancers are counted together) in New Zealand. It is also the cause of the most lost ‘disability-adjusted life years’ in developed countries—these measure the impact of a disease on both death and disability in a population.

Between 1998 and 2002, about 230 people aged twenty-five to sixty-four and 1,300 people aged sixty-five and over died of ischaemic heart disease (mostly heart attacks) in the Auckland region. The regional rate is continuing to decrease gradually, but ethnic inequalities persist. The mortality rate in the vast majority of CAUs in the region is in the range 85–130 per 10,000 for people aged sixty-five and over.
Lung cancer incidence

Figure 105: Lung cancer incidence (twenty-five- to sixty-four-year-olds), 1994–2000 time trend

Figure 106: Lung cancer incidence by TA (twenty-five- to sixty-four-year-olds), 1994–2000 aggregated
Lung cancer rates are determined almost entirely by the rates of tobacco use over the previous twenty to thirty years. The incidence of lung cancer overall has been decreasing in New Zealand for some time, following reductions in tobacco use, and this is evident in the Auckland region as well (Figure 105). However, there are significant ethnic and socioeconomic differences in lung cancer rates (Figure 107), which are probably responsible for the different TA rates (Figure 106).

The decrease in lung cancer has not been evenly distributed among different population groups. Low-income women, Pacific men and women, and Māori women all experienced an increase in lung cancer mortality (which tracks incidence very closely) between 1981 and 1999 (Shaw et al., 2005). Their peak lung cancer mortality rates are not expected to occur for another ten to twenty years, which will mean that inequalities in lung cancer will persist and in some cases increase, for many years (Shaw et al., 2005). Recent tobacco control activities that focus on Māori and Pacific, for example advertising campaigns with ethnic-specific messages (The Quit Group, 2005) aim to have an impact on these patterns.
Colorectal cancer incidence

Figure 108: Colorectal cancer incidence (twenty-five- to sixty-four-year-olds), 1994–2000 time trend

Figure 109: Colorectal cancer incidence by TA (twenty-five- to sixty-four-year-olds), 1994–2000 aggregated
Colorectal cancer is the second most common cause of cancer death in New Zealand, after lung cancer, and the second most common cancer to be registered by the Cancer Registry (after prostate cancer).

In the period 1994–2000, on average about 300 people aged sixty-five and over, and 150 people aged under sixty-five, were registered with colorectal cancer. In people aged sixty-five and over, the rate is higher in people of European and other ethnic groups than in Māori and Pacific people. However, in younger people both Māori and Pacific rates are higher than European/others, with Māori higher than Pacific. Both non-Māori and Māori rates have been stable over the ten years to 2001 nationally, but unless risk factors (diet, exercise) are addressed, there is the potential for Māori and Pacific rates overall to exceed those for other ethnic groups in the future.
Older adults (over sixty-five-year-olds)

Ischaemic heart disease

Figure 111: Ischaemic heart disease mortality by CAU (over sixty-five-year-olds), 1998–2002 aggregated
Figure 112: Ischaemic heart disease mortality (over sixty-five-year-olds), 1996–2002 time trend

Figure 113: Ischaemic heart disease mortality by TA (over sixty-five-year-olds), 1998–2002 aggregated
Refer to the discussion of ischaemic heart disease under the twenty-five- to sixty-four-year-olds section (page 181).
Fall-related hospitalisations

Figure 115: Fall-related hospitalisations by CAU (over sixty-five-year-olds), 2000–2004 aggregated
Figure 116: Fall-related hospitalisations (over sixty-five-year-olds), 1997–2004 time trend

Figure 117: Fall-related hospitalisations by TA (over sixty-five-year-olds), 2000–2004 aggregated
Falls are the most common cause of injury for older people, with approximately one-third of people aged over sixty-five falling at least once a year (Accident Compensation Corporation, 2005). As shown in Figure 116, the rate of hospitalisation for falls in the Auckland region has been rising over the period 1997 to 2004. North Shore City has the highest rate of falls hospitalisations in this age group. The European/other ethnic group has a rate one and a half times that of Māori and Pacific over sixty-five-year-olds. Although the rates shown have been age standardised, these differences may, to some extent, reflect the fact that there are relatively more very elderly people (over eighty-five-year-olds) in the European/other ethnic group than in the Māori and Pacific groups.

Hospitalisation data must be interpreted bearing in mind that a number of factors contribute to hospital admission, including the severity of the injury but also the relative accessibility of hospitals compared with general practice or emergency clinics, and whether it is appropriate for the family to care for the person at home.

Figure 118: Fall-related hospitalisations by ethnicity (over sixty-five-year-olds), 2000–2004 aggregated
Figure 119: Lung cancer incidence by CAU (over sixty-five-year-olds), 1994–2000 aggregated
Figure 120: Lung cancer incidence (over sixty-five-year-olds), 1994–2000 time trend

Figure 121: Lung cancer incidence by TA (over sixty-five-year-olds), 1994–2000 aggregated
Figure 122: Lung cancer incidence by ethnicity (over sixty-five-year-olds), 1998–2000 aggregated

Refer to the discussion of lung cancer under the twenty-five- to sixty-four-year-olds section (page 183).
Figure 123: Colorectal cancer incidence by CAU (over sixty-five-year-olds), 1994–2000 aggregated
Figure 124: Colorectal cancer incidence (over sixty-five-year-olds), 1994–2000 time trend

Figure 125: Colorectal cancer incidence by TA (over sixty-five-year-olds), 1994–2000 aggregated
Refer to the discussion of colorectal cancer incidence under the twenty-five- to sixty-four-year-olds section (page 185).
## Appendix 1: Summary of indicator data sources, definitions, and limitations

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<td><strong>Social and economic environment</strong></td>
<td>Neighbourhood socioeconomic status</td>
<td>1. Wellington School of Medicine 2. Public Health Intelligence 3. SNZ</td>
</tr>
<tr>
<td></td>
<td>New Zealand Deprivation Index 2001</td>
<td></td>
</tr>
<tr>
<td><strong>Definitions/formulae</strong></td>
<td><strong>Limitations of data</strong></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>See text.</td>
<td>See text.</td>
<td></td>
</tr>
<tr>
<td>The green activity space index is a combination of the proximity of the closest green space, the size and alternative spaces within a certain distance.</td>
<td>Does not include farmland, blue space, amenity value (such as facilities), intangibles (such as perceived attractiveness), or safety issues.</td>
<td></td>
</tr>
<tr>
<td>Calculated as the number of people receiving 'a' grade reticulated water divided by the number of people receiving reticulated water.</td>
<td>Some data were converted from equivalent household units to population using the SNZ occupation rate (usually resident households) from the 2001 Census, by TA. Commercial properties with on-site wastewater disposal are not included.</td>
<td></td>
</tr>
<tr>
<td>Calculated as the number of people receiving fluoridated reticulated water divided by the number of people receiving reticulated water.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculated as the estimated number of people in each territorial authority with on-site wastewater divided by the Statistics New Zealand 2004 population.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous density surface was created by attributing the meshblock resident population to available 2005 street addresses.</td>
<td>2001 MB and Census populations out of date.</td>
<td></td>
</tr>
<tr>
<td>Canadian Occupancy Standard is the percentage of households that require additional bedrooms, by CAU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel distance (road) from facility to street address.</td>
<td>The number and location of licensed premises is fluid and can change fairly rapidly.</td>
<td></td>
</tr>
<tr>
<td>Travel distance (road) from facility to street address.</td>
<td>Not all premises that sell food have a licence.</td>
<td></td>
</tr>
<tr>
<td>Count by CAU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Count by CAU.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZDep01 Meshblock quintiles.</td>
<td>2001 data are now out of date.</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Indicator</td>
<td>Sources</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Social and economic environment</td>
<td>Access to health services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Location of general practices</td>
<td>2005 ARPHS GP database</td>
</tr>
<tr>
<td></td>
<td>PHO enrolment numbers</td>
<td>NDSA (NZHIS)</td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reported crime</td>
<td>New Zealand Police</td>
</tr>
<tr>
<td></td>
<td>Transport</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Households without access to a motor vehicle</td>
<td>SNZ Census 2001</td>
</tr>
<tr>
<td></td>
<td>Food safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of premises registered in a food safety programme</td>
<td>1. Food Net (New Zealand Food Safety Authority)</td>
</tr>
<tr>
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</tr>
<tr>
<td>Healthy behaviour and risk factors</td>
<td>Risk factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smoking prevalence of youth</td>
<td>1. Action on Smoking and Health (ASH) Year Ten Surveys 2001–2004</td>
</tr>
<tr>
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<tr>
<td>Definitions/formulae</td>
<td>Limitations of data</td>
<td></td>
</tr>
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<td>-----------------------------------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Travel distance (road) from facility to street address.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persons enrolled as belonging to any Auckland region PHO by CAU/TA.</td>
<td>Data are only available for a limited time period. Enrolments may be overestimated as persons may be enrolled with multiple PHOs.</td>
<td></td>
</tr>
<tr>
<td>Data recorded and reported by the New Zealand Police. Data include the total level of reported offending (sum of the 7 major categories recorded) in the three Police districts that make up the Auckland region between July 2000 and June 2005.</td>
<td>According to Statistics New Zealand, “Only offences recorded by the police are included in the data. An unknown number of crimes go unrecorded, so the actual volume of crime in any society exceeds official figures. Also, the proportion of offences that are recorded varies according to the type of offence, and whether there is a victim. An example of a ‘victimless’ crime is the possession of cannabis for personal use. As such crimes tend not to be reported to the police but rather detected by them, levels of offending are highly dependent on the level of police activity. Any changes in the levels of some types of recorded crime may be all or partly due to changes in policing practices, public perceptions or policy initiatives, for example advertising campaigns.” (<a href="http://www.stats.govt.nz/analytical-reports/crime-in-nz/overview.htm">http://www.stats.govt.nz/analytical-reports/crime-in-nz/overview.htm</a>, accessed January 2006). Data relate to the police station where the offence was recorded not where the actual crime took place, though in most cases crimes are reported to the station that covers that area.</td>
<td></td>
</tr>
<tr>
<td>Number/proportion of households with access to motor vehicle(s).</td>
<td>2001 Census data are out of date.</td>
<td></td>
</tr>
<tr>
<td>Premises exempt from grading on the basis of their involvement in a food safety programme.</td>
<td>There is a discrepancy between the Food Net data and the TA data, with more premises registered in food safety programmes than recorded in the TA database.</td>
<td></td>
</tr>
<tr>
<td>1. For the Year 10 Survey, a smoker was defined as someone who smokes cigarettes at least monthly. 2. For the 1996 Census, the definition was someone who smokes at least one cigarette a day.</td>
<td>Schools self-select to participate in the Year 10 Survey and teachers supervise completion of the questionnaire. It is not possible to know how consistently the survey was administered. Also, the 1996 Census data are out of date.</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Indicator</td>
<td>Sources</td>
</tr>
<tr>
<td>------------------------------------</td>
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<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Healthy behaviour and risk factors</td>
<td>Smoking prevalence of total population (over fifteen-year-olds)</td>
<td>Ministry of Health New Zealand Health Survey 2003</td>
</tr>
<tr>
<td></td>
<td>Hazardous drinking (over fifteen-year-olds)</td>
<td>Ministry of Health New Zealand Health Survey 2003</td>
</tr>
</tbody>
</table>
<pre><code>                                    |                                                                                                       | 2. Ministry of Health New Zealand Health Survey 2003                                                  |
</code></pre>
<p>|                                    | Fruit and vegetable consumption                                          | Ministry of Health New Zealand Health Survey 2003                                                  |
|                                    | Breastfeeding rates                                                       | Plunket                                                                                            |</p>
<table>
<thead>
<tr>
<th>Definitions/formulae</th>
<th>Limitations of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>The proportion of people that smoke at least one cigarette a day.</td>
<td></td>
</tr>
<tr>
<td>Participants were asked questions about their alcohol consumption using the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is a ten-item questionnaire covering alcohol consumption, alcohol-related problems and abnormal drinking behaviour. Hazardous drinking is defined as an established pattern of drinking that carries a high risk of future damage to physical or mental health, but has not yet resulted in significant adverse effects. Hazardous drinking is most commonly identified from an AUDIT score of eight or more.</td>
<td></td>
</tr>
<tr>
<td>1. For the SPARC surveys the definition was: the proportion of adults (over eighteen-year-olds) and young people (five- to seventeen-year-olds) who were physically active as defined by the Sport and Physical Activity Surveys from 1997/1998, 1998/1999 and 2000/2001. ‘Physically active’ means the respondent took part in 2.5 or more hours of sport and active leisure in the seven days prior to the interview. 2. For the Health Survey: the proportion of people aged fifteen and over who were physically active for 2.5 or more hours in over the last seven days prior to the interview. The primary methods of collecting data on young people (five- to seventeen-year-olds) in the SPARC survey was to ask the parents, with the child’s help if they were present. This relies on the parents having a good knowledge of the child’s involvement in sport and leisure activities.</td>
<td></td>
</tr>
<tr>
<td>The proportion of people who ate at least two servings of fruit and three servings of vegetables daily.</td>
<td>DHB level only (including ethnicity).</td>
</tr>
<tr>
<td>Proportion of babies that are fully or exclusively breastfed at the ages of six weeks, three months and six months. Exclusive is defined as being when the infant has never had, to the mother’s knowledge, any water, formula or other liquid or solid food. Fully is defined as being when the infant has taken breast milk only and no other liquids or solids except a minimal amount of water of prescribed medicines, in the past forty-eight hours. Plunket enrolls approximately 85% of the new baby population and may underreport Māori and Pacific children.</td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>Indicator</td>
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<tr>
<td>Healthy behaviour and risk factors</td>
<td>Transport</td>
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<td></td>
<td>Modes of travel</td>
</tr>
<tr>
<td>Health states</td>
<td>Communicable diseases</td>
</tr>
<tr>
<td></td>
<td>Rotavirus (zero- to four-year-olds)</td>
</tr>
<tr>
<td></td>
<td>Meningococcal disease incidence</td>
</tr>
<tr>
<td></td>
<td>Childhood tuberculosis outbreak data</td>
</tr>
<tr>
<td>Whole of life</td>
<td>Population preventable hospitalisations</td>
</tr>
<tr>
<td></td>
<td>Motor vehicle-related hospitalisations</td>
</tr>
<tr>
<td></td>
<td>Overweight and obese people (over fifteen-year-olds)</td>
</tr>
<tr>
<td>Infants/children (zero-to four-year-olds)</td>
<td>Infant (under one-year-olds) mortality rate (per 10,000 births)</td>
</tr>
<tr>
<td></td>
<td>Injury and poisoning hospitalisations (zero- to four-year-olds)</td>
</tr>
<tr>
<td>Definitions/formulae</td>
<td>Limitations of data</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>This measures how people travel to work.</td>
<td>Valid only for those employed and with workplaces external to their home.</td>
</tr>
</tbody>
</table>
| 1. NZHIS data uses an age-standardised rate (under five-year-olds).  
2. Diagnostic Medlab data uses age-specific rate (under five-year-olds). | 1. Confidence intervals are not available.  
2. Community testing underreports true community rates. |
| Age-standardised rate (under twenty-year-olds).         | Only ‘confirmed cases’ and notified cases included in the data, therefore true number of cases underreported. |
| Age-standardised rates (under fifteen-year-olds) and outbreak events. | Defining an outbreak and reporting are problematic.                                   |
| Age-standardised rate.                                  | Injury hospitalisations, a proportion of which are preventable by public health interventions, are not included in this indicator.  
This indicator gives a general idea rather than a precise estimate of the rate of admissions that could be prevented with population based interventions.  
The indicator is, nonetheless, useful for comparisons between different population groups. |
| Age-standardised rate.                                  | The data reflect where the individual reside, not where the crash occurred. In addition, it is unknown whether the individual was the driver or a passenger in the vehicle. |
| Body mass index (BMI) is calculated from measured height and weight: weight(kg)/(height(m) squared).  
Overweight is defined as a BMI of >26 for Māori and Pacific people, >25 for other ethnic groups. Obesity is defined as >32 for Māori and Pacific, >30 for other ethnic groups. | DHB level only (including ethnicity). The BMI cut-offs used may underestimate the prevalence of overweight and obese people in Asian populations. |
<p>| Age-standardised rate of deaths in children under one year old. | See below (routine data sources).                                                    |
| Age-standardised rate.                                  | See below (routine data sources).                                                    |</p>
<table>
<thead>
<tr>
<th>State</th>
<th>Indicator</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health states</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children (five- to fourteen-year-olds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintentional injury hospitalisations</td>
<td>NMDS (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Significant carries index (SiC)</td>
<td>Auckland Regional Dental Service</td>
<td></td>
</tr>
<tr>
<td>Respiratory disease hospitalisations</td>
<td>NMDS (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Youth (fifteen- to twenty-four-year-olds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teenage birth rate (live and stillbirths)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>Mortality database (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Adults (twenty-five- to sixty-four-year-olds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischaemic heart disease mortality</td>
<td>Mortality database (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Lung cancer incidence</td>
<td>Cancer registry (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Colorectal cancer incidence</td>
<td>Cancer registry (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Older adults (over sixty-five-year-olds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischaemic heart disease mortality</td>
<td>Mortality database (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Fall-related hospitalisations</td>
<td>NMDS (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Lung cancer incidence</td>
<td>Cancer registry (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Colorectal cancer incidence</td>
<td>Cancer registry (NZHIS)</td>
<td></td>
</tr>
<tr>
<td>Definitions/formulae</td>
<td>Limitations of data</td>
<td></td>
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<tr>
<td>----------------------------------------------------------</td>
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<td></td>
</tr>
<tr>
<td>Age-standardised rate.</td>
<td>Sample sizes are too small to permit a breakdown by ethnicity or fluoride status within each TA.</td>
<td></td>
</tr>
<tr>
<td>The Significant Caries Index is the mean number of decayed, missing or filled teeth among the third of the population with the highest caries score. The World Health Organization has set a goal of having the SiC index be less than three in a given population.</td>
<td>Limitations of routine data sources</td>
<td></td>
</tr>
<tr>
<td>Age-standardised rate.</td>
<td>All routine data (hospitalisation, mortality, cancer registration) are likely to have some miscoding of ethnicity, usually leading to underestimation of rates, at least in Māori. Hospitalisation data relate to hospital admissions, and so do not reflect all the episodes of a health outcome experienced by the population. Seriousness, as well as the accessibility of hospitals and of other medical care, and the ability and willingness of family to care for a patient at home all have an impact on whether or not the person is hospitalised.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: References


## Appendix 3: Glossary of terms

<table>
<thead>
<tr>
<th>Term/abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARC</td>
<td>Auckland Regional Council</td>
</tr>
<tr>
<td>ARPHS</td>
<td>Auckland Regional Public Health Service</td>
</tr>
<tr>
<td>ASH</td>
<td>Action on Smoking and Health</td>
</tr>
<tr>
<td>CAU</td>
<td>Census area unit</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>DHB</td>
<td>District health board</td>
</tr>
<tr>
<td>DMFT</td>
<td>Decayed, missing or filled teeth</td>
</tr>
<tr>
<td>ESR</td>
<td>Institute of Environmental and Scientific Research Ltd.</td>
</tr>
<tr>
<td>GPs</td>
<td>General practitioners</td>
</tr>
<tr>
<td>HEAT</td>
<td>Health Equity Assessment Tool</td>
</tr>
<tr>
<td>HIA</td>
<td>Health impact assessment</td>
</tr>
<tr>
<td>LINZ</td>
<td>Land Information New Zealand</td>
</tr>
<tr>
<td>Local authority</td>
<td>Regional or local council</td>
</tr>
<tr>
<td>LTCCP</td>
<td>Long-term council community plans</td>
</tr>
<tr>
<td>MB</td>
<td>Meshblock</td>
</tr>
<tr>
<td>NDSA</td>
<td>Northern DHB Support Agency</td>
</tr>
<tr>
<td>NGO</td>
<td>Nongovernmental organisation</td>
</tr>
<tr>
<td>NMDS</td>
<td>National minimum dataset</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen dioxide</td>
</tr>
<tr>
<td>NZDep01</td>
<td>New Zealand deprivation index 2001</td>
</tr>
<tr>
<td>NZFSA</td>
<td>New Zealand Food Safety Authority</td>
</tr>
<tr>
<td>NZHS</td>
<td>New Zealand Health Information Service</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Cooperation and Development</td>
</tr>
<tr>
<td>PHI</td>
<td>Public Health Intelligence</td>
</tr>
<tr>
<td>PHOs</td>
<td>Primary health organisations (groups of doctors and others that serve a population of people)</td>
</tr>
<tr>
<td>Plunket</td>
<td>The Royal New Zealand Plunket Society (Inc.)</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate matter less than ten micrometers in diameter</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>Particulate matter less than two and a half micrometers in diameter</td>
</tr>
<tr>
<td>Term/abbreviation</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>Primary care</td>
<td>GP and other health care</td>
</tr>
<tr>
<td>SNZ</td>
<td>Statistics New Zealand</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>Sulphur dioxide</td>
</tr>
<tr>
<td>SPARC</td>
<td>Sport and Recreation New Zealand</td>
</tr>
<tr>
<td>SWSS</td>
<td>Sanitary works subsidy scheme</td>
</tr>
<tr>
<td>TA</td>
<td>Territorial authority or local council</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile organic compounds</td>
</tr>
<tr>
<td>WASSA</td>
<td>Water and sanitary services assessment</td>
</tr>
<tr>
<td>WINZ</td>
<td>National Water Information System New Zealand</td>
</tr>
</tbody>
</table>
Auckland region depicting proposed growth nodes and existing built-up (urban) areas

- Growth Nodes (Feb 2006)
- Built-up Areas
- TA Boundaries

Figure 127: Suburb and growth node map of the Auckland region