
Health Impact Assessment Report of Lithgow City Council Strategic Plan 2007



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2008.

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Abbreviations and acronyms

ABS	Australian Bureau of Statistics
CHETRE	Centre for Health Equity Training and Research evaluation
DCP	Development Control Plan
DOH	Department of Health (UK)
EIA	Environmental Impact Assessment
HIA	Health Impact Assessment
HIS	Health Impact Statement
lbw	low birth weight
LIHS	Lithgow Integrated Health Services
NHMRC	National Health and Medical Research Council
PHA	Public Health Authority
SEIFA	Socio Economic Index For Areas
ses	Socio economic status
SWAHS	Sydney West Area Health Service
WHO	World Health Organization ¹ .
WSROC	Western Sydney Regional Organization Council

Refer to the Glossary in the back of this report for the definitions of terms used in this report.

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Executive Summary

Introduction

This report explains the Health Impact Assessment (HIA) process and presents the findings of the HIA of the Lithgow City Council Strategic Plan, 2007. The primary output of the HIA is a set of evidence-based recommendations geared to informing the decision-making process. These recommendations aim to highlight practical ways to enhance the positive impacts or minimise any negative impacts on health, well being and health inequalities that might arise or exist in response to the Lithgow City Council Strategic Plan.

Lithgow City Council Strategic Plan is the first long-term plan to be developed by Lithgow City Council in collaboration and consultation with the community and government. It introduces a new framework of strategic planning in the Lithgow local government area, which is driven by the community's vision and issues. The Plan incorporates the visions and strategies and feeds these into Council's management and operational plans to deliver actions that ultimately achieve the vision for the community. The objective of the Strategic Plan is to provide the strategic framework for the future development of the Lithgow Local Government Area and to encourage environmental, economic and social sustainability (Lithgow City Council Strategic Plan, 2007, Page 4).

Governance of the HIA

A Steering Group consisting of the SWAHS project team, Lithgow City Council Policy and Planning Manager and key community members oversaw the HIA of the Lithgow City Council Strategic Plan. The HIA project was led by the SWAHS project team comprised of the SWAHS departments of Population Health and Strategic Direction and the Centre for Population Health. The SWAHS project team completed the tasks associated with the HIA process and developed a set of draft recommendations for review by the Steering Group and executive management.

Health Impact Assessment

HIA uses a combination of procedures, methods and tools by which a policy, program or project may be assessed and judged for its potential, and often unanticipated, effects on the health of the population and the distribution of those effects within the population (Gothenburg Consensus definition, modified by Mahoney and Morgan, 2001). The HIA of the Lithgow City Council Strategic Plan is an intermediate type HIA as it assessed more than three health impacts in depth and it was conducted over a six-month period.

Screening step in HIA

Screening is the first step in a HIA. Pre-screening meetings were held between Lithgow City Council and SWAHS where it was agreed that the Lithgow City Council Strategic Plan was to be assessed for health impacts. The SWAHS project team undertook the formal screening process using a standard screening tool. This resulted in a recommendation to proceed with the HIA based on:

- The potential of strategies in the Lithgow City Council Strategic Plan to differentially impact on the health of vulnerable groups in the community.

- The omission of special consideration for the needs of children aged 0-5 years in the Strategic Plan. This was considered a important omission given the value of the early years of life in healthy child development.
- The potential of the recommendations in the HIA report to influence the development of subsequent council plans e.g. Lithgow City Council Management Plan and to influence population health plans for SWAHS.

Scoping step in HIA

Scoping is the second step of a HIA. Members of the Steering Group approved the Scoping Plan of the HIA of the Lithgow City Council Strategic Plan. The rationale of the Scoping Plan for the HIA is based on an equity focus that recognises that positive and negative health effects differentially impact on residents according to vulnerability factors.

<u>HIA target vulnerable groups</u>
<ul style="list-style-type: none"> ▪ Pregnant women; ▪ Infants; ▪ Children; ▪ Youth; ▪ Older residents; ▪ Parents/carers of young children; ▪ Socioeconomically disadvantaged people; ▪ Aboriginal and Torres Strait Islander people; ▪ People with disabilities ▪ Locationally disadvantaged residents; ▪ People with difficulties communicating in English

The areas of Health, Community, Transport, and Environment in the Lithgow City Council Strategic Plan were nominated in the HIA Scoping Plan. This was based on:

- Greatest potential impacts of the strategies on the health of residents;
- Capacity of Lithgow City Council or SWAHS to be the lead agency in recommendations.

Identification step of HIA

Identification is the third step of a HIA. It involved consultation with key informants and collection of evidence, including: systematic reviews, journal articles, published reports and reports. This included Lithgow City Council's Social Plan, Issues Report, and Council Community Consultations; and the SWAHS Health Profile and SWAHS Diabetes Report. (A summary of the evidence and the initial recommendations arising from this evidence are in Pages 37-59 with more detailed evidence in the Appendix).

Assessment of evidence step in HIA

Assessment of evidence is the fourth step in a HIA. This involved synthesising and critically assessing the information. This included undertaking triangulation of methods; mapping the potential impact of the strategies in the Lithgow City Council Strategic Plan on the determinants of health; developing a matrix of the positive and negative health impacts on vulnerable groups in Lithgow LGA; and assessing the overall health impacts in terms of the size of the impact (how many in the population affected) and the differential impact on the population.

Key findings of HIA

Potential positive impacts of the strategies in the Lithgow City Council Strategic Plan

- Strategies and actions in the ten areas of the Lithgow City Council Strategic Plan will positively affect the majority of determinants of health. (Refer to Pages 27-30). This includes health determinants related to- employment, developing the local economy, education, access to services, lifestyle and behavioural factors, natural environment, built environment, heritage/culture/arts, and managing the environment. Subsequently, this would have positive impacts on the health of the population.
- The Health H1 strategy to provide health services that meet the needs of the community and the Community C3 strategy to encourage equitable access to services will potentially have health benefits for the Lithgow LGA population.
- The Health H2 strategy to develop partnerships to facilitate a healthy lifestyle is an effective way to address risk behaviours, as multidisciplinary approaches are more effective than a singular approach. This strategy is very important given the higher rates of mortality and hospitalisation related to the risk factors of smoking, physical inactivity and overweight and obesity in the Lithgow LGA population.
- Transport strategies T1, T3, T4, T5 will benefit the population by providing road infrastructure, equitable access and pedestrian access and connectivity (Health H1 action2). Transport and pedestrian access is important to facilitating access to health and other essential services. Pedestrian access encourages physical activity, which has many health benefits.
- The Community C1 strategy Action 3 to develop an Ageing Strategy provides the opportunity to ameliorate some of the negative aspects of ageing by highlighting the positive aspects of healthy ageing and supporting older residents with services.
- The Community strategies (C7, C9, C10) to ensure open spaces, provide a range of housing and to facilitate a safe community are excellent strategies that target the determinants of health.
- Environmental strategies E1, E5, E6, E9 and H3 will potentially have positive health effects on all people, but some of the vulnerable groups will particularly benefit.
- Improved air quality will benefit the population and particularly children and older people who are more susceptible to respiratory diseases than the general population.
- Improved water quality will benefit the population and children and older people who are more susceptible to infectious diseases than the general population.
- Improved water quality will benefit maternal health and the developing foetus as foetal development can be very adversely affected by water contaminants.
- Fluoridation in the water will greatly improve the oral health of developing children in the short term and longer term.

Strategies that potentially increase health inequalities

There were no strategies or actions in the Lithgow City Council Strategic Plan that would have a direct negative impact on the health of the population. Strategies, however, should explicitly consider the needs of the target HIA vulnerable groups or risk increasing health inequalities i.e. people in the vulnerable groups will not gain the same level of health benefits as other residents.

- The Health H1 strategy to provide health services that meet the needs of the community and the Community C3 strategy to encourage equitable access to services will potentially have health benefits for the population. However, the actions to achieve this by population modelling and using the Health Profile and Social will not adequately assess the needs of the HIA target vulnerable groups. (Refer to Pages 63 and Pages 78 of evidence).
- There are no explicit strategies or actions to invest in maternal health (important for mothers and foetal development) and the early years of life. This omission would result in missing this extremely important window of opportunity to provide health benefits that continue in childhood and through to adulthood.
- There are no explicit strategies or actions to address the determinants of lack of social support and poor coping skills. Services that provide practical support and link residents to local networks are important. There are a number of families that have moved from other areas to Lithgow to obtain public housing. This results in dislocation from social networks. Effective coping skills are important as vulnerable people are at risk of more than average levels of life stressors.
- There are no explicit strategies or actions to address the risk of injury through an integrated approach of education, environmental modifications and enforcement. This is essential as there are plans for increased transport infrastructure and growth. It would be judicious to include measures that address the role of alcohol in injury (e.g. motor vehicle accidents and assaults).

Summary of HIA findings

This HIA process revealed that the Lithgow City Council Strategic Plan would potentially enhance the health of the population of Lithgow LGA. If explicit actions to meet the needs of the vulnerable groups are not undertaken, however, health inequalities may be increased. In particular, strategies aimed at enhancing maternal health and increased investment in children in their early years of development should be considered.

Priority Recommendations for Lithgow City Council

Evidence-based recommendations are the primary output of a HIA with the purpose of informing the decision-making process. (The evidence on which the recommendations are based is provided in summary tables in Pages 37-59 and in more detail in the Appendix).

The recommendations were developed in response to the strategies in the areas of Health, Community, Transport and Environment in the Lithgow City Council Strategic Plan. There are five priority recommendations from each of these areas. The recommendations aim to highlight practical ways to build on the potential positive health impacts of the strategies and to address gaps in the strategies that may increase health inequalities of the HIA target vulnerable groups.

All the recommendations are in the summary of evidence section. The following are the priority recommendations for Lithgow City Council as the lead agency.

Recommendations in response to Health Strategies

<p>Lithgow City Council and SWAHS should establish integrated multi-agency project groups with relevant agencies to:</p> <ul style="list-style-type: none">▪ map the provision of services in Lithgow LGA;▪ identify gaps in service provision;▪ work towards integrating services with a special focus on service provision of vulnerable groups;▪ progress the following recommendations.
<p>Lithgow City Council to base plans and strategies where appropriate on the principle of the paramount importance of investment in maternal health and the health of children 0-5 years. This should include actions that support parents/families and recognise that families with multiple risk factors have complex needs. Actions may include:</p> <ul style="list-style-type: none">▪ 'A Learning City' strategy for affordable effective centre based programs for 3-4year olds;▪ Transition to school programs and positive parenting programs for at risk and economically disadvantaged residents.
<p>Lithgow City Council to continue to work with SWAHS and other agencies to develop initiatives to protect and promote health e.g. 'Live Life Well in Lithgow' Project and incorporate sustainability measures in the initiatives.</p>
<p>Lithgow City Council develop a comprehensive Tobacco Control Policy that will support smoke free environments and assist staff and the community in quitting smoking.</p>
<p>Lithgow City Council and SWAHS to consider strategies for addressing insufficient number of GPs in Lithgow LGA providing primary care. Factors affecting access to GP services include the unavailability of GPs in the villages practices that open for extended hours or bulk bill.</p>

Recommendations in response to Community Strategies

Lithgow City Council to proceed with action proposed in Lithgow City Council Strategic Plan to develop population models to monitor the needs of the population. Population models should be sufficiently sensitive to monitor the target vulnerable groups in the population.
Lithgow City Council to develop a Recreational Plan that includes actions to: <ul style="list-style-type: none"> ▪ Reviewing existing playgrounds in terms of shade provision, water bubblers, the developmental opportunities of play equipment provided and safety of play equipment and toilet facilities; ▪ Consider the needs of youth in planning of local parks and open spaces. This may include increasing accessibility by providing facilities that are not closed by gates; ▪ Audit existing recreation areas on Council controlled land to identify accessibility to people with disabilities or frail and aged. Where possible Council to plan progressive modification of existing facilities as required.
Lithgow City Council Ageing Strategy to include actions to collaborate with relevant stakeholders to: <ul style="list-style-type: none"> ▪ Improve safety and access for older people to the built environment through the provision of accessible footpaths, buildings and facilities (refer to WHO checklist of essential features of age-friendly cities, 2007) and to ▪ Implement falls prevention programs promoting 'staying active' to older people including the promotion of balance exercises; providing supportive physical and social environments that facilitate these actions.
Lithgow City Council to develop a strategy for reviewing the availability and adequacy of Baby Care Rooms or Parents Rooms that provide a safe, private place for women and men to feed and change their young children. The strategy would include a plan to provide these facilities.
Lithgow City Council and SWAHS to work with police and other stakeholders to develop actions to address alcohol as a major factor of violent crime in Lithgow LGA. The actions may include: Crime Prevention Through Environmental Design; surveillance; population health initiatives and enforcement measures.

Recommendations in response to Transport Strategies

Lithgow City Council considers strategies, such as- mapping, audit and analysis through the use of transport planning tools that map transport accessibility and walkability (see Appendix for example of Queensland tool). These tools identify transport needs and ensure effective transport planning based on community needs and to avoid duplication.
Lithgow City Council to survey residents in vulnerable groups to determine transport needs and to identify viable transport options (e.g. public transport, community buses) for all Lithgow and Lithgow villages.
Lithgow City Council facilitate the development of a comprehensive traffic management plan that addresses road safety, environmental and broader health issues in collaboration with RTA, the local Chamber of Commerce, Lithgow Integrated Health Services (LIHS), the local community and other relevant agencies. Focus is required on addressing the needs of children, youth, women and older people in the context of any new road infrastructure in the Lithgow LGA.
Lithgow City Council considers developing a regional approach to public transport provision for the LGA by forming partnerships with neighbouring Councils such as Blue Mountains City Council to advocate for improved public transport at a regional level.
Lithgow City Council considers other strategies that support safe pedestrian and cycling access

such as giving precedence to safe cycling and walking spaces, converting road space to green space and having a physical barriers between cars, cyclists and pedestrian (such as multiple kerbs). The Physical Activity Guidelines for Local Councils are a setting specific tool to assist Council in this area , and can be viewed on the NSW Dept. of Local Government web site at www.dlg.nsw.gov.au

Recommendations in response to Environment Strategies

Air

Lithgow City Council considers online and/or radio community health warnings of health impacts of hazard burning and poor air quality (similar to DECC & Health warnings)
<http://www.health.nsw.gov.au/living/airpollution.html>.

Lithgow City Council to liaise with rural fires control centres/National Parks and Wildlife during winter hazard reduction burns to consider strategies to reduce air pollution over the townships of Lithgow.

Lithgow City Council establish education strategies to raise awareness particularly within Aboriginal and Torres Strait Islander and low socio-economic communities of other indoor air quality hazards such as environmental tobacco smoke, Nox and CO, SO₂, particulate matter, and volatile organic compounds in collaboration with SWAHS, Dept of Housing and other agencies.

Water

Lithgow City Council to adopt a preventative risk management approach as recommended by NSW Health and as required in the *Australian Drinking Water Guidelines 2004* that encompasses all steps in water production from catchment to consumer

- Council with the assistance of SWAHS and other agencies to prepare and implement a Drinking Water Risk Management Plan for the Fish River and Farmers Creek reticulated water supplies within the responsibility of Lithgow Council.

Note: for further information please refer to the Australian Drinking Water Guidelines 2004, Chapter 3 'Framework for Management of Drinking Water – the 12 elements' available at http://www.nhmrc.gov.au/publications/synopses/_files/adwg_11_06.pdf

Lithgow City Council is encouraged to continue water supply demand management strategies to encourage the reduction in potable water demand.

- Council could encourage the installation of rainwater tanks at residences within townships supplied by reticulated water.
- Council could investigate the potential for increased treatment of sewage effluent at sewage treatment plants (STPs) to produce higher quality effluent for reuse.
- Council could investigate third party access e.g. sewer mining opportunities by industry to reduce usage of the potable supply.
- Council could encourage incorporating urban stormwater harvesting systems into urban development where appropriate.

Priority Recommendations for SWAHS

The Health Impact Assessment resulted in the following recommendations where SWAHS is the lead agency with the responsibility for implementation of the recommendation.

The recommendations are organised according to the vulnerability group that the recommendation is targeting. The evidence on which the recommendations are based is provided in summary tables in Pages 38-60 and in more detail in the Appendix.

Vulnerable Group	Recommendations
	<p>SWAHS and Lithgow City Council in partnership should establish integrated multi-agency project groups with relevant agencies to:</p> <ul style="list-style-type: none"> ▪ map the provision of services in Lithgow LGA; ▪ identify gaps in service provision; ▪ work towards integrating services with a special focus on service provision of vulnerable groups; ▪ progress the following recommendations.
<p>Pregnant women</p>	<p>SWAHS, Lithgow City Council and other stakeholders to implement smoking cessation programs for pregnant women and their partners/family.</p>
	<p>SWAHS, Lithgow City Council and other stakeholders to implement substance abuse programs for pregnant women and their partners/family.</p>
	<p>SWAHS, Lithgow City Council and other stakeholders to develop effective practical support services and referral networks for pregnant women.</p>
	<p>SWAHS to continuously review existing models of antenatal care to ensure there is a range of models for women at risk of delaying or not accessing antenatal care.</p>
<p>Older people</p>	<p>SWAHS, Lithgow City Council and other stakeholders to address elevations in hospitalisation for falls in the 75+ age group by implementing falls prevention programs:</p> <ul style="list-style-type: none"> ▪ incorporating falls assessments in health checks by GPs of the 75+ years age group; ▪ promoting 'staying active' to older people including the promotion of balance exercises; ▪ implementing falls prevention programs in hospital and aged facilities; ▪ providing supportive physical and social environments that facilitate these actions and ▪ including exercise strategies where older people may face barriers to physical activity (consider including in Council Ageing Strategy).
<p>People with disabilities</p>	<p>SWAHS, Lithgow City Council and other stakeholders to review and act on access issues to health services of people with multiple disabilities or conditions. The review would include:</p> <ul style="list-style-type: none"> ▪ identifying physical, transport and financial barriers to accessing health services; ▪ determining the difficulties in co-ordinating and managing contact and compliance with various health service specialities.

Vulnerable Group	Recommendations
All HIA targeted vulnerable groups	SWAHS and relevant stakeholders to: <ul style="list-style-type: none"> ▪ include transport issues in discharge planning; ▪ consider the patients' transport needs in wider health planning processes; ▪ consider home delivery prescription services if needed.
	SWAHS to consider conducting a health needs assessment of the Lithgow LGA in consultation with Lithgow City Council, local GPs, other health providers and the local community. The health needs assessment would include identifying the needs of the target vulnerable groups.
	SWAHS to provide specific health indicators of age groups (infants, children, youth, older residents) to inform the health needs assessment of vulnerable age groups.
General population	SWAHS, Division of GPs, Lithgow City Council and other stakeholders to address elevations in hospitalisation for asthma through strategies to: <ul style="list-style-type: none"> ▪ improve air quality ▪ decrease secondary tobacco exposure (including in homes and cars); ▪ improve access to health care services; including GPs. ▪ implement asthma management plans.
	SWAHS and Lithgow City Council and other stakeholders to address elevations in deaths due to lung cancer by: <ul style="list-style-type: none"> ▪ Implementing smoking cessation programs that consider the social, work and environmental context of smoking; ▪ implementing education programs to reduce passive smoking in the home, car and other places of exposure near pregnant women and near children; ▪ reducing the risk of exposure to industrial substances or building materials such as asbestos, nickel, chromium compounds, arsenic, polycyclic hydrocarbons and chloromethyl to women and children; ▪ continuing to monitor the compliance of shopkeepers in not selling tobacco to minors; and the compliance of pubs and clubs in preventing smoking in their establishments.
	SWAHS and Lithgow City Council and other stakeholders to address elevations in deaths due to heart disease by: <ul style="list-style-type: none"> ▪ implementing programs aimed at primary prevention focusing on reducing the key risk factors of poor nutrition, physical inactivity, overweight and obesity and smoking; and controlling blood pressure, cholesterol and diabetes; ▪ providing environments that support physical activity and healthy food choices.
	SWAHS and the Division of General Practice to investigate the prevalence and management of diabetes in relation to diabetes-related mortality and the high use of hospital services due to diabetes-related complications.
	SWAHS, Lithgow City Council and relevant stakeholders to develop strategy for the provision of containers for sharps and the disposal of sharps.
	SWAHS and Lithgow City Council to work in partnership with the police and other stakeholders to develop actions to address alcohol as a major factor of violent crime in Lithgow LGA.

Health Impact Assessment Report

The HIA Report describes the steps undertaken in the HIA process and provides the recommendations and the evidence on which the recommendations are based.

Introduction

Background

This report explains the HIA process and presents the findings of the Health Impact Assessment of the Lithgow City Council Strategic Plan.

Governance of HIA

A Steering Group oversaw the Lithgow City Council Strategic Plan HIA. The Steering Group consisted of key community members of SWAHS project team, other SWAHS members, and Lithgow City Council Policy and Planning Manager and two community members from Lithgow. (Refer to the Terms of Reference for other information on governance).

Health impact assessment (HIA)

HIA seeks to predict the health impact of a policy, program or project, including a development (enHealth, 2001). HIA is undertaken to-

- Enhance the positive impacts of any decisions and reduce (or eliminate) the negative impacts of any decision.
- Provide a systematic means of incorporating evidence into decision-making.

There are six steps in a HIA. This includes: (1) Screening; (2) Scoping; (3) Identification; (4) Assessment; (5) Decision-making and recommendations process; (6) Evaluation and follow up (adapted from HIA: a practical guide by Harris, Harris-Roxas, Harris and Kemp, 2007).

Principles underlying HIA

The principles underlying a HIA are Openness, Participation, Democracy, Sustainability, Equity and Ethical use of evidence. For more details refer to:

<http://www.health.nsw.gov.au/public-health/phb/HTML2005/julaug05html/article5p110.html>

Definition of health

The World Health Organization (WHO) definition of health states that: *'health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity'*.

The WHO broader definition focuses on health and well being that is situated in the social model of health where health is measured by qualitative methods e.g. key informants. The second approach to health is the biomedical model of health, which focuses on disease categories. In this approach, health is measured by the absence of health e.g. hospitalisations and deaths. Both approaches are useful in assessing health impacts as they provide both qualitative and quantitative evidence.

Definition of Health Impacts

Health impacts are the overall effects, direct or indirect, of a policy, plan, program or project on the health of a population (Harris et al, 2007, Page 6). These may include both:

- Direct effects on the health of the population, for example exposure to pollutants (including noise) that a proposal may release in the air, water and soil;
- Indirect effects through a proposal's influence on the determinants of health.

Definition of Determinants of Health

Determinants of health are factors that affect health in a positive or negative way as the context of people's lives determine their health. Human biology is a fixed factor, however, strategies may reduce the negative effects associated with biology e.g. an Ageing Strategy to provide supportive services for frail and aged. In addition, if investment is made in foetal wellbeing and the early years of life this may reduce the risk of a biological predisposition to some diseases (Nathanielsz and Thornburg, 2003).

Table 1 Determinants of health-key factors that determine health

Human biology (Fixed factors - effects of these factors may be influenced)	Lifestyle factors	Access to services	Social and economic factors	Physical environment
<ul style="list-style-type: none"> ▪ Genes ▪ Sex ▪ Race ▪ Ageing ▪ Early years- influences <p><u>Note-</u> Influences on foetal development and the early years of life have life long health effects. Investing in this period presents a window of opportunity to provide a healthier start in life.</p>	<ul style="list-style-type: none"> ▪ Poor diet ▪ Physical activity ▪ Smoking ▪ Alcohol ▪ Substance abuse in pregnancy ▪ Unsafe sexual behaviour ▪ Drugs ▪ Poor coping skills ▪ Support network ▪ Culture, customs and beliefs 	<ul style="list-style-type: none"> ▪ Education ▪ Health services ▪ Social services ▪ Transport ▪ Utilities ▪ Leisure. 	<ul style="list-style-type: none"> ▪ Poverty ▪ Income ▪ Unemployment ▪ Working conditions ▪ Social exclusion ▪ Social support 	<p><u>Natural</u></p> <ul style="list-style-type: none"> ▪ Air quality ▪ Water quality ▪ Open spaces ▪ Sun exposure ▪ Climate ▪ Disease vectors <p><u>Built environment</u></p> <ul style="list-style-type: none"> ▪ Housing ▪ Noise ▪ Roads and infrastructure ▪ Risk of injury ▪ Heating, cooling ▪ Shade provision

Table 1 is adapted from WHO Social determinants of health edited by Wilkinson and Marmot, 2003; and the following sources: http://www.phac-aspc.gc.ca/ph-sp/phdd/overview_implications/05_working.html; <http://www.who.int/hia/evidence/doh/en/index1.html>

Definition of Health Inequalities

Health inequalities and differentials in health can be defined as differences in health status or in the distribution of health determinants between different population groups. Some health inequalities are attributable to individual biological variations and risk behaviours. The external environment also influences health inequalities where conditions may be outside the control of the individuals. External environmental factors may be inequitably and thus unfairly distributed in the community so that some people, particularly vulnerable individuals, are more affected than others (Refer to <http://www.who.int/hia/about/glos/en/index1.html>.)

1. Screening

Definition of screening

Screening is the first step in a HIA. It is the process of determining whether or not a proposed development warrants impact assessment. Screening involves filtering out the plan if it did not require a HIA because the health effects were expected to be negligible; or the health effects are well known and readily controllable through measures that are well understood and routinely applied. The screening step involves pre-screening tasks, conducting a screening meeting and making screening recommendations (Harris et al, 2007).

Outcomes of screening step in Lithgow City Council HIA

Pre-screening meetings were held between Lithgow City Council and SWAHS where the Lithgow City Council Strategic Plan was decided as the proposal for the HIA i.e. the document to be assessed for health impacts. The SWAHS project team using a standard screening tool undertook a formal screening step. The details of this process and the outcomes of screening were presented to Lithgow City Council for discussion.

The screening step of the HIA of the Lithgow Strategic Plan resulted in a recommendation to proceed with the HIA. This decision was based on the:

- Potential of strategies in the Lithgow City Council Strategic Plan to differentially impact on the health of vulnerable groups in the community;
- Omission of special consideration of the needs of children aged 0-3 years in the Lithgow City Council Strategic Plan. This was considered a significant omission given the importance of the early years of life in healthy development.
- Potential of the recommendations in the HIA report to influence the development of subsequent Council plans, such as, the Management Plan.

2. Scoping

Definition of scoping

Scoping is the second step of a HIA. The purpose of this step is to determine the scope of the work to be undertaken, what's included and excluded based on the time and resource constraints that apply to the proposal under consideration.

2.i Outcomes of scoping step

The scoping plan of the HIA of the Lithgow City Council Strategic Plan was agreed upon by members of the Steering Group in September, 2007 after a presentation of the draft scoping plan on 6th September and the subsequent distribution by email.

The Terms of Reference and the Action Plan were distributed by email to internal and external Steering Group members for acceptance. This provided a comprehensive guide for the HIA process.

Type of HIA

The HIA was agreed upon with the process to take up to twelve weeks. The actual period for the HIA was six months, as there were gaps between meetings and the collection of evidence did not commence until much later than anticipated.

The number of impacts assessed in detail indicates an intermediate HIA. An intermediate HIA provides a more thorough assessment of potential health impacts and more detail on specific predicted impacts than a desk-based or rapid HIA (Harris et al, 2007). This is appropriate given that the Lithgow City Council Strategic Plan has potential to impact on the health of Lithgow LGA residents.

Type of evidence and method of assessment

The type of evidence and methods of collection were agreed upon. The details of these are in the Evidence Collection section on Page 25.

Steering group

The Terms of Reference provides details of the Steering Group, including- the members, roles and responsibilities and the rules of governance of the Steering Group.

Process for making recommendations

- The recommendations were drafted, as a direct result of the gathered evidence, by the SWAHS project group.
- SWAHS and Lithgow City Council members of the steering group and other relevant managers reviewed the draft recommendations.

- External members of the steering group and other relevant managers will be given the opportunity to review the recommendations after executive management have agreed to this.

2.ii What strategies are included in the HIA?

The Lithgow City Council Strategic Plan includes the areas identified from issues in community consultations - Community, Transport, Employment, Heritage, Education, Health, Environment Arts And Culture, Youth , Growth. All these issues have some impact on health.

The scoping strategy limits the HIA to examine the health impacts of the strategies in the Lithgow City Council Strategic Plan in the areas of Transport, Environment, Health and Community as outlined in Table 2. These areas and strategies were selected because:

- Lithgow City Council has the capacity to influence health more directly through these strategies;
- The strategies in the selected areas were considered to have the largest positive and negative potential health impacts on the target vulnerable groups.

Table 2 Selected issues and strategies assessed in HIA

<p>Community Strategies-</p> <ul style="list-style-type: none"> <input type="checkbox"/> C1-Modelling the population and assessing its needs. <input type="checkbox"/> C3-Encouraging equitable access to services and facilities which meet the needs of the community. <input type="checkbox"/> C7- Ensuring adequate open space is provided throughout towns and villages. <input type="checkbox"/> -C9- Providing a range of housing opportunities to meet the diverse needs of the community. <input type="checkbox"/> C10-Facilitating a safe community. 	<p>Health Strategies-</p> <ul style="list-style-type: none"> <input type="checkbox"/> H1 - Providing health services, which meet the needs of the community. <input type="checkbox"/> H2 - Developing partnerships with a range of stakeholders to facilitate healthy lifestyles. <input type="checkbox"/> H3 - Providing safe drinking water villages.
<p>Transport Strategies-</p> <ul style="list-style-type: none"> <input type="checkbox"/> T1- Providing road infrastructure, which meets the needs of residents. <input type="checkbox"/> T3 - Promoting equitable access to public transport. <input type="checkbox"/> T4 - Maximising the number of passenger train services terminating at Lithgow and provide a fast train service. <input type="checkbox"/> T5 - Improving and expanding the pedestrian and bicycle network. 	<p>Environment Strategies-</p> <ul style="list-style-type: none"> <input type="checkbox"/> E1 - Improving local air quality. <input type="checkbox"/> E4-Ensuring Council land is suitable for its intended use- contamination. <input type="checkbox"/> E5 - Implementing the waste management hierarchy of avoidance, reuse, recycle and dispose. <input type="checkbox"/> E6 - Protecting and improving our water quality. <input type="checkbox"/> E8 - Securing the community access to water. <input type="checkbox"/> E9 - Fulfilling responsibilities under the Drinking Water Catchment Regional Environmental Plan No. 1. <input type="checkbox"/> E7 - Improving our sewage infrastructure
<p>Source: Table developed from Lithgow City Council Strategic Plan that identifies strategies .</p>	

2.iii Who is included in the HIA?

The rationale of the scoping plan for the HIA of the Lithgow Strategic Plan is based on an equity focus that recognises that positive and negative health effects differentially impact on residents according to vulnerability factors. Therefore, the vulnerable groups most likely to be affected by the health impacts of the strategies in the Lithgow City Council Strategic Plan should be the target group of the HIA, as listed following:

<u>HIA target vulnerable groups</u>
<ul style="list-style-type: none">▪ Pregnant women;▪ Infants;▪ Children;▪ Youth;▪ Older residents;▪ Parents/carers of young children;▪ Socioeconomically disadvantaged people;▪ Aboriginal and Torres Strait Islander people;▪ People with disabilities▪ Locationally disadvantaged residents;▪ People with difficulties communicating in English

Table 3 on the next page provides the reasons for inclusion of the vulnerable groups in the scope of the HIA. For example, given the importance of the early years of development it is vital to consider health impacts on maternal health and children. Investment in the health of children in the prenatal period and in the first three years of life has short-term and long-term health benefits extending into adulthood.

Table 3 Selected targeted vulnerable groups in HIA Scoping Plan and reasons for inclusion

In Lithgow CC Social Plan-		Target group in HIA	Reasons group targeted in HIA
Priority	Target group		
M	Children	Infants Children	Influences on foetal development and the early years of life have life long term health effects. Investing in this period presents a window of opportunity to provide a healthier start in life.
no		Parents/carers of young children	Importance of supporting sole parents/families/carers, particularly those with complex needs to provide nurturing environment of young children.
M	Young people	Youth	Needs of youth important, such as, programs for youth at risk, education and employment opportunities; as well as recreational opportunities.
M	Older residents	Older residents	A planned approach to policy and service provision in NSW for older people, based on high quality data and research, and supported by equitable and sustainable resourcing is one of the objectives of the NSW Healthy Ageing Framework 1998–2003.
M A	Women Men	Pregnant women	Focus on pregnant women as they have an essential need for healthy lifestyle and support to contribute to maternal health and foetal health. It is recognised, however, that males have higher rates of mortality and morbidity than females. This is mainly due to risk behaviours and occupational exposures. Lithgow males and females have higher rates of mortality and hospitalisation than the NSW average. Programs to promote a healthier lifestyle and the determinants of health by Council are likely to enhance the health of the population.
M	People with disabilities	People with disabilities	People with disabilities have varied needs depending on their type of disability and other circumstances. People with multiple disabilities and associated conditions face considerable difficulties in accessing services.
M	Aboriginal and Torres Strait Islanders	Aboriginal and Torres Strait Islanders	Aboriginal and Torres Strait Islanders people experience poorer health status than non-Indigenous people and require culturally appropriate services.
M	People from culturally and linguistically diverse backgrounds	People with difficulties communicating in English	HIA focuses on language difficulties aspect of CALD, in particular, health literacy. Although people may have literacy skills, health literacy requires a higher level of skills to comprehend health information to allow compliance with medical orders, prescriptions and making informed choices.
A	Sole parents Housing Department residents	Socio-economically disadvantaged	Targeting sole parents (14% of families) and housing department residents is important as these disadvantaged groups have other associated issues (eg need for support for sole parents, clumping of housing department together gives rise to myriad problems). However, for the HIA it may omit disadvantaged people not in these groups.
A	Gay, lesbian Bisexual and Transgender People	Not included	This group have not been specifically targeted in the HIA. The provision of appropriate counselling, sexual health services and other services is recognised as important to the well being of this group.
no		Locationally disadvantaged	Residents may be locationally disadvantaged because they live in remote areas and/or poorer areas with fewer resources and/or areas with higher levels of crime. These factors impact negatively on access to services and information, reduce participation in community and risk social isolation.

Note: Priority of target groups in Lithgow City Council Social Plan: M= mandatory group ; A= additional group; no=not included in Lithgow City Council Social Plan

3. Identification

Identification is the third step in a HIA. It involves identifying impacts and data collection by:

- Developing a community/population profile ;
- Collecting evidence of secondary qualitative and quantitative information.

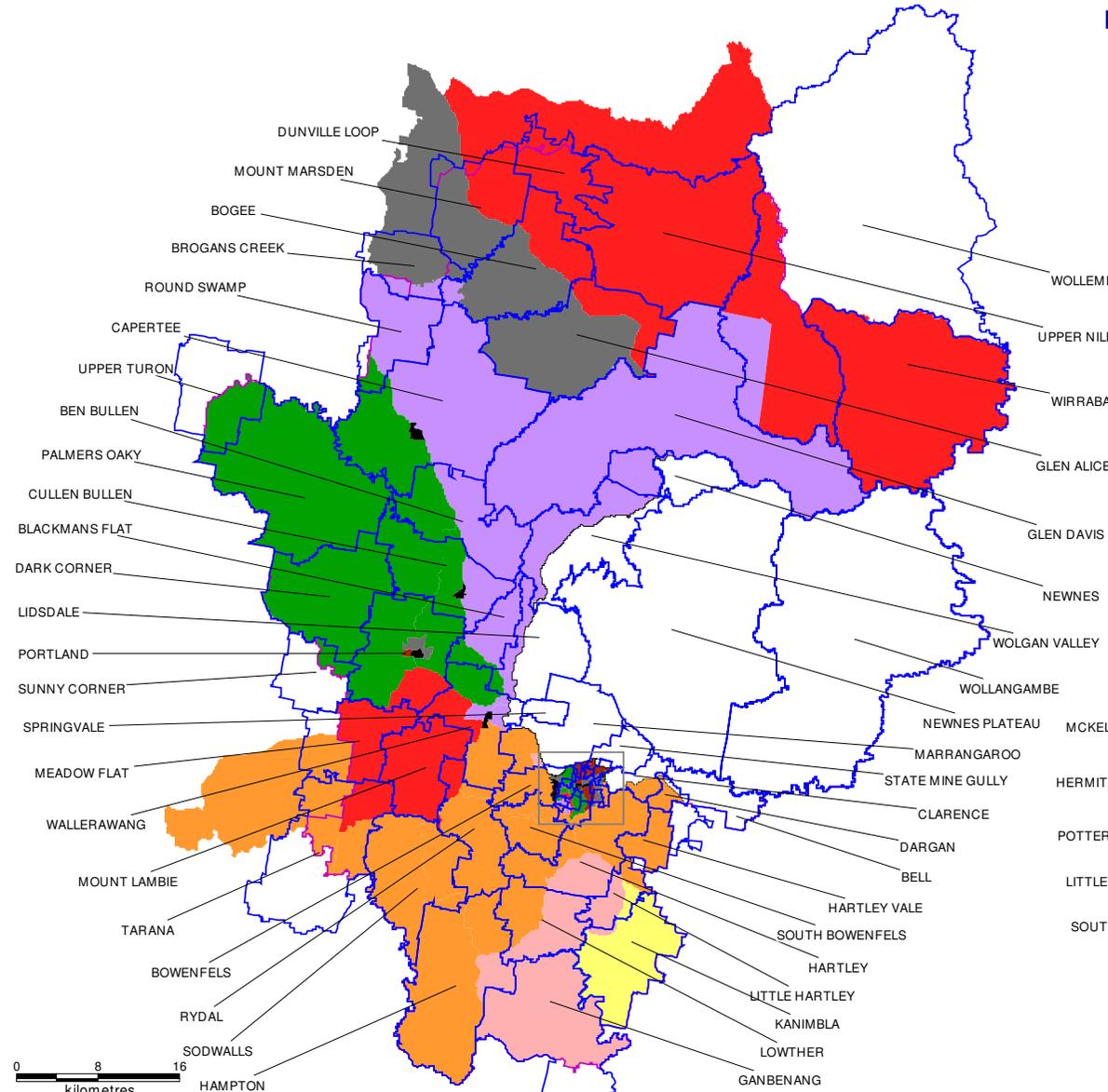
3.i Population profile of Lithgow Local LGA

Profiling describes key aspects of the health status and general demographic and socio-economic factors of the population, particularly in relation to factors that are believed to be susceptible to change or that may act as indicators of anticipated health impact(s). It enables the identification of the potential health effects on the community and it provides a baseline against which possible health impacts can be assessed. (Harris, Harris-Roxas Harris et al, 2007).

Table 4 Geographic and socio-economic indicators

Indicator	Description of Lithgow residents
Accessibility/remoteness Index of Australia (ARIA+)	99% of Lithgow's LGA residents were classified as living in an inner regional area.
Geographical area covered by Lithgow Local Government Area (LGA).	Approximately 4,551 square kilometres, extending from the Capertee and Wolgan Valleys in the north, Little Hartley in the east, Tarana in the south and Meadow Flat in the west.
Climate	Summer temperatures range from 11.8° -f 25.5°. Winter temperatures range 0.7° - 10.4°.
2006 Census population	20,230 Estimated Resident Population
Projected population in 2026	Increase by 0.4%
Changes in age group s	The 65+ years age group has a projected 89% increase by 2026.
Indigenous residents	696 Indigenous residents represent 3.4% of its population
Single parent families	12% of Lithgow's LGA residents
Jobless families" where no parent was employed.	25% of Lithgow's LGA residents
Dwellings in Lithgow were rented from the State Housing Authority.	6% of Lithgow's LGA residents
No access to a motor vehicle	12% of Lithgow's LGA residents
No access to a computer	34% of Lithgow's LGA residents
No access to the internet.	21% of Lithgow's LGA residents
Unemployment in 2003	7.6% of Lithgow's LGA residents
SEIFA of Disadvantage-2001 Census	SEIFA=936.82. This indicates that there is a higher proportion of disadvantaged Lithgow LGA residents than for NSW.
Areas with lowest proportion of disadvantaged residents in Lithgow LGA.	Kanimbla and part of Little Hartley.
Areas with highest proportion of disadvantaged residents in Lithgow LGA. (Collection districts in Lithgow, Bowenfels, Portland, Meadowflat, Cullen Bullen and Capertee have the highest proportion of disadvantaged residents in Lithgow LGA. These areas are in the 10% of collection districts in NSW with the highest proportion of disadvantaged residents. (Refer to Map 1 showing variation in disadvantage in Lithgow LGA).
Source: Geography and climate from http://www.lithgow.nsw.gov.au/ ; Census information from ABS 2001 and 2006 Census.	

Map 1 Index of Relative Socio Economic Disadvantage in Lithgow LGA, 2001 Census



**Index of Relative Socio-Economic Disadvantage
Lithgow Local Government Area, 2001**

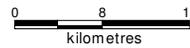
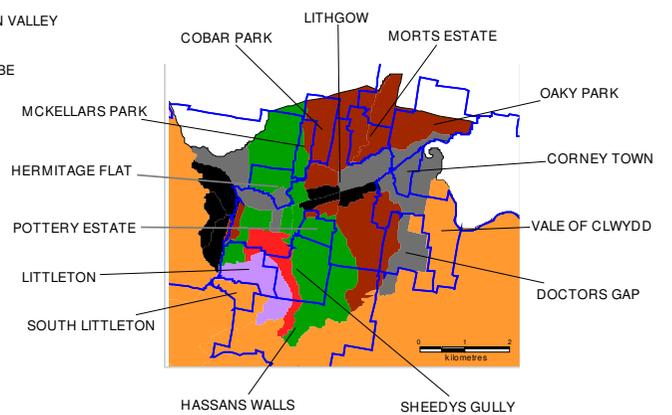
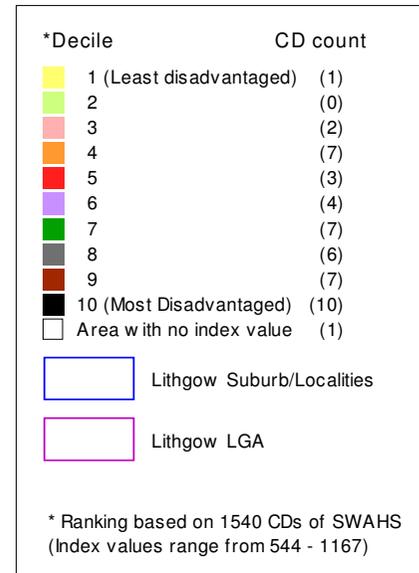


Table 5 Health risk indicators and health status indicators of Lithgow LGA

Health risk indicator	Lithgow LGA	NSW	Lithgow LGA residents compared to NSW
Maternal smoking in pregnancy	30% of births	17%	Significantly above NSW
Adults who smoke	28% of residents	22%	Significantly above NSW
Overweight or obese	53% of residents	47%	Significantly above NSW
Inadequate physical activity	60% of residents	54%	Significantly above NSW
Any alcohol risk drinking behaviour	39% of residents	35%	Not significantly different
High risk drinking behaviour	14% of residents	15%	Not significantly different
High or very high psychological distress	11% of residents	12%	Not significantly different

Source: Maternal smoking taken from Midwives Data Collection 1996-2004 in HOIST.; Other indicators from Fung, Achat, Close, 2005.

Table 6 Health status indicators of Lithgow LGA residents

Health Indicator	Description
Births	
Preterm births (<37 weeks gestation) in 1996-2004	Lithgow 8% of births and NSW 6%. Significantly above NSW
Low birth weight births (<2.5 kilograms) in 1996-2004	Lithgow 8% of births and NSW 7%. Significantly above NSW
Hospitalisation	
Most common causes of hospitalisation	Diseases of the digestive systems (including diseases of oesophagus, stomach, duodenum and intestines) and "factors influencing health status and contact with health services" (including health services procedures, admissions of newborn infants, care involving dialysis, admission to rehabilitation, nursing home and respite care).
All causes hospitalisation -includes all age groups	Males 17% and females 22% significantly higher than NSW
All diabetes-related hospitalisation	Males 69% and females 90% significantly higher than NSW
Ambulatory Care Sensitive Conditions (ACSCs) - avoidable through preventive care or early disease management.	Between 1994-95 and 2003-04, about 10% of all hospital separations (7,021) in Lithgow were avoidable through preventive care or early disease management
New cases of Cancer 1999-2003	
All malignant cancer	10% significantly higher than NSW
Colorectal cancer	Females 24% significantly higher than NSW
Prostrate cancer	Males 29% significantly higher than NSW
Deaths 1999-2003	
Life expectancy at birth in 1999-2003	Males 78 years; females 82.7 years (NSW: Males 77.88 years; females 83.1 years)
Leading causes of death	Cardiovascular disease and cancer.
Deaths from cardiovascular disease	Males 23% and females 57% significantly higher than NSW
Deaths from injuries	Males 63% and females 28% significantly higher than NSW
Deaths from all causes	Females 7% significantly higher than NSW

Source: Social Health Atlas, Epidemiology, Population and Health Strategic Direction, SWAHS.

Summary

- In the 2001 Census, Lithgow had a higher proportion of disadvantaged residents than NSW.
- There was a higher proportion of Lithgow LGA residents with health risk behaviours.
- Hospitalisation rates were higher than for NSW.
- Mortality rates for Lithgow LGA females were higher than for NSW females.

3.ii Evidence collection

An evidence base about the impact that projects, programs and policies have had on health is required to carry out HIA. The best available evidence is used to determine what impacts may occur (both positive and negative), the size of the impact (if possible) and the distribution of that impact in different population groups. Evidence of health impacts is often not available because of the long causal pathway between the implementation of a project/program/policy and any potential impact on population health. The many confounding factors make the determination of a link difficult. Therefore, this information must be supplemented with local and expert knowledge, policy information, and proposal specific information (WHO

<http://www.who.int/hia/evidence/doh/en/index1.html>).

The evidence collection process involved-

1. Combining information from consultation with key informants and documents from SWAHS (SWAHS health profile of Lithgow LGA, SWAHS Diabetes Report) and Lithgow City Council reports (Social Plan, Community Consultation and Issues Paper).
2. Analysing additional health indicators (egs. smoking in pregnancy, low birth weight, asthma, suicide, mental health, assaults and unintentional injuries) to provide a more complete picture of health in Lithgow LGA.
3. Undertaking a critical literature review of evidence regarding the health impacts of strategies in the Lithgow City Council Strategic Plan. The literature review was undertaken by following the hierarchy of evidence. This included-
 - Commencing with systematic reviews published in peer reviewed journals.
 - Reviewing journal articles published in peer reviewed journals when there were gaps in the literature and no systematic reviews.
 - Expanding the literature search to include suitable appropriate grey literature.

The evidence is presented in summary to provide context for the recommendations (Pages). More detailed evidence is included in the Appendix.

4. Assessment of evidence

Definition of assessment

The fourth step of a HIA is the assessment of evidence by synthesising and critically assessing the information in order to manage the different evidence on potential health impacts of the Lithgow City Council Strategic Plan.

Outcomes of assessment

The evidence is the foundation of recommendations. To synthesise and critically assess the information the following steps were undertaken-

- Checking the consistency of results by triangulation of methods;
- Mapping the potential impact of the strategies in the Lithgow City Council Strategic Plan on the determinants of health.
- Developing a matrix of the positive and negative health impacts of the strategies in the Strategic Plan in relation to vulnerable groups in Lithgow LGA.
- Assessing overall impact of strategy in terms of the size of the impact (how many in the population affected).

4.i Triangulation

Triangulation refers to the approach of investigating a phenomenon using two or more methods where similar findings of these different methods will strengthen the conclusions and recommendations drawn (Harden and Thomas, 2005; Leech and Onwuegbuzie, 2007).

In the HIA, different methods of collecting evidence were undertaken and the findings of the literature review were cross checked against the findings in the community consultation by Lithgow City Council, consultation with key informants and with health data for consistency in the evidence. Table 7 shows that the different sources of evidence supported each other. This confirms the validity of the evidence presented and the recommendations arising from the evidence.

Table 7 Triangulation of different methods of evidence collection.

Source of evidence	Areas in Lithgow City Council Strategic Plan			
	Health	Community	Transport	Environment
	Agreement among methods			
Community consultation by Lithgow City Council	yes	yes	yes	yes
Key informants consultation	yes	yes	yes	yes
Literature review	yes	yes	yes	yes
Other HIAs	yes	yes	yes	yes
SWAHS Health Profile	yes	yes	N/a	yes
Other health evidence	yes	yes	N/a	yes

4.ii Mapping impacts on health determinants

The mapping method aimed to determine if strategies and actions in the Lithgow City Council Strategic Plan would affect the determinants of health. Table 8 illustrates if the strategies in an area (on top row of table) potentially affect the determinants of health (in the left column).

- Strategies and actions in the ten areas of the Lithgow City Council Strategic Plan will positively affect the majority of determinants of health.
- The Health H1 strategy to provide health services that meet the needs of the community and the Community C3 strategy to encourage equitable access to services will potentially have health benefits for the population.
- The Health H2 strategy to develop partnerships to facilitate a healthy lifestyle is an effective way to address risk behaviours, as multidisciplinary approaches are more effective than a singular approach.
- Transport strategies T1, T3, T4, T5 will benefit the population by providing road infrastructure, equitable access and pedestrian access and connectivity (Health H1 action2).
- The Community C1 strategy Action 3 to develop an Ageing Strategy provides the opportunity to ameliorate some of the negative aspects of ageing (by supporting older residents with services and by highlighting the positive aspects of healthy ageing).
- The Community strategies C7, C9, C10 to ensure open spaces, provide a range of housing and facilitate a safe community are excellent strategies that target the determinants of health.
- Environmental strategies E1, E5, E6, E9 and H3 will potentially have positive health effects on all people, but some of the vulnerable groups will particularly benefit.
- Strategies or actions to reduce noise and to provide shade in parks and other leisure areas are not included in the Lithgow City Council Strategic Plan.
- The Health H1 strategy to provide health services that meet the needs of the community and the Community C3 strategy to encourage equitable access to services will potentially have health benefits for the population.
- There are no explicit strategies or actions to invest in maternal health (important also for foetal development) and the early years of life. This omission would result in missing this extremely important window of opportunity to provide health benefits that continue in childhood and through to adulthood.
- There are no explicit strategies or actions to address the determinants of lack of social support and poor coping skills. Services that provide moral support, practical support, and link residents to local networks are important.
- There are no explicit strategies or actions to address the risk of injury through an integrated approach of education, environmental modifications and enforcement. It would be prudent to include measures that address the role of alcohol in injury.

Table 8 Health impacts of Lithgow City Council Strategic Plan on determinants of health

		All strategies and actions in Lithgow City Council Strategic Plan								
Determinants of health that can be influenced		Health	Community	Transport	Environment	Employment	Education	Youth	Growth	Heritage/ Arts and culture
Fixed factors	Age, Sex Race.		C1- ageing strategy					Y1-youth actions		
	Foetal development and early years of life									
Social and economic factors	Poverty					indirect				
	Local economy			T1, T3. T5		E/11 E/13 E/15, E/16				
	Unemployment			T1, T3. T5		, E/11, E/12, E/14, E/15, E/16	ED1			
	Working conditions									
	Social exclusion			T1, T3. T5						
	Social support									
	Safe community		C10							
Lifestyle and risk behaviours	Poor diet	H2								
	Overweight and obesity	H2								
	Physical inactivity	H2		T5						
	Smoking	H2								
	Alcohol use	H2								
	Drug use	H2								
	Substance use in pregnancy									
	Unsafe sexual behaviour	H2								
	Poor coping skills									

Key	Positive health impact If partially shaded= contributes in part	No strategy or action in Strategic Plan where appropriate	Negative health impact
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(Table 8 continued) All strategies and actions in Lithgow City Council Strategic Plan

Determinants of health that can be influenced		Health	Community	Transport	Environment	Employment	Education	Youth	Growth	Heritage/Arts and culture
Access to services	Education						ED1, ED2	Y1	G1	
	Health services	H1						Y1	G1	
	Social services		C1, C3					Y1	G1	
	Transport			T2, T3, T4					G1	
	Utilities		C3 Action 3		E8				G1	
	Leisure		C4, C5, C6, C8,	T5				Y1	G1	A/C1
Natural environment	Air quality				E1					
	Water access and quality	H3			E6, E8, E9					
	Open spaces		C7, C8							
	Disease vectors				E2, E3, E5, E7					
Built environment	Housing		C9						G4	
	Noise.									
	Shade provision									
	Risk of injury (in the home, roads, open spaces, buildings)		C10							
	Infrastructure			T1, T5	E5 waste management; E7-sewage				G2, G6	
Preserving environment, Heritage and culture	Preserving Indigenous, Non-Indigenous culture/heritage, rural lifestyle		C1				E/16		G5	HR1 HR1 A/C1
	Biodiversity				E2, E3					
	Land use				E2,E4				G1,G2, G3, G4	
	Sustainability				E5-recycling					

Key Positive health impact
If partially shaded= contributes in part

No strategy or action in Strategic Plan where appropriate

Negative health impact

4.iii Matrix of health impacts on target vulnerable groups

The matrix of health impacts on the target vulnerable groups in the HIA is divided into two tables for clarity. Tables 9 and 10 demonstrate the health impacts that strategies in the areas of Health, Community, Transport and Environment would potentially have on the HIA target vulnerable groups. The health impacts are categorised as positive impact on health (+), negative impact on health (-), no strategy or action for vulnerable group, which may be potentially negative and/or widen health inequalities through health inequities.

4.ii.i Health impacts on children and their carers

Table 9 shows the health impacts of strategies in the Lithgow City Council Strategic Plan on the health of pregnant women, infants, children and parents and carers. These groups are clustered together because of the importance of health in pregnancy for not only maternal well being, but also the health of the developing foetus. The early years of life are an important period in child development and health with potential for long-term health benefits or adverse health effects. Strategies that support the parents and carers of children are important in maintaining the well being of parents and carers to enable parents to care for the essential needs of their children.

Children and youth are target groups identified by Lithgow City Council. It is assumed that the needs of these groups would be specifically addressed in subsequent plans. Important needs are highlighted, however, in the table.

Table 9 Health impacts of selected strategies on vulnerable groups in child development

Vulnerable groups	Health H1, H2, H3	Community C1, C3, C7, C9, C10	Transport T1, T3, T4, T5	Environment E1, E5, E6, E7, E8, E9
Pregnant women	*Need strategies and actions aimed at pregnant women to improve maternal health (and foetal health) by reducing— rates of smoking in pregnancy, alcohol and drug use, domestic violence, delayed access to antenatal care and improving diet and coping skills.	*Social Plan does not identify this group’s explicitly. Need services that offer practical support and support network during pregnancy. .	+ Support strategies that improve access to transport. This will improve transport access to antenatal care services. Transport needs to adequately extend to the villages of Lithgow LGA.	++ Support strategies as water, air and contaminants and poor waste management have serious health impacts on maternal health and the developing foetus.
Infants	* Need strategies and actions to address low birth weight, preterm births and other poorer birth outcomes (than NSW). * Need strategy to Increase breast feeding rates	*Need strategies and actions to identify developmental and educational needs of 0-3 years; provide preschool places if needed. * Provision of shade in open spaces.	+ Support strategies that improve access to transport to health services, childcare and leisure activities., * *	+Support strategy The immune system of children, infants in particular, are susceptible to water contaminants and unhygienic conditions. These may cause immediate illness and/or long term disease.
Children	*Need strategies and actions to reduce high rates of hospitalisation for injury and poisoning, and asthma. Encourage healthy lifestyle- improve canteen food, prevent environmental tobacco exposure and encouraging physical activity.	*Need to provide developmental opportunities through mobile play groups and toy libraries. * Determine if children in domestic violence receive adequate support services *Provision of shade in open spaces.	+Consider safety around school- need for drop off areas; pedestrian crossings.	+ Fluoridation protects the developing teeth of young children. Oral health is an important factor in physical health. +Support strategy as poor air quality is one risk factor in asthma and other respiratory disease.
Youth	* Need to reduce- high rates of hospitalisation for injury and poisoning, and asthma. Reduce driver risk taking, smoking and alcohol excess * Determine adequacy of sexual assault services for males and females and , substance abuse programs.	+ In Youth area Y1 there are actions to improve services for youth. * Need recreation facilities for youth eg skateboard park.	+ Support strategies that improve access to transport to school, work, and recreation. * Investigate needs of youth regarding transport from Lithgow town to villages late at night and after alcohol consumption.	+Support strategy as poor air quality is one risk factor in asthma and other respiratory disease.
Parents and carers of young children	*Provide services that support parents/carers of young children.	*Social Plan does not identify this group’s explicitly. * Provide facilities for breast feeding, changing babies and childcare.	+ Support strategies that improve access to transport to employment, food shopping, health services and leisure. * Consider parents/carers with strollers and prams .	

Key: + Positive health Impact - - negative health impact * omission or needs to be considered

4.ii.ii Impacts on other HIA vulnerable groups

In the social plan, older residents, people with disabilities and Aboriginal and Torres Strait Islander people are included in the target vulnerable groups.

In this HIA, target groups include-

- Locationally disadvantaged residents as these residents may live in areas isolated from adequate transport, services, and community facilities.
- People with difficulties communicating in English The Lithgow City Council Social Plan includes people from culturally and language diverse countries (CALD). In this HIA, the focus is on people who cannot adequately comprehend health information. It is noted, however, that other people may also have poor health literacy.
- Socio-economically disadvantaged residents. The Lithgow City Council Social Plan includes people from public housing and sole parents. These groups are likely to be socio-economically disadvantaged, however, it does not encompass all socio-economically disadvantaged people.

Table 10 demonstrates that strategies will improve the health of residents. There are, however, some issues to consider. These include: the community context of high rates of smoking, and physical inactivity; high comprehension skills needed for health literacy; and the need to work with agencies to develop strategies regarding inadequate resources to access services (money, time, childcare, knowledge).

The strategies of the Lithgow City Council Strategic Plan are well placed to enhance the health of the residents of Lithgow LGA overall. While no strategy would actively worsen the health of the vulnerable groups that are targeted in this HIA, there is concern, that resources may be diverted away from or under invested in the needs of the vulnerable groups. It is considered that omissions in addressing the particular needs of the vulnerable groups may increase health inequalities. That is, the proposed strategies may increase the health of residents in general but the health of residents in the vulnerable groups may not be enhanced at the same level. In turn, this will increase inequalities in health of these vulnerable groups and the general population.

Table 10 Health impacts of selected strategies on vulnerable groups in child development

Vulnerable groups	Health H1, H2, H3	Community C1, C3, C7, C9, C10	Transport T1, T3, T4, T5	Environment E1, E5, E6, E7, E8, E9
Aged residents	Reduce higher mortality rates, heart disease and lung cancer deaths; higher rates of hospitalisation for falls and diabetes. Reduce falls by modifying environment and strengthening exercises).	+ Ageing strategy potentially will improve quality of life for older people.	+ Support strategy for provision of accessible housing.	+ Support strategies. The old and frail and people with compromised immune systems are more affected by water contaminants than healthy adults.
People with disabilities (mental, physical, and learning disabilities)	*Address difficulties of people with multiple disabilities in accessing services. *Improve health information for people with health literacy difficulties. *Reduce high smoking rates of people with mental illness and comorbidity of substance abuse and mental illness.	+ Included in Social Plan Provision of open spaces that encourage participation		
Locationally disadvantaged residents.	Address difficulties in accessing- services, prescription services, health information, suitable. Consider innovations in models of care.	Provide access to health information and program participation.	Transport accessibility needs to extend to villages.	
Socio-economically disadvantaged	* Need to work with agencies to develop strategies regarding inadequate resources to access services (money, time, childcare, knowledge).	*Social Plan does not identify all disadvantaged (only Dept. housing) residents *Consider community context of high rates of smoking, and physical inactivity.		+Support strategy as poor air quality is one risk factor in asthma and other respiratory disease. Low ses particularly affected by asthma and respiratory disease.
Indigenous people	Develop valid health indicators of Indigenous health for health profile.			+ Indigenous people particularly affected by asthma and respiratory disease.
English difficulties	Develop health indicators in health profile for people with English difficulties.	Consider higher comprehension skills needed for health literacy.		
Overall assessment of strategy	+ Strategies H1, H2, H3 would have a large positive impact on the health of the general population. * In the H1 and H2 strategies, the above needs and issues of vulnerable people need to be considered. Without these considerations, this strategy may negatively impact on health and increase health inequalities in vulnerable groups. *Strategies should include actions to ensure that social and physical environments support healthier lifestyles.	+Strategies C1-C10 would have a large positive impact on the health of the general population by improving access to services, enhancing recreation and open spaces, reducing crime and providing a range of housing. . *Strategies should include actions- to ensure the learning needs of young children are catered for and needs of vulnerable groups are explicitly addressed.	- Strategies may have short and long term negative health impacts for the local population on a number of levels, especially for children, older people, pedestrians and cyclists. +Large short and long term positive health impact re access to mass transit, expanded pedestrian and bicycle network	+ Support strategies to combat– + water contaminant, +air quality and s and +poor waste management as they have serious health impacts especially on developing foetus. Young children and the elderly.
Key: + Positive health Impact - - negative health impact * omission or needs to be considered				

4.iv Assessing overall impacts

The assessment of overall impacts included the following:

Size of the impact

The size of the impact is how many in the population would be affected by the strategy. The criteria for the size of impact in this HIA: small=<15% of population; medium=15%-49%; large=50%.

- In most cases, the impact was large, as the vulnerable groups combined (with overlap excluded) comprised more than 50% of the population.

Timing of impacts

Timing of impacts is the timeframe for when the impact may come into effect can be short, medium or long term.

- Most health impacts have potentially both short term and long term health impacts. That is, health may potentially be affected initially and with longer-term consequences.

Differential impact

Differential impact is where an impact is distributed unequally across or within population groups. Some strategies will have positive health effects on all people, but some vulnerable groups will particularly benefit:

- Improved air quality will particularly benefit children and older people who are more susceptible to respiratory diseases.
- Improved water quality will particularly benefit children and older people who are more susceptible to infectious diseases.
- Improved water quality will particularly benefit maternal health and the developing foetus as foetal development can be very adversely affected by water contaminants.
- Fluoridation in the water will greatly improve the oral health of developing children.

Some of the strategies will have positive health effects on all people, but some of the vulnerable groups may not benefit if their needs are not considered.

- Specific needs of vulnerable group to equitably access services.
- Need for strategies and actions to include maternal and infant health. Needs of target vulnerable group need to be explicitly considered.
- Social and physical context of smoking and other risk behaviours should be considered.
- Measures to be implemented to reduce adverse effects of increased road traffic eg pollution and injuries of young children and older people.

Table 11 Overall assessment of impacts

Area	Potential impacts (what strategy aimed to achieve in Plan)	Nature of impact	Likelihood of impacts	Size of impact	Timing of impacts	Differential impact; i.e. Where impacts are distributed unequally across or within population groups
Health	Access to health services	+	Definite	Large	Short and long term	Need for strategies and actions to include maternal and infant health. Needs of target vulnerable group need to be explicitly considered. Otherwise health inequalities may increase.
		-	Probable	Medium		
	Facilitate healthy lifestyle	+ - Potentially	Definite Probable	Large	Short and long term	Need to address social and physical context of risk behaviours in vulnerable groups for Indigenous and disadvantaged. Need to reduce smoking and substance use in pregnancy
	Fluoridation	+	Definite	Large	Medium and long term	Children to benefit the most.
Community	Equitable access to services	+ - Potential	Definite Probable	Large	Short and long term	Needs of HIA target vulnerable group need to be explicitly considered. Otherwise health inequities increase.
	Open spaces	+	Definite	Large	Short and long term	All groups could benefit if open spaces are accessible. Plus provide developmental play opportunities for children.
	Housing	+	Definite	Large	Short and long term	Positive benefits for older people and people with disabilities.
	Safe community	+	Definite	Large	Short and long term	Positive benefits for all r people. Need to address domestic violence, and sexual assault. Wo
Transport	Transport network	+	Definite	Large	Short and long term	Improves transport network for in out of Lithgow.
	Unintended outcomes from increased traffic= pollution from fumes; pedestrian accidents and motor vehicle accidents	-	Probable	Large	Short and long term	Young children and older people are more vulnerable to adverse effects of pollution on respiratory system; Children and older people at higher risk of pedestrian accidents and more likely to be injured.
	Pedestrian and cycling access	+	Probable	Large	Short and long term	People physically able to walk and cycle will have particular benefits through physical activity.
Environment	Water quality and access (E6,E8, E9 and H3 strategy)	+	Definite	Large	Short and long term	All people will benefit. Developing foetus, children and older people will particularly benefit as they are most affected by polluted air and contaminated water.
	Air quality	+	Definite	Large	Short and long term	
	Waste management	+	Definite	Large	Short and long term	

Note: +positive impact; -= negative impact Criteria: Scale of impact: small=<15% of population; medium=15%-49%; large=50%

5. Recommendations in the context of evidence

The development of recommendations is Step 5 in the HIA process. The recommendations based on evidence and in response to the likely health impacts of the strategies and actions in the Lithgow City Council Strategic Plan. In particular, the health of Lithgow LGA residents in the vulnerable groups were considered.

The following tables illustrate the recommendations in the context of the evidence in which they were developed. The evidence included literature reviews and consultations with key informants. More detailed evidence is in the Appendix.

Recommendations in the evidence summary tables may differ to the priority recommendations. The twenty recommendations for Lithgow City Council and the recommendations for SWAHS that are in the beginning of the report have been further reviewed, refined and some recommendations have been combined. The priority recommendations were shaped with the guidance of the Steering Group.

The first agency stated in a recommendation is the lead agency with the responsibility for implementation of the recommendation.

5.i Health Recommendations in context of evidence

Table 12 Evidence summary and recommendations related to Health Strategy H1

H1 - Providing health services, which meet the needs of the community. Results-Access to health services.	
Action 1- Determine adequacy of health services in light of the local profile and population modelling.	
Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Health services tailored to the identified needs, of the community are more effective than those not based on community needs (Hawe, Degeling and Hall, 1990). ▪ Determining the adequacy of health services based on the contents of the local profile and population modelling has potential flaws. For example, the SWAHS health profile does not have specific indicators of the selected vulnerable groups. Therefore, the needs of these target groups may be overlooked. ▪ Analysis of deaths and hospitalisations suggest that health services should be based on a range of health indicators and risk factor indicators of the targeted vulnerability groups (pregnant women, people with disabilities, children, youth, older residents). ▪ Pregnant women have complex needs for their health and the health of the developing foetus. They may have little support as they displaced from families, they may be single, young, and live in poorly resourced areas of Lithgow ▪ There are significant elevated rates in low birth weight births and preterm births; and in hospitalisation for diabetes-related complications, injury and poisoning (falls in 75+ years) and asthma. ▪ There are significant elevated rates in maternal risk factors (smoking in pregnancy and delayed antenatal care). 	<ul style="list-style-type: none"> o Health to conduct a health needs assessment of the Lithgow LGA in consultation with Lithgow City Council, local GPs and other health providers and the local community. o SWAHS to provide specific health indicators of age groups (infants, children, youth, older residents). o SWAHS and Lithgow City Council and other stakeholders to address elevations in hospitalisation for asthma through strategies in air pollution (air quality, environmental pollution in homes and cars), access to services and asthma management plans where appropriate e.g. in pre-schools and schools. o SWAHS, Lithgow City Council and other stakeholders to address elevations in hospitalisation for injury and poisoning by implementing falls prevention programs targeting the 75+ age group. In particular, incorporating falls assessments in 75+ checks by GPs and promoting 'staying active' to older people including the promotion of balance exercises. Council also needs to consider providing supportive environments that encourage this (Consider including in Lithgow City Council Ageing Strategy). o Lithgow City Council to develop and implement a policy that: highlights the importance of maternal health and the health of children 0-3 years in all plans; includes the need for all plans/strategies to be assessed for both positive and negative impacts on infants and children; recommends strategies to ameliorate or reduce negative impacts. o SWAHS, Lithgow City Council and other stakeholders to implement smoking cessation programs for pregnant women and their partners or family. o SWAHS, Lithgow City Council and other stakeholders to develop effective practical support services and referral networks for pregnant women. o SWAHS to provide assess existing models of antenatal care to ensure there is a range of models of antenatal care for women at risk of delaying or not accessing antenatal care. o SWAHS and GP Divisions to explore the prevalence and management of diabetes relating to high use of hospital services.

HEALTH (Table 12 continued) H1 - Providing health services, which meet the needs of the community. Results-Access to health services	
(continued) Action 1- Determine adequacy of health services in light of the local profile and population modelling.	
Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ Lithgow LGA residents experienced significant elevations in deaths and deaths for lung cancer and heart disease specifically. ▪ Lithgow LGA residents experienced significant elevations in hospitalisation for asthma, diabetes, injury and poisoning (especially falls in 75+ age group). Refer to interventions at- ▪ http://www.health.qld.gov.au/chipp/what_is/e_of_injury.asp ▪ There is poor or little access to GPs, especially bulk billing GPs, after hours and in all areas. ▪ People with severe or multiple disabilities or conditions have complex support needs that may include difficulties with co-ordinating and scheduling transport and resources for frequent medical and dental appointments and obtaining information (Submissions/00290.CARA, 2002). ▪ A recent literature review (Rudd , Anderson, Nath, and Oppenheimer, 2007) examined more than 800 published studies and found that the reading grade levels needed for health materials far exceed the reading abilities of the average high school graduate. This well-established mismatch has significant consequences for health consumers (Institute of Medicine 2004). Refer to assistance in developing suitable resources at- http://www.ama-assn.org/ama/pub/category/9913.html http://www.hsph.harvard.edu/healthliteracy/index.html 	<ul style="list-style-type: none"> o SWAHS and Lithgow City Council and other stakeholders to address elevations in hospitalisation for asthma through strategies to- <ul style="list-style-type: none"> - improve air quality (including in homes and cars); - improve access to health care services; - implement asthma management plans where appropriate e.g. in pre-schools and schools. o SWAHS and Lithgow City Council and other stakeholders to address elevations in hospitalisation for injury and poisoning by utilising a multiple approach of education, environment modification and enforcement. o SWAHS and Lithgow City Council and other stakeholders to address elevations in deaths due to lung cancer by- <ul style="list-style-type: none"> - implementing smoke cessation programs that consider the social and environmental context of smoking; - implementing education program to reduce passive smoking e.g. smoking in the home, car and other paces of exposure, especially near pregnant women and children; - reducing the risk of exposure to industrial substances or building materials such as asbestos, nickel, chromium compounds, arsenic, polycyclic hydrocarbons and chloromethyl. o SWAHS, Lithgow City Council and other stakeholders to address elevations in deaths due to heart disease by- <ul style="list-style-type: none"> - implementing programs aimed at primary prevention focusing on reducing the key risk factors of poor nutrition, physical inactivity, overweight and obesity and smoking; and controlling blood pressure, cholesterol and diabetes; - providing environments that support physical activity and healthy food choices o SWAHS and the Division of General Practice to explore the prevalence and management of diabetes in relation to diabetes-related mortality and the high use of hospital services due to diabetes-related complications. o SWAHS, Lithgow City Council and other stakeholders to review health access issues related to people with multiple disabilities or conditions. o SWAHS and Lithgow City Council to provide health information so that individuals are able to obtain, process, and understand basic health information that is needed to make appropriate health decisions.

HEALTH (Table 12 continued) Strategy H1 - Providing health services, which meet the needs of the community. Results-Access to health services.

Action 2-Facilitate improved access to the Lithgow health service through public transport and pedestrian access

Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that -</p> <ul style="list-style-type: none"> ▪ Suitable public transport provides the ability to travel to and from health facilities. This reduces the risk of missing appointments and this contributes to maintaining better health. ▪ People with disabilities may have difficulties accessing public transport such as buses and trains . ▪ Improved access includes a range of design modifications and a range of transport options. ▪ Accessibility to health services includes transport after discharge from health services and to obtaining prescriptions. ▪ Enhancing the walkability of an area potentially improves levels of physical activity, increases accessibility to services, and connectivity to the community. ▪ Inadequate physical activity is a risk factor in obesity and cardiovascular disease. Physical activity also improves mental health. 	<ul style="list-style-type: none"> o Lithgow City Council to proceed with action to facilitate improved access to the Lithgow health service through public transport and pedestrian access with special consideration of the target vulnerable groups. o Lithgow City Council to survey residents in vulnerable groups to identify viable transport options for (e.g. public transport, community buses). o Lithgow City Council and SWAHS to develop a range of innovative transport schemes. This may include- emergency transport and non-emergency hospital transport, transport to day centres, General Practitioners, follow-up care. and to prescriptions services. o Lithgow City Council and SWAHS to provide a range of transport services to meet the needs and resources of people with disabilities. o SWAHS to (i) Include transport issues in discharge planning; (ii) Consider the patients' transport needs in wider health planning processes; (iii) Consider home delivery prescription services. o Lithgow City Council to consider strategies, such as- mapping, audit and analysis of the use of transport planning tools that map transport accessibility and walkability (see Appendix for example of Queensland tool). These tools identify transport needs and to ensure effective transport planning based on community needs and to avoid duplication. o Lithgow City Council to consider increasing the walkability of Lithgow by developing an integrated network of multi purpose paths, trails and tracks linking areas of Lithgow LGA.

HEALTH (Table 12 continued) **Strategy H1 - Providing health services, which meet the needs of the community.** **Results-Access to health services.**

Action 3-Lobby government and other stakeholders

Evidence (detailed evidence in Appendix)	Recommendations
<p>The literature and the results of the community survey suggest that -</p> <ul style="list-style-type: none"> ▪ Improved access is required to- aged care facilities, incident based and respite care facilities. ▪ The model of away from home respite care is not appropriate to all family situations and individuals. ▪ Viable solutions may include a range of options for respite care (out of home and in home), as well as support for the frail to live at home. 	<ul style="list-style-type: none"> ○ Lithgow City Council to work with other stakeholder groups for the increased provision of a range of services that increase the proportion of residents who can live at home (Consider including in Lithgow City Council Ageing Strategy). ○ Lithgow City Council and related agencies to: obtain information on current models of respite care for all ages; density and quantify gaps; and consider a range of different models of service provision in respite care (Consider including in Lithgow City Council Ageing Strategy).

Summary of impact of H1 -The strategy 'providing health services, which meet the needs of the community' is a sound strategy that is supported by a body of evidence. The actions to achieve the results of 'access to health services' need to (i) consider the adequacy of health services in terms of the needs of the vulnerable groups; (ii) include the specific transport needs of people with disabilities and other vulnerable groups in the planning and implementation actions to improve transport; (iii) identify the specific needs of the vulnerable groups and gaps in service provision and to encourage government in providing appropriate models of service.

Table 13 Evidence summary and recommendations related to Health Strategy H2

H2 - Developing partnerships with a range of stakeholders to facilitate healthy lifestyles. Results-A healthier community	
Evidence (detailed evidence in Appendix))	Recommendations
Action 1- Form a community health committee	
<p>The evidence shows that –</p> <ul style="list-style-type: none"> ▪ Developing partnerships with a range of stakeholders to facilitate healthy lifestyles is consistent with effective multisectoral approaches to reducing risk behaviours. 	<ul style="list-style-type: none"> o Lithgow City Council to strengthen the responsibilities of the health committee and widen membership to include a range of external stakeholders.
o Action 2-Develop initiatives to promote a healthy lifestyle	
<p>The evidence shows that –</p> <ul style="list-style-type: none"> ▪ The best approaches to reducing risk behaviours are where the physical, socio-economic and social context of these behaviours are considered in programs. ▪ Partnerships with Area Health Services utilising best practice in public health and capacity building strategies are effective in promoting a healthy lifestyle. 	<ul style="list-style-type: none"> o Lithgow City Council to continue to work with SWAHS and other agencies to develop initiatives to protect and promote health e.g. ‘Live Life Well in Lithgow’ Project.
o Action 3-Seek funding from government through grants and developers through developer contributions	
<p>The evidence suggests –</p> <ul style="list-style-type: none"> ▪ Funding provides finance for programs, however, programs need to be sustainable to achieve both short and long term positive changes in lifestyle. 	<ul style="list-style-type: none"> o Lithgow City Council to compile and utilize a calendar of varied sources of funding and to work with other partners to apply for funding. (Refer to http://www2.communitybuilders.nsw.gov.au/funding/ and WSROC funding calendar for sources of funding). o Lithgow City Council to incorporate sustainability measures healthy lifestyle initiatives.
<p><u>Summary of impact of H2</u> The strategy ‘developing partnerships with a range of stakeholders to facilitate healthy lifestyles’ is based on best practice. The actions to achieve the result of a healthier community are sound, however, the health committee needs to be strengthened and the membership widened to achieve this.</p>	

Table 14 Evidence summary and recommendations related to Health Strategy H3

H3 - Providing safe drinking water. Results-Access to safe drinking water within the reticulation system	
Evidence (detailed evidence in Appendix)	Recommendations
Action 1-Prepare operational plans and consider in the management plan process	
Action 2- Protect the Farmers Creek Catchment Area in the comprehensive Lithgow Local Environmental Plan	
<p>The evidence shows that –</p> <ul style="list-style-type: none"> ▪ Unsafe drinking water particularly affects vulnerable people such as the developing foetus, infants, children and the elderly. ▪ Doubts about water supply may inhibit water consumption as drinking adequate water has health benefits. 	<ul style="list-style-type: none"> o Lithgow City Council and SWAHS to support the strategy to provide safe drinking water, which complies with the Australian Drinking Water Guidelines. Fulfill all components of the hazard analysis and risk assessment approach recommended in the guidelines.
o Action 3- A position on water fluoridation be determined	
<p>The evidence shows that –</p> <ul style="list-style-type: none"> ▪ Lithgow children had more cavities than the average for NSW of the same age. ▪ Fluoridation significantly reduces dental decay in children ▪ Fluoridation is safe without short or long term ill effects. 	<ul style="list-style-type: none"> o Lithgow City Council to progress with fluoridation in the drinking water.
<p><u>Summary of impact of H3.</u> The strategy of providing safe drinking water is based on a wealth of information that unsafe water can have short and long term ill effects on the vulnerable, especially the developing foetus and infants. The action to prepare operational plans and consider in the management plan process incorporates the access to safe water in strategic processes. The motion to fluoridate the water will have a positive impact on the oral health of Lithgow's children.–</p>	

5.ii Community Recommendations in context of evidence

Table 15 Evidence summary and recommendations related to Community Strategy C1

C1-Modelling the population and assessing its needs. Results- a population model; • knowing the population, • planning resource	
Evidence (detailed evidence in Appendix)	Recommendations
o Action 1- Prepare population models •	
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Services, programs and facilities are better placed to meet the needs of the community when based on the identified needs of that community. ▪ The definition of a population model is any model, which describes the changes over time of a population. However, a population needs to be sensitive enough to determine the trends in terms of vulnerable groups in order to assess the needs of the targeted groups. 	<ul style="list-style-type: none"> o Lithgow City Council to develop population models that consider the vulnerable groups in the population.
o Action2- Identify and monitor population trends	
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Monitoring the trends of a population is effective in anticipating the needs of that population. However, the trends in vulnerable groups may differ from the general population so they should be monitored separately. 	<ul style="list-style-type: none"> o Lithgow City Council to monitor the vulnerable groups in the population to prepare for emerging needs of these groups.
o Action 3- Assess the basic needs of the population	
<p>The literature and community consultation shows that-</p> <ul style="list-style-type: none"> ▪ The Lithgow City Council Residents' panel is representative of the wider Lithgow population, however, it is not designed to adequately uncover the needs of all the targeted vulnerable groups. ▪ Needs assessment is best achieved through a triangulation of methods. ▪ Consultation with intersectoral stakeholders will provide a broad perspective for needs assessment and this is important because housing, education, employment, income, poverty and stress are the broad determinants of health. 	<ul style="list-style-type: none"> o Lithgow City Council to assess the needs of all vulnerable groups by surveying these groups and collating sources of information to include the social plan, other reports, community survey of Lithgow City Council and the SWAHS health profile.

(Table 14 continued) C1-Modelling the population and assessing its needs. <i>Results-</i> a population model; • knowing the population, • planning resource	
Action 4- Prepare an ageing strategy	
Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ The action to prepare an ageing strategy is sound as Lithgow LGA is an ageing population with projections indicating a declining population due in part to 17.5% migration related loss of young people aged 12-24 years (DIPNR, 2004 reported on pages 9- 10 of Social Plan). ▪ Ageing strategies often miss opportunities to utilise the resource that older people represent by considering the avenues that would permit older adults to play meaningful roles in their community and to contribute to that community. ▪ An effective ageing strategy needs to consider the wider implications of an ageing population on other age groups and vulnerable groups socially and economically. ▪ An ageing population may divert resources away from children's services and programs (Freed and Fant, 2004).Investment in the needs of children in relation to an ageing population should be considered as funding programs and services for the older age group in an ▪ The highest return for investment is in the investment in the 0-3 years population (Heckman, 2000; Centre on the developing child at Harvard University, 2007; Farrar et al, 2007; Schweinhart, 2005; Aslam et al, 2005; Kemp et al, 2004). ▪ The concept of distributive justice of resources recognizes the needs of all groups (Irwin, 1996; Engelman and Johnson, 2007). 	<ul style="list-style-type: none"> o Lithgow City Council to consider the avenues that would permit older adults to play meaningful roles in the community. o Lithgow City Council to include the needs of all age groups in relation to an ageing population in the ageing strategy. o Lithgow City Council to continue to increase investment in services for children 0-3 years.
<p>Impacts summary-The C1 strategy of modelling the population and assessing its needs is supported by evidence that a population model can assist in achieving the results of knowing the population and using the population model as a• planning resource. The actions to prepare a population model and monitoring the population, however, need to include specific methods of monitoring the trends in the targeted vulnerable groups in the community. The action to prepare an ageing strategy is supported by evidence that planning for an ageing population will better meet the needs of that population. The ageing strategy needs to consider the broad implications of an ageing population, such as: the ways in which older people in the population can contribute to the community; the health, social and economic changes of an older population; and the issue of under-investment in children 0-3 years to fund programs for older people.</p>	

Table 16 Evidence summary and recommendations related to Community Strategy C3

C3-Encouraging equitable access to services and facilities which meet the needs of the community Results-improved community well being, access to utilities.	
Action 1-Evaluate the needs identified in the Social Plan and consider in the operational and management plan process	
Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ In the Social Plan, some of the target vulnerable groups of the HIA are not explicitly addressed. This includes pregnant women, infants, parents and carers of young children, locationally disadvantaged residents and socio-economically disadvantaged residents. ▪ The Social Plan includes people who live in public housing, however this does not adequately capture all socio-economically disadvantaged people. Access to services may be hindered by lack of adequate resources of socio-economically disadvantaged people. This includes access to user pay recreation, resource for fares on public transport to travel to health and other services and facilities. ▪ The Social Plan identifies the needs of people with disabilities, however people with literacy difficulties may have difficulties accessing services and information. This is especially true regarding legal and health information as above average reading skills are required to read and process the information. ▪ Health information often requires higher levels of literacy than the average communication. This provides a challenge to people with literacy difficulties. It limits access to health and other important information. 	<ul style="list-style-type: none"> o Lithgow City Council to implement innovations in equitable access to services for the locationally disadvantaged and people with literacy. This may include different models of service delivery eg outreach services and online access of information. o Lithgow City Council to assess the needs of all vulnerable groups by using sources in addition to the social plan, o Lithgow City Council to identify the needs of pregnant women, the 0-3 years age group, and parents and carers of young children need to be identified and taken into consideration for access to services. o Lithgow City Council to identify number of pre-school places, advocate for increase if required (particularly free places for economically disadvantaged) and implement parent/family education strategy re the importance of 3-4 yr olds attending. o Lithgow City Council to identify the communities access to community playgroups and supported playgroups and increase if required. o Lithgow City Council to include in the Lithgow 'A Learning City' strategy, strategies for infants and children including support for parents/families, affordable effective centre based programs for 3-4yr olds, in particular for economically disadvantaged, transition to school programs, positive parenting programs etc. o Health and Lithgow City Council to investigate and support health information that is readable and comprehensible by people with literacy difficulties.

COMMUNITY (Table 16 continued)) Strategy C3 Action 2-Provide support to community organisations through Council's donations in accordance with the procedure to improve their ability to plan and deliver community services

Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Community organizations play an important role in service provision to vulnerable groups. ▪ Funding community organizations and encouraging their ability to plan and deliver community services is a sound action. Service delivery should be based on best practice principles that incorporate strategic and action planning. 	<ul style="list-style-type: none"> o Lithgow City Council to support the action to provide support to community organisations through Council's donations and to consider needs of vulnerable groups in this distribution.

Action 3-Lobby government and utility providers for improved access

<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Lobbying is enhanced if it includes an evidence base to support the request. ▪ Interested stakeholders and those organizations representing the targeted vulnerability groups can strengthen lobbying action when they collaborate. 	<ul style="list-style-type: none"> o Lithgow City Council to develop evidence base to support request for services.
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Action 4-Develop partnerships with community service providers

<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Collaboration with organizations representing the targeted vulnerability group can enhance equity in the distribution of services. ▪ Partnerships with community service providers encourages the integration of services. This facilitates the identification of gaps in service provision and enhances the referral to other appropriate services. 	<ul style="list-style-type: none"> o Lithgow City Council to identify barriers to access to services and to work with stakeholders to achieve equity in access.
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Table 17 Evidence summary and recommendations related to Community Strategy C7

C7- Ensuring adequate open space is provided throughout towns and villages. Results- provision of green community space	
Action 1-Complete an open space plan ; Action 2-Identify adequate open space in the land use strategy, comprehensive Lithgow Local Environmental Plan and/or development control plans; Action 3-Seek funding from developers through developer contributions.	
Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ Open spaces have many benefits to health and well being generally. This includes increasing physical activity, activation of higher cognitive processes and healthy brain development, improving mental health and enhancing educational and social skills (Barrett and Greenaway 1995; Valentine and McKendrick 1997; Cole-Hamilton et al. 2001; Bingley and Milligan 2004; Everard et al. 2004; Ward Thompson et al. 2004) ▪ The aesthetics of nature have a positive impact on well being (Travlou, 2003). ▪ Open spaces promote the inclusion of residents into the community and provide a material resource for people who have limited material resources (Thompson et al. 2004). ▪ People with disabilities can participate in using and enjoy walking trails and open spaces (Travlou, 2003). Participation in enjoying open spaces should be promoted so that lack of awareness does not limit the use of open spaces, parks, playgrounds and public gardens. These areas need to be physically accessible, maintained, attractive (Travlou, 2003). ▪ Play grounds should be designed to enhance and allow opportunities to play and explore but not isolated to increase the safety for children (Travlou, 2003). 	<ul style="list-style-type: none"> o Lithgow City Council to include playgrounds that support parents/families and provide child development opportunities, in particular located in pocket areas of disadvantage. Seek advise from the NSW Playgrounds Advisory Unit when designing playgrounds for children to achieve this. o Lithgow City Council to identify use of open spaces for people with disabilities and other vulnerable groups.
Impacts summary- The C7 strategy of 'ensuring adequate open space is provided throughout towns and villages' would have many positive benefits to the health of the vulnerable groups if there needs are included in the planning of these areas.	

Table 18 Evidence summary and recommendations related to Community Strategy C9

C9- Providing a range of housing opportunities to meet the diverse needs of the community. Results- choice in housing and land ,• providing life long housing	
Action 1-Provide for higher density development around transport and central business nodes Action 2-Identify sites for potential seniors living with easy access to services and facilities Action 3-Investigate the need for a community committee to facilitate the provision of aged care facilities and establish if need is demonstrated Action 4-Allow for a mixture of housing types in the comprehensive Lithgow local environmental plan and development control plans Action 5 Identify and protect land for future urban development including senior living in the land use strategy and comprehensive Lithgow Local Environmental Plan	
Evidence (detailed evidence in Appendix))	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Housing needs of the targeted vulnerable groups are varied. There are several government agencies project together to address the issue of housing affordability and availability. The Reshaping Public Housing reforms, announced by the Premier and the Minister for Housing in April 2005, have created new opportunities across human services for those most in need to be assisted more effectively. http://www.aho.nsw.gov.au/Files/Human%20Services%20Accord.pdf http://www.acoss.org.au/upload/publications/papers/info%20319_housing%20agreement.pdf http://www.dhw.wa.gov.au/homes/manuals/rental/rental_policy_DISABILITIES.html ▪ Council plays a very valuable role with other stakeholders in shaping the social and urban environment of housing for the targeted vulnerable groups. 	<ul style="list-style-type: none"> o Lithgow City Council to work with appropriate stakeholders in planning of urban environment appropriate to needs of targeted vulnerable groups.

Table 19 Evidence summary and recommendations related to Community Strategy C10

C10-Facilitating a safe community. Results- • obtain funding for actions, • partnerships between Council and the Police, • better designed public places for safety.	
Actions 1-Prepare a crime prevention plan Actions 2-Seek funding to implement the crime prevention plan Actions 3-Continue to participate in the police action community team Actions 4-Maintain the cctv monitoring program in the Lithgow Central Business District Action 5-Incorporate crime prevention design principles in development control plans and the design/upgrade of public places	
Evidence (detailed evidence in Appendix)	Recommendations
<p>The evidence shows that-</p> <ul style="list-style-type: none"> ▪ Evidence-Based Crime Prevention including a crime prevention plan is supported by a wealth of evidence http://www.lawlink.nsw.gov.au/lawlink/cpd/ll_cpd.nsf/pages/CPD_cpp_evidencebase_dplan ▪ LithgowLGA has relatively high rates of recorded crime in relation to domestic violence related assaults and sexual assaults. Crime has both direct and indirect impacts on health. ▪ The direct health impacts of crime include death, injuries and/or psychological distress. In terms of the vulnerability groups, domestic violence in pregnancy and traumatisation of children who witness domestic violence are of particular concern. Assaults and sexual assaults of young people represent many ill effects. ▪ Assaults of males are high in the 15-24 years age groups. Australian evidence suggest that sexual assault is vastly under-reported. This is particularly true for males who may not receive appropriate services as most services are geared more towards females. ▪ The indirect health impacts include feeling unsafe in the community and this can lead to lead to psychological distress or anxiety and reduced physical activity in the local community. 	<ul style="list-style-type: none"> o Health and Lithgow City Council to determine the adequacy of support services for victims of crime, particularly sexual assault. o Lithgow City Council, Health and other stakeholders to continue referral and support services for women and children who are victims of domestic violence.

5.iii Transport Recommendations in context of evidence

Table 20 Evidence summary and recommendations related to Transport Strategy T1

T1- Strategy- Providing road infrastructure which meets the needs of residents	
<p>TRANSPORT- Providing a choice of effective public and private transport options for those who live, work and visit our community</p> <p>Results: Community know of proposed road works; Government are more aware of road issues in the LGA; Cost sharing</p> <p>Actions: Prepare operational plans and consider in the management plan process Lobby governments Seek funding from government through contracts/grants and developers through developer contributions Form alliances/partnerships with other Councils</p>	
Evidence	Recommendations
<ul style="list-style-type: none"> ▪ Road traffic is major cause of adverse health effects (WHO 2006). Traffic related air pollution, noise, crashes and social effects combine to generate a wide range of negative health consequences including increased mortality, cardiovascular, respiratory and stress related diseases, cancer and physical injury (WHO 2006). Particularly vulnerable groups are children and elderly people, cyclists and pedestrians (WHO 2006). <p>Compared to the NSW average (SWAHS Epidemiology Unit 2006):</p> <ul style="list-style-type: none"> ▪ Women in Lithgow HIA have significantly higher death rates from motor vehicles accidents. ▪ Men in Lithgow LGA have a significantly rate of hospital admissions for car accidents <ul style="list-style-type: none"> ▪ The design and construction of nil or low pollution exposure walking and cycling routes hat connect the health service campus (located 7 kms from the town) to the Lithgow CBD precinct will avoid or minimize the frequent occurrence of people walking on the verge of the GWH, with all its associated risks, to access the services of the LIHS. It will also provide a major incentive for the local community to be physically active in a safe environment away from the Great Western Highway, and assist the local community in having increased options to access primary health care 	<ul style="list-style-type: none"> o That Lithgow City Council endorse, as a principle for all relevant Council policies and plans that relate to road infrastructure, the paramount importance of human health and safety as a primary component in the development and implementation of these plans and policies. o That Lithgow City Council facilitate, in collaboration with the RTA, the local Chamber of Commerce, Lithgow Integrated Health Services(LIHS), the local community and other relevant agencies, the development of a comprehensive traffic management plan that addresses road safety, environmental and broader health issues. Particular focus is required on the addressing the needs of children, youth, women and older people in the context of any new road infrastructure in the Lithgow LGA. o That LIHS, in partnership with the other appropriate agencies, neighbouring land owners (of the health service campus) and the local community, explore possible options for the design and construction of nil or low pollution exposure walking and cycling routes that connect the health service campus .

Table 21 Evidence summary and recommendations related to Transport Strategy T3

T3 Strategy- Promoting equitable access to public transport	
Actions:-	
1. Representation of Council on the Transport Project Party	
2. Lobby governments	
3. Making urban areas easier to access by public transport. Results:- Voice for the community Maximise access to public transport.	
Evidence	Recommendations
<ul style="list-style-type: none"> ▪ Substantial public health benefits are to be gained through improved public transport in rural and urban areas (NSW Health 2007). ▪ Cycling, walking and the use of public transport promote health in four ways. They provide exercise, reduce fatal accidents, increase social contact and reduce air pollution (WHO 2003) ▪ Equitable and accessible transport options are important for rural areas, especially for accessing local health services (NSW Health 2007). ▪ Transportation and public health research substantiates the link between increased transport access and levels of service and substantial benefits for public health (Ewing and Kreutzer,2006). ▪ Access to public transport is a key element of social inclusion. Lack of access increases isolation (Kavanagh et al, 2005). ▪ Transport disadvantage research demonstrates that the inequitable distribution of public transport services across urban areas in NSW has a disproportionate adverse effect on lower income households. Moreover, in outer urban areas where public transport provision is less frequent and private car reliance is greater, lower income households have reduced access to employment and other services as well as bear an increased burden of transport costs, (especially so if petrol costs increase further) (Hurni, 2006). ▪ Better public transport, in a survey of three socially disadvantaged localities in Western Sydney, was highly rated (76.3%) by “food insecure” households as useful future strategies(Nolan et al, 2006). 	<ul style="list-style-type: none"> o That Lithgow City Council considers developing a regional approach to public transport provision for the LGA by forming partnerships with neighbouring Councils such as Blue Mountains City Council, so as to advocate for improved public transport at a regional level. o That Lithgow City Council and Blue Mountains City Council, as a partnership initiative, facilitate the development of a Lithgow / Blue Mountains Regional Integrated Transport Strategy in collaboration with the Ministry of Transport, Rail Corp., private bus companies, taxi services and the local community, so as to present a plan for a coordinated and strategic approach to public transport improvements in the LGAs. This strategy needs to encompass the health impacts of transport disadvantage in the LGAs, especially for vulnerable populations. Community transport options could also be considered in this context. o That Lithgow City Council explores options for public transport improvements with large local government advocacy agencies such as ROCs and the Local Government and Shires Association

Table 22 Evidence summary and recommendations related to Transport Strategy T5

T5 Strategy Improving and expanding the pedestrian and bicycle network	
<p>Actions</p> <ol style="list-style-type: none"> 1. Seek funding and prepare a pedestrian access and mobility plan and consider in operational and management plan processes. 2. Incorporate path and cycle ways in master plans for future development areas and requirements in development control plans. 3. Seek funding from government through grants and developers through developer contributions <p>Results</p> <ul style="list-style-type: none"> • easy and safe access • enhanced recreational facilities • opportunity to improve health • more people riding and walking • cost sharing 	
Evidence	Recommendations
<ul style="list-style-type: none"> ▪ Strong evidence from a wide range of published research that the presence of well designed and safe pedestrian and cycling amenities will increase physical activity participation across the whole population (WHO, 2003, NSW Health 2007). ▪ Improving walkability and addressing traffic and personal safety issues also increases physical activity such as walking and cycling (ICMA,2005) ▪ Improving the environmental aesthetics and the provision of shade also underpins improvements in walking and cycling environments (Wells et al, 2007) ▪ National physical activity guidelines (Commonwealth Dept. of Health and Ageing, 1999) recommend that walking or cycling for 30 minutes each day will improve health and well being. 	<ul style="list-style-type: none"> ○ That the proposed pedestrian and mobility plan be based the guidelines as outlined in the RTA’s booklet “How to prepare a pedestrian access and mobility plan” available at www.rta.nsw.gov.au ○ That the proposed expansion of the cycle network plan be based on guidelines as outlined in the RTA’s booklet “How to prepare a bike plan”, available at www.rta.nsw.gov.au ○ That safe pedestrian connectivity be applied as a principle in not only master plans for future development areas but also in the regeneration of existing areas such as the CBD precinct and other major destinations such as the railway station, bus stops, local shops and the health services campus. ○ That other strategies be considered to support safe pedestrian and cycling access such as giving precedence to safe cycling and walking spaces, converting road space to green space and having a physical barriers between cars, cyclists and pedestrian (such as multiple kerbs). ○ That site specific DCPs, such as DCP for Child Care Centres and DCP for Car Parks have specific components for safe pedestrian access as design requirements ○ That other urban planning tools such as Physical Activity Guidelines for Local Councils be utilised where needed to address pedestrian and cycling access and safety.

5.iv Environment Recommendations in context of evidence

Table 23 Evidence summary and recommendations related to Environment Strategies E6 and E9

E6– Protecting and Improving our water quality. Results-Cleaner water, cost sharing E9 - Fulfilling responsibilities under the Drinking Water Catchment Regional Environmental Plan No. 1. Results-legal responsibilities;fulfilled; • cost sharing not cost shifting	
Actions protection of waterways, consult land use strategy, riparian rehabilitation, review onsite sewage management strategy, review stormwater management plan.	
Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ There is well documented evidence that disease outbreaks from reticulated drinking water supplies remain a risk that could be better managed and prevented in affluent nations. There have been over 70 case studies of disease outbreaks associated with drinking water in 15 affluent nations over the past 30 years. (Hrudey et al 2006, p 948) ▪ Drinking water can be contaminated with a wide range of disease causing microorganisms such as <i>Giardia</i>, <i>Cryptosporidium</i>, <i>Salmonella</i>, <i>Shigella</i>, <i>Campylobacter</i>, some strains of <i>E.coli</i>, cyanobacteria (blue green algae), Rotavirus, Noravirus and Hepatitis A virus as well as many others. Most of these cause diarrhoea, vomiting and other gastrointestinal upsets. Some of them can also lead to more serious illnesses and even death. The people most at risk from unsafe water are those with weakened immune systems and those that are elderly or very young. (NSW Health 2007 p 4) ▪ Recycled water can be treated to a very high quality, however if not correctly managed; exposure to recycled water has the potential to adversely impact on the health of people and the environment. Humans can be exposed to recycled water through ingestion, inhalation and by contact with the skin. . (DWE 2007) ▪ Stormwater is now recognized as a valuable resource rather than a nuisance to be disposed of. However there is the potential for stormwater destined for reuse to pose a public health risk. Risks can be reduced by treating and disinfecting the harvested stormwater and/or limiting public access for some applications. ▪ Inflows of stormwater runoff to surface water bodies by increasing turbidity from suspended soil particles eroded from the landscape are associated with elevated concentrations of bacteria, <i>Giardia</i> and <i>Cryptosporidium</i> and other microorganisms. (Gaffield et al 2003, p 1527) Aspects of stormwater quality which can have an impact on public health and/or the health of the environment also include turbidity, pH, heavy metals, salts, nutrients and pesticides. (DEC 2006a). 	<ul style="list-style-type: none"> ○ Lithgow City Council to adopt a preventative risk management approach as required in the Australian Drinking Water Guidelines 2004 that encompasses all steps in water production from catchment to consumer ○ Lithgow City Council with the assistance of SWAHS and other agencies to prepare and implement a Drinking Water Risk Management Plan for the Fish River and Farmers Creek reticulated water supplies within the responsibility of Lithgow City Lithgow City Council. ○ To reduce potable water demand Lithgow City Council to investigate the potential for increased treatment of sewage effluent at STPs to produce higher quality effluent for reuse. ○ To reduce potable water demand Lithgow City Council to investigate third party access e.g. sewer mining opportunities by industry to reduce usage of the potable supply. ○ To reduce potable water demand Lithgow City Council should encourage incorporating urban stormwater harvesting systems into urban development where appropriate (Mitchell et al 2007, p 135-144) (See recommendations included in E8)

Table 24 Evidence summary and recommendations related to Environment Strategy E8 for water

E8 – Protecting and securing access to water. Results-Cleaner water, cost sharing	
Actions alternative sources, finalise integrated water cycle management plan, promote reuse schemes, education on water conservation techniques, incorporate WSUD, review minimum water storage capacity requirements for dwellings with no access to reticulated water supply, seek funding, develop operational plans..	
Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ Options to reduce water demand by increasing reuse and recycling also have potential to improve the quality of the drinking water supply by reducing the amount of contaminants in runoff entering surface waters throughout the catchment. Options such as recycling effluent, greywater reuse, improving on site sewage management, and stormwater harvesting and reuse can all contribute. ▪ Protection of the water catchment is the first barrier to protecting a drinking water supply. An example of an integrated water cycle plan has been undertaken by Eurobodalla Lithgow City Council, involving auditing and summarizing key water cycle issues and suggesting potential control measures. (Schneider et al 2003 p91) ▪ Local Lithgow City Councils can use the development planning process to prevent impacts on water quality and improve catchments health by adopting an integrated approach to water cycle management ▪ Water sensitive urban design incorporates the principles of waterway health, pollution prevention and treatment, and utilizing harvesting and reuse approaches. (Brown 2005, p 461) Community design has a major effect on stormwater volumes and quality, as well as treatment methods and costs. Best management practices can reduce but not eliminate pollutant loadings of common stormwater pollutants. Protecting public health by reducing urban stormwater runoff and associated diffuse pollutant sources makes sense as a complement to water treatment infrastructure and health care interventions. (Gaffield 2003,p 1529) The use of ponds and wetlands allow contaminants to settle out of the water or be broken down by sunlight and biological activity. 	<ul style="list-style-type: none"> ○ Lithgow City Council is encouraged to continue water supply demand management strategies to encourage residents to reduce their potable water demand. ○ Lithgow City Council could encourage the installation of rainwater tanks at residences within townships supplied by reticulated water. ○ Lithgow City Council could encourage greywater reuse at residences within townships supplied by reticulated water. ○ Lithgow City Council is encouraged to continue planning for an Integrated approach to Water Cycle Management by: <ul style="list-style-type: none"> - Assessing the current condition of waterways - Identifying significant risks to water quality - Identifying zones that protect river corridors, wetlands and sensitive landscapes. - Planning for higher risk developments - Setting benchmarks for design and best practice. (DEC 2006) - Incorporating an integrated urban stormwater harvesting system where appropriate (Mitchell et al 2007, p 135-144) ○ Lithgow City Council is encouraged to continue planning to incorporate water sensitive urban design principles in urban development by ○ Reducing the use of impervious surfaces when designing communities ○ Increasing surfaces that drain directly to vegetated areas ○ Using appropriately designed constructed surface water treatment ponds or wetlands for stormwater storage and treatment. ○ Lithgow City Council and SWAHS should establish integrated multi-agency project groups with relevant agencies where needed to progress the above recommendations.

Table 25 Evidence summary and recommendations related to Environment Strategy E1 for air quality

E1 – Improving local air quality. Results-Cleaner air, better health.

Actions	
<ol style="list-style-type: none"> 1. Review the solid fuel strategy, 2. Review eligibility criteria for fuel rebate, 3. Promote alternative heating, 4. Provide education on operation of heaters, natural gas in Portland, 5. Lobbying for the extension of natural gas to Portland 6. Continue participation in cities for climate protection program, 7. Undertake energy audits of Lithgow City Council buildings. 	
Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ Main sources of air pollution are industrial emissions, motor vehicle emissions, domestic wood burning, coal burning for electricity generation, and from bushfires or hazard reduction burning of native vegetation. (WSROC 2007 p 41) ▪ The air pollutants of most concern to health are particulate matter, carbon monoxide, oxides of nitrogen, ozone and sulphur dioxide. ▪ Indoor levels of NO₂ are often many times higher than outdoor levels in housing that uses unflued gas appliances. There is evidence of a significant association between respiratory symptoms in children associated with the use of unflued gas appliances for heating and cooking. (Ciuk et al 2001, p 433; Ponsonby et al 2000,p 1544) ▪ Australia has a very high prevalence of Asthma compared to other developed countries. Hospitalisation for asthma for the Lithgow population was above the NSW average in all age groups. The 15-24 year age group were 22% above the NSW average (not significant at 99%CI); the 25-74 years age group was 166% significantly above NSW average; and the 75+. age group was 104%, significantly above NSW average. ▪ The most vulnerable groups are the elderly, very young, people with existing respiratory conditions (WSROC 2007 p 41) and pregnant women and foetal health. 	<ul style="list-style-type: none"> ○ Lithgow City Council's solid fuel rebate program should encourage residents to convert to flued gas heaters or other alternatives, and provide information on ventilation to remove the risk of NO_x and CO in the indoor environment. ○ Lithgow City Council to establish in collaboration with SWAHS, Dept of Housing and other agencies, education strategies to raise awareness particularly within Aboriginal and Torres Strait Islander and low socio-economic communities of other indoor air quality hazards such as environmental tobacco smoke, No_x and CO, SO₂, particulate matter, and volatile organic compounds. ○ Lithgow City Council to investigate measures to promote safe, energy efficient and sustainable housing stock for heating in winter and cooling in summer could be explored. (Canterbury District Health Board 2006) ○ SWAHS to investigate the implementation of a school based asthma management plan and shared care with GPs within Lithgow LGA.

(Table 25 continued E1 **E1 – Improving local air quality.** **Results-Cleaner air, better health**

Evidence (detailed evidence in Appendix)	Recommendations
<ul style="list-style-type: none"> ▪ Maternal exposure to low levels of ambient air pollution, including particulate matter, carbon monoxide, oxides of nitrogen, ozone and sulphur dioxide is associated with Pre-term birth and low birthweight babies. (Hansen et al 2006a p 935;Maisonet et al 2004 p108; Ghosh et al 2007 p400) ▪ Particle concentrations, NOx and CO are significantly associated with respiratory diseases, COPD, pneumonia, asthma and CVD hospitalisations for people <15 years of age and >65 years of age. (Hinwood et al 2006 abstract) ▪ Increases in outdoor concentrations of CO, NO2 and particulates have significant associations with increases in cardiovascular admissions for adults especially the elderly ≥65 years of age below normal air quality health guideline levels. (Barnett et al 2006, p1018) Increased risk of deaths brought forward from in older people. (WSROC 2007, p41) For areas with high sources of PM2.5 from wood heaters have shown an estimate of 6% increased mortality for each additional 10µg/ m3 of PM2.5. (Robinson et al 2007 abstract) ▪ Socio economically disadvantaged populations have higher rates of chronic respiratory diseases especially asthma rates as well as their associated risk factors, including smoking and environmental exposures including from poor housing and air pollution. ▪ Airborne particulates from bushfires should be considered as injurious to human health as those from other sources. The control of smoke pollution from bushfires in urban areas presents an additional challenge for managers of fire prone landscapes. (Johnston et al 2002, abstract) 	<ul style="list-style-type: none"> ○ Lithgow City Council to consider strategies to prevent or reduce exposure to air pollutants to ensure that there is a focus on the vulnerable populations most affected by issues of air quality due to the location of their residence, school or work environments. For example buffer zones should be maintained or established between housing and industries and main roads and/or strategic planting of trees/vegetation to reduce the amount of dust and other pollutants entering homes. ○ Lithgow City Council in collaboration with other agencies to consider establishing a monitoring project of ambient air quality for assessment against the <i>Ambient Air Quality National Environmental Protection Monograph</i> with particular focus at sampling locations close to main roads and/or industry. Available at: http://www.ephc.gov.au/nepms/air/air_nepm.html ○ SWAHS to consider project in collaboration with Lithgow City Council and other agencies to investigate options to improve monitoring of health outcomes in addition to standard air quality measures. GIS information could be used to relate hospital admissions to those patients who work or live in an area where air quality is poor. (Canterbury District Health Board 2006) ○ Lithgow City Council to consider online and/or radio community health warnings of health impacts of hazard burning and poor air quality (similar to DECC and Health warnings) http://www.health.nsw.gov.au/living/airpollution.html ○ Lithgow City Council to liaise with rural fires control centers/National Parks and Wildlife during winter hazard reduction burns to consider strategies to reduce air pollution over the townships of Lithgow. ○ Establish integrated multi-agency project groups with relevant agencies where needed to progress the recommendations.

Table 26 Evidence summary and recommendations related to Strategy E5 for waste management

E5 - Implementing the waste management hierarchy of avoidance, reuse, recycle and dispose.	
Actions <ol style="list-style-type: none"> 1. Review Lithgow City Council's waste management strategy 2. Focus education on avoiding, reusing and recycling waste 3. Construct and operate Blackman's Flat waste management facility 4. Prepare and implement closure plans for existing landfills 5. Explore potential waste services opportunities within the Central Tablelands Alliance 6. Consult the community on the next garbage and recycling contract to identify needs 7. Prepare and implement a communication strategy for changes to waste facilities and services 8. Identify opportunities to recycle commercial products and services 9. Prepare operational plans and consider in management plan process 	
Evidence of potential health impacts	Recommendations
<p>Lithgow City Council's commitment to review the existing waste management strategy with a focus on 'avoiding, reusing and recycling waste' is strongly supported.</p> <p>To meet the future needs of the community Lithgow City Council is building a new waste and recycling centre north-west of the city. The facility will replace most of Lithgow City Council's existing landfills and will be built 17 kilometres from Lithgow CBD at Blackman's Flat. The current licence for the Lithgow Waste Facility, located in Geordie Street, is Category 1 (household waste) and the licence includes clinical waste (contaminated waste) and asbestos. The current Lithgow Waste Facility is within one kilometre of residential development and part of the Lithgow CBD falls within 3 kilometres of the present waste facility.</p> <p>The proposed landfill solid waste facility at Blackmans Flats will be a state-of-the-art facility that complies with the environmental requirements of the day as approved by the Environmental Protection Agency (now DECC) as per the Environmental Guidelines: Solid Waste Landfills (NSW Environment Protection Authority, 1996).</p> <p>The Development Assessment Report (Geolyse, 2006) concluded that the waste facility would not adversely affect the locality with the planned appropriate measures in place. The Blackman's Flats locality is characterised by large open cut mining operations and power stations, which surround the Blackmans Flat area. The topography of the proposed waste facility site combined with existing and proposed landscaping will provide sufficient screening of the proposed development. Providing noise and air quality are appropriately managed and comply with the DEC's requirements, the proposed development is not considered to be inconsistent with the character and amenity of the locality (Geolyse, 2006).</p> <p>Measures will be in place to protect the health of workers, residents and the environment. No green waste will be disposed of at the facility, which will minimize methane gas produced by the facility. Surface and subsurface monitoring of landfill gases will be undertaken. Leachate from the landfill and stormwater from the waste management and inert waste areas will be directed to the leachate storage tank. The Leachate Storage System will be designed and managed to retain a minimum freeboard in the tanks to enable containment of a 25 year ARI 24 hour storm event without overflowing. If leachate exceeds this level, the excess will be removed from site and disposed of at another licensed treatment facility (Geolyse, 2006).</p> <p>The proposed Blackmans Flats solid waste landfill facility will have a buffer distance of 1 kilometre from current residences. This is</p>	

E5 - Implementing the waste management hierarchy of avoidance, reuse, recycle and dispose.

greater distance than that currently required. EPA Guidelines (Page 7) state that a residential zone or a dwelling not associated with the facility should not be within 250 metres of a landfill site with having regard to the topography and local meteorological conditions

The literature indicates some evidence of an increased risk of adverse reproductive effects (i.e. low birth weight, birth defects) in residents within 2 to 3 kilometres of a hazardous waste landfill site (Geshwind et al, 1992; Dolk et al, 2003); and within 2 kilometres of landfill sites with either low volumes of or no hazardous waste (Goldberg et al, 1997; Elliott et al, 2002; Palmer et al, 2005). A major study by Elliott et al (2001, 2002) examined all landfill sites in the UK. The results showed a very small but significant increased risk of adverse reproductive outcomes of residents within 2 kilometres of both hazardous waste facilities and non-hazardous waste sites. The very small positive association (RR=1.04) found between residence within 2 kilometres of a landfill waste site and the reproductive outcomes of low birth weight (6%), very low birth weight (4%), and birth defects (2%) (Elliott et al, 2001) can not be stated with certainty to be causal. There are however some important limitations of this research that must also be taken into account:

- o Individual information such as maternal smoking, income or deprivation, and nature of health care was not available
- o A consistent mechanism for the landfill site to exert adverse effects on pregnancy has not been found

On balance, the health researchers do not know whether they have documented a true effect of the landfill on birth outcomes, or if there is another explanation for what they have observed. In the face of such scientific uncertainty SW Population Health advocates a prudent approach that could be modified as new scientific information emerges. In this case, preventing residential development within 2km of the proposed landfill should prevent the adverse birth effects documented in the UK studies. Should a better understanding of if and how landfill sites affect birth outcomes emerge the buffer may be able to be reduced in the future.

The precautionary principle puts forward the 'commonsense' notion that decision-makers should be cautious when assessing potential health or environmental harms in the absence of the full scientific facts. The precautionary approach in health impact assessment suggests that Lithgow City Council should consider all the current available evidence when considering future residential development near the waste facility. Lithgow City Council may consider leaving a buffer distance of up to 2 kilometres around the waste facility where future residential development is excluded. This buffer distance could be reviewed periodically in the light of new scientific information.

There is the potential that leachate from closed landfill sites can migrate offsite into the groundwater or local streams. A key objective of any landfill plan should be that leachate does not impact on any drinking water supply. Leachate generation is determined by the availability of water, the landfill surface conditions, the refuse conditions, and the characteristics of the underlying soil. Leachate composition is extremely variable, but has been determined to be affected by the waste itself, landfill location, climate, site engineering factors, and the age of the landfill. (Lu, Morrison and Stearns, 1981) A risk assessment process, looking at the potential of migration of pollutants offsite into groundwater or local streams would reduce the risk of adverse environmental and health outcomes from these sites. (Butt, Lockley and Oduyemi, 2007)) When planning final site use, the critical factors that must be considered are: settlement, foundation characteristics, control of leachate and gas, vegetation, and final grade. Depending on the end use selected, efficient site access may also be a consideration. Ideally, A timetable should be prepared to ensure that the following features are inspected at regular intervals:

- settlement, cover soil integrity, and need for grading;
- buffers and vegetation;
- sediment and erosion control facilities;

Council to consult the evidence current at the time of planning future residential development; and Council to consider the evidence to determine if residential development should be excluded from up to a 2-kilometre radius of the boundary of any operational solid waste disposal site.

Council to consider a post closure phase risk assessment of all closed waste disposal sites. This may include maintaining surveillance programs to monitor and inform management of these sites due to the risk of leachate traveling offsite or if site reuse is to be considered..

E5 - Implementing the waste management hierarchy of avoidance, reuse, recycle and dispose.

- fencing;
- leachate and gas controls;
- integrity of final site use facility;
- vandalism; and
- monitoring.

SWAHS endorses the strategy to develop a new waste facility at Blackmans Flats. Moving the waste facility to 17 kilometres out of Lithgow will decrease the number of residents in proximity to the waste facility. The new state of the art waste facility has the potential to facilitate the control and correct management of solid waste disposal, thereby avoiding potential nuisance and health risks. .

6. Evaluation and follow-up

Evaluation and monitoring is the sixth step in a HIA.

The endpoints of the evaluation and monitoring stages are-:

- A process evaluation to be included with the final report. A pro forma document is provided by CHETRE (Harris et al, 2007).
- An impact assessment of what changed as a result of the HIA. This is to be completed in November 2008.

Monitoring the HIA outcomes and recommendations could be achieved using a table to track progress.

Table 27 Proposed follow up plan to Lithgow City Council Strategic Plan HIA

Recommendation	Performance indicator	Responsibility	Progress/actions	Difficulties
(List recommendations)	Provide measure of implementation of recommendation	Who is the lead agency for this recommendation? Within the lead agency, what department is responsible?.	What has occurred since March 2008 to progress the recommendation?	What factors have prevented progress or implementation of the recommendation.?

Table 27 is an example of a possible format for monitoring by providing a visual mapping of the progress of the recommendations towards implementation. Many recommendations would not be able to be immediately implemented or may be desirable rather than able to be realized in the immediate future. The table can still be useful to note the plan to implement or consider implementation in the future.

Glossary of Terms

Table 28 Glossary of terms

Term	Description
Coping skills	The methods a person uses to deal with stressful situations. These may help a person face a situation, take action, and be flexible and persistent in solving problems.
Decision makers	The people who have control over the final content of the proposal and/or are responsible for its implementation, including the extent to which it is influenced by the HIA
Differential impacts	Where impacts are distributed unequally across or within population groups.
Direct versus indirect impacts	Direct impacts effect the health of the population directly, for example exposure to pollutants (including noise) that a proposal may release in the air, water and soil. Indirect impacts effect the health of the population indirectly through the proposal's influence on the determinants of the health, for example the affects a proposal might have on the local job market, access to local shops and amenities and the availability of public green space.
Endpoints	The outcome of each step within an HIA
Enhancement measures	Changes made to a proposal to increase the likelihood of positive impacts.
Health	A state of complete physical, mental and social well being and not merely the absence of disease or infirmity.
Health determinants or determinants of health	The 'causes of the causes of health' that are found outside the traditional health sector, often referred to as social or environmental determinants of health.
Health Equity	Health equity is concerned with whether the differential distribution of health impacts is considered unfair and modifiable.
Health Hazards	An agent with a potential to create ill health (e.g., bacteria, toxins, chemicals).
Health inequalities	This is the term commonly used to indicate the variation of health by socioeconomic status, or differences in people's health between geographical areas and between different groups of people..
Health inequities	Health inequity refers to those inequalities in health that are deemed to be unfair or stemming from some form of injustice
Health Impact Assessment	A tool to assess the impacts of a proposal prior to the implantation of that proposal.
Health impacts	The overall effects, direct or indirect, of a policy, plan, program or project on the health of a population.
Health literacy	Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. These are the skills that all people need to, for instance, find their way to the right place in a hospital, fill out medical and insurance forms, and communicate with healthcare providers.

Term	(Table 28 continued) Description
Health Outcome	A change in the health status of an individual, group or population which is attributable to a planned intervention or series of interventions, regardless of whether such an intervention was intended to change health status.
Health Promotion	Concerned with promoting health and wellbeing.
Health Protection	Concerned with protecting health from risks and hazards.
Health Risk	Indicates the extent to which the potential of a hazard may be realized
Locationally disadvantaged	.People who live in locations that are disadvantaged through lack of access to services and infrastructure or experience high levels of social disadvantage, such as rural and remote areas, outer metropolitan areas, and pockets of disadvantage within metropolitan areas.
Mitigation measures	Measures to reduce the likelihood or severity of negative impacts
Needs assessment	Needs assessment is the first step in planning any health promotion initiative. It is the process of identifying and analysing the priority health problem and the nature of the target group for the purpose of planning any health promotion action. (Hawe, Degeling and Hall 210:1990).
Project team	Those responsible for leading the work of the HIA, for report writing, and for framing the recommendations about modifications to the proposal. eg. SWAHS project team
Proponents	Those responsible for developing the proposal under assessment eg. Lithgow City Council
Proposal	The proposal is a draft policy, plan, program, or project eg . Lithgow City Council Strategic Plan that is examined for the HIA.
Recommendations	Clear and concise statements of action resulting from the HIA.
Short term impacts	Short term impacts are those potentially occurring within a short time frame (may be weeks, months or a few years, depending on the nature of the proposal and impacts).
Long term impacts	Long term impacts are those potentially occurring over a longer time frame, usually years or even decades
Cumulative impacts	Cumulative impacts are a series of smaller impacts that collectively add up to a large impact.
Stakeholders	People involved in or affected by proposal development and implementation, drawn from public, private and voluntary sectors, and the communities or groups affected
Steering group	Group appointed to oversee the process and outputs of an HIA, and comprises representatives from key stakeholder organisations and, ideally, representatives from the communities affected. It sometimes includes one or more of the decision makers.
Strength based approach	A strengths based approach operates on the assumption that people have strengths and resources for their own empowerment. Used in the context of programs for older people in this HIA.
Triangulation	Triangulation refers to the approach of investigating a phenomenon using two or more methods. Similar findings of these different methods about the phenomena in question will strengthen the conclusions and recommendations drawn.
Unanticipated effects	Impacts that may not have been considered for various reasons such as time, resources, or professional orientation, during the development of a proposal.
Values	Beliefs about concepts such as health and equity, as well as views regarding the degree of importance to be placed on elements of HIA such as differential impacts and types of evidence, and views about the processes of HIA such as participation, transparency and decision-making processes.

Source: Taken from Harris et al, 2007. Health Impact Assessment: A Practical Guide, Page 34- with some minor changes and additions.

Appendix

Detailed evidence of health impacts of Health strategies

The vision for health in the Lithgow City Council Strategic Plan is –
'Creating a healthy community providing opportunities and facilities for a healthy lifestyle'.

The Lithgow City Council Strategic Plan is assessed in terms of equity for the targeted population in the scoping plan. The target population refers to identified vulnerable groups in the population. These groups consist of- pregnant women, infants, children, youth, older residents, people with disabilities, Aboriginal and Torres Strait Islander residents, socio-economically disadvantaged residents, and people who have difficulty communicating in English.

H1 - Providing health services, which meet the needs of the community

Results-Access to health services.

In the Lithgow City Council Strategic Plan, the strategy 'providing health services, which meet the needs of the community' aims to achieve the results of access to health services by the following actions -

Action 1- Determine adequacy of health services in light of the local profile and population modelling.

The action of determining the adequacy of health services based on the contents of the local profile and population modelling has potential shortcomings to achieve the result of access to health services. These are-

- The SWAHS health profile does not have specific indicators of the selected vulnerable groups. Therefore, the important health issues of these target groups may be overlooked.
- Population models may not be sensitive enough to detect population trends to anticipate health service needs of the vulnerable groups.

Evidence-

The demographic and health profile of Lithgow LGA (refer to Pages 23-25 of this HIA report) reveals that Lithgow LGA residents have significantly elevated mortality and hospitalisation rates for many causes. The deaths and hospitalisations are aggregated therefore it is difficult *to determine the adequacy of health services in light of the local profile and population modelling.*

It is important to identify the health issues for specific age group and others in the vulnerable groups. Following are some examples of how a breakdown by age groups or other factors is more revealing to provide an evidence base for the development and implementation of strategies and programs. These examples are chosen because of their impact on the health of vulnerable groups, the large elevation in rates, they are preventable to some extent and because Lithgow City Council has a potential role in reducing the prevalence of these conditions.

Maternal and infant health

Births during 1996-2005 (Table 29) show that a significantly higher proportion of Lithgow women gave birth to a low birth weight infant (8%) or a preterm infant (8%) compared with NSW (6% and 7% respectively).

Low birth weight and preterm birth are important indicators of maternal and foetal health. Low birth weight and preterm birth are associated with an increased of perinatal mortality (Silins., Semenciw, Morrison, Lindsay, et. al., 1985; Malamitsi-Puchne, 1991). There are other longer term adverse outcomes. The link between low birth weight and the subsequent development of obesity, disrupted glucose homeostasis and hypertension is well established (Cottrell and Ozanne, 2007) as well as increasing the risk of insulin resistance (Thompson, Norman, Donkin, Shankaret al., 2007) and coronary heart disease and type 2 diabetes later in life (Eriksson, 2007).

Maternal and infant health and socio-economic disadvantage

The Mother and Babies Report (NSW Health, 2005) found that a lower socio-economic status was a definite disadvantage in terms of birth outcomes. Poorer outcomes such as pre-term birth and low birth weight were more common in the less advantaged groups. The likelihood of interventions such as induction of labour, instrumental delivery or caesarean section increased with socio-economic advantage, and mothers in the most advantaged groups were less likely to smoke during pregnancy.

Consultation reveals that pregnant women have complex needs for their health and the health of the developing foetus. They may be single, young, and live in poorly resourced areas and some women use drugs and alcohol in pregnancy. They may have little support as they are displaced from families. Displacement occurs as Departing of Housing houses are offered at Lithgow and families or sole parents relocate away from their friends and family.

Table 29 Maternal and infant health indicators of births during 1996-2005

Indicator	Description of indicator	Lithgow LGA residents				NSW		SS
		Births	% of total	LCI	UCI	Births	% of total	
<u>Health outcomes</u>								
Low birth weight	Infant birth weight < 2.5 kilograms	203	8%	7.1%	8.9%	54,513	6%	↑
Preterm	Infant born < 37 weeks gestation	214	8%	7.5%	9.4%	61,144	7%	↑
Perinatal mortality Rate/1,000	Stillborn deaths or infant death in the first 30 days after birth	26	10.2/1,000	7/1,000	14/1,000	7,857	9.1/1,000	
All Births	All births to Lithgow female residents	2,550	100%			86,3842	100%	na
<u>Behavioural risk factors</u>								
Smoking	Maternal smoking in pregnancy	768	30%	28.4%	32%	150,507	17%	↑
Delayed antenatal care	The first antenatal visit occurred after 20 weeks pregnancy	339	13%	12.1%	14.5%	90,707	11%	↑
No antenatal visit	There is no self-reported maternal visit for antenatal care during pregnancy	58	2%	1.8%	2.8%	98,11	1%	↑
Source: Midwives Data Collection in HOIST. Note- LCI=95% lower confidence interval UCI=95% lower confidence interval. SS= Significant difference to NSW SS=statistical significance at 95%. ↑ = significantly above NSW; ↓ = significantly below NSW.								

Smoking in pregnancy

During 1996-2005, a significantly higher proportion of Lithgow women smoked in pregnancy (30%) than NSW women (17%). Cigarette smoking in pregnancy is one of the most important and modifiable risk factors associated with adverse perinatal outcomes. It is associated with placenta previa, abruptio placentae, premature rupture of the membranes, preterm birth, intrauterine growth restriction and sudden infant death syndrome (Andres and Day, 2000) and low birth weight (Triche and Hossain, 2007).

Smoking remains one of the few potentially preventable factors associated with low birthweight, preterm birth and perinatal death. A systematic review of smoking cessation studies (Lumley, Oliver, Chamberlain and Oakley, 2004) included a search of the Cochrane Pregnancy and Childbirth Group trials register and the Cochrane Tobacco Addiction Group trials register (July 2003), MEDLINE (January 2002 to July 2003), EMBASE (January 2002 to July 2003), PsychLIT (January 2002 to July 2003), CINAHL (January 2002 to July 2003), and AUSTHEALTH (January 2002 to 2003). The review found that smoking cessation programs in pregnancy reduce the proportion of women who continue to smoke, and reduce low birth weight and preterm birth. The pooled trials have inadequate power to detect reductions in perinatal mortality or very low birth weight.

Deaths

Table 30 shows that the mortality rates (includes all causes) of Lithgow LGA residents were significantly above NSW in the 25-74 years age group (7% higher); and in the 75+ years age group (7% higher).

Lung disease- deaths

Deaths from lung disease were significantly above NSW in the 25-74 years age group (12% higher); and in the 75+ years age group (18% higher). Strategies should be aimed at reducing the risk factors associated with lung disease – smoking, passive smoking and exposure to toxic chemicals.

Heart disease- deaths

Heart disease is a general term for a wide variety of diseases and conditions that affect the function of the heart. Deaths from heart disease were significantly above NSW in the 25-74 years age group (8% higher); and in the 75+ years age group (24% higher). Strategies should be aimed at reducing the risk factors associated with heart disease that can be influenced. These include factors that increase a person's risk of developing atherosclerosis include:

- diabetes
- excess weight and obesity
- family history of atherosclerosis or coronary artery disease
- congenital malformation
- high blood pressure
- high cholesterol levels
- increasing age
- lack of exercise
- male gender
- smoking

Other causes of heart disease include:

- autoimmune disorders, in which the body is attacked by its own immune system

- heart valve infections, known as endocarditis, which can damage the valves and cause conditions such as aortic regurgitation or mitral stenosis
- infections of the heart muscle, known as myocarditis
- infection of the lining around the heart, a condition called bacterial pericarditis
- kidney failure, which can cause pericarditis, an inflammation of the lining around the heart. Kidney failure may also cause an abnormal collection of fluid around the heart, called pericardial effusion.
- toxins, such as alcohol and some chemotherapy medicines used to treat cancer. Both of these can cause a condition called cardiomyopathy, a disease of the heart muscle

<http://uimc.discoveryhospital.com/main.php?id=3163>

<http://www.abc.net.au/health/library/stories/2003/02/27/1831271.htm>

Hospitalisation

Consultation reveals that there is inadequate access to GPs, bulk billing GPs, GPs open for extended hours and GPs available in the villages of Lithgow LGA. Residents may use hospital services instead of GP attendance. This may in part contribute to hospitalisation rates of Lithgow LGA residents significantly above NSW in the- 0-14 years age group (25% higher); 15-24 years age group (33% higher); 25-74 years age group (20% higher); and 75+ years age group (11% higher).

Asthma- hospitalisation

SWAHS health profile indicates significant elevations in deaths and hospitalisations of Lithgow LGA residents. During 2001-2004, Lithgow residents experienced significantly higher rates than NSW in hospitalisation for asthma in the 0-14 years age group (65% higher), in the 25-74 years age group (166% higher) and in the 75+ years age group (104% higher). Therefore, asthma hospitalisation is elevated across the age groups. Higher rates of hospitalisation may also be due to inadequate management of asthma in the community and/or lack of general practitioner services. Elevations may also be due to a higher prevalence of asthma in the population due to various factors including air quality. Therefore, actions addressing these factors need to be implemented.

Injury and poisoning- hospitalisation

Lithgow residents were significantly above NSW in hospitalisation for injury and poisoning across the age groups: in the 0-14 years age group (66% higher); in the 15-24 years age group (33% higher); in the 25-74 years age group (54% higher); and in the 75+ years age group (40% higher).

Table 31 provides a further breakdown by external causes and reveals that there are differences among the age groups. Falls represent 62% of injury and poisoning separations for the 75+ years, 36% of 0-14 years, 17% of 25-74 years and 13% of 15-24 years. Hospitalisation of Lithgow residents aged 75+ years for falls (62% CI 58%-66%) was significantly above NSW. The proportion of hospitalisations of Lithgow residents aged 15-24 years for assaults (13% CI 11%-16%) was significantly above NSW.

Strategies to reduce injury and poisoning in the community-

http://www.health.qld.gov.au/chipp/what_is/e_of_injury.asp

http://www.health.nsw.gov.au/pubs/m/pdf/fallsinjury_brief.pdf

Table 30 Age specific health indicators of Lithgow LGA residents, Hospitalisation 1/7/2001-30/6/2006. Deaths 1998-2004.

Health indicator	Infants and children				Youth				Adults				Older adults			
	0-14 years				15-24 years				25-74 years				75+ years			
	Std	LCI	UCI	% diff	Std	LCI	UCI	% diff	Std	LCI	UCI	% diff	Std	LCI	UCI	% diff
Hospitalisation-																
All causes	23,786	22,911	24,685	25% ↑	24,117	22,992	25,280	33% ↑	38,330	37,695	38,972	20% ↑	109,300	105,887	112,791	11% ↑
Asthma	931	766	1,119	65% ↑	141	70	252	22%↑	256	206	314	166% ↑	319	164	553	104% ↑
Injury and poisoning	2,816	2,527	3,128	66% ↑	4,418	3,949	4,925	33% ↑	2,894	2,718	3,079	54% ↑	12,785	11,625	14,025	40% ↑
Mortality-																
All causes									445	390	505	7% ↑	7,555	6,763	8,410	7% ↑
Lung cancer									40.3	25.4	60.4	12% ↑	199	94	367	18%↓
Heart disease									90.7	67.2	119.5	8% ↑	2,650	2,189	3,176	24% ↑

Source: Data downloaded from HOIST data warehouse at NSW Health. Deaths from dataset deaths.nswres_97cc; hospital separations from Inpatient Statistical Collection isc.eoc0106. Population data from HOIST pops.slapops and pops.nswpopos. Notes- Std.= Direct age standardized rate; CI= upper and lower 99% confidence intervals; % diff= the percentage different that Lithgow is different to NSW; ↑ = significantly above NSW; ↓ = significantly below NSW.; ; ↑ = above NSW but not statistically significant; ↓ = below NSW., but not statistically significant. Note- combined male and female deaths show significantly higher rates than NSW in all cause mortality, and heart disease deaths.

Table 31 Injury and poisoning hospitalisation by external cause, of Lithgow LGA residents by age group, 1/7/2001-30/6/2006.

External cause of injury and poisoning	Infants and children			Youth			Adults			Older adults			All residents		
	0-14 years			15-24 years			25-74 years			75+ years			Total		
	Lithgow		NSW	Lithgow		NSW	Lithgow		NSW	Lithgow		NSW	Lithgow		NSW
	hospitalisations	%	%	hospitalisations	%	%	hospitalisations	%	%	hospitalisations	%	%	hospitalisations	%	%
Falls	212	33%	36%	91	15%	13%	520	18%	17%	655	61.6%	49%	1,478	29%	26.9%
Complications of medical and surgical care	39	6%	11%	49	8%	11%	1,044	37%	39%	288	27.1%	39%	1,420	27%	33.1%
Other accidents	159	25%	27%	156	25%	30%	544	19%	19%	79	7.4%	8%	938	18%	18.0%
Land transport accidents	76	12%	5.8%	130	21%	15%	247	9%	7%	14	1.3%	1.5%	467	9%	6.0%
Self harm	18	3%	1.1%	46	7%	10%	150	5%	5.1%	2	0.2%	0.3%	216	4%	4.0%
Assault	14	2%	1.3%	82	13%	9%	108	4%	3.6%	3	0.3%	0.1%	207	4%	3.0%
Poisoning	37	6%	3.4%	20	3%	3%	58	2%	1.7%	8	0.8%	0.7%	123	2%	1.8%
Other	5	1%	1.3%	14	2%	3%	79	3%	3.9%	3	0.3%	1.0%	101	2%	2.7%
Bike	41	6%	5.2%	12	2%	2%	27	1%	0.8%	0	0.0%	0.0%	80	2%	1.2%
Pedestrian	7	1%	1.3%	4	1%	1%	19	1%	0.8%	3	0.3%	0.5%	33	1%	0.8%
Venomous	5	1%	1.1%	5	1%	1%	18	1%	0.6%	2	0.2%	0.1%	30	1%	0.5%
Smoke and fire	5	1%	0.7%	2	0%	1%	12	0%	0.4%	3	0.3%	0.1%	22	0%	0.4%
Burns and scalds	11	2%	3.3%	2	0%	0%	6	0%	0.3%	2	0.2%	0.2%	21	0%	0.6%
Electrocution	0	0%	0.1%	2	0%	0%	11	0%	0.2%	1	0.1%	0.0%	14	0%	0.2%
Others	1	0%	0.2%	5	1%	1%	7	0%	0.5%	0	0.0%	0.1%	13	0%	0.4%
Other transport accidents	3	0%	0.6%	0	0%	0%	2	0%	0.3%	0	0.0%	0.1%	5	0%	0.3%
Drowning	1	0%	0.5%	0	0%	0%	0	0%	0.1%	0	0.0%	0%	1	0%	0.1%
Total	634	100%	100%	620	100%	100%	2,852	100%	100%	1,063	100.0%	100%	5,169	100%	100.0%
Age group as % of total	12%		10%	12%		11%	55%		53%	21%		26%	100%		100%

Source: Data downloaded from HOIST data warehouse at NSW Health. Deaths from dataset deaths.nswres_97cc; hospital separations from Inpatient Statistical Collection isc.eoc0106. Population data from HOIST pops.slapops and pops.nswpopos. Notes-

People with disabilities

People with disabilities have general health needs and specific needs associated with their disability. For example, in the 2006 Census, 5.5% (CI 5.2%-5.7%) of the Lithgow LGA population had core activity need for assistance. This was significantly higher than for NSW (4.2%). The Core Activity Need for Assistance' variable has been developed to measure the number of people with a profound or severe disability. People with a profound or severe disability are defined as needing help or assistance in one or more of the three core activity areas of self-care, mobility and communication because of a disability, long term health condition lasting six months or more), or old age. (data extracted from ABS, 2006 Census).

People with severe or multiple disabilities or conditions have complex support needs that may include difficulties with co-ordinating and scheduling transport and resources for frequent medical and dental appointments and obtaining information (Submissions/00290.CARA, 2002-
<http://www.health.sa.gov.au/generational-health-review/documents/Submissions/00290.pdf>).

Diabetes-related physical and sensory disabilities

People with disabilities have varied needs for health services and may have health conditions to manage. The condition may be incidental to their disability, the result of their disability or the cause of their disability. An example of the latter is where people with diabetes develop diabetes-related complications, such as, increased risk of heart disease and stroke (and possible physical disabilities), blindness, kidney failure, neuropathy and limb amputation (Bate and Jerums, 2003). Therefore, the person has to manage their diabetes and the resulting disability or disabilities.

Table 32 reveals that hospitalisation for diabetes-related ophthalmic complications was significantly above NSW by 73% and 112% for Lithgow males and females. Hospitalisation for diabetes-related lower limb amputation was 96% and 167% significantly above NSW for Lithgow males and females (SWAHS Diabetes Profile, 2007).

Table 32 Diabetes-related indicators of Lithgow LGA residents

	Lithgow males		Lithgow females	
	Lithgow as % difference to NSW	Statistical significance	Lithgow as % difference to NSW	Statistical significance
Deaths 1998-2004--				
All diabetes-related mortality	27% higher	ns	37% higher	ns
Hospitalisation 2001-2004				
All diabetes-related hospitalisation	69% higher	↑	90% higher	↑
Renal failure diabetes-related hospitalisation	36% higher	↑	9% lower	ns
Ophthalmic complications diabetes-related hospitalisation	73% higher	↑	112% higher	↑
Acute myocardial infarction diabetes-related hospitalisation	11% higher	ns	51% higher	ns
Lower limb amputation diabetes-related hospitalisation	96% higher	↑	167% higher	↑
Source: Taken from Diabetes Profile in Sydney West (2007). Data extracted from deaths.nswres_cc and isc.eoc(Inpatient Statistical Collection) in HOIST <u>Note</u> ns=not statistically significant; ↓Significantly lower than NSW ↑Significantly higher than NSW.				

Consultation suggests that the wider spread disposal of syringes is an issue that should be considered.

People with health literacy difficulties

The Lithgow city Council Social Plan identifies the needs of people with disabilities. However, people with literacy difficulties (and the sight-impaired, very elderly and people with language difficulties) may also have problems accessing services and information. A recent literature review (Rudd, Anderson, Nath, and Oppenheimer, 2007) examined more than 800 published studies and found that the reading grade levels needed for health materials far exceed the reading abilities of the average high school graduate. This well-established mismatch has significant consequences for health consumers (Institute of Medicine, 2004).

Health literacy is defined as: the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions. Health literacy includes the ability to understand instructions on prescription drug bottles, appointment slips, medical education brochures, doctor's directions and consent forms, and the ability to negotiate complex health care systems. Health literacy is not simply the ability to read. It requires a complex group of reading, listening, analytical, and decision-making skills, and the ability to apply these skills to health situations. A person who functions adequately at home or work may have marginal or inadequate literacy in a health care environment (Green, 2007).

Low health literacy is linked to higher rates of hospitalisation and higher use of emergency services (Literacy and Health Outcomes , 2004). Some examples are-

- Cancer-Low literacy adversely impacts cancer incidence, mortality, and quality of life (Merriman, 2002) -
 - o Cancer screening information may be ineffective; as a result, patients may be diagnosed at a later stage.
 - o Treatment options may not be fully understood; therefore, some patients may not receive treatments that best meet their needs.
 - o Informed consent documents may be too complex for many patients and consequently, patients may make suboptimal decisions about accepting or rejecting interventions.
- Diabetes- Among primary care patients with Type 2 diabetes, inadequate health literacy is independently associated with worse glycemic control and higher rates of retinopathy. It is suggested that inadequate health literacy may contribute to the disproportionate burden of diabetes related problems among disadvantaged populations Schillinger, 2002).
- Asthma- Inadequate literacy was common and strongly correlated with poorer knowledge of asthma and improper metered-dose inhaler (MDI) use. More than half of patients reading at a sixth grade level or less report they go to the Emergency Department when they have an attack compared with less than a third of literate patients. Less than one third of patients with the poorest reading skills knew they should see a physician when their asthma was not symptomatic as compared with 90% of literate patients (Williams, 1998).
- Hypertension- Almost half (48%) of the patients with hypertension or diabetes in a study had inadequate functional health literacy, and these patients had significantly less knowledge of their disease, important lifestyle modifications, and essential self-management skills, despite having attended formal education classes (Williams, 1998).

Resources/kits enhancing understanding and readability of health information are at-
<http://www.ama-assn.org/ama/pub/category/9913.html>
<http://www.hsph.harvard.edu/healthliteracy/index.html>
www.nifl.gov/mailman/listinfo/Healthliteracy

www.hsph.harvard.edu/healthliteracy/
www.centreforliteracy.qc.ca/health/healthlt.htm
www.nlhp.cpha.ca/
http://cahealthliteracy.org/resource_center.html
www.ncver.edu.au/

Action 2-Facilitate improved access to the Lithgow health service through public transport and pedestrian access

Suitable public transport provides the ability to travel to and from health facilities more easily, thereby missing fewer appointments and maintaining better health. The quality of transport is important and should be characterized by timeliness and care. Other features may include access to appropriate transport options; improved information about transport services and more obvious points of access to transport services. However, improved access to public transport may have different requirements for the target vulnerable groups. .
<http://www.transport.nsw.gov.au/abouttrans/access-trans-action-plan.html>

People with disabilities

Generally, people with physical disabilities cannot access public transport and are reliant on taxis, with varying levels of subsidy throughout Australia, or on private vehicles. Some areas do not operate a taxi subsidy scheme (Physical Disability Council of Australia Ltd (PDCA)).

Transport to and from health services

Transport from hospital after treatment or discharge potentially poses difficulties for people with disabilities, people with few resources (e.g. economic, support of family or friends) and the locationally disadvantaged.

Pedestrian access

The action to improve pedestrian access is in line with good practice to enhance the walkability of an area. This potentially improves levels of physical activity and increases accessibility to services. Inadequate physical activity is a risk factor in obesity and cardiovascular disease. Physical activity also improves mental health (NSW Physical Activity Taskforce, 1998).

Transport Planning tool- Land Use and Public Transport Accessibility Index (LUPTAI)

Queensland Transport has developed an innovative planning tool that will assist planners, policy makers and development assessors make decisions about future growth and transport. The planning tool is called the Land Use and Public Transport Accessibility Index (LUPTAI). It measures how easy it is to access health, education, banking, shopping and employment through walking or public transport, within a specific geographic area.

The tool uses Geographical Information System (GIS) software to generate a map that gives a visual representation of the opportunity to reach destinations through public transport, walking or a combination of both. A five-colour scale shows the level of access for any given area. Data sets about the locations of services are entered into the system, which produces a map that highlights areas of None, Poor, Low, Medium or High accessibility.

LUPTAI will assist planners and decision-makers at the state and local level to: determine where to focus urban growth ; maximise land use and transport integration; assess large scale developments ; assist in writing policy, and establish funding priorities.

http://www.transport.qld.gov.au/Home/Projects_and_initiatives/Projects/Land_use_public_transport_accessibility_index/

Action 3-Lobby government and other stakeholders

Lithgow City Council plays an important role in advocating for services to meet the needs of residents and by collaborating in projects with other stakeholders to address these needs. Improving public health outcomes include approaches through social planning and public health planning, and links with council management, strategic and statutory planning processes, activities of councils in public health, partnerships with Area Health Services, best practice in public health and capacity building strategies.

In an ageing population, the issue of the frail and elderly living in their own homes is important, as some frail older people can live at home rather than in facilities if appropriate services are in place. Concern by residents has been expressed regarding the long waiting lists for- aged care facilities, incident based and respite care facilities (Page 49 of Lithgow City Council Strategic Plan). The needs for residents may not be as simple as ' need for respite care'. Out of home models of respite care for the aged, people with disabilities and children are not appropriate to all family situations and individuals. Therefore, the needs of carers and the person concerned need to be identified to better provide appropriate models of service.

H2 - Developing partnerships with a range of stakeholders to facilitate healthy lifestyles. Results-A healthier community

In the Lithgow City Council Strategic Plan, the strategy 'developing partnerships with a range of stakeholders to facilitate healthy lifestyles' aims to achieve the results of a healthier community by the following actions –

Action 1- Form a community health committee

Developing partnerships with a range of stakeholders to facilitate healthy lifestyles is consistent with effective multi-sectoral approaches to health behaviours. The Local Government Public Health Survey (Whittington, 2004) shows that partnerships with area health services involving health protection and promotion were common across all council classifications, but much more common among non-rural councils. On the whole, collaboration was highly valued by councils as they believed it facilitated more effective service provision.

The action to form a health committee suggests an integrated approach to programs that is effective in addressing lifestyle issues. The determinants of health include housing, transport, education, health (Baum, 1999) so stakeholders in these areas should be included.

The Local Government Public Health Survey (Whittington, 2004) shows that partnerships with area health services involving health protection and promotion were common across all council classifications, but much more common among non-rural councils. On the whole, collaboration was highly valued by councils as they believed it facilitated more effective service provision.

Action 2-Develop initiatives to promote a healthy lifestyle

The Local Government Public Health Survey (Whittington, 2004) found that partnerships were stronger in health protection than promotion. This was likely due to the regulatory role of councils and being more familiar with the regulatory role of health protection.

Developing partnerships with a range of stakeholders to facilitate healthy lifestyles is consistent with effective multi-sectoral approaches to health behaviours. This should include

understanding of the social and economic context of risk behaviours (Berkman and Kawachi, 2000).

Action 3-Seek funding from government through grants and developers through developer contributions

The action to *seek funding from government through grants and developers through developer contributions* provides one way to achieve funding for initiatives to promote a healthier lifestyle in Lithgow. However, programs need to be sustainable to achieve both short term and long term positive changes in lifestyle.

H3 - Providing safe drinking water. Results-Access to safe drinking water within the reticulation system

Action 1-Prepare operational plans and consider in the management plan process

Action 2- Protect the Farmers Creek Catchment Area in the comprehensive Lithgow Local Environmental Plan

The strategy to provide safe drinking water in villages by including this commitment in the planning process ensures follow through. Furthermore, the action to protect the Farmers Creek Catchment Area, which is a source of pollution, addresses a main area of contaminated water for the affected areas.

Safe drinking water is important to health. Water can be contaminated either naturally or by chemicals introduced in the water supply from agriculture, industry, leaking septic systems or other means. Ground water from deep wells is normally relatively pure and free of biological contamination. However, contamination may occur if wells are installed improperly or if surface water enters the well. If water comes from surface water (lakes and rivers), this water is normally polluted and must be treated (Table 33).

<http://www.epa.gov/safewater/contaminants/index.html>

Vulnerability of foetus and children

Unsafe drinking water has a worse impact on the developing foetus and young children as they differ from adults in a range of behavioural and physiological parameters that may need to be taken into account in the risk characterisation phase of risk assessments. The principal factors causing these potential differences are:

- Growth, development and maturational rates;
- Children have greater potential future durations of life, which is relevant to the potential for accumulation or exceeding latency periods;
- Dietary differences—children can eat much greater quantities of particular foods (particularly dairy products, soft drinks and some fruit and vegetables) than adults on a body weight basis (Rees, 1999);
- Exposure factors—the surface area to body mass ratio will change markedly with ageing. In the newborn the ratio is typically 0.067 (m²/kg) decreasing to 0.025 in an adult. While the respiratory volume remains fairly constant at 10 ml/kg/breath, the surface area of the alveoli increases from 3m² in an infant to approximately 75m² in an adult and the respiration rate drops from 40 breaths per minute to 15 breaths per minute (Snodgrass, 1992). Children have unique exposure possibilities e.g. Placental transfer and breast milk (Kimmel et al, 1992);
- Behavioural factors, e.g. Children are more likely to indulge in soil eating behaviours;

- Available parameters for toxicity assessment, e.g. Techniques for assessing dizziness, intelligence and hearing impairment are different between children and adults;
- Biochemical and physiological responses— children have a higher metabolic rate, more limited ability to control body temperature, more rapid growth rate, a higher percentage of water in the lean body tissue;
- Disposition of the agent within the body, e.g. Transit time, pH and enzyme activity in the gut are different for children as are tissue-chemical bindings;
- Liver function related to detoxification matures after birth, as does the renal excretion of foreign compounds;
- Differences in gut microflora;
- The immaturity of children's immune systems; and
- Differences in the clearance of chemicals—the higher clearance of certain chemicals from the body in children compensates in part for the greater sensitivity for their developing organ systems (Renwick,1999) but for some other chemicals, clearance may be lower.

References for risk assessments of foetus, children and the aged are cited in-
<http://www.health.gov.au/internet/wcms/publishing.nsf/Content/ohp-ehra-2004.htm~ohp-ehra-2004-background.htm~ohp-ehra-2004-background-11.htm>
<http://www.nrdc.org/health/kids/ocar/chap2.asp>

Table 33 Health effects of contaminants in drinking water

<i>Common Sources</i>	Negative health impacts
<p>Asbestos Asbestos can leak into your water supply from natural deposits or asbestos cement in water systems.</p>	<p>Asbestos can cause cancer</p>
<p>Arsenic Arsenic occurs naturally in the environment, and is generally combined with oxygen, chlorine and sulphur to form inorganic arsenic compounds. Organic arsenic compounds are formed when the element combines with carbon and hydrogen. Water contamination can result from natural deposits, glass or electronic waste.</p>	<ul style="list-style-type: none"> ▪ Arsenic can cause toxicity in the nervous system. ▪ Very high levels of arsenic can result in death. Consumption of lower levels of arsenic can cause digestive tract pain, nausea, vomiting and other stomach disorders, decreased production of red and white blood cells, damage to blood vessels, abnormal heart rhythms, a 'pins and needles' feeling in the hands and feet and liver and kidney damage. ▪ Ingesting or inhaling low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small 'corns' or 'warts' on the hands, feet and torso. Contact with inorganic arsenic may also cause redness and swelling to the skin. ▪ Studies show that ingestion of inorganic arsenic can increase the risk of skin, lung, bladder, liver, kidney or prostate cancer. Inhalation of inorganic arsenic can increase the risk of lung cancer. Inorganic arsenic is a recognised human carcinogen, a substance capable of causing cancer (see refs). ▪ Some studies have indicated that long-term exposure to low levels of arsenic in children may result in lower IQ scores. Children may be less efficient at converting inorganic arsenic to the less toxic organic arsenic. For this reason, children may be more susceptible to health effects than adults. ▪ Some evidence exists that inhaled or ingested arsenic can affect pregnant women and their unborn babies. Large doses that cause illness to the pregnant females can also cause low birth weight, foetal malformations or foetal death. Arsenic can cross the placenta and may be found in foetal tissues. Arsenic has also been found at low levels in breast milk.
<p>Cadium Cadmium can occur in water from natural deposits, batteries or paints.</p>	<p>Cadmium can cause kidney disorders and possibly cancer. Cadmium, especially cadmium oxide is a 'probable carcinogen'. There is evidence of it causing prostate and kidney cancer in humans, it has been shown to cause lung and testicle cancer in animals. It is also a teratogen, and may cause reproductive damage. Inhalation of smoke from burning cadmium or from cadmium oxide is toxic to the respiratory system. It is unlikely that this sort of exposure would occur except in cases of unusual industrial accidents. Repeated low exposures can cause permanent kidney damage that may go unnoticed. Lung scarring can occur from a single high exposure or repeated low exposures. Long-term exposures can cause anaemia, fatigue and loss of the sense of smell. High exposures can cause rapid lung damage, shortness of breath, chest pain, and a build up of fluid in the lungs. In severe cases death or permanent lung damage occurs. High exposure may also cause nausea, vomiting, cramps, and diarrhoea High exposures are unlikely to occur except in cases of unusual industrial accidents. (http://www.npi.gov.au/database/substance-info/profiles/17.html - health)</p>

<i>(Table 5 continued) Common Sources</i>	Negative health impacts
<p>Chlorine</p> <p>Chlorine is the most widely used disinfectant for drinking water in Australia.</p>	<p>Chlorine and its by-product, trihalomethanes, can cause cancer of the liver, rectum, colon, bladder and stomach. Chlorine can also be absorbed through the skin and inhaled while in the shower. There is some evidence which suggests chlorine may pose serious health risks when it is absorbed or ingested over a long period of time. There is also evidence that chlorine can destroy protein in our body. Several scientific studies have shown that there is a possible link between disinfection by-products and an increased risk from a variety of cancers, but this has not been confirmed. Some recent studies have suggested a possible link with effects on pregnancy, but again this has not been clearly established. Scientists are still project out what the links may be and how significant the effects could be. As a precaution, many countries limit the allowable level of chlorinated disinfection by-products in the water. Some countries also limit the level of nonchlorinated disinfection by-products. The Australian Drinking Water Guidelines suggest maximum values for a range of disinfection byproducts (for example, 0.25 parts per million for trihalomethanes). Although the focus to date has been on chlorine-containing disinfection by-products, this has been mainly because they are easier to detect in a laboratory. : www.waterquality.crc.org.au</p>
<p>Cryptosporidium and Giardia</p> <p>Cryptosporidium and Giardia are parasites normally caused by animal or human faeces, but can also be caused by contaminated food products. Land runoff carries the parasites into surface water (lakes, streams and rivers).</p>	<p>Cryptosporidium can cause flu-like symptoms that can be life threatening for persons with sup-pressed immune systems, such as those with HIV/ AIDS and cancer patients.</p>
<p>Mercury</p> <p>Mercury contamination in water can result from natural deposits, crop runoff, batteries and electrical switches.</p>	<p>Mercury can cause kidney and nervous system disorders. Unborn babies are at increased risk from mercury. The mercury in fish can lead to raised mercury levels in the mother. This mercury can be passed on through the placenta to her developing baby. The foetus appears to be most sensitive to the effects of mercury during the third and fourth months of a pregnancy. The effects on the brain and nervous system may not be noticed until developmental milestones - such as walking and talking - are delayed. Memory, language and attention span may also be affected.</p>
<p>Copper</p> <p>Direct and indirect water contamination by copper can result from natural or industrial deposits, wood preservatives or plumbing.</p>	<p>Copper in our diet is necessary for good health. You eat and drink about 1,000 micrograms (1,000 ug) of copper per day. Drinking water normally contributes approximately 150 ug/day. Copper can cause severe gastrointestinal irritation. Immediate effects from drinking water which contains elevated levels of copper include : vomiting; diarrhoea ; stomach cramps ; nausea. The seriousness of these effects can be expected to increase with increased copper levels or length of exposure Children under one year of age are more sensitive to copper than adults. Long-term exposure (more than 14 days) to copper in drinking water which is much higher than 1,000 ug/l has been found to cause kidney and liver damage in infants. Other persons who are highly susceptible to copper toxicity include people with liver damage or Wilson's disease.</p>

Refer to Leder, Sinclair and McNeil (2002).;
<http://www.clw.csiro.au/cecr/aquatic.html>

H3 - Providing safe drinking water. Results-Access to safe drinking water within the reticulation system

Action 3- A position on water fluoridation be determined

Lithgow children had more cavities than the average for NSW of the same age. Tooth decay develops when acid destroys the outer surface of the tooth. The acid is produced from sugars by bacteria in the mouth. Fluoride can limit acid, and also repair damage before it becomes permanent. A constant supply of a low level of fluoride in the mouth from fluoridated water acts like a continuous repair kit for teeth (NSW Health).

A baby's first teeth begin to form in the 16th week of pregnancy. Almost completely formed in gums at birth. Strength of primary teeth depends on mother's health and diet during pregnancy. Pregnant mothers need to eat a well-balanced diet. A good diet will provide the developing baby with the right amount of fluoride.

Fluoride is important for healthy teeth. Breast-fed or bottle-fed babies (one year - four years) need at least 250ml of fluoridated water every day (about one cup) to get the right amount of fluoride. This may include water added to baby's bottle, or water added to juice or vegetables. Older children need to drink more (The Children's Hospital Westmead et al, 2007). Tooth decay may result in pain, infection and destruction of soft tissue in the mouth. Poor dental health can affect speech and language development, as well as school attendance and performance, with implications for self-esteem, employment and social wellbeing (SCRGSP, 2007).

Many studies prove water fluoridation is safe and effective. One of the best (UK National Health Service Centre for Reviews and Dissemination, 2000). The actual amount of fluoride added to water is around one 1 ppm. Only a tiny amount of fluoride is needed to help our teeth resist decay. Water fluoridation allows everybody in the community to access fluoride and help protect teeth against decay. Drinking fluoridated water is safe for children of all ages (NSW Health).

Fluoridated water has no environmental impact. Soil naturally has fluoride (more than 300 parts per million) and the ocean has around one ppm or more (NSW Health). Concerns regarding fluoridation have been put forward before the introduction of fluoridated water in many areas. Informed community debate was effective in allaying fears in the community.

Refer to-

<http://www.lgsa.org.au/www/html/349-water-fluoridation-resources.asp>

Detailed evidence on health impacts of Community Strategies-

The vision for the area of community in the Lithgow City Council Strategic Plan is- *We retain, respect and strengthen both our overall sense of community, and the unique linked communities of groups, rural areas, villages and towns that make up the Lithgow LGA.*

The Lithgow City Council Strategic Plan is assessed in terms of equity for the targeted population in the scoping plan. The target population refers to the identified vulnerable groups - pregnant women, infants, children, youth, older residents, people with disabilities, Aboriginal and Torres Strait Islander residents, socio-economically disadvantaged residents, and people who have difficulty communicating in English.

C1-Modelling the population and assessing its needs.

Results- A population model; knowing the population, planning resource

In the Lithgow City Council Strategic Plan the strategy '*modelling the population and assessing its needs*' aims to achieve the results of a population model; knowing the population; and a planning resource by the following actions-

Action 1- Prepare population models

The action to *prepare population models* to achieve the results of knowing the population and using the model as a planning resource needs further description. The definition of a population model is any model that describes the changes over time of a population. However, a population model needs to be sensitive enough to determine the trends of the vulnerable groups.

Action2- Identify and monitor population trends

The action to *identify and monitor population trends* is consistent with good practice. Needs assessment that proactively plans for emerging needs mitigates against service shortfall and ineffective reactive actions if the trends of the vulnerable groups are sufficiently identified and monitored.

Action 3- Assess the basic needs of the population

The action to *assess the basic needs of the population* is sound as services, programs and facilities are more effective when based on identified needs. Needs assessment is best achieved through a triangulation of methods. Lithgow City Council has included community consultation to inform the development of strategies and actions. The basic needs of the vulnerable groups, however may not be adequately assessed. The Lithgow City Council Resident Feedback Register consists of 200 randomly selected residents across Lithgow LGA. It may be representative of the wider population, however, it is not constructed to uncover the needs of all the targeted vulnerable groups.

Determining the needs of vulnerable groups requires consultation with intersectoral stakeholders to provide a broader perspective because housing, education, employment, income, poverty and stress are the broad determinants of health.

Action 4- Prepare an ageing strategy

The action to *prepare an ageing strategy* is sound as Lithgow LGA is an ageing population with projections indicating a declining population. The decline in the projected population is due in part to a 17.5% migration related loss of young people aged 12-24 years. Population projections include an overall decrease in the number of residents by 2019 (DIPNR, 2004 reported on pages 9- 10 of Social Plan).

To help build the capacity of local government to meet the specific opportunities and challenges of an ageing population, the Australian Local Government Association has developed the Australian Local Government Population Ageing Action Plan 2004 - 2008. The action plan provides a flexible and dynamic framework that builds awareness, encourages action, fosters partnerships and improves access to information. This four-year action plan complements other, related national ageing strategies, such as the Australian Government National Strategy for an Ageing Australia (<http://www.alga.asn.au/policy/healthAgeing/ageing/plan/>).

Older adults and the principles of healthy ageing

Healthy ageing is an approach to ageing that promotes-

- ageing as a natural, positive part of life
- the diversity of older people in their needs, interests and backgrounds
- active participating in community life regardless of age
- breaking down myths and stereotypes about ageing and older people
- interdependence of generations.

(City of Tea Tree Gully Ageing Strategy 2001-2011).

Role of older people in community

An effective ageing strategy facilitates the social and civic participation of older people in community activities and encourages initiatives to provide meaningful roles for older residents within the community. The growing proportion of older people, especially the very old, is often thought of only in terms of the need for increased health care. Older people, however, are a diverse population group, varying in their capability and interests. Creating a positive image of older people within the community is important for shifting myths and stereotypes about ageing (City of Tea Tree Gully Ageing Strategy 2001-2011).

Older people living in their own homes

Most older people prefer to remain in their own homes amongst their friends and neighbours, but may require support to live independently at home. Primary prevention contributes in maintaining health and function in older people (Fried, Freedman, Endres, and Wasik, 1997) and to keeping them living in their homes rather than nursing homes. Programs to maintain the function and support older people so that they can continue living in their home are the Early Intervention/Prevention approach, the strengths based support model and the Australian Council of the Ageing (COTA) Maintenance of Function project (Richardson, 1999).

Age friendly cities

The World Health Organization has developed a checklist for aspects of age-friendly cities. This includes the areas of: outdoor spaces and buildings; transportation; housing; social participation; respect and social inclusion; civic participation and employment; community services and health services. An age friendly city provides social and civic opportunities that encourage older people to remain connected to their community. An age friendly city also

includes a built environment and open spaces that are designed for the safe access of older residents (WHO, 2007).

Impact of ageing population on vulnerable groups

An equitable ageing strategy considers the wider implications of an ageing population. This includes the future of family care, issues of intergenerational relations, employment, living arrangements and attitudes (Tinker, 2002). An equitable ageing strategy includes the distribution of resources among the age groups. The concept of distributive justice of resources recognises the needs of all groups (Irwin, 1996; Engelman and Johnson, 2007).

Youth in ageing population

The needs of young people should be considered in light of the implications of an ageing population. The diversion of resources to an ageing population may not support the education, training and employment needs and aspirations of youth. The loss of TAFE courses and the type of work available may reduce the attractiveness of living in Lithgow for young people (as per results of community engagement, 2007).

Children in ageing population

Commitment to the investment in the needs of young children should be strengthened. Resources may be potentially diverted away from children's services and programs to fund the programs and services for the older age group in an ageing population (Freed and Fant, 2004). Evidence indicates the highest return for investment is derived from the early investment in early childhood (Heckman, 2000; Centre on the developing child at Harvard University, 2007; Farrar et al, 2007; Schweinhart, 2005; Aslam et al, 2005; Kemp et al, 2004). Refer to children and childcare places further on.

C3-Encouraging equitable access to services and facilities which meet the needs of the community

Results- improved community, well being, access to utilities

Action 1-Evaluate the needs identified in the Social Plan and consider in the operational and management plan process

The action to *evaluate the needs identified in the Social Plan and consider in the operational and management plan process* is a sound action as the equitable access to services and facilities has many positive direct and indirect impacts on health. Furthermore, identifying and considering these needs at a strategic level such as operational and management planning is based on best practice. However, the Social Plan may not adequately consider the needs of all the vulnerable groups in the access to services.

In the Social Plan the mandated vulnerable groups include- children, young people, women, people with disabilities, Aboriginal and Torres Strait Islanders people, people from culturally and linguistically diverse backgrounds, and older people. The additional groups in the Social Plan include- men; gay, lesbian, bisexual and transgender people; Department of Housing residents and sole parents.

Some vulnerable groups not included in Social Plan-

Pregnant women

Parents/carers of young children

Socio-economically disadvantaged people

People with learning disabilities, such as, reading difficulties

Locationally disadvantaged residents

Issues in equitable access to services include the availability and accessibility of services or facilities for residents. Strategies to achieve equitable access to services aim to achieve the availability of appropriate services without gaps in service provision; and to provide accessible services. Accessibility of services and facilities include physical and locational accessibility, culturally sensitive staff of services or facilities. Access to services and facilities may put demands on individual or family resources such as child-minding, transport costs, and time.

Pregnant women

Women and children are identified in the Social Plan, however, the needs of pregnant women, infants and parents /carers of children are not explicitly stated.

Parents/carers of young children

Council has the capacity to ensure that there are adequate facilities in the community for breastfeeding/feeding and changing infants. Baby Care Rooms or Parents Rooms provide a safe, private place for men and women to care for their young children. Breastfeeding rooms facilitate breastfeeding (<http://www.breastfeeding.asn.au/>). For example, an initiative by Penrith Council includes a “Breastfeeding Welcome Here” sticker and kit. These have been produced to improve community acceptability of breastfeeding in public through the accreditation and promotion of breastfeeding friendly businesses.

(<http://www.penrithcity.nsw.gov.au>).

It is important to encourage breastfeeding as breastfeeding -

- Increases protection against diseases (Lerman, et al 1994; Cochi, 1986; Papst, Spady, 1990; Van-Coric, 1990; Chang, 1990; Lucas, Cole, 1990; Alho, 1990; Teele, 1989; Lopez, 1990; Holberg, 1991) and illnesses (Palti, 1984; Koutras, 1989; Wright, 1989; Hoffman, 1988; Mitchell, 1991) and general morbidity (Van Den Bogaard, 1991).
- Increases protection against respiratory infections (de Duran, 1991; Woodwar, 1990).
- Increases protection from allergies (Merrett, 1988) and eczema (Chandra, 1989).
- Decreases the risk of infant death (Habicht, 1986).
- Decreases the risk of gastroesophageal reflux (Heacock, 1992); multiple sclerosis (Dick, 1976); and inguinal hernia (Pisacane, 1995):
- Enhances cognitive development (Morrow-Tlucak, 1988; Morley, 1988) and the development of a higher intelligence quotient (IQ) (Lucas, 1992).
- Enhances social development (Baumgartner, 1984).
- Protects against malocclusion¹ (Labbok, 1987).

¹ A malocclusion refers to the misalignment of teeth and/or incorrect relation between the teeth of the two dental arches

Children 0-3 years

Children are included in the Social Plan, however, the 0-3 years age group require special attention. International evidence indicates that attending early childhood education and care services positively impacts on children's developmental outcomes and subsequent school success (Schweinhart, 2005; Boocock, 1995). Half of all intellectual development is established by the age of four years (estimated). Strengthening the ability of mother and family to stimulate children and encourage them to learn can set the stage for adult success (ENEP, UNICEF, WHO, 2002; Centre on the developing child at Harvard University, 2007; Schweinhart, 2005; McCain et al, 2007). Other services that contribute to intellectual development through play are toy libraries and play groups.

Further investigation is required to determine if there are a sufficient number of childcare places in Lithgow LGA to meet the needs of children and their families. There are 6 childcare services in Lithgow LGA. These include - family day care, long day care, pre-school and out of school hours care services. Lithgow LGA does not have any other type of childcare services). There are 4 services in Lithgow, 1 in Wallerawang (pre-school) and 1 in Portland (long day care).

Table 34 Childcare places in Greater Lithgow LGA

Type of Service	No. in Lithgow	No. Licensed Places
Long Day Care	2	96
Family Day Care	1	Not given
Pre-School	2	79
Out of School Hours Care	1	45
Total	6	220

Source: Lady Gowrie Childcare Data (purchased by SWAHS) – Updated 30 July 2007

Socio-economically disadvantaged people

The Social Plan includes people who live in public housing and those who are sole parents. These groups represent people who are most likely to be socio-economically disadvantaged. There are, however, likely to be other residents who are socio-economically disadvantaged.

Access to services for socio-economically disadvantage residents may be hindered by lack of adequate resources for- user pay services and recreation, fares on public transport to travel to health and other services and facilities. Opportunities that are free or low cost are more likely to encourage inclusiveness and community participation.

Locationally disadvantaged people

Locational disadvantage is a risk factor in access to services with locationally disadvantaged people more likely to be admitted for chronic disease (Brameld.and Holman, 2006). People living in remote areas may benefit from the availability of health education information on the internet. Table 35 shows that less than half of households in Lithgow LGA have internet connection (49%), which is significantly lower than for NSW (61%)

Table 35 Households with internet connection, 2006 Census

Internet connection	Lithgow LGA	Penrith LGA	Blue Mnts LGA	SWAHS	NSW
	% of households				
No Internet connection	47%	33%	29%	32%	35%
Broadband	24%	45%	47%	46%	41%
Dial-up	25%	17%	22%	18%	20%
Other	0%	1%	0%	1%	1%
<i>Total households connected to internet</i>	<i>49%</i>	<i>63%</i>	<i>69%</i>	<i>65%</i>	<i>61%</i>
Internet connection not stated	3%	3%	2%	3%	3%
Total	100%	100%	100%	100%	100%

Source: ABS, Census, 2006.

Action 2-Provide support to community organisations through Council's donations in accordance with the procedure to improve their ability to plan and deliver community services

The action to *support community organizations* is proposed to achieve equitable access to services and facilities. Community organizations play an important role in service provision to vulnerable groups. Funding community organizations and encouraging their ability to plan and deliver community services is a sound action. Service delivery should be based on best practice principles that incorporate equity in strategic and action planning.

Action 3-Lobby government and utility providers for improved access

Utilities are private or public service facilities such as gas, electricity, telephone, water and sewer. The action to *lobby government and utility providers for improved access* is important as living conditions play a key role in health, especially in the health of children (Dube, Felitti Dong et al. 2003; Marmot, Shipley, Brunner, Hemingway, 2001; Rahkonen, Lahelma, Huuhka, 1997). Therefore, Lithgow City Council needs to work with stakeholders to achieve improved access to utilities for all residents including those living in remoter areas of Lithgow LGA.

Action 4-Develop partnerships with community service providers

The action to *develop partnerships with community service providers* to encourage equitable access to services and facilities, which meet the needs of the community, is sound. Partnerships with community service providers encourage the integration of services. This facilitates the identification of gaps in service provision and enhances the referral to other appropriate services. Lithgow City Council in partnership with other stakeholders could map the provision of services in Lithgow LGA to identify gaps in service provision; and to work towards integrating services with a special focus on service provision of vulnerable groups.

C7- Ensuring adequate open space is provided throughout towns and villages. Results- provision of green community space

Action 1-	Complete an open space plan
Action2-	Identify adequate open space in the land use strategy, comprehensive Lithgow Local Environmental Plan and/or development control plans
Action 3-	Seek funding from developers through developer contributions

Open space is a major community resource that needs careful planning and management for maximum benefits. This includes: conserving and protecting the natural and cultural environment and enhancing recreational and tourism opportunities (Tract Consultants, 2007). Open spaces that include some of the natural environment provide opportunities for exploring and appreciating the beauty of the environment. The aesthetics of nature have a positive impact on well being.

Open spaces provide opportunities for children, youth and other age groups to walk, run, and play. Open spaces promote the inclusion of residents into the community and provide a material resource for people who have limited material resources (O'Brien, 2007). This includes people with disabilities who should be considered in designing open spaces. Participation in enjoying open spaces should be promoted so that lack of awareness does not limit the use of open spaces, parks, playgrounds and public gardens. These areas need to be physically accessible, maintained, attractive (People and places edited by Marcus and Francis, 1987).

Open spaces have many benefits to health and well being by increasing physical activity; activation of higher cognitive processes and healthy brain development; improving mental health; and enhancing educational and social skills (Barrett and Greenaway 1995; Valentine and McKendrick 1997; Cole-Hamilton et al. 2001; Bingley and Milligan 2004; Everard et al. 2004; Open Space: People Space; 2007; Thomas and Thompson 2004; Thompson 2005).

Play grounds should be designed to provide physical and intellectual challenges to children but designed for safety (Travlou, 2003; NSW Playgrounds Advisory Unit http://www.kidsafensw.org/playsafety/training_presentations.htm). Considerations in designing and installing playgrounds are the layout and design, surfacing for impact absorption, installation and maintenance of equipment, shade provision and safety management. This may include managing 'fall-zones'² <http://www.sofweb.vic.edu.au/scln/menu.htm>.

Consideration should be given to the provision of water bubblers, toilets, and seating at intervals in the area.

Consultation suggests that Council should consider the needs of youth in the planning of local parks and open spaces. This may include increasing accessibility by providing facilities that are not closed by gates.

² A fall zone is the distance from any part of equipment to any hard surface (borders, paths, tree trunks or adjacent equipment) is referred to as the 'fall zone' and should generally be a minimum of 2.5 metres. In the case of moving equipment, this distance is measured from the extremity of movement. Students falling, jumping or being pushed off equipment should land within the fall zone onto an impact-absorbing

C9- Providing a range of housing opportunities to meet the diverse needs of the community.

Results- choice in housing and land ,• providing life long housing

Action1-	Provide for higher density development around transport and central business nodes.
Action2-	Identify sites for potential seniors living with easy access to services and facilities.
Action 3-	Investigate the need for a community committee to facilitate the provision of aged care facilities and establish if need is demonstrated.
Action 4-	Allow for a mixture of housing types in the comprehensive Lithgow local environmental plan and development control plans
Action 5-	Identify and protect land for future urban development including senior living in the land use strategy and comprehensive Lithgow Local Environmental Plan.

Housing or shelter is one of our most basic needs. The interface between living conditions and health is a complex one without simple 'cause/effect' relationships. Nevertheless evidence gathered from many studies shows clear patterns of association between poor conditions - for example cold, damp, infestation, noise, poor air quality and overcrowding - and an increased incidence of ill health. (Waters, 2001; Ambrose, 2002).

Factors in suitable housing

Housing problems that impact on health can arise due to the design, location, security and affordability of housing:

<http://foodsafetymatters.gov.au/phs/Documents/sphun/20398.pdf>

Design

People living in poor quality housing that is overcrowded (Waters, 2001) or poorly ventilated (Ambrose, 2002) are more likely to suffer both physical and mental health problems (Lowy, 1990).

Location

The health impact of poor housing is often exacerbated by housing located in areas where there are high levels of unemployment, inadequate transport, environmental hazards, and violence (Ellaway and Macintyre, 1998). Poor location of housing includes the inaccessibility to stores to buy nutritious food as compared to the availability of junk food, alcohol and gambling services. Housing that is poorly located can also result in people being isolated from their natural support networks (Ellaway and Macintyre, 1998)

Security

Housing insecurity increases relocation rates, which has a significant impact on the education attainments of children living in such situations (Lay, E. 1995). Housing tenure is also directly linked to cardio-vascular disease and mortality from all causes for people in rental accommodation is higher than for owner-occupiers, even after other socioeconomic variables are considered (Centre for South Australian Economic Studies. 1993).

Affordability

Inadequate housing and housing stress caused by having to spend more than 30% of a low income on housing can lead to family conflict and breakdown (Phibbs, 2006). Housing and rents that are unaffordable can lead to homelessness. Homeless adults have a much higher

rate of mental health problems, although it is not understood whether these problems result from being homeless or homelessness is the result of pre-existing mental health problem.

Housing needs of the targeted vulnerable groups are varied. There are several government agencies project together to address the issue of housing affordability and availability. The Reshaping Public Housing reforms, announced by the Premier and the Minister for Housing in April 2005, have created new opportunities across human services for those most in need to be assisted more effectively.

<http://www.aho.nsw.gov.au/Files/Human%20Services%20Accord.pdf>

http://www.acoss.org.au/upload/publications/papers/info%20319_housing%20agreement.pdf

http://www.dhw.wa.gov.au/homes/manuals/rental/rental_policy_DISABILITIES.html

Role of Council in housing environment

Council plays a very valuable role with other stakeholders in shaping the social and built environment of housing for the targeted vulnerable groups. In the report Provisions for adaptable housing by local government in New South Wales (Elenor, 2006) adaptable housing is defined as units designed in such a way as they are, or can be easily modified in the future to become, accessible to both occupants and visitors with disabilities or progressive disabilities.

People with disabilities

The survey of 152 local government authorities identified 49 LGAs with provisions for either accessibility to buildings or adaptable housing in either a local environmental plan or a development control plan (Lithgow City Council was not one of these). The majority of these Local Environment Plans and development control plans contained provisions related to access and mobility to public spaces and buildings. Of the total with provisions related to disability access, a subset of 40 of these LGAs had provisions in a DCP in relation to adaptable housing. The majority of these LGAs are in greater Sydney; however, 10 LGAs with adaptable housing requirements are in regional areas (Lithgow City Council was not one of these).

Older residents

In the report on Page 20, it refers to the State Environmental Planning Policy (Seniors Living) 2004 Policy that aims to encourage the provision of housing (including residential care facilities). The policy, which has the force of regulation under the NSW Environmental Planning and Assessment Act, overrides any other environmental planning instrument to the extent of any inconsistency. It sets aside local planning controls that would prevent the development of housing for seniors or people with a disability to the standards set by the Policy.

<http://www.parliament.nsw.gov.au/prod/PARLMENT/hansArt.nsf/V3Key/LA20070601012>

The results of the Seniors Housing Survey conducted by the University Of New South Wales will be available in 2008 for further information.

C10-Facilitating a safe community.

Results- • obtain funding for actions, • partnerships between Council and the Police, • better designed public places for safety.

Action1-	Prepare a crime prevention plan.
Action2-	Seek funding to implement the crime prevention plan.
Action3-	Continue to participate in the police action community team
Action4-	Maintain the cctv monitoring program in the Lithgow Central Business District
Action5-	Incorporate crime prevention design principles in development control plans and the design/upgrade of public places

Crime in Lithgow

Lithgow LGA has relatively high rates of recorded crime in relation to assaults, domestic violence related assaults and sexual assaults. Hospitalisation for assaults is high in the 15-24 years age group of Lithgow LGA males.

Table 36 **Crime statistics of Lithgow LGA**

Offence	Rate per 100,000	Ranking in LGAs
Assault	981.8	24
Domestic assault	548.1	35
Sexual offence	228.8	36
Malicious damage	2,011.3	40
Source: http://bocd.lawlink.nsw.gov.au/bocd/cmd/ranking/lnit		

Health impacts of crime

The direct health impacts of crime include death, injuries and/or psychological distress. In terms of the vulnerability groups, domestic violence in pregnancy and traumatisation of children who witness domestic violence are of particular concern due to their short term and long term effects.

http://www.voc.sa.gov.au/Information/The_impact_of_crime/How_you_feel.asp

Assaults and sexual assaults of young people are associated with many adverse physical and mental health effects. Australian evidence suggest that sexual assault is vastly under-reported. This is particularly true for males who may not receive appropriate services as most services are geared more towards females. <http://www.aifs.gov.au/acssa/statistics.html>

Crime is associated with indirect health impacts that include feeling unsafe in the community. Concerns about safety may restrict people's mobility and levels of activity and may exclude them from some places, particularly at night. Such concerns can lead to loss of independence, isolation or constraint on some activities. Different groups may feel more vulnerable than others, making safety an important equity issue (Semmens 1999; Foster, Giles-Corti, Knuiman, 2006).

Crime prevention

Crime prevention may include measuring crime, developing a crime profile, developing a community profile including social and demographic trends and developing a crime prevention action plan. The plan may include a number of approaches, such as, the Crime Prevention Through Environmental Design approach; surveillance by CCTV monitoring systems; public health approach to crime prevention; and collaboration with police in enforcement measures.

Crime Prevention Through Environmental Design (CPTED)

In Crime Prevention Through Environmental Design, Jeffery (1971 and 1977) and later Jeffrey (1990) and Geason and Wilson, 1989 suggested urban design, including the design of streets, parks, terminals, super highways, etc, could prevent crime by reducing the opportunities to prevent crime. This "opportunity theory" of crime prevention and control was expanded by Mayhew, Clarke, Sturman and Hough (1976) and Clarke and Mayhew (1980). in their work for the UK Home Office Research Unit, and by Canadian researchers Brantingham and Brantingham (1981 where the positive aspects of CPTED are discussed as well as the arguments against this approach and the difficulties in implementing CPTED.

http://amwac.health.nsw.gov.au/public-health/health-promotion/injury-prevention/safe-communities/pdf/crime_design.pdf

CCTV monitoring

A review (Welsh and Farrington 2006) of high quality evaluations of the effectiveness of CCTV as a crime prevention measure concluded that there was an overall eight percent reduction in crime in the experimental areas where CCTV was installed compared with a nine percent increase in crime in the control areas. The review included evaluations of 19 sites in the UK and the USA. Other findings from this meta-analysis concluded that CCTV interventions were more successful in car parks than in other settings such as city centres or housing estates, and that CCTV interventions were generally more successful in the UK than in the USA.

Public health approach to crime

Programs to prevent and reduce violence often adopt a public health approach to crime prevention. Such an complements other approaches by bringing a different view and other important players, tools and resources to the task of preventing and reducing crime (Moore, 1995 cited by Tonry and. Farrington (eds)

.Research shows that emphasis should be given to primary prevention measures and that many different sectors and agencies should collaborate on prevention activities (World Health Organization 2002). Public health interventions aimed at preventing violence, include

- **Universal interventions** - approaches aimed at large groups or the general population, without regard to individual risk. Examples might include violence prevention curricula delivered to all pupils in a school, sport and physical activity programs in crime prevention (AICrime reduction matters, No. 13: 2003) or community-wide media campaigns.
- **Selected interventions** - approaches aimed at those considered to be at a heightened risk of perpetrating violence (having one or more risk factors for violence).

An example of such an intervention is parenting skills training provided to low-income single parents.

- **Indicated interventions** - approaches aimed at those who have already demonstrated violent behaviour, such as perpetrators of domestic violence.

(AICrime reduction matters, No. 7: 2003)

Alcohol and crime

Alcohol consumption is strongly associated with crime. A fact sheet (<http://www.alcoholinfo.nsw.gov.au>) summarizes research conducted by the NSW Bureau of Crime Statistics and Research (BOCSAR) into the nature and extent of alcohol-related crime in NSW. Alcohol is particularly implicated in assaults, domestic violence, sexual assaults and malicious damage.

The reduction of alcohol-related crime can be achieved through the approaches of: Crime Prevention Through Environmental Design, surveillance, public health, and enforcement (Hommel, Hauritz and Wortley, 1997). Evidence-Based crime prevention including a crime prevention plan is supported by many sources.

<http://www.aic.gov.au/research/cvp/publications.html>

http://www.lawlink.nsw.gov.au/lawlink/cpd/ll_cpd.nsf/pages/CPD_cpp_evidencebasedplan.

www.police.qld.gov.au/programs/crimePrevention.

Detailed evidence on health impacts of Environment Strategies

E1 - Improving local air quality

Outdoor air quality: Main sources of air pollution are industrial emissions, motor vehicle emissions, domestic wood burning, coal burning for electricity generation, and from bushfires or hazard reduction burning of native vegetation. (WSROC 2007 p 41)

The air pollutants of most concern to health are particulate matter, carbon monoxide, oxides of nitrogen, ozone and sulphur dioxide.

Coal fired power generation in NSW is responsible for significant emissions of sulphur dioxide (SO₂) and as a result has the potential to impact on regional air quality. In 1992-93 power stations accounted for 35% and 60% of all anthropogenic emissions in the greater *Metropolitan Air Quality Study* region of nitrogen oxides (NO_x) and SO₂ respectively (Carnovale et al. 1997). Emissions of SO₂ are released from tall stacks and can under certain conditions be carried to ground level at some distance downwind resulting in locally elevated concentrations of SO₂, which is a pollutant of concern because it can affect respiratory health. The current NHMRC health goals, established in 1996, are 0.20 ppm for a one-hour average and 0.02 ppm for an annual average. (DEC, 1997)

Acid rain or wet deposition is also a problem in the northern hemisphere. SO₂ and NO_x emissions are converted in the atmosphere (over a period of between 2 and 20 days) to sulfuric and nitric acids and to aerosols which are deposited through rain (wet deposition) or directly on land (dry deposition). The main concern with regard to deposition in NSW is soil acidification. NSW has 9.5 million ha of naturally acid soils, which have lower buffer capacity and are hence more sensitive to any anthropogenic sources of acidification. The location of significant sources of industrial SO₂ and NO_x in the Hunter Valley, has led to concerns about acid deposition in NSW. (DEC, 1997)

Indoor Air quality: Indoor levels of NO₂ are often many times higher than outdoor levels. Significant association between respiratory symptoms in children associated with the use of unflued gas appliances for heating and cooking. (Ciuk et al 2001, p 433; Ponsonby et al 2000, p 1544) Hazards in indoor air quality include biological and chemical contaminants and encompass homes, workplaces, transportation vehicles etc. Chemical hazards include ETS, NO_x and SO₂, PM and VOCs, pesticides, formaldehyde and plasticisers. Biological hazards include infectious agents (bacteria and viruses) moulds, endotoxins, antigens from HDM, rodents, cockroaches, pollen and animal dander. (Wu et al 2007, p 953)

The most vulnerable groups are elderly, very young, people with existing respiratory conditions ((WSROC 2007 p 41) and pregnant women and foetal health.

(1) Evidence of health impacts on health of pregnant women and foetal health

Particulate matter: Data has shown that an increase in 10 µg/m³ of particle concentration (PM₁₀) is associated with about 5% increase in post-neonatal mortality for all causes and around 22% for post-neonatal mortality for respiratory diseases. (Lacasana et al 2004 p183; Sram et al 2005, p 375). Possible exposure to total suspended particles (TSP) late in pregnancy to PM increased the risk of pre-term delivery. (OR 1.10 per 100µg/m³ increase in TSP; CI 1.01-1.20) (Maisonet et al 2004 p108). Associations found between intrauterine

growth restriction and an increase in TSP during the early stages of pregnancy. (Maisonet et al 2004 p110-111). Particulates seem the most important for infant deaths. (Sram et al 2005 p 375) First trimester PM_{2.5} exposure of > 18.4ug/m³ increases the risk of small for gestational age by 26% and similarly for second trimester increases the risk by 24%. (Ghosh et al 2007 p400) Increase risk of PTB by 10% for each 100ug/m³ increase in TSP. (Ghosh et al 2007 p401) Exposure to PM₁₀ and O₃ during first trimester was associated with risk of PTB. (Hansen et al 2006a, p 935)

NO_x: Possible increase risk of pre-term delivery with exposures occurring during first trimester or third trimester (Maisonet et al 2004 p108; Ghosh et al 2007 p401)). Associations found between intrauterine growth restriction and an increase in NO_x during the third trimester of pregnancy. (Maisonet et al 2004 p110-111).

CO: Associations found between intrauterine growth restriction and an increase in CO during the first and last trimesters of pregnancy. (Maisonet et al 2004 p110-111). Average 3 month exposure to CO >5.5 ppm was found to increase risk of LBW. (Ghosh et al 2007 p400)

SO₂: Increase risk of low birth weight (OR 1.10 per 50ug/m³ increase; 95% CI, 1.01-1.20) Maisonet et al 2004 p108). An increased risk of very low birth weight (OR 2.88; CI 1.16-7.13) at high levels of exposure to SO₂ and total suspended particles (>56.75 versus <9.94ug/m³) Maisonet et al 2004 p108). Possible increase in pre-term with exposures during last week of pregnancy. Associations found between intrauterine growth restriction and an increase in SO₂ at different stages of pregnancy. (Maisonet et al 2004 p110-111). Increase risk of PTB by 26% for each unit increase of SO₂ (logarithmic scale) (Ghosh et al 2007 p401)

Ozone: Associations found between intrauterine growth restriction and an increase in O₃ during the third trimester pregnancy. (Maisonet et al 2004 p110-111). Exposure to PM₁₀ and O₃ during first trimester was associated with risk of PTB. (Hansen et al 2006a, p 935)

The currently available evidence is compatible with either a small adverse effect of particulate air pollution on foetal growth and duration of pregnancy or with no effect. (Glinianaia et al 2004, p 36)

There was some evidence to suggest that the effect of air pollution on LBW is differential by gender, with females being at higher risk. Males are at higher risk of PTB. (Ghosh et al 2006, p400) Although some studies showed associations between exposure to above air pollutants and LBW, several studies showed no association. However, overall the evidence suggests an association between exposure to air pollution and adverse pregnancy outcomes. (Ghosh et al 2007 p401)

A study in Brisbane concluded that there was no strong evidence that low level ambient air pollution during pregnancy is associated with sub-optimal fetal growth. (Hansen et al 2006, p 383) However, in the same study the same author concluded that maternal exposure to low levels of ambient air pollution is associated with PTB. (Hansen et al 2006a p 935)

Positive health impacts-The strategy has potential by reducing maternal exposure to low levels of ambient air pollution to reduce the occurrence of PTB and LBW babies.

Negative health impacts-Strategies should ensure that there is a focus on the populations most affected by issues of air quality due to the location of their residence or work environments for example those that live near main roads or major industry.

Scale of health impact (severity of impact)-Potentially high – however this depends upon the level of ambient air pollution in the Lithgow area. (Yet to be researched).

Size of health impact (how many in the population affected)-Potentially all pregnant mothers and babies born in Lithgow, however there may be increased impacts on those mothers who live in close vicinity to main roads or polluting industries during their pregnancy and therefore are exposed to higher levels of pollutants.

Short-term health impact-Exposure to air pollutants has been shown to increase by 5% post-neonatal mortality for all causes and around 22% for post-neonatal mortality for respiratory diseases. (Lacasana et al 2004 p183; Sram et al 2005, p 375))

Long term health impact-LBW and PTB has long term health implications for the health of the child and into adult hood. They are....

Overall assessment of health impact-Improving ambient air quality in the Lithgow LGA will reduce the numbers of pre term and low birth weight babies born to residents of the area.

Intervention evidence suggests establishing a monitoring project of ambient air quality for assessment against the *Ambient Air Quality National Environmental Protection Monograph* with particular focus at sampling locations close to main roads and/or industry. Available at: http://www.ephc.gov.au/nepms/air/air_nepm.html

(2) Evidence of health impacts on children -

Particulate matter: Association between PM10 concentrations and Dr visits for asthma in primary school children with a history of wheeze. (Jalaludin et al 2002 p 32) Increased ambient levels of particulates and ozone have been reported to precipitate symptoms of asthma, increase emergency department visits and hospitalisations for asthma. (Keeler et al 2002,174) PM10 and PM2.5 generated by vegetation fires were significantly associated with onset of asthma symptoms in children with asthma resulting in commencing oral steroid medication, mean daily symptom count and reliever medication. However no association was found for more severe outcomes of asthma attacks, increased health care attendances or missed school work days. (Johnston et al 2006, abstract)

NOx: Association between NOx concentration and the prevalence of wet cough in primary school children with a history of wheeze. (Jalaludin et al 2002 p 32) Sources of NOx can potentiate reactivity in persons with asthma.

Nox have been identified as lower respiratory tract irritants associated with respiratory symptoms . The most important source of NOx is motor vehicle exhausts. (Ciuk et al 2001, p 433)

SO2: May exacerbate respiratory disease including in children with asthma. (WSROC, 2007, p 41)

CO: May exacerbate respiratory disease including in children with asthma. (WSROC, 2007, p 41)

Ozone: No association with O3 concentrations and respiratory symptoms, asthma medication use and Dr visits. (Jalaludin et al 2002 p 362) Moderate levels of ambient ozone have an adverse effect on children with a history of wheezing and this effect is larger in children with bronchial hyper-reactivity and a doctor diagnosis of asthma. (Jalaludin et al 2000, p 549) Increased ambient levels of particulates and ozone have been reported to precipitate symptoms of asthma, increase emergency department visits and hospitalisations for asthma. (Keeler et al 2002,174)

Particle concentrations, NO_x and CO are significantly associated with respiratory diseases, COPD, pneumonia, asthma and CVD hospitalisations for people <15 years of age and >65 years of age. (Hinwood et al 2006 abstract)

Positive health impacts-The strategy has potential, by reducing children's exposure to low levels of ambient air pollution, to reduce the occurrence asthma and other respiratory symptoms.

Negative health impacts-Strategies should ensure that there is a focus on the populations most affected by issues of air quality due to the location of their residence, or school environments for example those that live near main roads or major industry.

Scale of health impact (severity of impact)-Potential high - Depend upon levels of childhood asthma in Lithgow = ?

Size of health impact (how many in the population affected)-Potentially large – given levels of hospitalisation for childhood asthma in Lithgow.

Short-term health impact-Reduction in child hood asthma symptoms, presentations to GPs and hospitalisations as a result of air pollutants.

Overall assessment of health impact-Improving ambient air quality in the Lithgow LGA will reduce the prevalence of children with asthma symptoms as a result of air pollution.

Intervention evidence- Exposure of school children to CO – travel by car resulted in higher journey exposures to CO concentrations than walking – however results depended on the duration of the journey and the routes selected. The effect of journey exposure on an 8 hr mean for CO exposure was insignificant because of the relatively short journey times, however short term peaks during journeys to school may be more significant for other pollutants such as NO_x) (Ashmore et al 2000, p 50)

Airborne particulates from bushfires should be considered as injurious to human health as those from other sources. The control of smoke pollution from bushfires in urban areas presents an additional challenge for managers of fire prone landscapes. (Johnston et al 2002, abstract)

Indoor air quality has a significant impact on public health particularly among children and the poor. Education strategies, information dissemination on risks, and simple interventions (Wu et al 2007, p 953)

(3) Evidence of health impacts on aged residents

Particulates: Increases in outdoor concentrations of CO, NO₂ and particulates have significant associations with increases in cardiovascular admissions for adults especially the elderly ≥65 years of age below normal air quality health guideline levels. (Barnett et al 2006, p1018) Increased risk of deaths brought forward from in older people. (WSROC 2007, p41) For areas with high sources of PM_{2.5} from wood heaters have shown an estimate of 6% increased mortality for each additional 10 µg/ m³ of PM_{2.5}. (Robinson et al 2007 abstract) A increase of 4% in hospital admissions was associated with an increase of 10 µg/ m³ in PM₁₀ with the relationship stronger in areas with heavy traffic. The spatial variation within a city needs to be considered when the health impact of air pollution is assessed. (Chen et al 2007 abstract) Significant effects on total mortality and respiratory mortality. (Simpson et al 2005, abstract) Significantly associated with increased use of hospital services (Wilson et al 2004 abstract)

SO₂: Causes throat irritation and upper respiratory tract infections in people with respiratory disease. (WSROC 2007 , p41) Significantly associated with increased use of hospital services (Wilson et al 2004 abstract).

CO: For a 0.9 ppm increase in CO there were significant increases in elderly hospital admissions for total cardiovascular disease (2.2%), all cardiac disease (2.8%), cardiac failure (6%), ischaemic heart disease (2.3%) and myocardial infarction (2.9%). (Barnett et al 2006, p1018) There is evidence that air pollutants may trigger fibrillation in people with a history of serious arrhythmia. ((Barnett et al 2006, p1022)

NO_x: Increases in outdoor concentrations of CO, NO₂ and particulates have significant associations with increases in cardiovascular admissions for adults especially the elderly >=65 years of age below normal air quality health guideline levels. (Barnett et al 2006, p1018) Significant effects on total mortality and respiratory mortality. (Simpson et al 2005, abstract) Significantly associated with increased use of hospital services (Wilson et al 2004 abstract)

Ozone: Eye and throat irritation, reduced capacity to exercise and exacerbation of respiratory disease. (WSROC 2007 , p41) Significantly associated with increased use of hospital services (Wilson et al 2004 abstract)

The associations found for CO, NO₂ and PM are not additive but probably refer to the impacts of a particular pollutant mix. (motor vehicle exhausts). (Barnett et al 2006, p1022)

Particle concentrations, NO_x and CO are significantly associated with respiratory diseases, COPD, pneumonia, asthma and CVD hospitalisations for people <15 years of age and >65 years of age. (Hinwood et al 2006 abstract)

Positive health impacts-The strategy has the potential, by reducing the exposure of the elderly population to low levels of ambient air pollution, to reduce the levels of hospital admissions for cardio-respiratory disease, upper respiratory tract irritations and infections and total mortality and respiratory mortality for this section of the population.

Negative health impacts-Strategies should ensure that there is a focus on the populations most affected by issues of air quality due to the location of their residence, or social environments for example those that live near main roads or major industry.

Scale of health impact (severity of impact)-Potentially high - Depends upon level of respiratory disease in Lithgow elderly population

Size of health impact (how many in the population affected)- Potentially large - Depends upon level of respiratory disease in Lithgow elderly population

Short-term health impact- Reduction of symptoms and mortality from respiratory disease in the elderly population.

Long term health impact- Increase life expectancy of elderly population

Overall assessment of health impact-Improving ambient air quality in the Lithgow LGA will reduce the prevalence of respiratory morbidity and mortality in the elderly population as a result of air pollution.

(4) Evidence-of health impacts on Aboriginal and Torres Strait Islanders

Poor living environments have been highlighted as key to respiratory ill-health among Australian aborigines. Non-urban residence was associated with a reduction lung function in Aboriginal children. Antenatal factors may have influenced lung development the greater influence of poor living conditions and infections overrides any detectable effects of antenatal factors in this population. Improved living conditions and better treatment of childhood respiratory infections and asthma may be the most effective way to improve childhood lung function and to reduce the burden of respiratory disease and its consequences on Aboriginal adults. (Bucens et al 2006, p 452) Note: Study was conducted with Northern Territory Aboriginal Children aged 8-14 years.

Indigenous kindergarten children had more recent wheeze and parent reported asthma than non-indigenous children in a study conducted in the ACT in 2000 and 2001. Indigenous children were however exposed to higher levels of ETS. (Glasgow et al 2003 p 534)

Respiratory morbidity and mortality are much greater for Australians of Aboriginal descent than for Australians of European decent. Hospital data indicate that acute infections account for most of this excess morbidity and mortality with much higher rates of chronic obstructive airway disease and bronchiectasis as well as more frequent lower respiratory tract symptoms and lower levels of lung function. (Verheijden et al 2002, p 247) No pollutant exposure was assessed however exposure to ETS, HDM allergens, and/or bacterial infections most likely account for some of the differences.

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Positive health impacts-Improvements to indoor air quality may have a greater positive impact on Aboriginal and Torres Strait Islander populations such as reducing ETS, HDM allergens, mould and issues of overcrowding. However, as discussed for previous vulnerable populations high levels of air pollutants such as NOx, particulates and CO to increase the prevalence of respiratory morbidity and mortality rates.

Negative health impacts-Strategies should ensure that there is a focus on the populations most affected by issues of air quality due to the location of their residence, or work environments for example those that live near main roads or major industry. Attention should be focused to ensure that inequalities are not increased.

Scale of health impact (severity of impact)-Potentially high

Size of health impact (how many in the population affected)-Low - Small population within Lithgow.

Short-term health impact-Reduction of symptoms and mortality from respiratory disease in the Aboriginal and Torres Strait Islander population.

(5) Evidence-of health impacts on Socio Economic disadvantaged population

Socio economically disadvantaged populations have higher rates of chronic respiratory diseases especially asthma rates as well as their associated risk factors, including smoking and environmental exposures including from poor housing and air pollution. Other factors which also have an impact include economic factors (taxation, social security) work environments, urban design and educational achievements and early childhood development. (Glover et al 2004 p 5)

There is continuing concern that minority and economically disadvantaged populations bear a disproportionate share of environmental exposures and related illnesses.

Ambient air pollutants are known to contribute to various respiratory problems including bronchitis, emphysema, and asthma. Asthma prevalence is an important environmental health measure as exacerbation of asthma, asthma prevalence, and asthma hospitalisation rates have been linked to air pollution. Asthma mortality also reflects the influence of socioeconomic factors that also contribute to health disparities such as access to health care and effective preventative medical therapy (Payne-Sturges, et al 2006 p 160) Note: this is a US study.

There remains a disproportionately higher prevalence of harmful environmental exposures, particularly air pollution, for populations that reside in urban settings, have low socio-economic status and ethnic minorities. (ALA, 2001)

Positive health impacts-

As discussed for previous vulnerable populations reductions in ambient levels of air pollutants such as NO_x, particulates and CO will reduce the prevalence of respiratory morbidity and mortality rates.

Improvements to indoor air quality may have also have a positive impact on socio economically disadvantaged populations such as by reducing ETS, HDM allergens, and exposure to mould.

Negative health impacts-Strategies should ensure that there is a focus on the populations most affected by issues of air quality due to the location of their residence, or work environments for example those that live near main roads or major industry. Attention should be focused to ensure that inequalities are not increased.

Scale of health impact (severity of impact)-Potentially high

Size of health impact (how many in the population affected)-potentially high

Short-term health impact-

Reduction of symptoms and mortality from respiratory disease in socio economically disadvantaged population.

Overall assessment of health impact-

Improving ambient air quality in the Lithgow LGA will reduce the prevalence of respiratory morbidity and mortality in the socio economically disadvantaged population as a result of air pollution.

(Intervention evidence- Strategies to improve the home environment will also make an impact. (Wu et al 2007)

<p>E6 – Protecting and improving our water quality E8 – Securing the community access to water</p>
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(Health impacts evidence-

Protecting and improving water quality and securing the communities access to water are undeniably linked.

There is well documented evidence that disease outbreaks from reticulated drinking water supplies remain a risk that could be better managed and prevented in affluent nations. There have been over 70 case studies of disease outbreaks associated with drinking water in 15 affluent nations over the past 30 years. (Hrudey et al 2006, p 948)

An estimated 2,300 people became seriously ill and seven died from exposure to microbially contaminated drinking water in the town of Walkerton, Ontario, Canada in May 2000. The organisms involved were *Escherichia coli* 0157:H7 and *Campylobacter jejuni* although other pathogens were likely to have been present. (Hrudey et al 2003, p7)

Drinking water can be contaminated with a wide range of disease causing microorganisms such as *Giardia*, *Cryptosporidium*, *Salmonella*, *Shigella*, *Campylobacter*, some strains of *E.coli*, cyanobacteria (blue green algae), Rotavirus, Noravirus and Hepatitis A virus as well as many others. Most of these cause diarrhoea, vomiting and other gastrointestinal upsets. Some of them can also lead to more serious illnesses and even death. The people most at risk from unsafe water are those with weakened immune systems and those that are elderly or very young. (NSW Health 2007 p 4)

Options to reduce water demand by increasing reuse and recycling also have potential to improve the quality of the drinking water supply by reducing the amount of contaminants in runoff entering surface waters throughout the catchment. Options such as recycling effluent, greywater reuse, improving on site sewage management, and stormwater harvesting and reuse can all contribute.

Recycled water can be treated to a very high quality, however if not correctly managed; exposure to recycled water has the potential to adversely impact on the health of people and the environment. Humans can be exposed to recycled water through ingestion, inhalation and by contact with the skin. . (DWE 2007)

Greywater reuse at the individual dwelling is becoming a more accepted practice. Greywater can include laundry and bathing wastewater, and kitchen wastewater (with a

higher level of treatment required) Concentrations of microbial and chemical hazards in greywater vary a great deal depending upon human behavior and individual control of materials discharged into the wastewater. Microbial control depends upon the level of faecal matter disposed via washing nappies or other types of soiled clothing. Chemical quality depends upon the products such as shampoos, oils, grease, garden chemicals and solvent detergents disposed of into the greywater. (NRMMC and EPHC, 2006, p 115)

On site sewage management of domestic sewage and wastewater is an important consideration for the health of communities, and the environment. All types of domestic liquid waste are potentially highly infectious, particularly as bacterial numbers, including pathogens, in septic tank effluent have multiplied to roughly ten times that found in raw sewage. Surcharging effluent from a failed absorption trench is a public health risk to the occupants of the premises and the greater community. In order to protect public health, people must not come into either direct contact with untreated wastewater or via facilitated transmission through vectors such as vermin and rodents. Onsite sewage can also feed into local stormwater runoff creating a diffuse source of pollution into local creeks and waterways.

Stormwater is now recognized as a valuable resource rather than a nuisance to be disposed of. However there is the potential for stormwater destined for reuse to pose a public health risk. Risks can be reduced by treating and disinfecting the harvested stormwater and/or limiting public access for some applications.

Inflows of stormwater runoff to surface water bodies by increasing turbidity from suspended soil particles eroded from the landscape are associated with elevated concentrations of bacteria, *Giardia* and *Cryptosporidium* and other microorganisms. (Gaffield et al 2003, p 1527) Aspects of stormwater quality which can have an impact on public health and/or the health of the environment also include turbidity, pH, heavy metals, salts, nutrients and pesticides. (DEC 2006a)

Surface waters used for swimming and other forms of recreation that are contaminated by urban runoff have been associated with numerous cases of illness including ear and eye discharges, skin rashes and gastrointestinal problems. Consumption of seafood from contaminated waters is linked to diarrheal and paralytic illnesses caused by hepatitis A, and Norwalk viruses, *Vibrio* species and marine biotoxins from algal blooms. (Gaffield et al 2003, p 1527)

Excess nitrogen from urban and agricultural sources exacerbates harmful algal blooms. Major sources of nitrogen include fertilizers, vehicle exhausts and septic systems.

An integrated urban stormwater harvesting systems should be able to provide five core functions: a) collection, b). treatment, c). storage, d). flood and environmental flow protection and e). distribution to end users. Additional functions such as aesthetic and recreational benefits can also be provided whenever practicable. (Mitchell et al 2007, p 135-144)

Community Action: Research into the community acceptability of domestic water management showed that the community receptivity for both rainwater collection and greywater reuse was highest for external uses such as watering gardens and flushing toilets, and progressively decreased with increasing personal contact. Receptivity to

greywater reuse fell more rapidly with the community believing there was a higher health risk associated with its use than rainwater. (Brown and Davies, 2007 p 283)

Positive health impacts-Protecting and improving drinking water quality using a preventative risk management approach will reduce the likelihood of outbreaks of illness occurring in the Lithgow community.

Protecting and sustaining the water catchments using WSUD principles will increase water quality of the source waters and also help secure the community water supply by reduce the demand on the potable drinking water supply.

Negative health impacts-The two reticulated water supplies within the Lithgow LGA have different issues relating to their water quality. Strategies using a preventative risk management approach should ensure that there is a focus on the populations most affected by issues of poor water quality due to their location on the reticulated water supply system.

Townships not currently connected to the reticulated supply should be assisted through education and advice on protecting and maintaining their water supplies.

An increase in reuse and recycling of water needs to be managed appropriately to ensure that additional public health risks are not created.

Scale of health impact (severity of impact)-Potentially large impact

Size of health impact (how many in the population affected)-Potentially large impact

Short-term health impact-Contamination of a water supply with microorganisms has the potential to cause serious outbreaks of illness affecting a large proportion of the community and in extreme cases causing death. The population groups most at risk are immuno-compromised people, the elderly and the young.

Long term health impact-Contamination of a water supply with chemicals has the potential to cause longer term health impacts.

Overall assessment of health impact-Adopting a preventative risk based approach to managing water supply systems is the best method of ensuring safe drinking water is supplied to consumers. (Rizak et al 2003, p 31)

Premises such as caravan parks, and other small businesses with small private water supplies should also be encouraged to adopt a risk management approach to managing their water supplies.

Education should be provided to private residences that rely on their own water supply of the risks and preventative measures that can be taken to ensure a safe water supply.

Intervention evidence- The most effective means of assuring drinking water quality and the protection of public health is through adoption of a preventive risk management approach that encompasses all steps in water production from catchment to consumer. (NHMRC 2004, p 2-1) Water treatment systems using a multiple barrier risk

management approach to managing the water supply should assure safe drinking water is provided to consumers.

The NHMRC Community water planner is an application available on CD ROM from the NHMRC. It is a tool that is designed to allow water supply managers or local state/territory agencies project with local operators to prepare a tailored Drinking Water Risk Management Plan for their individual water supplies. The management plan produced will be directly applicable to the specific water supplies of the community. (NHMRC 2005)

Protection of the water catchment is the first barrier to protecting a drinking water supply. An example of an integrated water cycle plan has been undertaken by Eurobodalla Council, involving auditing and summarizing key water cycle issues and suggesting potential control measures. (Schneider et al 2003 p91)

Recommendations included:

- Encouragement of installation of rainwater tanks at residences within townships supplied by reticulated water.
- Increased treatment of sewage effluent to produce higher quality effluent for reuse, option could be to investigate third party access e.g. sewer mining opportunities by industry to reduce usage of the potable supply.
- Water supply demand management to encourage residents to reduced their potable water demand.

Benefits include:

- Reduction in potable water consumption
- Improved security of supply
- Reduced impacts from stormwater runoff
- Reduction in stormwater infrastructure requirements
- Reduced sewage volumes
- Reduced potential for sewer overflows
- Decreased environmental and public health impacts
- Increased potential for high value reuse (Schneider et al 2003 p91)

Local councils can use the development planning process to prevent impacts on water quality and improve catchments health by:

- Recognising the community's values for waterways in LEPs
- Assessing the current condition of waterways
- Identifying significant risks to water quality
- Identifying zones that protect river corridors, wetlands and sensitive landscapes
- Planning for higher risk developments
- Setting benchmarks for design and best practice. (DEC 2006)
- Incorporating an integrated urban stormwater harvesting system where appropriate (Mitchell et al 2007, p 135-144)

A strategic approach to on site sewage management planning will facilitate the long-term sustainable use of residential land and will ensure that the cumulative and site-specific effects of wastewater are thoroughly assessed and managed. (DLG 1998)

Water sensitive urban design incorporates the principles of waterway health, pollution prevention and treatment, and utilizing harvesting and reuse approaches. (Brown 2005, p 461) Community design has a major effect on stormwater volumes and quality, as well as treatment methods and costs. Best management practices can reduce but not eliminate pollutant loadings of common stormwater pollutants. Protecting public health by reducing urban stormwater runoff and associated diffuse pollutant sources makes sense as a complement to water treatment infrastructure and health care interventions. (Gaffield 2003,p 1529) The use of ponds and wetlands allow contaminants to settle out of the water or be broken down by sunlight and biological activity.

Evidence suggests that Lithgow City Council and relevant stakeholders should incorporate water sensitive urban design principles by

- Reducing the use of impervious surfaces when designing communities
- Increasing surfaces that drain directly to vegetated areas
- Using appropriately designed constructed surface water treatment ponds or wetlands for stormwater storage and treatment.

References

HIA Report references

1. Enhealth, Health Impact Assessment Guidelines, September 2001. http://enhealth.nphp.gov.au/council/pubs/pdf/hia_guidelines.pdf
2. Epidemiology Unit, SWAHS Diabetes Report, 2007. Sydney West Area Health Service.
3. Epidemiology Unit, SWAHS Health Profile, 2006. Sydney West Area Health Service.
4. Fung, S; Achat, H and Close, G. 2005. Cross-sectional view of health indicators: the new Sydney West Area Health Service. Epidemiology, Sydney West Area Health Service.
5. Hall, P; Roxas-Hall, B Hall P et al (2007) Health Impact Assessment: A practical Guide. CHETRE, University of NSW.
6. Harden, Angela; Thomas, James. Methodological Issues in Combining Diverse Study Types in Systematic Reviews. *International Journal of Social Research Methodology: Theory and Practice*. Vol 8(3) Jul 2005, 257-271.
7. Harris, P., Harris-Roxas, B., Harris, E., and Kemp, L. Health Impact Assessment: A Practical Guide, Sydney: Centre for Health Equity Training, Research and Evaluation (CHETRE). Part of the UNSW Research Centre for Primary Health Care and Equity, UNSW.
8. Last, J. M. (1995). *A Dictionary of Epidemiology*, 3rd edition. New York: Oxford University Press.
9. Leech, Nancy L; Onwuegbuzie, Anthony J. An array of qualitative data analysis tools: A call for data analysis triangulation. *School Psychology Quarterly*. Vol 22(4) Dec 2007, 557-584.
10. Lithgow City Council's Social Plan. A social plan for the Lithgow LGA 2006-2011, 2006. Lithgow City Council.
11. Mahoney M, Morgan R. Health Impact Assessment in Australia and New Zealand: An exploration of methodological concerns. *International Journal of Health Promotion and Education* 2001; 8(1): 8–11.
12. Nathanielsz P and Thornburg, KL. 2003. Fetal programming: from gene to functional systems - an overview. *J Physiol* (2003), 547.1, pp. 3-4
13. Our Place, Our Future. Lithgow City Council's Strategic Plan Results of Community Engagement, 2006. . Lithgow City Council.
14. Our Place, Our Future. Lithgow City Council's Strategic Plan. June 2007. Lithgow City Council.
15. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. The definition of health has not been amended since 1948. <http://www.who.int/suggestions/faq/en/index.html>
16. Public Health In NSW Local Government :Summary Results Of Local Government Public Health Survey. 2005. Local Government And Shires Associations By The NSW Department For Health.
17. WHO Library Cataloguing in Publication Data. Social determinants of health: the solid facts. 2nd edition / edited by Richard Wilkinson and Michael Marmot.

Health references

1. Agency for Healthcare Research and Quality, 2004. *Evidence Report/Technology Assessment* Number 87. Literacy and Health Outcomes. U.S. Department of Health and Human Services, January.
2. Andres RL, Day MC. Perinatal complications associated with maternal tobacco use. [Review] [89 refs] [Journal Article. Review] *Seminars in Neonatology*. 5(3):231-41, 2000 Aug.
3. Aslam H, Kemp L (2005). Home visiting in South West Sydney. CHETRE NSW.
4. Australian Bureau of Statistics (ABS) (2006 Census). Canberra, ACT: ABS.
5. Baldo MH. The antenatal care debate. [Review] [43 refs] [Journal Article. Review] *Eastern Mediterranean Health Journal*. 7(6):1046-55, 2001 Nov
6. Baldwin LM, Larson EH, Connell FA, Nordlund D, Cain KC, Lawrence Cawthon M, et al. The effect of expanding Medicaid prenatal services on birth outcomes. *Am J of Public Health*. 1998; 88:1623–1629.
7. Bate, Katherine L and Jerums, George. MJA Practice Essentials — Endocrinology- Preventing complications of diabetes. *MJA* 2003; 179 (9): 498-503.

8. Boocock (1995). Early Childhood Programs in other Nations: Goals and Outcomes. In the future of children, Vol 5 (3): 94-115.
9. Baum F. 1999 Social Capital: is it good for your health? Issues for a public health agenda. *J Epidemiol CommunHlth*, 53(4).
10. Centre for Epidemiology and Research. NSW Department of Health. New South Wales, Mothers and Babies 2005. *N S W Public Health Bull* 2007; 18(S-1).
11. Centre on the Developing Child at Harvard University (2007). A Science-Based Framework for Early Childhood Policy: Using Evidence to Improve Outcomes in Learning, Behaviour, and Health for Vulnerable Children. <http://www.developingchild.harvard.edu>.
12. Cottrell EC, Ozanne SE. Developmental programming of energy balance and the metabolic syndrome. [Review] [104 refs] [Journal Article. Review] *Proceedings of the Nutrition Society*. 66(2):198-206, 2007 May.
13. Davis J (2007). Climate change and its impact on young children. Queensland University of Technology
14. http://www.earlychildhoodaustralia.org.au/resource_themes/sustainability_global_warming_and_climate_change/climate_change_and_its_impact_on_young_children.html.
15. Eriksson JG. Epidemiology, genes and the environment: lessons learned from the Helsinki Birth Cohort Study. [Review] [63 refs] [Journal Article. Review] *Journal of Internal Medicine*. 261(5):418-25, 2007 May.
16. Ewan C, Young A, Bryant E, Calvert D (1994) National Framework for Environmental and Health Impact Assessment. NHMRC Australia.
17. Farrar E, Goldfeld S, Moore T (2007). School Readiness. Australian Research Alliance for Children and Youth Melbourne.
18. Fiscella, K. (1995). Does prenatal care improve birth outcomes? A critical review. *Obstetrics and Gynecology*, 85, 468-479. [
19. Fowler EB, Breault LG, Cuenin MF. Periodontal disease and its association with systemic disease. [Review] [63 refs] [Journal Article. Review] *Military Medicine*. 166(1):85-9, 2001 Jan.
20. Green, Health Literacy: Terminology and Trends in Making and Communicating Healthrelated Information. *J. Health Issues* 2007, Number 92, pp. 11–14.
21. Guralnik JM, Fried LP, Salive ME. Disability as a public health outcome in the ageing population. [Review] [98 refs] [Journal Article. Review] *Annual Review of Public Health*. 17:25-46, 1996
22. Guyer, B., Strobino, D., Ventura, S., MacDorman, M., and Martin, J. (1996). Annual summary of vital statistics-1995. *Pediatrics*, 98, 1007-1019.
23. Hawe, P, Degeling, D. and Hall, J., (1990) Evaluating Health Promotion: A Health Workers Guide, MacLennan and Petty Publishers, Sydney.
24. Heckman J (2000). Invest in the very young. Ounce of Prevention Fund and University of Chicago USA.
25. Herron, M., Katz, M., and Creasy, R. (1982). Evaluation of a preterm birth prevention program: A preliminary report. *Obstetrics and Gynecology*, 59, 442-445.
26. Hodnett ED, Fredericks S. Support during pregnancy for women at increased risk of low birthweight babies.[update of Cochrane Database Syst Rev. 2000;(2):CD000198; PMID: 10796178]. [Review] [49 refs] [Journal Article. Review] *Cochrane Database of Systematic Reviews*. (3):CD000198, 2003.
27. Institute of Medicine, 2004. *Health literacy: A prescription to end confusion*. National Academies Press, 500 Fifth St. NW, Washington, DC 20001.
28. Kemp L, Anderson T, Bellingham K, McIntyre L, Clark T, Harris E (2004). Linking in: building partnerships for families in disadvantaged communities. CHETRE NSW.
29. Leder, K; Sinclair, M; and McNeil, J (2002). Water and the environment: a natural resource or a limited luxury? *MJA* 2002 177 (11/12): 609-613.
30. Lumley J, Oliver SS, Chamberlain C, Oakley L. Interventions for promoting smoking cessation during pregnancy.[update of Cochrane Database Syst Rev. 2000;(2):CD001055; PMID: 10796228]. [Review] [165 refs] [Journal Article. Meta-Analysis. Review] *Cochrane Database of Systematic Reviews*. (4):CD001055, 2004.
31. Malamitsi-Puchner A. Perinatal mortality related to low birth weight. [Journal Article] *European Journal of Obstetrics, Gynecology, and Reproductive Biology*. 41(1):23-4, 1991 Aug 20.

32. Manton KG. Future trends in chronic disability and institutionalization: implications for long-term care needs. [Review] [68 refs] [Journal Article. Review] *Health Care Management.* 3(1):177-91, 1997
Jun.NSW Health. www.fluoridenow.com.au
33. McCain, Mustard and Shanker (2007). Early Years Study 2: Putting Science into Action. Council for Early Child Development. Canada.
34. Merriman, Betty, *CA: A Cancer Journal for Physicians*, May/June 2002.
35. NSW Physical Activity Taskforce. Simply active everyday: a plan to promote physical activity in NSW, 1998-2002. Sydney: NSW Health 1998.
36. Physical Disability Council of Australia Ltd (PDCA) ,P O Box 77, Northgate Qld 4013, Telephone: 07 3267 1057, Fax: 07 3267 1733, Email: pdca@pdca.org.au, www.pdca.org.au.Queensland Government
http://www.transport.qld.gov.au/Home/Projects_and_initiatives/Projects/Land_use_public_transport_accessibility_index/
37. Reyes L. Manalich R. Long-term consequences of low birth weight. [Review] [56 refs] [Journal Article. Review] *Kidney International - Supplement.* (97):S107-11, 2005 Aug.
38. Rudd, R., Anderson, J., Nath, C. and Oppenheimer, S. 2007, 'Health literacy: An update of medical and public health literature', in Review of Adult Learning and Literacy, J. Comings, B. Garner and C. Smith (eds.), National Centre for the Study of Adult Learning and Literacy, Vol. 7, Chapter Six.
39. Schillinger, Dean, *JAMA*, July 24/31, 2002.
40. Silins, J.Robert M. Semenciw, Howard I. Morrison, Joan Lindsay, Greg J. Sherman, Yang Mao, and Donald T. Wigle. Risk factors for perinatal mortality in Canada. *Can Med Assoc J.* 1985 December 15; 133(12): 1214-1219
41. SCRGSP (Steering Committee for the Review of Government Service Provision, 2007. Overcoming Indigenous disadvantage key indicators 2007. Productivity Commission Canberra.
42. Submissions/00290 at <http://www.health.sa.gov.au/generational-health-review/documents/Submissions/00290.pdf>
43. The Children's Hospital at Westmead, Sydney Children's Hospital, Randwick and Kaleidoscope, Hunter Children's Health Network (2007). Tooth Development Fact Sheet. Sydney. <http://www.chw.edu.au/parents/factsheets/toothdej.htm>.
44. Thompson, Nichola M; Norman, Amy M; Donkin, Shawn S; Shankar, Ravi R.; Vickers Mark H; Miles, Jennifer L and Breier, Bernhard H. Prenatal and Postnatal Pathways to Obesity: Different Underlying Mechanisms, Different prenatal outcomes. *Endocrinology.*2007; 148: 2345-2354.
45. Triche EW. Hossain N. Environmental factors implicated in the causation of adverse pregnancy outcome. [Review] [24 refs] [Journal Article. Review] *Seminars in Perinatology.* 31(4):240-2, 2007 Aug.
46. UK Health Education Authority. Transport and Health: a briefing paper for health professionals and local authorities. London: Health Education Authority; 1998.
47. UNEP, UNICEF, WHO (2002). Children in the new millennium, environmental impact on health.
48. Villar J. Carroli G. Khan-Neelofur D. Piaggio G. Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy.[update of Cochrane Database Syst Rev. 2000;(2):CD000934; PMID: 10796217]. [Review] [47 refs] [Journal Article. Review] *Cochrane Database of Systematic Reviews.* (4):CD000934, 2001
49. Whittington, V. Results of Local Government Public Health Survey, 2004 p u b l i c h e a l t h i n N S W
l o c a l g o v e r n m e n t.
50. Williams, MV, *Chest*, October 1998.
51. Williams MV, *Archives of Internal Medicine*, January 26, 1998.

Community References

1. Agency for Health Care Research and Quality Report, *Literacy and Health Outcomes* January 2004.
2. AICrime reduction matters, No. 7: The public health approach to crime prevention, 12 August 2003. <http://www.aic.gov.au/publications/crm/crm007.html>
3. AICrime reduction matters No. 13: The role of sport and physical activity programs in crime prevention, 4 November 2003.
4. Ambrose, P. 2002. "Some Way Short of Holism:United Kingdom Urban Regeneration and Non-Housing Outcomes", Queensland Department of Health, Occasional Paper No.8 (2).

5. Barrett, J. and Greenaway, R. (1995). Why Adventure? The Role and Value of Outdoor Adventure in Young People's Personal and Social Development. A Review of Research. The Foundation for Outdoor Adventure.
6. Bingley A., and Milligan, C. (2004) 'Climbing trees and building dens'. Mental health and well-being in young adults and the long-term effects of childhood play experience. Research Report, Institute of Health Research, Lancaster University.
7. Brameld KJ. Holman CD. Demographic factors as predictors for hospital admission in patients with chronic disease. [Journal Article. Research Support, Non-U.S. Gov't] *Australian and New Zealand Journal of Public Health*. 30(6):562-6, 2006 Dec..
8. Brantingham, P.J. & Brantingham, P.L. 1981, "Notes on the geometry of crime", in P.J. Brantingham & P.L. Brantingham (eds), *Environmental Criminology*, Sage, London.
9. Centre for South Australian Economic Studies. 1993. The Impact of Socio-Economic and Locational Disadvantage on Health Outcomes and Cost, Department of Health, Housing, Local Government and Community Service, p.xi.
10. City of Te Tree Gully Ageing Strategy 2001-2011.
<http://www.teatreegully.sa.gov.au/binaries?img=1653&dstypen=html>.
11. Cole-Hamilton, I., Harrop, A. and Street, C. (2001). The Value of Children's Play and Play Provision: A Systematic Review of Literature. N. P. Institute.
12. Dube SR, Felitti VJ, Dong M et al. The impact of adverse childhood experiences on health problems: evidence from four birth cohorts dating back to 1900. *Prev Med* 2003;37:268–77.
13. Elenor, Chris (2006). Provisions for adaptable housing by local government in New South Wales. A report for Shelter NSW. 377 Sussex Street, Sydney NSW 2000. www.sheltersnsw.org.au
14. Ellaway, A and Macintyre, S. 1998. "Does housing tenure predict health in the UK because it exposes people to different levels of housing related hazards in the home and its surroundings", *Health Practice*, June, 4 (2), 141-150.
15. Engelman M. Johnson S. Population ageing and international development: addressing competing claims of distributive justice. [Journal Article] *Developing World Bioethics*. 7(1):8-18, 2007 Apr.
16. Everard, B., Hudson, M., Lodge, G. (2004). Research into the Effect of Participation in Outdoor Activities on Engendering Lasting Active Lifestyles. E. O. Council.
17. Foster, S; Giles-Corti, B; Knuiaman, M . 2006. Perceptions of safety in suburban neighbourhoods: exploring the influence of the physical environment..
18. Freed GL. Fant K. The impact of the 'ageing of America' on children. [Journal Article. Research Support, Non-U.S. Gov't] *Health Affairs*. 23(2):168-74, 2004 Mar-Apr.
19. Fried LP. Freedman M. Endres TE. Wasik B. Building communities that promote successful ageing. [Review] [16 refs] [Journal Article. Research Support, Non-U.S. Gov't. Review] *Western Journal of Medicine*. 167(4):216-9, 1997 Oct..
20. Geason, Susan & Wilson Paul R. 1989, *Designing out crime: Crime prevention through environmental design*, Australian Institute of Criminology, Canberra.
21. Guidelines for School Playgrounds: Playground Safety Management, February 2005.
www.sofweb.vic.edu.au/scln/menu.htm
22. Homel, R; Hauritz, M; and Wortley, R. 1997. Preventing alcohol-related crime through community action: The Surfers Paradise Safety Action Project. Queensland Department of Health in Policing for Prevention: Reducing Crime, Public Intoxication and Injury. Criminal Justice Press.
23. Irwin S. Age related distributive justice and claims on resources. [Review of 44 refs] [Journal Article. Review] *British Journal of Sociology*. 47(1):68-92, 1996 Mar.
24. Jeffery, C. Ray. (1971). *Crime Prevention Through Environmental Design*. Beverly Hills, CA: Sage Publications.
25. Jeffery, C. Ray. (1977). *Crime Prevention Through Environmental Design*. Beverly Hills, CA: Sage Publications.
26. Jeffery, C. Ray. (1990). *Criminology: An Interdisciplinary Approach*. Englewood Cliffs, NJ: Prentice-Hall.
27. Kidd SA. Eskenazi B. Wyrobek AJ. Effects of male age on semen quality and fertility: a review of the literature. [Review] [66 refs] [Journal Article. Research Support, U.S. Gov't, Non-P.H.S. Research Support, U.S. Gov't, P.H.S. Review] *Fertility and Sterility*. 75(2):237-48, 2001 Feb.
28. Lay, E. 1995. Investigation of Factors affecting the Education of Young Children with particular emphasis on Socio-economic Disadvantage, University of Newcastle.

29. Lowy, S. 1990. "Accidents at Home", *BMJ*, Vol 300, 13 Jan, 104-106.
30. Marmot M, Shipley M, Brunner E, Hemingway H. Relative contribution of early life and adult socioeconomic factors to adult morbidity in the Whitehall II study. *J Epidemiol Community Health* 2001;55:301–7.
31. Mayhew, P., Clarke, R.V.G., Sturman, A. & Hough, J.M. (1976). *Crime as opportunity*. London: HMSO.
32. Moore, M. 1995, 'Public health and criminal justice approaches to prevention', in M. Tonry and D. Farrington (eds), *Building a Safer Society. Strategic Approaches to Crime Prevention*, University of Chicago Press, Chicago, pp. 237-62.
33. O'brien, K. Social housing and green space: a case study in Inner London. *Forestry*.2006; 79: 535-551
34. *Open Space: People Space* by Catharine Ward Thompson (Editor), Penny Travlou (Editor). Taylor and Francis Ltd; New Ed edition (15 Jul 2007).
35. Pal L. and Santoro N. Age-related decline in fertility. [Review] [142 refs] [Journal Article. Review] *Endocrinology and Metabolism Clinics of North America*. 32(3):669-88, 2003 Sep.
36. *People places Second Edition Design Guidelines for Urban Open Spaces*. Edited by Cooper Marcus, C and Francis, C. Amazon Publishing.
37. Phibbs, P. (2000) "The Social and Economic Impacts of Unmet Housing Needs", Queensland Department of Housing, Occasional Paper No.4, 14-16. public-housing.qld.gov.au.
38. Rahkonen O, Lahelma E, Huuhka M. Past or present? Childhood living conditions and current socioeconomic status as determinants of adult health. *Soc Sci Med* 1997;44:327–36.
39. Richardson, K. (1999), *Maintenance of Function in Older Persons Project: Final Report-Stage One*, Adelaide: Council on the Ageing (COTA).
40. Semmens, N. (1999) Working bibliography on fear of crime @ 29.07.99 (513 entries). Criminology Institute, Faculty of Law, Sheffield University, UK. <http://usitweb.shef.ac.uk/~lwp98ncs/fearof.htm>
41. Thomas, G and Thompson, G. (2004) *A Child's Place: why environment matters to children*. A Green Alliance/Demos report. www.demos.co.uk .
42. Tinker A. The social implications of an ageing population. Introduction. [Review] [27 refs] [Journal Article. Review] *Mechanisms of Ageing and Development*. 123(7):729-35, 2002 Apr.
43. Tract Consultants Pty Ltd and HM Leisure Planning Pty Ltd . *City of Greater Geelong – Study of Open Space Networks –2007*.
44. Travlou, Penny, 2003. <http://www.openspace.eca.ac.uk/conference/proceedings/PDF/Travlou.pdf>
<http://www.springerlink.com/content/x6p009108857735p/>
<http://www.naturalengland.org/about/board/jun07/060607-NEB P07 21 - Final.pdf>
45. Valentine, G. and McKendrick, J. (1997). "Children's Outdoor Play: Exploring Parental Concerns about Children's Safety and the Changing Nature of Childhood." *Geoforum*, 28(2) 1997, 219-35.
46. Ward Thompson, C., Aspinall, P., Bell, S., Findlay, C., Wherrett, J., and Travlou, P. (2004) *Open Space and Social Inclusion: Local Woodland Use in Central Scotland*. Edinburgh: Forestry Commission.
47. Waters, A. 2001. *Do housing conditions impact on health inequalities between Australia's rich and poor?* Australian Housing and Urban Research Institute, Melbourne, 2001.
48. Welsh BC and Farrington DP 2006. Closed-circuit television surveillance, in Welsh BC and Farrington DP (eds) *Preventing crime: what works for children, offenders, victims, and places*. Dordrecht: Springer: 193-208
49. World Health Organization, *Global Age-Friendly Cities: A Guide*. (2007). WHO Press, Switzerland.
50. World Health Organisation 2002, *World Report on Violence and Health: Summary*, WHO, Geneva.

Transport References

1. World Health Organisation (2006). *Health effects and risks of transport systems: the HEARTS Project*. WHO. Denmark. www.euro.who.int
2. SWAHS (2006). *SWAHS Healthcare Services Plan 2005-2010*. Penrith NSW
3. NSW Health (2007). *Healthy People NSW-Improving the health of the population*. Population Health Division, NSW Health. North Sydney. NSW

4. World Health Organisation (2000). *Healthy Urban Planning- a WHO Guide for Planning for People*. Spon Press on behalf of WHO. London.UK
5. Ewing, R. Kreutzer, R. Frank, L. (2006) *Understanding the Link between Public Health and the Built Environment*. A report prepared for participants in the Leadership in Energy and Environmental Design for Neighbourhood Development [LEED-ND]. LEED-ND Core Committee. USA
6. Kavanagh, P. Doyle, C. Metcalfe, O. (2005) *Health Impacts of Transport- a review*. Institute of Public Health. Ireland
7. Hurni, A. (2006) *Transport and Social Disadvantage in Western Sydney*. Western Sydney Community Forum. Parramatta NSW
8. Emerine, D. and Feldman, E. (2005). *Active Living and Social Equity: Creating Healthy Communities for all Residents. A Guide for Local Governments* International City/Country Management Association [ICMA]. Washington USA
9. Commonwealth Dept. of Health and Ageing (1999) *National Physical Activity Guidelines for Adults*. Australian Government. Canberra ACT

Environment -Air Quality References

1. American Lung Association, 2001, *Urban Air Pollution and Health Inequalities: A Workshop Report, Environmental Health Perspectives*, Vol 109, Supp 3; pp 357-374.
2. Ashmore MR, Batty K, Machin F, Gulliver J, Grossinho A, Elliott P, Tate J, Bell M, Livesley E, Briggs D, 2000, Effects of traffic management and transport mode on the exposure of school children to carbon monoxide, *Environmental Monitoring and Assessment*, Vol 65, pp49-57.
3. Barnett AG, Williams GM, Schwartz J, Best TL, Neller AH, Petroeschevsky AL, Simpson RW, 2006, The Effects of Air Pollution on Hospitalisations for Cardiovascular Disease in Elderly People in Australian and New Zealand Cities, *Environmental Health Perspectives*, Vol 114, No. 7; pp1018-1023.
4. Bucens IK, Reid A, Sayers SM, 2006, Risk factors for reduced lung function in Australian Aboriginal children, *Journal of Paediatrics and Child Health*, Vol 42, pp 452-457.
5. Canterbury District Health Board 2006, *Health Impact Assessment - Greater Christchurch Urban Development Strategy Options*, Public Health Advisory Committee, Canterbury District Health Board. Available at: [http://www.hiaconnect.edu.au/files/HIA_report\(web\).pdf](http://www.hiaconnect.edu.au/files/HIA_report(web).pdf) accessed 16/11/07.
6. Ciuk J, Volkmer RE, Edwards JW, Domestic Nitrogen Oxide Exposure, Urinary Nitrate and Asthma Prevalence in Preschool Children, *Archives of Environmental Health*, Vol 56, No 5, pp433-438. DEC, 1997, State of the Environment Report, Department of Environment and Conservation, Available at: http://www.environment.nsw.gov.au/soe/97/ch1/13_3.htm#Section_1.5.3 accessed 16/11/07.
7. Ghosh R, Rankin J, Pless-Mulloli T, Glinianaia S, 2007, Does the effect of air pollution on pregnancy outcomes differ by gender? A systematic review, *Environmental Research*, Vol 105, pp400-408.
8. Glasgow NJ, Goodchild EA, Yates R, Ponsonby AL, 2003, Respiratory health in Aboriginal and Torres Strait Islander children in the Australian Capital Territory, *Journal of Paediatric Child Health*, Vol 39, pp 534-539.
9. Glinianaia S, Rankin S, Bell R, Pless-Mulloli, T, Howel D, 2004, Particulate Air Pollution and Fetal Health, A systematic review of the epidemiologic evidence, *Epidemiology*, Vol 15, No. 1, pp36-44.
10. Glover JD, Hetzel DMS, Tennant SK, 2004, The socioeconomic gradient and chronic illness and associated risk factors in Australia, *Australian and New Zealand Health Policy*, Vol 1, No. 8.
11. Hansen C, Neller A, Williams G, Simpson R, 2006, Low levels of ambient air pollution during pregnancy and fetal growth among term neonates in Brisbane, Australia, *Environmental Research*, Vol 103, pp 383-389.
12. Hansen C, Neller A, Williams G, Simpson R, 2006a, Maternal exposure to low levels of ambient air pollution and preterm birth in Brisbane, Australia, *BJOG*, Vol 113 pp 935-941.
13. Jalaludin BB, Chey T, O'Toole BI, Smith WT, Capon AG, Leeder SR, 2000, Acute effects of low levels of ambient ozone on peak expiratory flow rate in a cohort of Australian Children, *International Journal of Epidemiology*, Vol 29, pp549-557.

14. Jalaludin BB, O'Toole BI, Leeder SR, 2004, Acute effects of urban ambient air pollution on respiratory symptoms, asthma medication use, and doctor visits for asthma in a cohort of Australian Children, *Environmental Research*, Vol 95, pp32-42.
15. Jalaludin B, Mannes T, Morgan G, Lincoln D, Sheppard V, Corbett S, 2007, Impact of ambient air pollution on gestational age is modified by season in Sydney, Australia, *Environmental Health*, Vol 6, No. 16.
16. Keeler GJ, Dvonch T, Fuyuen YY, Parker EA, Israel BA, Marsik FJ, Morishita M, Barres JA, Robins TG, Brakefield-Caldwell W, Sam W, 2002, Assessment of Personal and Community-Level Exposures to Particulate Matter among Children in Detroit, Michigan, as Part of Community Action Against Asthma (CAAA), *Environmental Health Perspectives*, Vol 110, Supp 2, pp 173-181,
17. Lacasana M, Esplugues A, Ballester F, 2005, Exposure to ambient air pollution and prenatal and early childhood health effects, *European Journal of Epidemiology*, Vol 20, pp183-199.
18. Mannes T, Jalaludin B, Morgan G, Lincoln D, Sheppard V, Corbett S, 2005, Impact of ambient air pollution on birth weight in Sydney, Australia, *Occupational Environmental Medicine*, Vol 62, pp 524-530.
19. Maisonet M, Correa A, Misra D, Jaakkola JJK, 2004, A review of the literature on the effects of ambient air pollution on fetal growth, *Environmental Research*, Vol 95, pp106-115.
20. Payne-Sturges D, Gee GC, 2006, National environmental health measures for minority and low-income populations: Tracking social disparities in environmental health, *Environmental Research*, Vol 102; pp 154-171.
21. Ponsonby AL, Dwyer T, Kemp A, Couper D, Cochrane J, Carmichael A, A prospective study of the association between home gas appliance use during infancy and subsequent dust mite sensitization and lung function in childhood, *Clinical and Experimental Allergy*, Vol 31, pp 1544-1552.
22. Sram R, Binkova B, Dejmek J, Bobak M, 2005, Ambient Air Pollution and Pregnancy Outcomes: A Review of the Literature, *Environmental Health Perspectives*, Vol 446, No. 4, pp375-382.
23. Verheijden MW, Ton A, James AL, Wood M, Musk AW, 2002, Respiratory morbidity and lung function in two Aboriginal communities in Western Australia, *Respirology*, Vol 7, pp247-253
24. WSROC, 2007, Draft Greater Western Sydney Urban Development HIA Assessment Report – August 2007, Western Sydney Regional Organisation of Councils.
25. Wu F, Jacobs D, Mitchell C, Miller D, Karol MH, 2007, Improving Indoor Environmental Quality for Public Health: Impediments and Policy Recommendations, *Environmental Health Perspectives*, Vol 115, No. 6; pp 953-957

Environment- Water Quality References

1. Brown RR, Davies P, 2007, Understanding community receptivity to water re-use: Ku-ring-gai Council case study, *Water Science and Technology*, Vol 55, No. 4, pp 283-290.
2. Brown RR, 2005, Impediments to Integrated Urban Stormwater Management: The Need for Institutional Reform, *Environmental Management*, Vol 36, No. 3, pp 455-468.
3. DEC 2006 *Local planning for healthy waterways - using NSW Water Quality Objectives*, Department of Environment and Conservation. Available at: <http://www.environment.nsw.gov.au/resources/usingsnwwqos06167.pdf> accessed 16/11/07.
4. DEC 2006a *Stormwater Harvesting and Reuse*, Department of Environment and Conservation. Available at <http://www.environment.nsw.gov.au/resources/managestormwatera06137.pdf>.
5. DLG 1998, Environment and Health Protection Guidelines – On-site sewage management for single households, Department of Local Government.
6. DWE 2007, *Interim Guidelines for Management of Private Recycled Water Schemes*, Water for Life, NSW Government, Department of Water and Energy. Available at: www.waterforlife.nsw.gov.au/__data/assets/pdf_file/0005/9923/Management_of_Private_Recycled_Water_Schemes.pdf accessed 16/11/07.
7. Gaffield SJ, Goo R., Richards LA, Jackson RJ, 2003, Public Health Effects of Inadequately Managed Stormwater Runoff, *American Journal of Public Health*, Vol 93, No. 9; pp1527-1533.
8. Hrudey SE, Hrudey EJ, Pollard SJT, 2006, Risk Management for assuring safe drinking water, *Environment International*, Vol 32, pp948-957.

9. Hrudey SE, Payment P, Huck PM, Gillham RW, Hrudey EJ, 2003, A fatal waterborne disease outbreak epidemic in Walkerton, Ontario: comparison with other waterborne outbreaks in the developed world. *Water Science and Technology*, Vol 47, No. 3, pp7-14.
10. NSW Health 2007, *Private Water Supply Guidelines*, NSW Department of Health. Available at <http://www.health.nsw.gov.au/public-health/ehb/water/pdf/pwsgmay07.pdf> accessed 16/11/07.
11. NHMRC 2004, *Australian Drinking Water Guidelines*, National Health and Medical Research Council at- <http://www.nhmrc.gov.au/publications/synopses/eh19syn.htm> accessed 16/11/07.
12. NHMRC 2005 *Australian Drinking Water Guidelines – Community Water Planner – User Guidelines*, National Health and Medical Research Council, Available at: http://www.nhmrc.gov.au/publications/synopses/_files/awg0.pdf accessed 16/11/07.
13. NRMCC and EPHC, 2006, *National Recycled Water Guidelines- Phase 1*, National Research Management Ministerial Council and Environmental Protection and Heritage Council. Available at: http://www.ephc.gov.au/pdf/water/WaterRecyclingGuidelines-02_Nov06_.pdf accessed 16/11/07.
14. Rizak S, Cunliffe D, Sinclair M, Vulcano R, Howard J, Hrudey S, Callan P, 2003, Drinking water quality management: a holistic approach, *Water Science and Technology*, Vol 47, No. 9, pp31-36.
15. Schneider P, Davison A, Langdon A, Freeman G, Essery C, Beatty R, Toop P, 2003, Integrated water cycle planning for towns in New South Wales, Australia, *Water Science and Technology*, Vol 47, No 7-8: pp 87-94.

Environment -Waste Management References

The references are those cited in the evidence summary. The other references in this list refer to a more detailed examination of the evidence.

1. Baker D, Greenland S, Mendlein J, Harmon P. A Health study of two communities near the Stringfellow waste disposal site. *Arch Environ Health* 43:325-334 (1988).
2. Barker DJ, Hales CN, Fall CHD, Osmond C, Phipps K, Clark PM 1993 Type 2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidemia (Syndrome X): relation to reduced fetal growth. *Diabetologia* 36:62–67.
3. Berry M, Bove F. Birth weight reduction associated with residence near a hazardous waste landfill. *Environ Health Perspect* 105:856-861 (1997).
4. Butt TE, Lockley E and Oduyemi KOK, 2007, Risk assessment of landfill disposal sites – State of the art, *Waste Management*, Vol 28, pp 952-964.
5. Cantor KP. Drinking water and cancer. [Review] [225 refs] *Cancer Causes & Control*. 8(3):292-308, 1997 May.
6. Croen LA, Shaw GM, Sanbonmatsu I, Selvin S, Buffler PA. Maternal residential proximity to hazardous waste sites and risk of selected congenital malformations. *Epidemiology* 8:347-354 (1997).
7. Deane M, Swan SH, Harris JA, Epstein DM, Neutra RRI. Adverse pregnancy outcomes in relation to water contamination, Santa Clara County, California, 1980-1981. *Am J Epidemiol* 129:894-904 (1989).
8. Deane M, Swan SH, Harris JA, Epstein DM, Neutra RR. Adverse pregnancy outcomes in relation to water consumption: a re-analysis of data from the original Santa Clara study, California, 1980-1981. *Epidemiology* 3:94-97 (1992).
9. Dearwent SM, Mumtaz MM, Godfrey G, Sinks T, Falk H. Health effects of hazardous waste. [Journal Article] *Annals of the New York Academy of Sciences*. 1076:439-48, 2006 Sep.
10. Dolk H, Vrijheid M, Armstrong B, Abramsky L, Bianchi F, Garne E, Nelen V, Robert E, Scott JES, Stone D, Tenconi R. Risk of congenital anomalies near hazardous-waste landfill sites in Europe: the EUROHAZCON study. *Lancet* 352:423-427 (1998).
11. Dolk H, Vrijheid M. The impact of environmental pollution. *British Medical Journal*, Volume 68, 25-45.
12. Elliott P, Briggs D, Morris S, de Hoogh C, Hurt C, Jensen TK, et al. 2001. Risk of adverse birth outcomes in populations living near landfill sites. *British Medical Journal* 323: 363-368.
13. Elliott P, Morris S, Briggs D, Hurt C, de Hoogh C, Maitland I, et al. 2001. *Birth outcomes and selected cancers in populations living near landfill sites*, report to the Department of Health, London, UK, Imperial College, Small Area Health Statistics Unit.

14. Environmental Agency. *A practical guide to environmental risk assessment for waste management facilities*. London: EA, 2000. (Guidance note 25.)
15. Forsén, T; Eriksson, J; Tuomilehto, J; et al "The Fetal and Childhood Growth of Persons Who Develop Type 2 Diabetes." It is in the 1 August 2000 issue of *Annals of Internal Medicine* (volume 133, pages 176-182)
16. Geolyse . Development Assessment Report. Blackmans Flat waste Management Facility. PO Box 1963, Orange, NSW . Tel 026321055. 2006
17. Geschwind SA, Stolwijk JAJ, Bracken M, Fitzgerald E, Stark A, Olsen C, Melius J. Risk of congenital malformations associated with proximity to hazardous waste sites. *Am J Epidemiol*135:1197-1207 (1992).
18. Gilbreath S. Kass PH. Adverse birth outcomes associated with open dumpsites in Alaska Native Villages. [Journal Article] *American Journal of Epidemiology*. 164(6):518-28, 2006 Sep 15.
19. Goldberg MS, Goulet L, Riberdy H, Bonvalot Y. Low birth weight and preterm births among infants born to women living near a municipal solid waste landfill site in Montreal, Quebec. *Environ Res* 69:37-50 (1995).
20. Goldman LR, Paigen B, Magnant MM, Highland JH. Low birthweight, prematurity and birth defects in children living near the hazardous waste site, Love Canal. *Hazard Waste Hazard Mater* 1985; 2: 209–23..
21. Heller L. Antunes Catapreta C.A. Solid waste disposal in urban areas and health - Belo Horizonte, Brazil. *Waste Management and Research*. 21(6)(pp 549-556), 2003. Date of Publication: Dec 2003.
22. Hu H. Shine J. Wright RO. The challenge posed to children's health by mixtures of toxic waste: the Tar Creek superfund site as a case-study. [Review] [130 refs] Research Support, N.I.H., Extramural. Research Support, U.S. Gov't, Non-P.H.S.. Review] *Pediatric Clinics of North America*. 54(1):155-75, x, 2007 Feb.
23. Johnson BL. A review of health-based comparative risk assessments in the United States. [Review] [13 refs] [Comparative Study. Journal Article. Review] *Reviews on Environmental Health*. 15(3):273-87, 2000 Jul-Sep.
24. Kharrazi M, VonBehren J, Smith M, Lomas T, Armstrong M, Broadwin R, Blake E, McLaughlin B, Worstell G, Goldman L. A community-based study of adverse pregnancy outcomes near a large hazardous waste landfill in California. *Toxicol Ind Health* 13:299-310 (1997).
25. Knox E. Childhood cancers, birthplaces, incinerators and landfill sites. [Journal Article. Research Support, Non-U.S. Gov't] *International Journal of Epidemiology*. 29(3):391-7, 2000 Jun.
26. Kuehn CM, Mueller BA, Checkoway H, Williams M Risk of malformations associated with residential proximity to hazardous waste sites in Washington State. *Environ Res*. 2007 Mar;103(3):405-12. Epub 2006 Oct 13
27. Lackland et al Low Birth Weights Contribute to the High Rates of Early-Onset Chronic Renal Failure in the Southeastern United States. *Arch Intern Med*. 2000;160:1472-1476.
28. Lu, JCS | Morrison, RD | Stearns, RJ. 1981, EPA Report EPA-600/9-81-002a, March, 1981, *In: Land Disposal: Municipal Solid Waste, Proceedings of the Seventh Annual Research Symposium*, March 16-18, 1981, Philadelphia, Pennsylvania. Shultz, D. W., Ed, , p 1-17. 10 Fig, 6 Tab, 23 Abstract available from: <http://md1.csa.com/partners/viewrecord>
29. Linzalone N, Bianchi F [Studying risks of waste landfill sites on human health: updates and perspectives] *Epidemiol Prev*. 2005 Jan-Feb;29(1):51-3
30. Marshall EG, Gensburg IJ, Deres DA, Geary NS, Cayo MR. Maternal residential exposure to hazardous wastes and risk of central nervous system and musculoskeletal birth defects. *Arch Environ Health* 52:416-425(1997).
31. Mohan R. Spiby J. Leonardi G.S. Robins A. Jefferis S. Sustainable waste management in the UK, the public health role. *Public Health*. 120(10)(pp 908-914), 2006.
32. Morris SE, Thomson AO, Jarup L, de Hoogh C, Briggs DJ, Elliott P. No excess risk of adverse birth outcomes in populations living near special waste landfill sites in Scotland. *Scott Med J*. 2003 Nov;48(4):105-7
33. Netwaste. Eastern subregional waste management plan, 2004. http://www.netwaste.org.au/pdfs/SRP_Eastern.pdf
34. NSW Environment Protection Authority (1996), *Environmental Guidelines: Solid Waste Landfill*.

35. O'Leary P and Walsh P n.d..*Landfill closure and long-term care* - The last of a 10-part correspondence course prepared by the Department of Engineering Professional Development, University of Wisconsin-Madison, in cooperation with Waste Age, *In the 1991-92 Solid Waste Landfills Independent Study Course*, University of Wisconsin-Madison. Accessed 18/04/08 available from <http://www.bvsde.ops-oms.org/muwwww/fulltext/repind49/lesson10/lesson10.html>
36. Orr M. Bove F. Kaye W. Stone M. Elevated birth defects in racial or ethnic minority children of women living near hazardous waste sites. *International Journal of Hygiene and Environmental Health*. 205(1-2)(pp 19-27), 2002.
37. Paigen B, Goldman LR, Magmant MM, Highland JH, Steegman AT. Growth of children living near the hazardous waste site, Love Canal. *Hum Biol* 59:489-508 (1987).
38. Palmer,1 SR; Dunstan,FDJ; Fielder,H et a'. 3Risk of Congenital Anomalies after the Opening of Landfill Sites *Environ Health Perspect*. 2005 October; 113(10): 1362–1365.
39. Perez, HR; Frank, AL; Zimmerman NJ.- Health Effects Associated With Organic Dust Exposure During the Handling ofMunicipal Solid Waste H Indoor and Built Environment, 2006 - ibe.sagepub.com.
40. Redfearn A, Roberts D. Health effects and landfill sites. *Issues on Environmental Science and Technology*. 2002, 18: 103-140.
41. Rich-Edwards, Colditz, Stampfer, Willett et al.. Birthweight and the Risk for Type 2 Diabetes Mellitus in Adult Women. *Ann Intern Med*. 1999;130:278-284.
42. Richter ED. Chlamtac N. Berman T. Laster R. A review of environmental and occupational exposure to asbestos in Israel. [Review] [58 refs] [Journal Article. Review] *Public Health Reviews*. 29(2-4):247-64, 2001.
43. Rushton L. Health hazards and waste management. [Review] [48 refs] *British Medical Bulletin*. 68:183-97, 2003.
44. Shaw GM, Schulman J, Frisch JD, Cummins SK, Harris JA. Congenital malformations and birthweight in areas with potential environmental contamination. *Arch Environ Health* 47:147-154 (1992).
45. Swan SH, Shaw G, Harris JA, Neutra RR. Congenital cardiac anomalies in relation to water contamination, Santa Clara County, California, 1981-1983. *Am J Epidemiol* 129:885-893 (1989).
46. Smith MT. Lea CS. Buffler PA. Human population changes caused by hazardous waste. [Review] [28 refs] [Journal Article. Research Support, U.S. Gov't, P.H.S.. Review] *Central European Journal of Public Health*. 3(2):77-9, 1995 May.
47. Sosniak WA, Kaye WE, Gomez TM. Data linkage to explore the risk of low birthweight associated with maternal proximity to hazardous waste sites from the National Priorities List. *Arch Environ Health* 49:251-255 (1994).
48. Sosniak WA, Kaye WE, Gomez TM. Data linkage to explore the risk of low birthweight associated with maternal proximity to hazardous waste sites from the National Priorities list. *Arch Environ Health* 1994; 49: 251–5.
49. Stirling DA. Land use history and public health.[comment]. [Comment. Letter] *American Journal of Public Health*. 91(12):1917, 2001 Dec
50. Vianna NJ, Polan AK. Incidence of low birthweight among Love Canal residents. *Science*1984; 226: 1217–9. Impact of environmental pollution on health: balancing risk196 *British Medical Bulletin* 2003;68
51. Vrijheid M. Health effects of residence near hazardous waste landfill sites: a review of epidemiologic literature. *Environ Health Perspect* 2000; 108: 101–12.
52. Vrijheid M., Dolk H., Armstrong B., Boschi G., Busby A., Jorgensen T., Pointer P. Hazard potential ranking of hazardous waste landfill sites and risk of congenital anomalies. *Occupational and Environmental Medicine*. 59(11)(pp 768-776), 2002.
53. Welsh DE. Asbestos exposure during an abatement project. [Journal Article] *Journal of Occupational & Environmental Hygiene*. 4(2):D7-9, 2007 Feb.
54. Wigle DT, 2003. *Child Health and the environment*: Oxford university Press.
55. Wigle DT. Arbuckle TE. Walker M. Wade MG. Liu S. Krewski D. Environmental hazards: evidence for effects on child health. [Review] [359 refs] [Journal Article. Review] *Journal of Toxicology & Environmental Health Part B: Critical Reviews*. 10(1-2):3-39, 2007 Jan-Mar.
56. Wilson J. *Environment and birth defects*. New York: Academic Press, 1973.
57. World Health Organization. *Population Health and waste management: scientific data and policy options*. WHO regional office, Denmark, 2007.

58. Wrensch M, Swan SH, Lipscomb J, Epstein DM, Neutra RR, Fenster L. Spontaneous abortions and birth defects related to tap and bottled water use, San Jose, California, 1980-1985. *Epidemiology* 3:98-103 (1992).